



*State of Georgia
Department of Transportation
District 3*

NHS-0000-00(764, 8458, 765, 803, 804, and 805)

I-75 INTERCHANGE IMPROVEMENTS

P. I. Nos. 0000764, 0008458, 0000764, 0000803, 0000804, and 0000805
Cook, Crisp, Tift and Turner Counties, Georgia

Value Engineering Report
Preliminary Design Stage
March 2007

Design Team
American Engineers, Inc.
Greenhorne & O'Mara
Gresham, Smith and Partners
PARSONS
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Value Engineering Consultant



Lewis & Zimmerman Associates, Inc.



Lewis & Zimmerman Associates, Inc.

Taking the Chance out of Change

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April 11, 2007

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

re: Project Numbers NHS-0000-00(764, 8458, 765, 803, 804, 805), P. I. No. 0000764, 0000765, 0008458, 0000803, 0000804, 0000805, I-75 Interchange Improvements, Cook, Crisp, Tift and Turner Counties, Georgia
Value Engineering Study Report

Dear Ms. Myers:

Lewis & Zimmerman Associates, Inc. is pleased to submit four hard copies and one CD ROM of the referenced report.

Areas of concerns included: (1) the acceptance by the Department to accede to lengthening all the bridges and overpasses along this corridor to accommodate a potential fourth lane on I-75 with no certainty of its occurrence – especially beyond the year 2050, and (2) the blanket replacement of all overpasses.

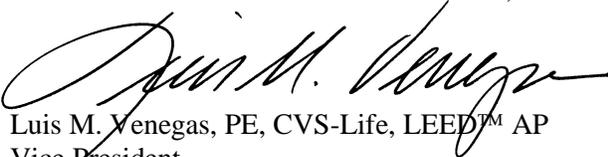
The objective of the value engineering study was to identify opportunities that would accommodate future capacity, i.e., the third lane on I-75, improving safety through better geometry and accessibility and, where logically possible and warranted, reducing capital cost.

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

We look forward to working with you on future assignments and stand ready to provide additional value engineering services.

Sincerely,

LEWIS & ZIMMERMAN ASSOCIATES, INC.



Luis M. Venegas, PE, CVS-Life, LEED™ AP
Vice President

Attachment

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EXECUTIVE SUMMARY

INTRODUCTION

This value engineering (VE) study report summarizes the events of the VE study conducted by Lewis & Zimmerman Associates, Inc. (LZA) for the State of Georgia Department of Transportation (GDOT), Atlanta, Georgia. The subjects of the study were the following projects: NHS-0000-00(764, 8458, 765, 803, 804, and 805), P. I. No. 0000764, 0000765, 0008458, 0000803, 0000804, and 0000805, collectively entitled: I-75 Interchange Improvements in Cook, Crisp, Tift and Turner Counties, Georgia. The design teams are: Gresham Smith and Partners (764 and 8458), American Engineers, Inc. (765), Parsons (803), URS Corporation (804), and Greenhorne & O'Mara (805).

PROJECT DESCRIPTION

These projects are five of eight programmed projects to widen U. S. Interstate Highway 75 (I-75) from four to six lanes from State Route (SR) 133 in Valdosta to the Crisp/Dooly County line north of Cordele. The southern terminus is just north of SR 37 near Adel, Georgia in Cook County, and the northern terminus is just south of SR 300 near Cordele, Georgia south of the Crisp County line.

These projects are being undertaken to reconstruct, widen, and improve their respective I-75 interchanges and associated overpasses to accommodate the current on-going widening of I-75 from four to six lanes and to facilitate the addition of the potential fourth lane on I-75.

The probable cost of construction for these projects is based on the six cost estimates provided by the design teams. The total cost of \$250,217,561 is broken down as follows:

- Project 764 • \$ 35,557,033
- Project 765 • \$18,719,767
- Project 803 • \$43,559,314
- Project 804 • \$77,212,399
- Project 805 • \$51,782,481
- Project 8458 • \$23,386,657

GDOT provided an inflation rate of 8.00% per annum based on recent historical data.

CONCERNS AND OBJECTIVES

Although the projects are straightforward in their designs regarding the reconstruction of the interchanges, widening and lengthening of overpasses, and all associated work necessary to carry out the intended improvements including right-of-way takes, the VE team found opportunities for functional evaluation in: (1) potentially unnecessary work associated with lengthening and widening the bridges and interchanges to accommodate the potential future fourth lane which may not materialize, (2) right-of-way takes, (3) maintaining status quo of ramp separation distances without jeopardizing safety, and (4) alternative methods of construction.

The objectives of the VE study were to identify opportunities that would fulfill the basic function of accommodating future capacity (of the on-going third lane addition to the mainline) by improving accessibility and geometry thereby improving safety and, where warranted, reducing capital cost.

HIGHLIGHTS OF THE STUDY

Highlighted below are some of the ideas developed during the VE workshop.

The rural I-75 corridor is currently being widened to three lanes in each direction on the mainline. The potential for the fourth lane is in long-term planning but may never occur. As such, expenditure of funds today to accommodate an unknown and perhaps unneeded future requirement is not warranted. Therefore, five alternatives, Alt. Nos. 805-2, 805-8, 805-14, 805-22, and 805-31, would shorten the overpass bridges to accommodate the third lane widening only at Alberson, Wardlow, Musselwhite, Bedgood, and Old Hatley Roads. Accumulatively, these five alternatives show an initial savings of nearly \$480,000.

In a similar manner and using the same rationale, Alt. Nos. 805-1, 805-7, 805-13, 805-30, 803-7, 804-16, and 804-17 would forgo any improvements to the following overpasses or interchanges: Alberson, Wardlow, Musselwhite, Old Hatley, and Wesley Rigdon Roads overpasses and Bussey Road and East Washington Avenue interchanges. These alternatives collectively indicate an initial cost savings of about \$20,000,000.

Reducing the bridge widths to match the Department's bridge policy manual would render an initial savings approaching \$1,290,000, as noted in Alt. No. 805-29A for Hawpond Road, No. 805-31 for Old Hatley Road, No. 805-33 for Rockhouse Road, No. 804-7 for SR 32 (Jefferson Davis Highway) bridge over Hat Creek, No. 803-24 for Willis Still Road, No. 765-4 for Omega-Eldorado interchange, No. 764-6 for Barneyville Road, No. 764-10 for Rountree Road, and No. 8458-3 for Kinard Bridge Road.

A commonly employed design to eliminate bridge end spans is to use mechanically stabilized embankment walls. This has been indicated on the following 16 alternatives collectively, delineating an initial savings of close to \$4,065,000. These are Alt. No. 805-5 at Alberson Road, No. 805-11 at Wardlow Road, No. 805-17 at Musselwhite Road, No. 805-25 at Bedgood Road, No. 805-28A at Hawpond Road, No. 805-33 Old Hatley Road, No. 805-39 at Rockhouse Road, No. 804-2 Inaha Road, No. 804-8 at Jefferson Davis Highway, No. 803-9 at Wesley Rigdon Road, No. 803-16 Chula Brookfield Road, No. 803-18 at Willis Still Road, No. 765-3 at Omega - Eldorado Road, No. 764-3 at Barneyville Road, No. 764-9 at Rountree Bridge Road, and No. 8548-2 at Kinard Bridge Road.

Due to interchange reconstructions, several side streets have been re-designed for improved accessibility to the crossing roadways. Although normally considered to be the rule-of-thumb solution, this may not be the most prudent solution when alternative routings are available for accessibility, albeit in some cases the rerouting would exceed one mile. Nevertheless, this potential was explored by providing cul-de-sacs at four locations: Ewing Farm Road at North Street (No. 804-22), Carrington Drexler Road (803-3), Academy Drive (803-17), and CR 114 in the northeast quadrant of the Willis Still Road interchange (803-22). Initial savings were calculated at \$3,043,000.

Acknowledging that elimination of any of the existing overpasses would require additional travel for the users and emergency vehicles, their elimination does not violate any standards or criteria. This being the

case, and noting the very low volume of traffic of the following two overpasses, Alt. Nos. 805-3 eliminates the Alberson Road overpass and saves about \$1,200,000, Alt. No. 803-10 would eliminate the Wesley Rigdon overpass at a savings of nearly \$2,780,000.

Changing the configuration or relocating some of the new/reconfigured ramps of three interchanges could result not only in initial cost savings but improved geometry, safety and accessibility. This is narrated on the following alternatives: No. 805-38 that would relocate the Rockhouse Road northbound loop off ramp to the northeast quadrant of the interchange and reduce the project cost by close to \$700,000; No. 803-13 expands the Chula Brookfield Road interchange to the east of I-75 only and obtains savings of about \$2,300,000; and No. 764-8 compresses the diamond at the Rountree Road interchange resulting in savings of nearly \$1,500,000.

Finally, eliminating the Floyd Road realignment at Rockhouse Road could realize initial savings exceeding \$1,700,000.

The Summary of Potential Cost Savings worksheet following this narrative outlines all of the alternatives and design suggestions developed by the VE team. Some of the alternatives are mutually exclusive or interrelated so that 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 on the Creative Idea Listing worksheets in the Section 4 of this report.

SUMMARY OF POTENTIAL COST SAVINGS



PROJECT: NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805 I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, Georgia Department of Transportation, District 4 Preliminary Design Stage						
PRESENT WORTH OF COST SAVINGS						
ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
	I-75 INTERCHANGE IMPROVEMENTS FROM SR 159 TO SR 300 (805xx)					
805-1	Leave the Alberson Road overpass as is	\$1,372,985	\$0	\$1,372,985		\$1,372,985
805-2	Shorten bridge to accommodate only three lanes in each direction on I-75 at Alberson Road	\$96,137	\$0	\$96,137		\$96,137
805-3	Eliminate the Alberson Road overpass	\$1,373,060	\$171,418	\$1,201,642		\$1,201,642
805-5	Use mechanically stabilized embankment walls to eliminate bridge end spans at Alberson Road	\$392,069	\$282,429	\$109,640		\$109,640
805-7	Leave the Wardlow Road overpass as is	\$1,360,182	\$0	\$1,360,182		\$1,360,182
805-8	Shorten bridge to accommodate only three lanes in each direction on I-75 at Wardlow Road	\$90,251	\$0	\$90,251		\$90,251
805-11	Use mechanically stabilized embankment walls to eliminate bridge end spans at Wardlow Road	\$259,309	\$222,220	\$37,089		\$37,089
805-13	Leave the Musselwhite Road overpass as is	\$1,769,997	\$0	\$1,769,997		\$1,769,997
805-14	Shorten bridge to accommodate only three lanes in each direction on I-75 at Musselwhite Road	\$114,994	\$0	\$114,994		\$114,994
805-17	Use mechanically stabilized embankment walls to eliminate bridge end spans at Musselwhite Road	\$351,195	\$337,695	\$13,500		\$13,500
805-19	Reduce alignment of Arms Road at the Musselwhite Road Interchange	\$292,018	\$140,026	\$151,992		\$151,992
805-22	Shorten bridge to accommodate only three lanes in each direction on I-75 at Bedgood Road	\$83,929	\$0	\$83,929		\$83,929
805-25	Use mechanically stabilized embankment walls to eliminate bridge end spans at Bedgood Road	\$258,655	\$317,668	(\$59,013)		(\$59,013)
805-26	Do not relocate Rock Road	\$96,975	\$0	\$96,975		\$96,975
805-28A	Use mechanically stabilized embankment walls to eliminate bridge end spans at Hawpond Road	\$773,021	\$796,641	(\$23,620)		(\$23,620)

Note: Italicized alternatives could not be developed due to the lack of time; however, they should be further explored by the Department and the respective design teams.

SUMMARY OF POTENTIAL COST SAVINGS



PROJECT: NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805 I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, Georgia Department of Transportation, District 4 Preliminary Design Stage						
PRESENT WORTH OF COST SAVINGS						
ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
I-75 INTERCHANGE IMPROVEMENTS FROM SR 300 TO SR 159 (805xx) (Continued)						
805-29A	Reduce bridge width at Hawpond Road to match bridge policy manual	\$2,904,278	\$2,713,312	\$190,966		\$190,966
805-30	Leave the Old Hatley Road overpass as is	\$1,306,817	\$0	\$1,306,817		\$1,306,817
805-31	Shorten bridge to accommodate only three lanes in each direction on I-75 at Old Hatley Road	\$98,862	\$0	\$98,862		\$98,862
805-33	Use mechanically stabilized embankment walls to eliminate bridge end spans at Old Hatley Road	\$323,291	\$252,774	\$70,517		\$70,517
805-35	Reduce bridge width at Rockhouse Road to match bridge policy manual	\$3,011,206	\$2,879,209	\$131,997		\$131,997
805-36	Eliminate the Floyd Road realignment at Rockhouse Road	\$1,098,844	\$19,283	\$1,079,561		\$1,079,561
805-38	Relocate the Rockhouse Road northbound loop off ramp to the northeast quadrant of the interchange	\$1,863,634	\$1,147,549	\$716,085		\$716,085
805-39	Use mechanically stabilized embankment walls to eliminate bridge end spans at Rockhouse Road	\$774,656	\$428,906	\$345,750		\$345,750
805-21	<i>Leave the Bedgood Road overpass as is</i>			\$0		\$0
805-27	<i>Compress the diamond at Hawpond Road</i>			\$0		\$0
805-29	<i>At Hawpond Road eliminate Olivia Drive improvements</i>			\$0		\$0
I-75 INTERCHANGE IMPROVEMENTS FROM TIFT COUNTY LINE TO SR 159 (804xx)						
804-2	Use mechanically stabilized embankment walls to eliminate bridge end spans at Inaha Road	\$520,663	\$366,483	\$154,180		\$154,180
804-3	Do not relocate Sumner Road	\$248,200	\$0	\$248,200		\$248,200
804-7	Reduce bridge width at SR 32 (Jefferson Davis Highway) over Hat Creek to match Bridge Policy Manual	\$2,034,761	\$1,946,218	\$88,543		\$88,543

Note: Italicized alternatives could not be developed due to the lack of time; however, they should be further explored by the Department and the respective design teams.

SUMMARY OF POTENTIAL COST SAVINGS



PROJECT: NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805 I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, Georgia Department of Transportation, District 4 <i>Preliminary Design Stage</i>						
PRESENT WORTH OF COST SAVINGS						
ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
	I-75 INTERCHANGE IMPROVEMENTS FROM TIFT COUNTY LINE TO SR 159 (804xx) (Continued)					
804-8	Use mechanically stabilized embankment walls to eliminate bridge end spans at Jefferson Davis Highway	\$1,329,406	\$758,570	\$570,836		\$570,836
804-16	Leave the Bussey Road Interchange as is	\$4,862,105	\$0	\$4,862,105		\$4,862,105
804-17	Leave the East Washington Avenue Interchange as is	\$6,084,698	\$0	\$6,084,698		\$6,084,698
804-22	Cul-de-sac Ewing Farm Road at North Street	\$594,652	\$3,821	\$590,831		\$590,831
<i>804-1</i>	<i>Compress the diamond at Inaha Road</i>			\$0		\$0
<i>804-5</i>	<i>Realign Goose Creek Road to avoid the pond</i>					
			<i>D E S I G N</i>		<i>S U G G E S T I O N</i>	
<i>804-6</i>	<i>Realign Goose Creek Road closer to SB on ramp</i>			\$0		\$0
<i>804-11</i>	<i>Compress the diamond at Jefferson David Highway</i>			\$0		\$0
<i>804-13</i>	<i>Eliminate the access drive at Jefferson David Highway</i>			\$0		\$0
<i>804-14A</i>	<i>Eliminate the bicycle shoulders</i>			\$0		\$0
<i>804-15</i>	<i>Compress the diamond at the Bussey Road Interchange</i>			\$0		\$0
<i>804-18</i>	<i>Compress the diamond on the east side at Washington Avenue</i>			\$0		\$0
<i>804-19</i>	<i>Reduce the relocation of Peacock Road</i>			\$0		\$0
<i>804-21</i>	<i>At North Street, shorten Ewing Farm Road realignment</i>			\$0		\$0
<i>804-24</i>	<i>Do not take the properties within the new loop ramp (Ramp R)</i>			\$0		\$0
<i>804-25</i>	<i>Use mechanically stabilized embankment walls to eliminate the end spans - North Street</i>			\$0		\$0

Note: Italicized alternatives could not be developed due to the lack of time; however, they should be further explored by the Department and the respective design teams.

SUMMARY OF POTENTIAL COST SAVINGS



PROJECT: NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805 I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, Georgia Department of Transportation, District 4 Preliminary Design Stage						
PRESENT WORTH OF COST SAVINGS						
ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
	I-75 INTERCHANGE IMPROVEMENTS FROM NORTH OF TIFTON CITY LIMITS TO TURNER COUNTY LINE (803xx)					
803-3	Cul-de-sac Carrington Drexler Road	\$936,193	\$31,464	\$904,729		\$904,729
803-7	Leave the Wesley Rigdon Road overpass as is	\$3,247,020	\$0	\$3,247,020		\$3,247,020
803-9	Use mechanically stabilized embankment walls to eliminate bridge end spans at Wesley Rigdon Road	\$495,245	\$190,734	\$304,511		\$304,511
803-10	Eliminate the Wesley Rigdon Road overpass	\$3,019,635	\$235,510	\$2,784,125		\$2,784,125
803-13	Expand the Chula Brookfield Road Interchange to the east side of I-75 only	\$2,302,762	\$0	\$2,302,762		\$2,302,762
803-15	Shorten the limits of construction of Chula Brookfield Road	\$343,549	\$105,684	\$237,865		\$237,865
803-16	Use mechanically stabilized embankment walls to eliminate bridge end spans at Chula Brookfield Road	\$897,034	\$333,904	\$563,130		\$563,130
803-17	Cul-de-sac Academy Drive	\$522,814	\$31,464	\$491,350		\$491,350
803-18	Use mechanically stabilized embankment walls to eliminate bridge end spans at Willis Still Road	\$1,070,574	\$355,436	\$715,138		\$715,138
803-21	Remove CR 114 south of Willis Still Road at the Willis Still Road/I-75 Interchange	\$649,242	\$168,444	\$480,798		\$480,798
803-22	Cul-de-sac CR 114 in the northeast quadrant of the Willis Still Road/I-75 Interchange	\$1,063,600	\$7,857	\$1,055,743		\$1,055,743
803-24	Reduce bridge width at Willis Still Road to match Bridge Policy Manual	\$3,132,046	\$3,022,629	\$109,417		\$109,417
<i>803-1</i>	<i>Eliminate the noise walls at the Brighton Road Interchange</i>		<i>D E S I G N S U G G E S T I O N</i>			
<i>803-2</i>	<i>Compress the diamond on the east side of the Brighton Road Interchange</i>			\$0		\$0
<i>803-5</i>	<i>Use reinforced slopes to minimize the use of mechanically stabilized embankment walls on Brighton Road</i>		<i>D E S I G N S U G G E S T I O N</i>			
<i>803-6</i>	<i>Eliminate the loop ramps on the southwest quadrant of the Brighton Road Interchange and extend to the east</i>			\$0		\$0

Note: *Italicized alternatives could not be developed due to the lack of time; however, they should be further explored by the Department and the respective design teams.*

SUMMARY OF POTENTIAL COST SAVINGS



PROJECT: NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805						
I-75 INTERCHANGE IMPROVEMENTS						
Cook, Crisp, Tift, and Turner Counties, Georgia Department of Transportation, District 4						
<i>Preliminary Design Stage</i>						
PRESENT WORTH OF COST SAVINGS						
ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
	I-75/SR 401/CR 251 – ROUNTREE BRIDGE ROAD (EXIT 41) CR 253 – BARNEYVILLE ROAD (EXIST 45) INTERCHANGE RECONSTRUCTION (764xx) (Continued)					
764-8	Compress diamond at the Rountree Bridge Road Interchange	\$2,386,997	\$855,281	\$1,531,716		\$1,531,716
764-9	Use mechanically stabilized embankment walls to eliminate bridge end spans at Rountree Bridge Road	\$589,240	\$272,857	\$316,383		\$316,383
764-10	Reduce bridge width at Rountree Bridge Road to match Bridge Policy Manual	\$2,233,106	\$2,014,347	\$218,759		\$218,759
<i>764-1</i>	<i>Compress the diamond at the Barneyville Road Interchange</i>			\$0		\$0
<i>764-2</i>	<i>Minimize ramp doglegs at the Barneyville Road Interchange</i>			\$0		\$0
<i>764-4</i>	<i>Do not take the property where the telecommunication pole is currently located and allow access at the Barneyville Road Interchange</i>	<i>D E S I G N S U G G E S T I O N</i>				
<i>764-11</i>	<i>Reduce the approach/departure tangents on the ramps of the Rountree Bridge Interchange</i>			\$0		\$0
	I-75/SR 401/CR 246 – KINARD BRIDGE ROAD (EXIT 49) INTERCHANGE RECONSTRUCTION (8458xx)					
8458-2	Use mechanically stabilized embankment walls to eliminate bridge end spans at Kinard Bridge Road	\$848,737	\$467,675	\$381,062		\$381,062
8458-3	Reduce bridge width at Kinard Bridge Road to match Bridge Policy Manual	\$3,854,994	\$3,603,279	\$251,715		\$251,715
<i>8458-4</i>	<i>Relocate the Kinard Bridge Interchange</i>			\$0		\$0
<i>8458-5</i>	<i>Compress the Kinard Bridge Interchange</i>			\$0		\$0
<i>8458-7</i>	<i>Use a Single-Point Urban Interchange (SPUI)</i>			\$0		\$0

Note: Italicized alternatives could not be developed due to the lack of time; however, they should be further explored by the Department and the respective design teams.

STUDY RESULTS

INTRODUCTION

The results are the major feature of a value engineering study since they represent the benefits that can be realized on the project by the owner, users and designers. The results will directly affect the project design and will require coordination among the designers, the user and the owner to determine the ultimate acceptance of each alternative.

The creative ideas are organized according to the order in which they were originally generated by the VE team during their function analysis and creative sessions.

RESULTS OF THE STUDY

The VE team generated 116 ideas for change during the Function Analysis and Speculation phases of the VE Job Plan. The evaluation of these ideas was based upon 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.

Of the 116 ideas generated, 84 were sufficiently rated to warrant further investigation. Continued research and development of these ideas yielded 52 alternatives for change with an impact on project costs and one design suggestion. An additional 30 alternatives were not developed due to the lack of time. These should be further explored by the Department and the design teams to determine if they can be incorporated into their respective projects.

The developed alternatives and design suggestion are presented in detail following this narrative and on the Summary of Potential Cost Savings worksheets. The undeveloped alternatives are listed in italics on the Summary of Potential Cost Savings worksheets for easy identification.

EVALUATION OF ALTERNATIVES

It is important to consider each part of an individual alternative on its own merit. There may be a tendency to disregard an alternative because of concern about one portion of it. Separate consideration should be given to each of the areas within an alternative that are acceptable and those parts should be considered in the final design, even if the entire alternative is not implemented.

Cost is the primary basis of comparison for alternative designs. To ensure that costs are comparable within the alternatives proposed by the VE team, the designer's cost estimates, where possible, were used as the pricing basis. Where appropriate, the impact of energy costs, replacement costs, and effect on operations and maintenance are shown within each alternative.

Some of the alternatives are interrelated, so acceptance of one may preclude the acceptance of another. The reader should evaluate those alternatives carefully to select the ideas with the greatest beneficial impact to the project.

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, Georgia DOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **805-1**

DESCRIPTION: **LEAVE THE ALBERSON ROAD OVERPASS AS IS** SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The current design calls for the removal of the existing Alberson Road overpass bridge and replacing it with a longer bridge to accommodate future I-75 widening to four lanes in each direction. The design also removes and replaces 12 feet of outside shoulder on I-75 for the future widening of I-75.

ALTERNATIVE:

Leave the Alberson Road overpass as is.

ADVANTAGES:

- Cost savings up front
- Eliminates potentially unneeded future work
- Reduces construction time
- Precludes expenditure of capital costs needed elsewhere

DISADVANTAGES:

- Increases future cost to accommodate an additional fourth lane on I-75
- Substandard horizontal clearance on I-75

DISCUSSION:

This is a rural widening of I-75 with a low average daily traffic count. The addition of the fourth lane to I-75 is a long-range project and may never be constructed. As such, expenditure of this capital should be avoided or used elsewhere in the State for needed improvements.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,372,985	•	\$ 1,372,985
ALTERNATIVE	\$ 0	•	\$ 0
SAVINGS	\$ 1,372,985	•	\$ 1,372,985

CALCULATIONS



PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, ALTERNATIVE NO.:
 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
 Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
 Preliminary Design Stage

805-1

SHEET NO.: 2 of 3

• MISC.: FLOOR OFFICE / R/W MARKERS / FENCE $\Rightarrow \$316,800 \div 7 \text{ PROJECTS} = \underline{\$45,257}$

• CONCRETE: SLOPE PAVING @ 45 \$/SY $\times \left[(50' \times (\frac{64'+90'}{2})) + (57' \times (\frac{67'+90'}{2})) \right] \frac{1}{4}$
 $= \underline{\$56,495}$
 APPROACH SLAB @ 130 \$/SY $\times [30' \times 35' \times 2] \frac{1}{4} = \underline{\$30,333}$

ROADWAY: $L = (5900 - 5163) + (7830 - 4950) = 617'$
 2-LANE 805 TYP. SECTION COST = 81.16 \$/LF $\Rightarrow \underline{\$50,075}$
 (26.09 \$/SY)

GUARDRAIL: TP-W @ 15.23 \$/LF $\times (230' + 250') \div 2 = \underline{\$14,620}$
 TP 12 ANCH @ 16.75 $\times 4 = \underline{\$6,699}$
 $\underline{\$21,320}$

DRAINAGE: TP 1 SPILLWAY @ \$2,300 $\times 4 = \underline{\$9,200}$

EMBANKMENT: WEST END $\Rightarrow \frac{0 + [(6' \times 28') + (7' \times 45') + (4' \times 35')]}{2} (48+00 - 45+50) \frac{1}{27}$

$= \underline{2,366 \text{ CY}}$

EAST END $\Rightarrow \frac{0 + [(5' \times 60') + (5' \times 50')]}{2} (54+00 - 52+00) \frac{1}{27}$

$= \underline{2,037 \text{ CY}}$

$\underline{\underline{4,403 \text{ CY}}}$

R/W: WEST END $\Rightarrow [(35' \times 150') \frac{1}{2} + (35' \times 350')] \div 43,560$

$= \underline{\underline{0.34 \text{ AC}}}$

I-75 SHOULDER:

REMOVAL $\Rightarrow \text{CY} \Rightarrow [1.2' \times 12' \times (550' + 550')] \frac{1}{27} = \underline{587 \text{ CY}}$

PAVEMENT $\Rightarrow 12' \times 1100' \times \frac{1}{4} = \underline{1,467 \text{ SY}}$

VALUE ENGINEERING ALTERNATIVE



PROJECT:	NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 <i>Preliminary Design Stage</i>	ALTERNATIVE NO.:	805-2
DESCRIPTION:	SHORTEN THE BRIDGE TO ACCOMMODATE ONLY THREE LANES IN EACH DIRECTION ON I-75 AT ALBERSON ROAD	SHEET NO.:	1 of 3

ORIGINAL DESIGN:

The present design sets the bridge length to accommodate four lanes in each direction on I-75.

ALTERNATIVE:

Shorten the bridge to accommodate only three lanes in each direction.

ADVANTAGES:

- Reduces bridge construction cost
- Less bridge to maintain
- Lengthening may never be required
- Precludes potentially unnecessary work
- Simplifies construction
- Small reduction in construction time

DISADVANTAGES:

- If a fourth lane is constructed, the bridge would have to be replaced or have substandard horizontal clearance to columns on I-75
- More costly to replace in the future – if ever needed

DISCUSSION:

Since the construction of the fourth lane is in the long-range, there is the possibility that it will never be built. In order to reduce current construction costs, construct only enough bridge length to provide adequate clearance for three lanes in each direction.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 96,137	•	\$ 96,137
ALTERNATIVE	\$ 0	•	\$ 0
SAVINGS	\$ 96,137	•	\$ 96,137

CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS**
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
Preliminary Design Stage

ALTERNATIVE NO.: **805-2**

SHEET NO.: **2 of 3**

Skew angle = 58-14

Bridge width = 31.25'

Reduced bridge length = $2(12)/\sin \alpha = 28.23'$

Reduced bridge area = 882 ft²

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage**

ALTERNATIVE NO.: **805-3**

DESCRIPTION: **ELIMINATE THE ALBERSON ROAD OVERPASS**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The current design calls for the removal of the existing bridge and replacing it with a longer bridge to accommodate future I-75 widening to four lanes in each direction. The design also removes and replaces 12 feet of outside shoulder on I-75 for the future widening of I-75.

ALTERNATIVE:

Remove the bridge and cul-de-sac on Alberson Road.

ADVANTAGES:

- Initial cost savings
- May never be required
- Reduces construction time
- Precludes expenditure of capital costs needed elsewhere

DISADVANTAGES:

- Access to I-75 increased by two miles
- Increased future cost to accommodate an additional fourth lane on I-75, if ever it were to occur

DISCUSSION:

This is a rural overpass over I-75 with a low average daily traffic count and sufficiency rating. The addition of the fourth lane to I-75 is a long-range project and may never be constructed. As such, expenditure of this capital should be avoided or used elsewhere in the State for needed improvements.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,373,060	•	\$ 1,373,060
ALTERNATIVE	\$ 171,418	•	\$ 171,418
SAVINGS	\$ 1,201,642	•	\$ 1,201,642

CALCULATIONS



PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, ALTERNATIVE NO.:
0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4 805-3
Preliminary Design Stage

SHEET NO.: 2 of 3

$$\text{Circ-DE-SAC} \Rightarrow 40' R \Rightarrow \pi (40)^2 (1/4) = 558.554$$

$$\text{PUMENT} \Rightarrow 88.94 \text{ \$/LF} (1/28) \times 9 = 28.59 \text{ \$/SY}$$

$$\$15,967.6 \times 2 = \boxed{131,935}$$

$$\text{BARRIER} \Rightarrow 500 \times 2 = \boxed{1000}$$

$\boxed{\$32,935 \text{ TOTAL}}$

BRIDGE COST \Rightarrow (SEE 805-1)

$$\$1,128,856 - 108,609 \text{ BR. REMOVAL} = \boxed{\$1,020,252}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage**

ALTERNATIVE NO.: **805-5**

DESCRIPTION: **USE MECHANICALLY STABILIZED EMBANKMENT WALLS TO ELIMINATE THE BRIDGE END SPANS AT ALBERSON ROAD**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN:

The present design indicates the bridge at Alberson Road with 2:1 end slopes.

ALTERNATIVE:

Construct mechanically stabilized embankment walls (MSE) at Bents 2 and 4 to eliminate the end slopes.

ADVANTAGES:

- Reduces bridge construction cost
- Less bridge to maintain

DISADVANTAGES:

- Eliminates the end span
- Challenges a GDOT preference
- Eliminates potential future location for an additional lane

DISCUSSION:

Construction of MSE walls eliminates the construction of two end spans and two intermediate bents, thereby reducing the construction cost of the bridge. Also, there is less bridge area to maintain. The negative is that if additional space is needed for lanes in the future, the space provided by the end spans would not be available. However, this bridge is not at an interchange and is in a rural location so the likelihood of needing that additional space is low.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 392,069	•	\$ 392,069
ALTERNATIVE	\$ 282,429	•	\$ 282,429
SAVINGS	\$ 109,640	•	\$ 109,640

SKETCHES



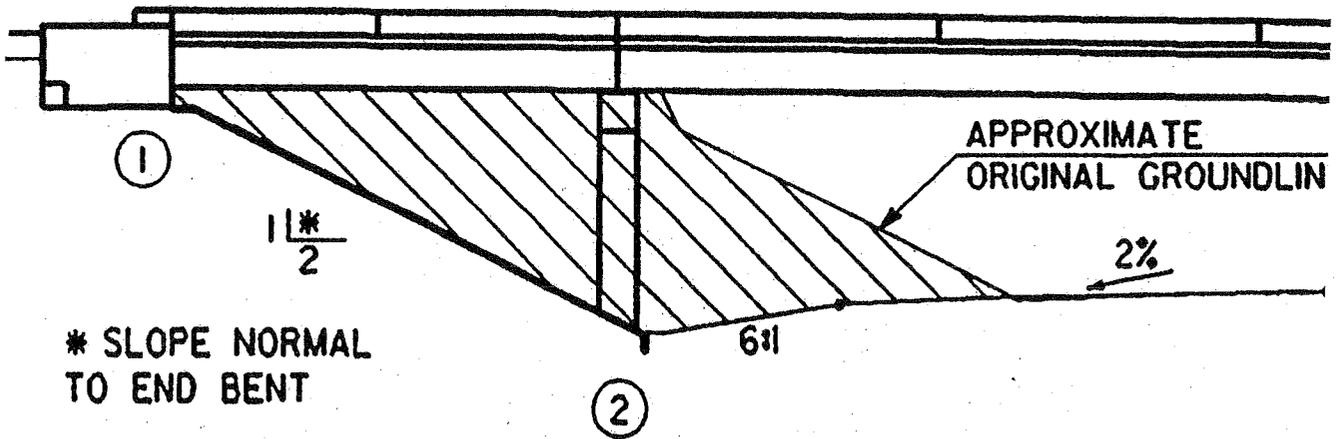
PROJECT: NHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765,
0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
Preliminary Design Stage

ALTERNATIVE NO.:

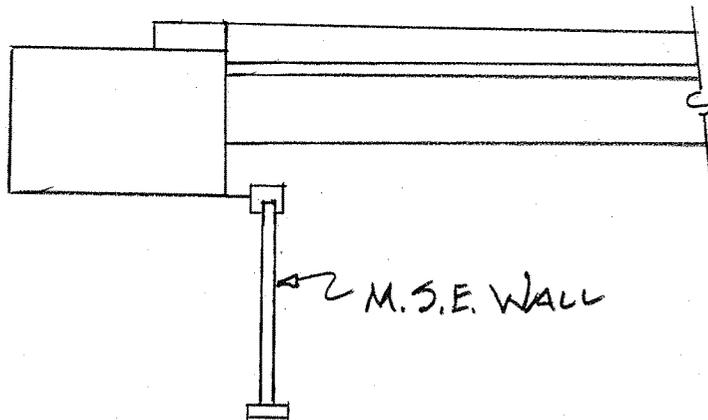
805-5

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS**
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
Preliminary Design Stage

ALTERNATIVE NO.: **805-5**

SHEET NO.: **3 of 4**

Skew angle = $\alpha = 58-14$

Bridge width (out-to-out) = 31.25

Span 1 length = 54

Span 4 length = 47

Bridge area = $W [(L_1 + L_4) - 2(6)/\sin \alpha] = 3597 \text{ ft}^2$

Assume wall height = 4' at end

Height under bridge = $H = 24$

Wall Area = $2[(W/\sin \alpha)H + .5(4 + H)[2(H - 4)/\sin \alpha](2)]$
 $= 4400 \text{ ft}^2$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage**

ALTERNATIVE NO.: **805-7**

DESCRIPTION: **LEAVE THE WARDLOW ROAD OVERPASS AS IS**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The current design calls for the removal of the existing Wardlow Road overpass bridge and replacing it with a longer bridge to accommodate future I-75 widening to four lanes in each direction. The design also removes and replaces 12 feet of outside shoulder on I-75 for the future widening of I-75.

ALTERNATIVE:

Leave the Wardlow Road overpass as is.

ADVANTAGES:

- Cost savings up front
- Eliminates potentially unneeded work
- May never be required
- Reduces construction time
- Precludes expenditure of capital costs needed elsewhere

DISADVANTAGES:

- Increases future cost to accommodate an additional fourth lane on I-75

DISCUSSION:

This is a rural widening of I-75 with a low average daily traffic count. The addition of the fourth lane to I-75 is a long-range project and may never be constructed; as such, expenditure of this capital should be avoided or used elsewhere in the State for needed improvements.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,360,182	•	\$ 1,360,182
ALTERNATIVE	\$ 0	•	\$ 0
SAVINGS	\$ 1,360,182	•	\$ 1,360,182

CALCULATIONS



PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
 Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
 Preliminary Design Stage

805-7

SHEET NO.: 2 of 3

MISC: FLD-OFFICE / R-W MARKERS / FENCING $\Rightarrow \$316,800 \div 7 \text{ PROJECTS} = \$45,257$

CONCRETE: SLOPE PAVING @ 45 \$/SY $\times [50' \times (\frac{4+40}{2}) + 57' (\frac{67+90}{2})] \times \frac{1}{4}$
 $= \$56,195$

APPROACH SLAB @ 130 \$/SY $[30' \times 35' \times 2] \times \frac{1}{4}$
 $= \$30,333$

ROADWAY: $L = (5700.0 - 5176.0) + (4826 - 4500) = 850'$

2-LANE 805 TYP. SECT COST = 81.16 \$/LF (2609 \$/SY)

GUARD RAIL: TP-W @ 15.23 \$/LF $\times (300 + 280) \times 2 = \$17,667$

TP-RANCH @ 6.75 $\times 4 = \$6699$

DRAINAGE: TP-1 SPILLWAY @ \$2,300 $\times 4 = \$9,200$

EMBANKMENT: WEST END $\Rightarrow \frac{0 + [(6' \times 50') + (5' \times 35')]}{2} \times 350' (\frac{1}{27})$
 $= 3,132 \text{ CY}$

EAST END $\Rightarrow \frac{0 + [(5' \times 35') + (5' \times 40')]}{2} \times 554' (\frac{1}{27})$
 $= 3,897 \text{ CY}$
6,929 CY

R/W:

WEST END $\Rightarrow \left(\frac{20' + 60'}{2}\right) 100' + \left(\frac{10' + 60'}{2}\right) 100' \div 43,560 = 0.17 \text{ AC}$

EAST END $\Rightarrow \left(\frac{25'}{2}\right) 100' + \left(\frac{25'}{2}\right) 100' \div 43,560 = 0.06 \text{ AC}$

0.23 AC

I-75 SHOULDER:

REMOVAL $\Rightarrow \text{CY} = [1.2' \times 12' \times (450')^2] \times \frac{1}{27} = 480 \text{ CY}$

PAVEMENT $\Rightarrow 12' \times 900' \times \frac{1}{4} = 1,200 \text{ SY}$

VALUE ENGINEERING ALTERNATIVE



PROJECT:	NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage	ALTERNATIVE NO.:	805-8
DESCRIPTION:	SHORTEN THE BRIDGE TO ACCOMMODATE ONLY THREE LANES IN EACH DIRECTION ON I-75 AT WARDLOW ROAD	SHEET NO.:	1 of 3

ORIGINAL DESIGN:

The present design sets the bridge length to accommodate four lanes in each direction on I-75.

ALTERNATIVE:

Shorten the bridge to accommodate only three lanes in each direction.

ADVANTAGES:

- Reduces bridge construction cost
- Less bridge to maintain
- Lengthening may never be required
- Precludes potentially unnecessary work
- Simplifies construction
- Small reduction in construction time

DISADVANTAGES:

- If fourth lane is constructed, bridge would have to be replaced or have substandard horizontal clearance to columns on I-75
- More costly to replace in the future – if ever needed

DISCUSSION:

Since the construction of the fourth lane is in the long range, there is the possibility that it will never be built. In order to reduce current construction costs, construct only enough bridge length to provide adequate clearance for three lanes in each direction.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 90,251	•	\$ 90,251
ALTERNATIVE	\$ 0	•	\$ 0
SAVINGS	\$ 90,251	•	\$ 90,251

CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764,
0008458, 0000765, 0000803, 0000804, and 0000805; I-75
INTERCHANGE IMPROVEMENTS
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
*Preliminary Design Stage***

ALTERNATIVE NO.: **805-8**

SHEET NO: **2 of 3**

Skew angle = 74-28

Bridge width = 33.25'

Reduced bridge length = $2(12)/\sin \alpha = 24.91'$

Reduced bridge area = 828 ft²

VALUE ENGINEERING ALTERNATIVE



PROJECT:	NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 <i>Preliminary Design Stage</i>	ALTERNATIVE NO.: 805-11
DESCRIPTION:	USE MECHANICALLY STABILIZED EMBANKMENT WALLS TO ELIMINATE BRIDGE END SPANS AT WARDLOW ROAD	SHEET NO.: 1 of 4

ORIGINAL DESIGN: (Sketch attached)
 The bridge has 2:1 end slopes with end span.

ALTERNATIVE: (Sketch attached)
 Construct mechanically stabilized embankment (MSE) walls at Bents 2 and 4 to eliminate end spans.

ADVANTAGES:

- Reduces costs
- Less bridge to maintain

DISADVANTAGES:

- Eliminates end span and potential future location for additional lanes

DISCUSSION:

Construction of MSE walls eliminates the construction of two end spans and two intermediate bents, reducing the construction cost of the bridge. Also, there is less bridge area to maintain. The negative is that if additional space is needed for lanes in the future, the space provided by the end spans would not be available. However, this bridge is not at an interchange and is in a rural location, so the likelihood of needing that additional space is low.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 259,309	•	\$ 259,309
ALTERNATIVE	\$ 222,220	•	\$ 222,220
SAVINGS	\$ 37,089	•	\$ 37,089

SKETCHES



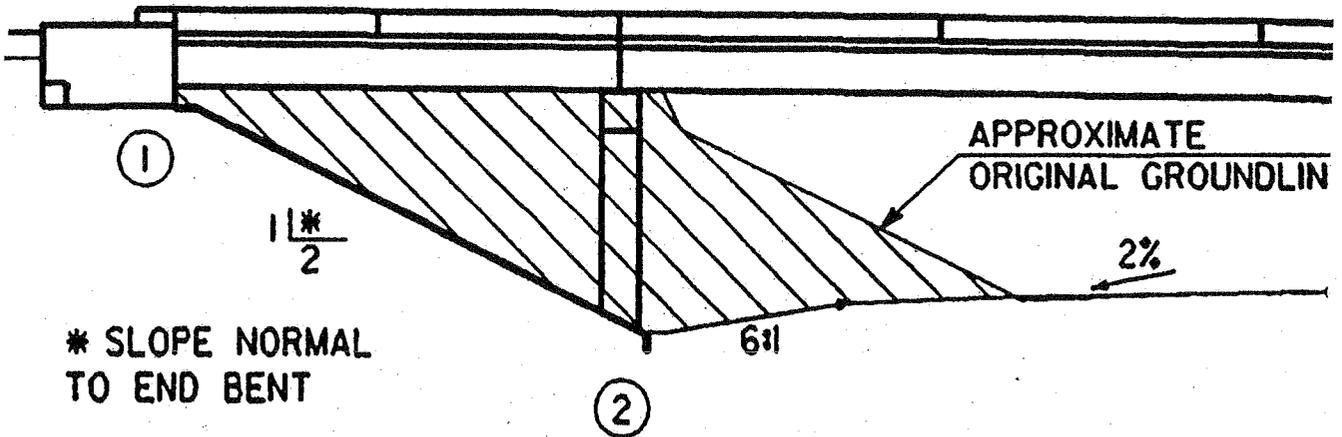
PROJECT: NHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765,
0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
Preliminary Design Stage

ALTERNATIVE NO.:

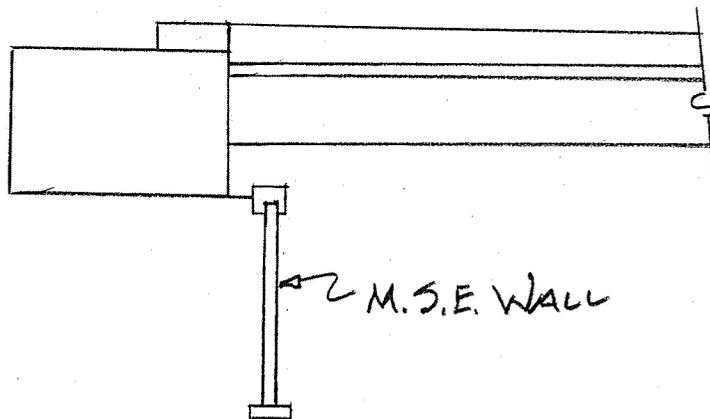
805-11

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS**
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
Preliminary Design Stage

ALTERNATIVE NO.: **805-11**

SHEET NO.: **3 of 4**

Skew angle = $\alpha = 74-28$

Bridge width (out-to-out) = 33.25

Span 1 length = 42

Span 4 length = 42

Bridge area = $W [(L_1 + L_4) - 2(6)/\sin \alpha] = 2379 \text{ ft}^2$

Assume wall height = 4' at end

Height under bridge = $H = 22'$

Wall Area = $2[(W/\sin \alpha)H + .5(4 + H)[2(H - 4)/\sin \alpha](2)]$

= 3462 ft^2

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage**

ALTERNATIVE NO.: **805-13**

DESCRIPTION: **LEAVE THE MUSSELWHITE ROAD OVERPASS AS IS**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The current design calls for the removal of the existing Musselwhite Road bridge and replacing it with a longer bridge to accommodate future I-75 widening to four lanes in each direction. The design also removes and replaces 12 feet of outside shoulder on I-75 for the future widening of I-75.

ALTERNATIVE:

Leave the Musselwhite Road overpass.

ADVANTAGES:

- Reduces costs up front
- Eliminates potentially unneeded work
- May never be required
- Reduces construction time
- Precludes expenditure of capital costs needed elsewhere

DISADVANTAGES:

- Increases future cost to accommodate an additional fourth lane on I-75
- Substandard horizontal clearance on I-75

DISCUSSION:

This is a rural widening of I-75 with a low average daily traffic count. The addition of the fourth lane to I-75 is a long-range project and may never be constructed; as such, expenditure of this capital should be avoided or used elsewhere in the State for needed improvements.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,769,997	•	\$ 1,769,997
ALTERNATIVE	\$ 0	•	\$ 0
SAVINGS	\$ 1,769,997	•	\$ 1,769,997

CALCULATIONS



PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, ALTERNATIVE NO.:
 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
 Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4 805-13
 Preliminary Design Stage

SHEET NO.: 2 of 3

MIS: FLD.OFFICE / R/W MARKERS / FENCE \Rightarrow $\$316,800 \div 7 \text{ PROJECTS} = \underline{\$45,257}$

CONCRETE: SLOPE PAVING Vol $\Rightarrow \left[(40' \times \left(\frac{45'+85'}{2}\right) + 45' \times \left(\frac{45'+90'}{2}\right)) \right] \times \frac{1}{4}$
 $= 626.3954$
 APPROACH SLAB Vol $\Rightarrow [30' \times 35' \times 2] \times \frac{1}{4}$
 $= 233.354$

ROADWAY: $L = (5700.0 - 5204 - 30) + (4790 - 30 - 4450) = \underline{310'}$
 2 LANE 805 TYP. SECTION COST = 81.16 \$/LF

GUARDRAIL: TP-W $\Rightarrow L = (270' + 430') \times 2 = \underline{1400'}$
 TP-12ACH \Rightarrow x 4 @ \$1675

DRAINAGE: TP-1 SPILLWAY x 4 @ \$2300

EMBANKMENT: WEST SIDE $\Rightarrow 0 + \left[(8' \times 35') + (7' \times 30') + (1' \times 30') \right] (496') \times \frac{1}{27} = \underline{2,204 \text{ CY}}$

EAST SIDE $\Rightarrow 0 + \left[(11' \times 55') + (4' \times 30') + (5' \times 15') \right] (340') \times \frac{1}{27} = 5,037 \text{ CY}$
7,211 CY

R/W: WEST END $\Rightarrow \left[30' \times \left(\frac{235'+390'}{2}\right) + 30' \times \left(\frac{175'+280'}{2}\right) \right] \div 43,560 = 0.37 \text{ AC}$
 EAST END $\Rightarrow \left[40' \times \left(\frac{300'+440'}{2}\right) + (250' \times 100' \times \frac{1}{2}) \right] \div 43,560 = 0.65 \text{ AC}$
 $\Sigma = 1.02 \text{ AC}$

I-75 SHOULDER: REMOVAL \Rightarrow CY $\Rightarrow [1.2 \times 12' \times (400+550')] \times \frac{1}{27} = \underline{507 \text{ CY}}$
 PAVT $\Rightarrow 12' \times 950' \times \frac{1}{4} = \underline{1,267.5 \text{ Y}}$

ARMS RD: (SEE 805-19) \$186,338

COST WORKSHEET



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805), P. I. Nos. 0000764, 0000765, 0008458, 0000803, 0000804, and 0000805;**
I-75 INTERCHANGE IMPROVEMENTS
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
Preliminary Design Stage

ALTERNATIVE NO:
805-13

SHEET NO.: 3 of 3

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
Bridge Removal	LS	1	108,604	108,604			
Bridge Replacement	LS	1	625,000	780,000			
Miscellaneous		1	45,257	45,257			
Concrete Slope Paving	SY	626	45	28,170			
Concrete Approach Slab	SY	233	130	30,290			
Roadway	LF	310	81.16	25,160			
Type W Guardrail	LF	1,400	15.23	21,322			
Type 12 Anchor	EA	4	1,675	6,699			
Type I Spillway	EA	4	2,300	9,200			
Embankment	CY	7,241	14	101,374			
I-75 Shoulder Removal	SY	507	30.00	15,210			
I-75 Shoulder Pavement	SY	1,267	70.43	89,235			
Arms Road Relocation (See Alt. #19)	EA	1	186,338	186,338			
Construction Subtotal				1,446,858			
Markup at 21.11%				305,432			
Construction Total				1,752,290			
Right-of-Way	AC	1.02	5,000	5,100			
R/W Markup (247.2%)				12,607			
Right-of-Way Total				17,707			
Sub-total				1,769,997			
Mark-up at				INCL			
TOTAL				1,769,997			

VALUE ENGINEERING ALTERNATIVE



PROJECT:	NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 <i>Preliminary Design Stage</i>	ALTERNATIVE NO.: 805-14
DESCRIPTION:	SHORTEN THE BRIDGE TO ACCOMMODATE ONLY THREE LANES IN EACH DIRECTION ON I-75 AT MUSSELWHITE ROAD	SHEET NO.: 1 of 3

ORIGINAL DESIGN:

The present design sets the bridge length to accommodate four lanes in each direction on I-75.

ALTERNATIVE:

Shorten the bridge to accommodate only three lanes in each direction.

ADVANTAGES:

- Reduces bridge construction cost
- Less bridge to maintain
- Lengthening may never be required
- Precludes potentially unnecessary work
- Simplifies construction
- Small reduction in construction time

DISADVANTAGES:

- If fourth lane is constructed, bridge would have to be replaced or have substandard horizontal clearance to columns on I-75
- More costly to replace in the future – if ever needed

DISCUSSION:

Since the construction of the fourth lane is in the long range, there is the possibility that it will never be built. In order to reduce current construction costs, construct only enough bridge length to provide adequate clearance for three lanes in each direction.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 114,994	•	\$ 114,994
ALTERNATIVE	\$ 0	•	\$ 0
SAVINGS	\$ 114,994	•	\$ 114,994

CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764,
0008458, 0000765, 0000803, 0000804, and 0000805; I-75
INTERCHANGE IMPROVEMENTS
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
*Preliminary Design Stage***

ALTERNATIVE NO.: **805-14**

SHEET NO.: **2 of 3**

Skew angle = 45-18

Bridge width = 31.25'

Reduced bridge length = $2(12)/\sin \alpha = 33.76'$

Reduced bridge area = 1055 ft²

VALUE ENGINEERING ALTERNATIVE



PROJECT:	NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage	ALTERNATIVE NO.:	805-17
DESCRIPTION:	USE MECHANICALLY STABILIZED EMBANKMENT WALLS TO ELIMINATE BRIDGE END SPANS AT MUSSELWHITE ROAD	SHEET NO.:	1 of 4

ORIGINAL DESIGN: (Sketch attached)
 The bridge has 2:1 end slopes with end span.

ALTERNATIVE: (Sketch attached)
 Construct mechanically stabilized embankment (MSE) wall at Bents 2 and 4 to eliminate end spans.

ADVANTAGES:

- Reduces cost
- Less bridge to maintain

DISADVANTAGES:

- Eliminates end span and potential future location for additional lanes

DISCUSSION:

Construction of MSE walls eliminates the construction of two end spans and two intermediate bents, reducing the construction cost of the bridge. Also, there is less bridge area to maintain. The negative is that if additional space is needed for lanes in the future, the space provided by the end spans would not be available. However, this bridge is not at an interchange and is in a rural location, so the likelihood of needing that additional space is low.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 351,195	•	\$ 351,195
ALTERNATIVE	\$ 337,695	•	\$ 337,695
SAVINGS	\$ 13,500	•	\$ 13,500

SKETCHES



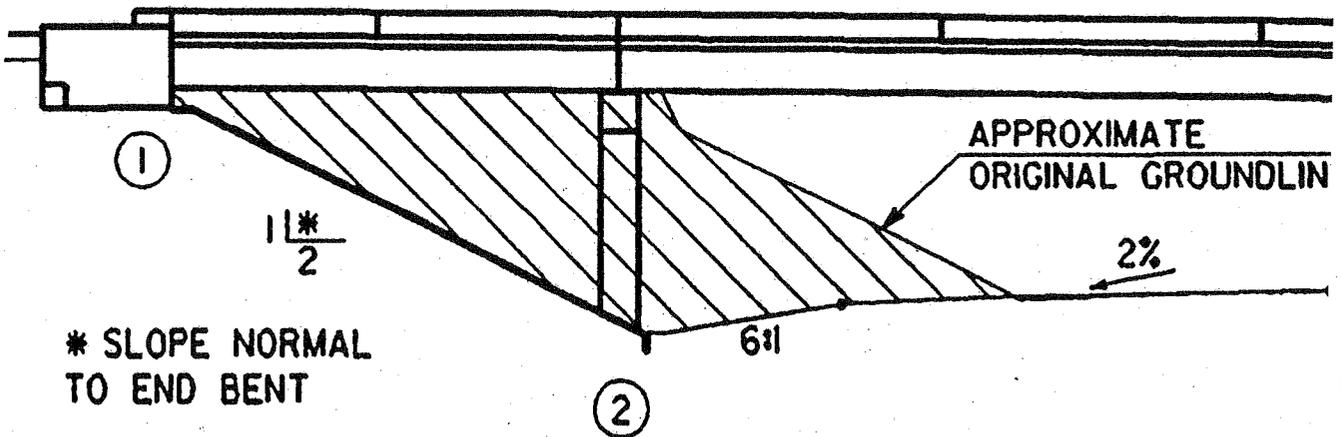
PROJECT: NHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765,
0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
Preliminary Design Stage

ALTERNATIVE NO.:

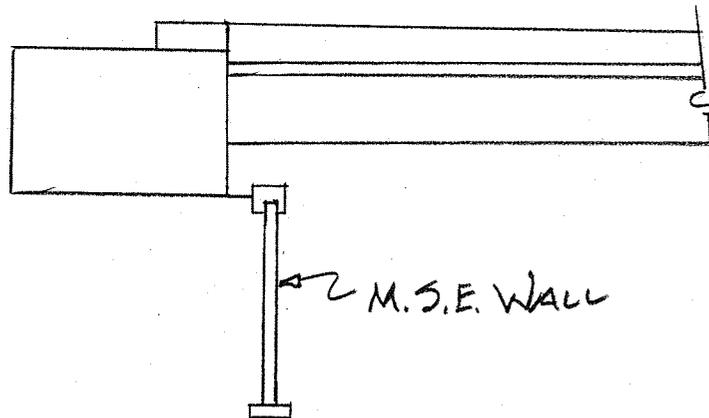
805-17

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS**
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
Preliminary Design Stage

ALTERNATIVE NO.: **805-17**

SHEET NO.: **3 of 4**

Skew angle = $\alpha = 45-18$

Bridge width (out-to-out) = 31.25

Span 1 length = 63

Span 4 length = 57

Bridge area = $W [(L_1 + L_4) - 2(6)/\sin \alpha] = 3222 \text{ ft}^2$

Assume wall height = 4' at end

Height under bridge = $H = 24$

Wall Area = $2[(W/\sin \alpha)H + .5(4 + H)[2(H - 4)/\sin \alpha](2)]$
 $= 5261 \text{ ft}^2$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **805-19**

DESCRIPTION: **REDUCE THE ALIGNMENT OF ARMS ROAD AT THE MUSSELWHITE ROAD INTERCHANGE** SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

The Musselwhite Road intersection reconstruction involves a 130 foot eastward shift for the relocation of Arms Road.

ALTERNATIVE: (Sketch attached)

Adjust Arms Road just west of the proposed alignment with the reduction of the proposed bridge width over I-75.

ADVANTAGES:

- Initial cost savings
- Reduces right-of-way costs
- May reduce stream buffer impacts
- Staging for Arms Road will be easier

DISADVANTAGES:

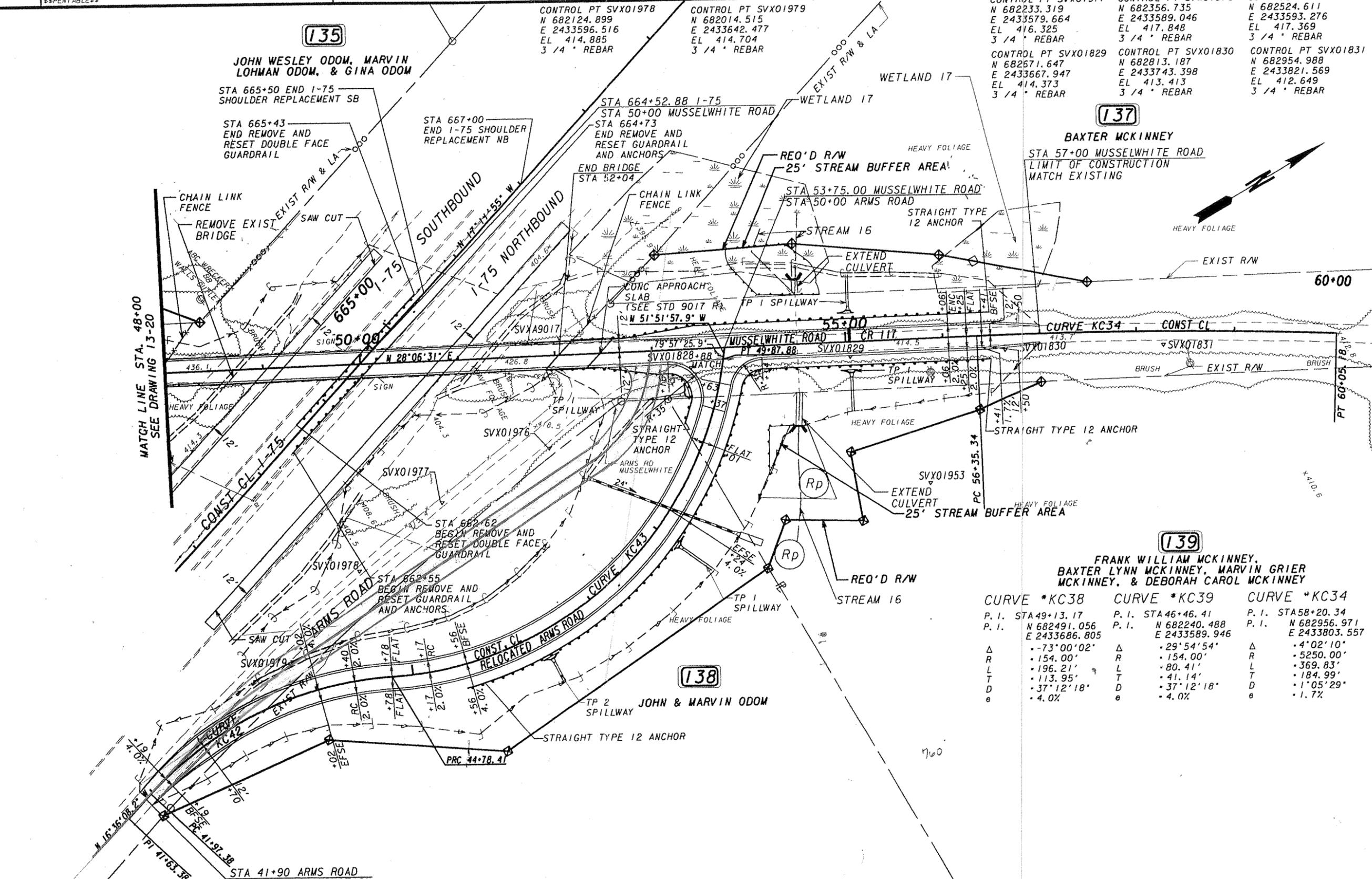
- None apparent

DISCUSSION:

Arms Road will be shifted to the west to reduce the horizontal and vertical impacts and required right-of-way. The proposed bridge limits will be reduced with the proposed use of MSE walls. The separation between the new bridge and the now adjusted Arms Road is approximately the same, at about 130 feet. Arms Road relocation on Musselwhite Road remains a stopping condition for local traffic.

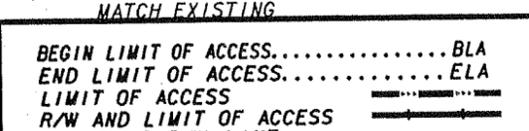
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 292,018	•	\$ 292,018
ALTERNATIVE	\$ 140,026	•	\$ 140,026
SAVINGS	\$ 151,992	•	\$ 151,992

TIME: PRF: DGN:	COUNTY: TURNER/CRISP	PROJECT NUMBER: NHS-0000-00(805)	SHEET NO.:	TOTAL SHEETS:
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CONTROL PT SVX01977 N 682233.319 E 2433579.664 EL 416.325 3/4" REBAR	CONTROL PT SVX01978 N 682356.735 E 2433589.046 EL 417.848 3/4" REBAR	CONTROL PT SVX01828 N 682524.611 E 2433593.276 EL 417.369 3/4" REBAR
CONTROL PT SVX01829 N 682671.647 E 2433667.947 EL 414.373 3/4" REBAR	CONTROL PT SVX01830 N 682813.187 E 2433743.398 EL 413.413 3/4" REBAR	CONTROL PT SVX01831 N 682954.988 E 2433821.569 EL 412.649 3/4" REBAR

139 FRANK WILLIAM MCKINNEY, BAXTER LYNN MCKINNEY, MARVIN GRIER MCKINNEY, & DEBORAH CAROL MCKINNEY		
CURVE *KC38	CURVE *KC39	CURVE *KC34
P. I. STA 49+13.17	P. I. STA 46+46.41	P. I. STA 58+20.34
P. I. N 682491.056 E 2433686.805	P. I. N 682240.488 E 2433589.946	P. I. N 682956.971 E 2433803.557
Δ -73°00'02"	Δ -29°54'54"	Δ -4°02'10"
R 154.00'	R 154.00'	R 5250.00'
L 196.21'	L 80.41'	L 369.83'
T 113.95'	T 41.14'	T 184.99'
D 37°12'18"	D 37°12'18"	D 1°05'29"
e 4.0%	e 4.0%	e 1.7%



G & O
GREENHORNE & O'MARA
 221 NEWMARKET PARKWAY
 SUITE 104

REVISION	DATE

STATE OF GEORGIA
 DEPARTMENT OF TRANSPORTATION
 OFFICE: CONSULTANT DESIGN
MAINLINE PLAN
 MUSPELWHITE ROAD

CALCULATIONS



PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, ALTERNATIVE NO.:
 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
 Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
 Preliminary Design Stage

805-19

SHEET NO.: 3 of 5

MUSSELWHITE RD1 REDUCE ALIGNMENT OF FEEDUTAGE

REVISED ARMS ROAD CONSTRUCTION LENGTH = 680 LF DESIGN ORIGINAL LENGTH 836.42 LF

28 LF - ASPH. E-TOP @ 135 lbs 9.50 mm
 28 LF - ASPH. B-BINDER 220 lbs 19.0 mm
 28 LF - G.A.B - 8" CURRENT COST PERMILE \$158.77
 • ASPH. E-TOP @ 135 LBS/SYDS
 $A = 680 LF \times 28' = 19,040 \div 9 = 2115.55 SYDS$

MAINT. TP. A SILT FENCE
 1500 LF x \$4.00 = \$6000.00
 MAINT. TP. C SILT FENCE
 1500 LF x \$5.00 = \$7500.00

$2115.55 SYDS (135 \text{ lbs/SYDS}) = 285,600.00 \text{ LBS} \div 2000$
 $= 142.80 TNS - E-TOP \times \$85.00 = \$12,138.00 \checkmark$

• ASPH B-TOP @ 220 LBS/SYDS
 $A = 680 LF \times 28' = 19,040 \div 9$
 $= 2115.55 SYDS$

$2115.55 SYDS (220 \text{ lbs/SYDS}) = 465,421.00 \text{ LBS} \div 2000$
 $= 232.71 TNS \times \$85.00 = \$19,780.39 \checkmark$

G.A.B - 8" DEPTH INSTALLATION
 $A = 680 LF \times 28' = 19,040 \div 9$
 $= 2115.55 SYDS$

LINE ITEM No. 310-1101

$2115.55 SYDS (135 \text{ lbs/SYDS}) 8" \div 2000 = 1142.40 TNS \times \$25.00 = \$28,560.00$

* TP. 2 CURB & GUTTER 30" x 6"
 1360 LF x \$20.00 LF = \$27,200.00 ✓

* REINF. CONC. PIPE
 110 LF - 24" RCP x \$65.00 = \$7,150.00 ✓

* GRASSING COMPLETE

CORRIDOR WIDTH = $128.33 \times 824.62'$
 $= 105,826.23 SF \div 43540$
 $= 2.42 ACS$

ACREAGE FOR ARMS ROAD RIGHT-OF-WAY
 5.44 Acres
 DESIGN 'A' = $290' \times 60' / 43560$
 $A = .399 ACS$
 REVISED REQ'D RIGHT-OF-WAY FOR ADJUSTED ARMS ROAD

TEMP. GRASS
 $\$520.09 \text{ Ac} \times 2.42 ACS = \1258.62

$A = 760' \times 120' = 91,200 SF / 43560$
 $= 2.09$

TP. A SILT FENCE
 1500 LF x \$2.00 = \$3,000.00

REDUCED ACREAGE = $-2.94 ACS$
 $= 0.399 ACS$

TP. C SILT FENCE = 1500 LF x \$2.00 = \$3,000.00

TOTAL REVISED ACREAGE = 2.49 ✓

CALCULATIONS



PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, ALTERNATIVE NO.:
 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
 Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4 805-19
 Preliminary Design Stage

MUSSELEWHITE RD.: REDUCE ALIGNMENT OF FRONTAGE RD (ARMS RD)

SHEET NO.: 4 of 5

ORIG. DESIGN ESTIM. ARMS ROAD:

$$836.62 \text{ LF} \times 24' = 20,078.88 \text{ SF/9} \quad \text{TP. 2 C \& G 30" \times 8" = 1673 LF} \times \frac{\$20.00}{\text{LF}} = \underline{\underline{\$33,464.00}}$$

$$= \underline{\underline{2230.98 \text{ SYDS}}}$$

E-TOP

$$2230.98 \left(\frac{110 \text{ lbs}}{\text{SYDS}} \right) = 184.05 \text{ TNS} \times \$85 = \underline{\underline{15,644.74}}$$

BINDER -

$$2230.98 \left(\frac{220 \text{ lbs}}{\text{SYDS}} \right) = 981.63 \text{ TNS} \times \$85 = \underline{\underline{83,438.55}}$$

GAP

$$2230.98 \left(\frac{110 \text{ lbs}}{\text{SYDS}} \right) \cdot 8" = 981.63 \text{ TNS} \times \$25.00 = \underline{\underline{24,540.75}}$$

PROP. 24" RCB

$$150 \text{ LF} \times \$65 = \$9,750.00$$

$$\text{EROSION CTRL.} = \$19,500$$

ESTIM'D ORIG. COST

$$\underline{\underline{\$186,338.84}}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage**

ALTERNATIVE NO.: **805-22**

DESCRIPTION: **SHORTEN THE BRIDGE TO ACCOMMODATE ONLY THREE LANES IN EACH DIRECTION ON I-75 AT BEDGOOD ROAD**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The present design sets the bridge length to accommodate four lanes in each direction on I-75.

ALTERNATIVE:

Shorten the bridge to accommodate only three lanes in each direction.

ADVANTAGES:

- Reduces bridge construction cost
- Less bridge to maintain
- Lengthening may never be required
- Precludes potentially unnecessary work
- Simplifies construction
- Small reduction in construction time

DISADVANTAGES:

- If a fourth lane is constructed, the bridge would have to be replaced or have substandard horizontal clearance to columns on I-75
- More costly to replace in the future – if ever needed

DISCUSSION:

Since the construction of the fourth lane is in the long range, there is the possibility that it will never be built. In order to reduce current construction costs, construct only enough bridge length to provide adequate clearance for three lanes in each direction.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 83,929	•	\$ 83,929
ALTERNATIVE	\$ 0	•	\$ 0
SAVINGS	\$ 83,929	•	\$ 83,929

CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764,
0008458, 0000765, 0000803, 0000804, and 0000805; I-75
INTERCHANGE IMPROVEMENTS
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
*Preliminary Design Stage***

ALTERNATIVE NO.: **805-22**

SHEET NO.: **2 of 3**

Skew angle = 76-59

Bridge width = 31.25'

Reduced bridge length = $2(12)/\sin \alpha = 24.63'$

Reduced bridge area = 770 ft²

VALUE ENGINEERING ALTERNATIVE



PROJECT:	NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage	ALTERNATIVE NO.:	805-25
DESCRIPTION:	USE MECHANICALLY STABILIZED EMBANKMENT WALLS TO ELIMINATE BRIDGE END SPANS AT BEDGOOD ROAD	SHEET NO.:	1 of 4

ORIGINAL DESIGN: (Sketch attached)
 The bridge has 2:1 end slopes with end span.

ALTERNATIVE: (Sketch attached)
 Construct mechanically stabilized embankment (MSE) wall at Bents 2 and 4 to eliminate end spans.

ADVANTAGES:

- Reduces costs
- Less bridge to maintain

DISADVANTAGES:

- Eliminates end span and potential future location for additional lanes

DISCUSSION:

Construction of MSE walls eliminates the construction of two end spans and two intermediate bents, reducing the construction cost of the bridge. Also, there is less bridge area to maintain. The negative is that if additional space is needed for lanes in the future, the space provided by the end spans would not be available. However, this bridge is not at an interchange and is in a rural location, so the likelihood of needing that additional space is low.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 258,655	•	\$ 258,655
ALTERNATIVE	\$ 317,668	•	\$ 317,668
SAVINGS	\$ (59,013)	•	\$ (59,013)

SKETCHES



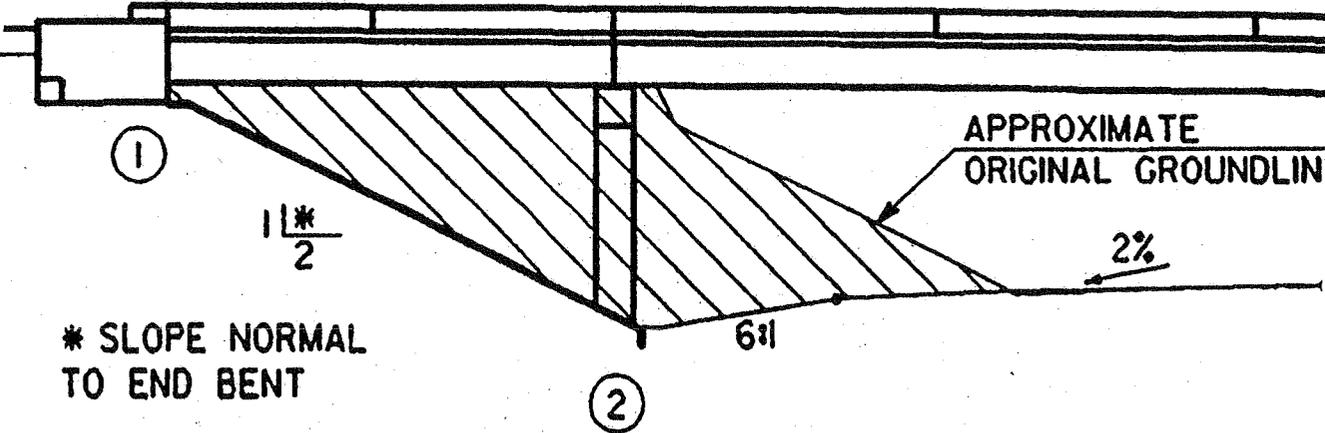
PROJECT: NHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765,
0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
Preliminary Design Stage

ALTERNATIVE NO.:

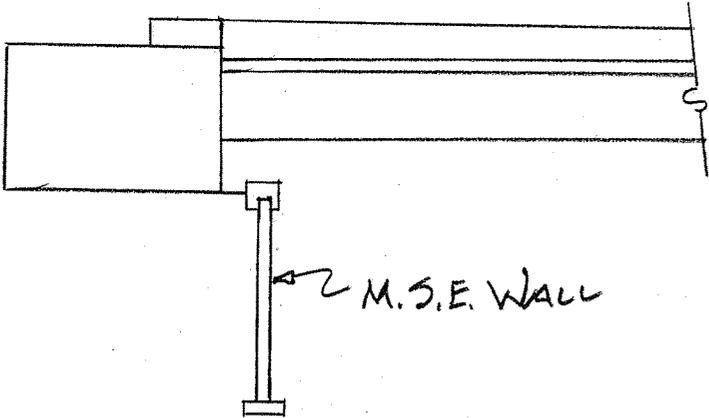
805-25

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764,
0008458, 0000765, 0000803, 0000804, and 0000805; I-75
INTERCHANGE IMPROVEMENTS
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
Preliminary Design Stage**

ALTERNATIVE NO.: **805-25**

SHEET NO.: **3 of 4**

$$\text{Skew angle} = \alpha = 76.59$$

$$\text{Bridge width (out-to-out)} = 31.25$$

$$\text{Span 1 length} = 49$$

$$\text{Span 4 length} = 39.25$$

$$\text{Bridge area} = W [(L_1 + L_4) - 2(6)/\sin \alpha] = 2373 \text{ ft}^2$$

Assume wall height = 4' at end

$$\text{Height under bridge} = H = 28$$

$$\begin{aligned} \text{Wall Area} &= 2[(W/\sin \alpha)H + .5(4 + H)[2(H - 4)/\sin \alpha](2)] \\ &= 4949 \text{ ft}^2 \end{aligned}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage**

ALTERNATIVE NO.: **805-26**

DESCRIPTION: **DO NOT RELOCATE ROCK ROAD**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The current design calls for the relocation of Rock Road approximately 160 feet further west on Bedgood Road.

ALTERNATIVE:

Do not relocate Rock Road.

ADVANTAGES:

- Initial cost savings
- Not necessary
- Reduces construction time
- Simplifies design and construction

DISADVANTAGES:

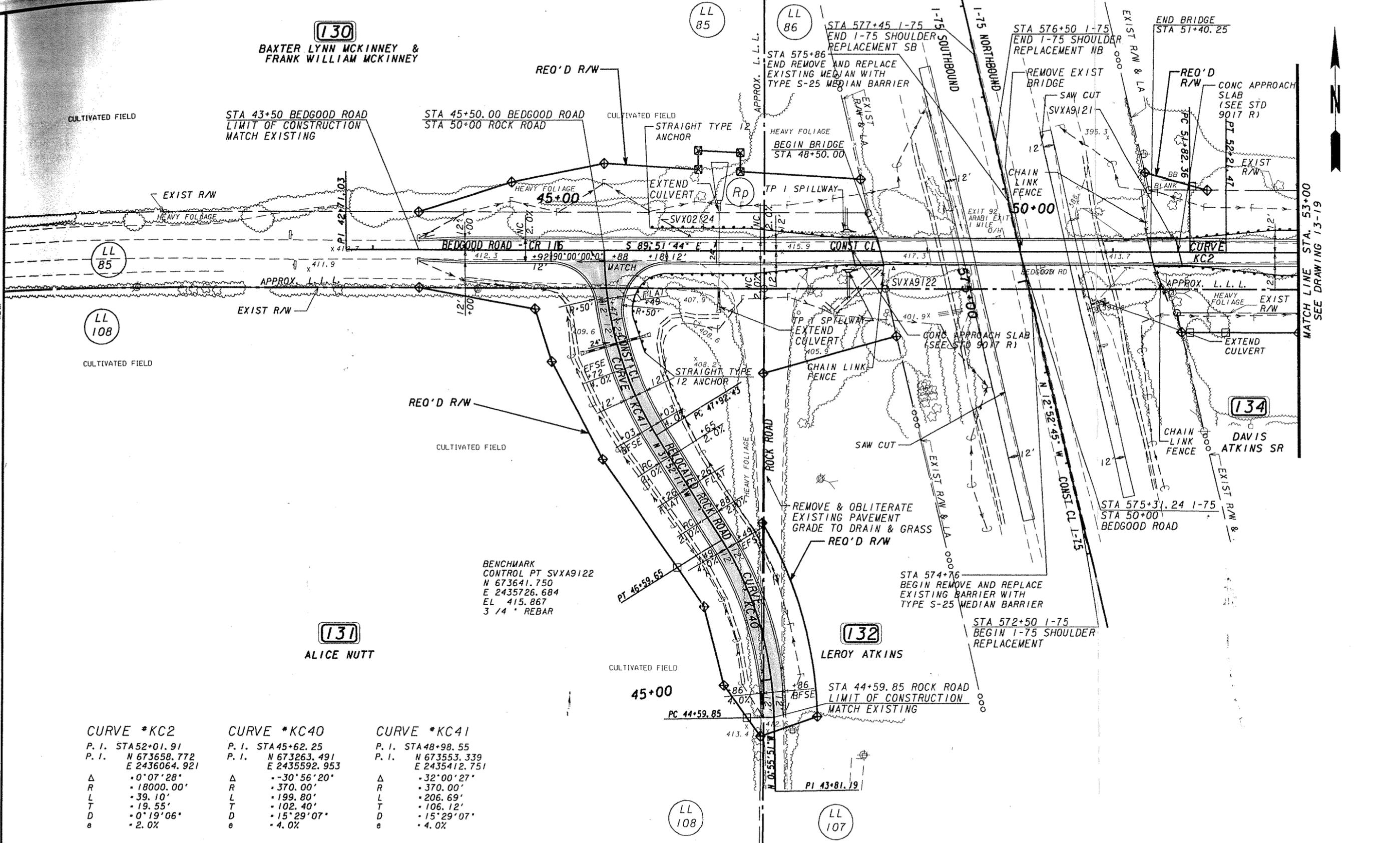
- None apparent

DISCUSSION:

It appears the sight distance from the end of the new bridge at Bedgood Road and the current location of Rock Road is adequate. As such, Rock Road's relocation is not warranted.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 96,975	•	\$ 96,975
ALTERNATIVE	\$ 0	•	\$ 0
SAVINGS	\$ 96,975	•	\$ 96,975

TIME**\$	SPRF#	*DGN#	COUNTY	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
PENTABLE			TURNER/CRISP	NHS-0000-00(805)		



CURVE *KC2	CURVE *KC40	CURVE *KC41
P. I. STA 52+01.91	P. I. STA 45+62.25	P. I. STA 48+98.55
P. I. N 673658.772	P. I. N 673263.491	P. I. N 673553.339
E 2436064.921	E 2435592.953	E 2435412.751
Δ -0°07'28"	Δ -30°56'20"	Δ -32°00'27"
R -18000.00'	R -370.00'	R -370.00'
L -39.10'	L -199.80'	L -206.69'
T -19.55'	T -102.40'	T -106.12'
D -0°19'06"	D -15°29'07"	D -15°29'07"
e -2.0%	e -4.0%	e -4.0%

BENCHMARK
CONTROL PT SVXA9122
N 673641.750
E 2435726.684
EL 415.867
3/4" REBAR

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

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

G& GREENHORNE & O'MARA

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: CONSULTANT DESIGN
MAIMINE DIAM

CALCULATIONS



PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765,
0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
Preliminary Design Stage

ALTERNATIVE NO.:

805-26

Do Not Relocate Rock Road

SHEET NO.: 3 of 4

$$\text{Asphalt Paving} - (528.15 \times 28) + (320 \times 2) = 15,428.5 \text{ SF} \div 9 = 1714.5 \text{ SF}$$

24" Pipe - 70 LF

$$\text{Silt Fence} - 528 \text{ LF} \times 2 = 1056 \text{ LF}$$

Excavation - 1100 CY

$$\text{R/W} - 62,250 \text{ SF} \div 43560 = 1.4 \text{ Ac.}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT:	NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage	ALTERNATIVE NO.:	805-28A
DESCRIPTION:	USE MECHANICALLY STABILIZED EMBANKMENT WALLS TO ELIMINATE BRIDGE END SPANS AT HAWPOND ROAD	SHEET NO.:	1 of 4

ORIGINAL DESIGN: (Sketch attached)
The bridge has 2:1 end slopes with end span.

ALTERNATIVE: (Sketch attached)
Construct mechanically stabilized embankment (MSE) wall at Bents 2 and 4 to eliminate end spans.

ADVANTAGES:

- Reduces cost
- Less bridge to maintain

DISADVANTAGES:

- Eliminates end span and potential future location for additional lanes

DISCUSSION:

Construction of MSE walls eliminates the construction of two end spans and two intermediate bents, reducing the construction cost of the bridge. Also, there is less bridge area to maintain. The negative is that if additional space is needed for lanes in the future, the space provided by the end spans would not be available. However, this bridge is in a rural location, so the likelihood of needing that additional space is low.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 773,021	•	\$ 773,021
ALTERNATIVE	\$ 796,641	•	\$ 796,641
SAVINGS	\$ (23,620)	•	\$ (23,620)

SKETCHES



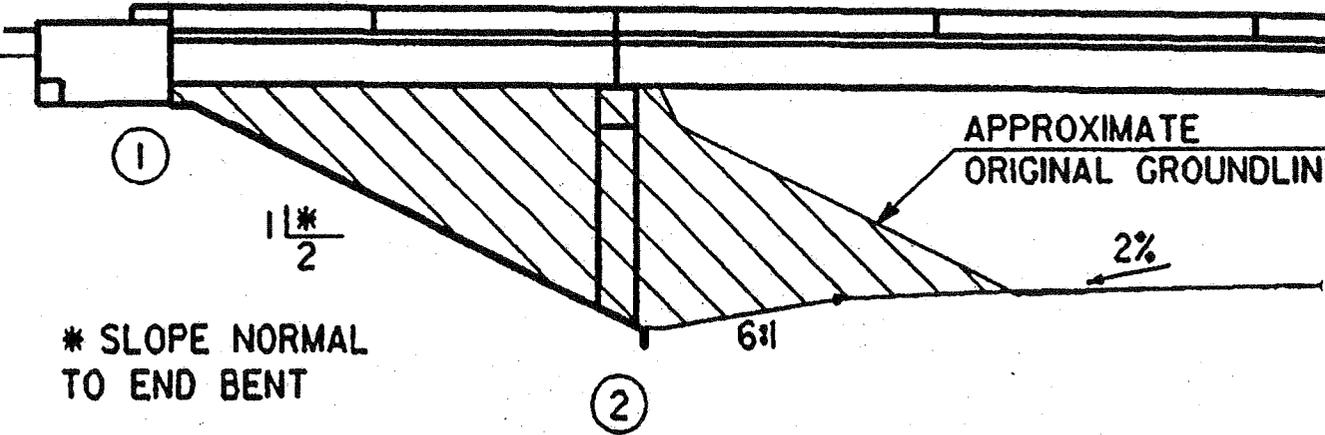
PROJECT: NHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765,
0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
Preliminary Design Stage

ALTERNATIVE NO.:

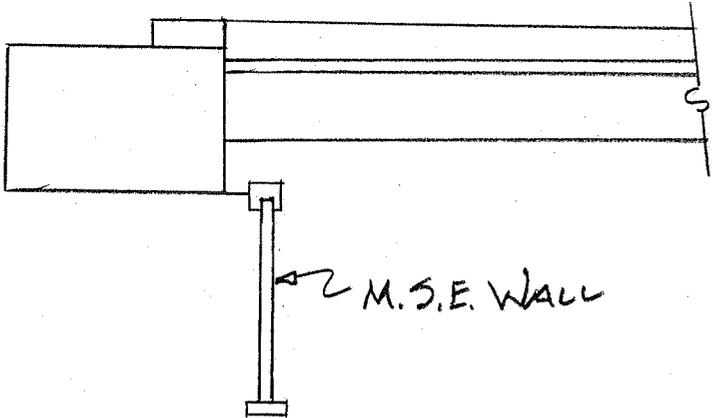
805-28A

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage**

ALTERNATIVE NO.: **805-28A**

SHEET NO.: **3 of 4**

$$\text{Skew angle} = \alpha = 77-47$$

$$\text{Bridge width (out-to-out)} = 91.25$$

$$\text{Span 1 length} = 50$$

$$\text{Span 4 length} = 40$$

$$\text{Bridge area} = W [(L_1 + L_4) - 2(6)/\sin \alpha] = 7092 \text{ ft}^2$$

$$\text{Assume wall height} = 4' \text{ at end}$$

$$\text{Height under bridge} = H = 26$$

$$\begin{aligned} \text{Wall Area} &= 2[(W/\sin \alpha)H + .5(4 + H)[2(H - 4)/\sin \alpha](2)] \\ &= 12411 \text{ ft}^2 \end{aligned}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **805-29A**

DESCRIPTION: **REDUCE THE BRIDGE WIDTH AT HAWPOND ROAD TO MATCH BRIDGE POLICY MANUAL** SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The current design calls for the new bridge at Hawpond Road to have four lanes at 12 feet, a 20-foot median, and two shoulders at 10 feet.

ALTERNATIVE:

Provide a new bridge at Hawpond Road with four lanes at 12 feet, a 20-foot median, and two shoulders at 7 feet.

ADVANTAGES:

- Reduces bridge cost
- Complies with GDOT policy
- Reduces maintenance costs
- Simplifies design and construction

DISADVANTAGES:

- None apparent

DISCUSSION:

The GDOT Bridge and Structures Policy Manual defines widths for bridges for both state routes and non-state routes. Reducing the bridge width to the alternative width reduces the cost of the bridge and provides a bridge width in compliance with the Manual. The average daily traffic count at this site is 2,000 vehicles per day, the speed design is 45 mph, and this is a county road, so the shoulder width should be 7 feet.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 2,904,278	•	\$ 2,904,278
ALTERNATIVE	\$ 2,713,312	•	\$ 2,713,312
SAVINGS	\$ 190,966	•	\$ 190,966

CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764,
0008458, 0000765, 0000803, 0000804, and 0000805; I-75
INTERCHANGE IMPROVEMENTS
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
*Preliminary Design Stage***

ALTERNATIVE NO.: **805-29A**

SHEET NO.: **2 of 3**

Bridge Length = 292'

Proposed bridge width (out-to-out) = 91.25'

Proposed bridge area = 26645 ft²

Alternative bridge width (out-to-out) = 85.25'

Alternative bridge area = 24893 ft²

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS**
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
Preliminary Design Stage

ALTERNATIVE NO.: **805-30**

DESCRIPTION: **LEAVE THE OLD HATLEY ROAD OVERPASS AS IS**

SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The current design calls for the removal of the existing Hatley Road overpass bridge and replacing it with a longer bridge to accommodate future I-75 widening to four lanes in each direction. The design also removes and replaces 12 feet of outside shoulder on I-75 for the future widening of I-75.

ALTERNATIVE:

Leave the Old Hatley Road overpass as is.

ADVANTAGES:

- Cost savings up front
- Eliminates potentially unneeded work
- May never be required
- Reduces construction time
- Precludes expenditure of capital costs needed elsewhere

DISADVANTAGES:

- Increases future costs to accommodate an additional fourth lane on I-75
- Substandard horizontal clearance on I-75

DISCUSSION:

This is a rural widening of I-75 with a low average daily traffic count. The addition of the fourth lane to I-75 is a long-range project and may never be constructed; as such, expenditure of this capital should be avoided or used elsewhere in the State for needed improvements.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,306,817	•	\$ 1,306,817
ALTERNATIVE	\$ 0	•	\$ 0
SAVINGS	\$ 1,306,817	•	\$ 1,306,817

CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage**

ALTERNATIVE NO.: **805-30**

SHEET NO. **2 of 3**

Misc.: Field Office, R/W markers, fence => $\$316,800/7$ projects = $\$45,257$

Concrete:

Approach slab $2(30)(35)/9 = 233$ SY

Roadway: $L = 5500 - 4150 - 321 - 60 = 969$ LF Roadway cost is $\$81.16/LF$

Guardrail: Type W = $420 + 350 + 2(285) + 1.4(150) = 1550$ LF

Type 12 straight anchor 4

Drainage: Type I spillway 4

Replace I-75 shoulder: $2(86000 - 85650)(12)/9 = 933$ SY

Asphalt Pavement = $165 + 660 + 440 = 1265$ #/SY = 0.633 Ton/SY

GAB 12"(110#/"/SY) = 1320 #/SY = $0.66/SY$

Total asphalt pavement cost = $0.633(85) + 0.66(25) = \$70.30/SY$

R/W $[.5(125)(16) + .5(350)(40) + .5(370)(35) + .5(275)(35) + .5(300)(36)]$

= $24,688$ SF/ $43,560 = 0.57$ ac

R/W cost = $5000(1+2.472) = \$17,360/ac$

Excavation $(321 - 221)(25)(85)/27 = 5743$ CY

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **805-31**

DESCRIPTION: **SHORTEN THE BRIDGE TO ACCOMMODATE ONLY THREE LANES IN EACH DIRECTION ON I-75 AT OLD HATLEY ROAD** SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The present design sets the bridge to accommodate four lanes in each direction on I-75 beneath the bridge.

ALTERNATIVE:

Shorten the bridge to accommodate only three lanes in each direction.

ADVANTAGES:

- Reduces bridge construction cost
- Less bridge to maintain
- Lengthening may never be required
- Precludes potentially unnecessary work
- Simplifies construction
- Small reduction in construction time

DISADVANTAGES:

- If fourth lane is constructed, bridge would have to be replaced, or have substandard horizontal clearance to columns
- More costly to replace in the future – if ever needed

DISCUSSION:

Since the construction of the fourth lane is in the long range, there is the possibility that it will never be built. In order to reduce current construction costs, construct only enough bridge length to provide adequate clearance for three lanes in each direction.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 98,862	•	\$ 98,862
ALTERNATIVE	\$ 0	•	\$ 0
SAVINGS	\$ 98,862	•	\$ 98,862

CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764,
0008458, 0000765, 0000803, 0000804, and 0000805; I-75
INTERCHANGE IMPROVEMENTS
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
*Preliminary Design Stage***

ALTERNATIVE NO.: **805-31**

SHEET NO.: **2 of 3**

Skew angle = 68-52

Bridge width = 35.25'

Reduced bridge length = $2(12)/\sin \alpha = 25.73'$

Reduced bridge area = 907 ft²

VALUE ENGINEERING ALTERNATIVE



PROJECT:	NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage	ALTERNATIVE NO.:	805-33
DESCRIPTION:	USE MECHANICALLY STABILIZED EMBANKMENT WALLS TO ELIMINATE BRIDGE END SPANS AT OLD HATLEY ROAD	SHEET NO.:	1 of 4

ORIGINAL DESIGN: (Sketch attached)

The bridge has 2:1 end slopes with end span.

ALTERNATIVE: (Sketch attached)

Construct mechanically stabilized embankment (MSE) wall at Bents 2 and 4 to eliminate end spans.

ADVANTAGES:

- Reduces cost
- Less bridge to maintain

DISADVANTAGES:

- Eliminates end span
- Eliminates potential future location for additional lanes
- Challenges GDOT preference

DISCUSSION:

Construction of MSE walls eliminates the construction of two end spans and two intermediate bents, reducing the construction cost of the bridge. Also, there is less bridge area to maintain. The negative is that if additional space is needed for lanes in the future, the space provided by the end spans would not be available. However, this bridge is not at an interchange and is in a rural location, so the likelihood of needing that additional space is low.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 323,291	•	\$ 323,291
ALTERNATIVE	\$ 252,774	•	\$ 252,774
SAVINGS	\$ 70,517	•	\$ 70,517

SKETCHES



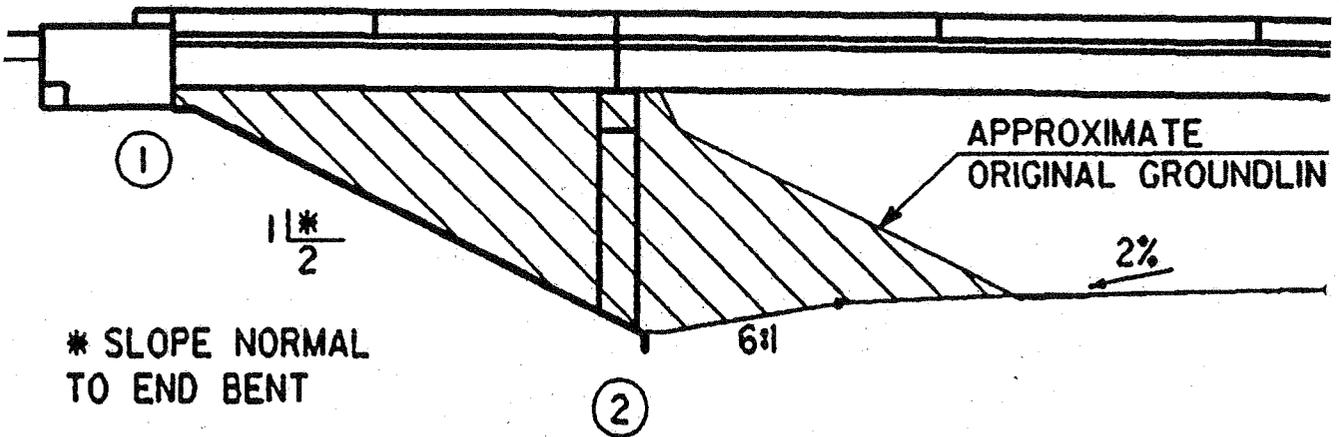
PROJECT: NHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765,
0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
Preliminary Design Stage

ALTERNATIVE NO.:

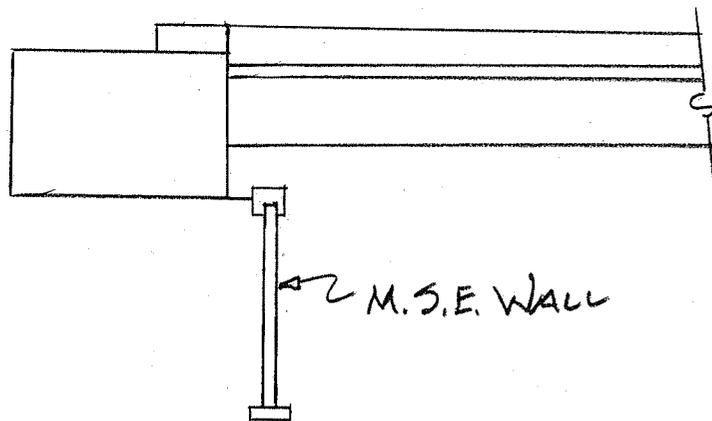
805-33

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage**

ALTERNATIVE NO.: **805-33**

SHEET NO.: **3 of 4**

Skew angle = $\alpha = 68-52$

Bridge width (out-to-out) = 35.25

Span 1 length = 45

Span 4 length = 52

Bridge area = $W [(L_1 + L_4) - 2(6)/\sin \alpha] = 2966 \text{ ft}^2$

Assume wall height = 4' at end

Height under bridge = $H = 23$

Wall Area = $2[(W/\sin \alpha)H + .5(4 + H)[2(H - 4)/\sin \alpha](2)]$
 $= 3938 \text{ ft}^2$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **805-35**

DESCRIPTION: **REDUCE THE BRIDGE WIDTH AT ROCKHOUSE ROAD TO MATCH THE BRIDGE POLICY MANUAL** SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The current design calls for the new bridge to have four lanes at 12 feet, a 20-foot median, and two shoulders at 10 feet over I-75 at Rockhouse Road.

ALTERNATIVE:

Provide the bridge at Rockhouse Road with four lanes at 12 feet, a 20-foot median, and two shoulders at 7 feet.

ADVANTAGES:

- Reduces bridge cost
- Complies with GDOT policy

DISADVANTAGES:

- None apparent

DISCUSSION:

The GDOT Bridge and Structures Policy Manual defines widths for bridges for both state routes and non-state routes. Reducing the bridge width to the alternative width reduces the cost of the bridge and provides a bridge width in compliance with the manual. The average daily traffic count at this site is 4,000 vehicles per day, the speed design is 45 mph, and this is a state route, so the shoulder width should be 7 feet.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 3,011,206	•	\$ 3,011,206
ALTERNATIVE	\$ 2,879,209	•	\$ 2,879,209
SAVINGS	\$ 131,997	•	\$ 131,997

CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS**
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
Preliminary Design Stage

ALTERNATIVE NO.: **805-35**

SHEET NO.: **2 of 3**

Bridge Length = 302.75'

Proposed bridge width (out-to-out) = 91.25'

Proposed bridge area = 27626 ft²

Alternative bridge width (out-to-out) = 87.25'

Alternative bridge area = 26415 ft²

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **805-36**

DESCRIPTION: **ELIMINATE THE FLOYD ROAD REALIGNMENT AT ROCKHOUSE ROAD** SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

The current design calls for the realignment of Floyd Road approximately 3,900 linear feet at the Rockhouse Road/I-75 interchange.

ALTERNATIVE: (Sketch attached)

Eliminate the realignment of Floyd Road by cul-de-sacing Floyd Road.

ADVANTAGES:

- Initial cost savings
- Reduces right-of-way takes
- Reduces construction time
- Improves safety

DISADVANTAGES:

- Loses connectivity
- Adds approximately 6 miles of travel distance from Floyd Road to Rockhouse Road (SR 33)

DISCUSSION:

Although adding almost six miles of travel distance from the end of the proposed cul-de-sac at Floyd Road to access SR 33/Rockhouse Road, the cost of realignment does not appear to be warranted at over \$1,000,000 – all for very few residents.

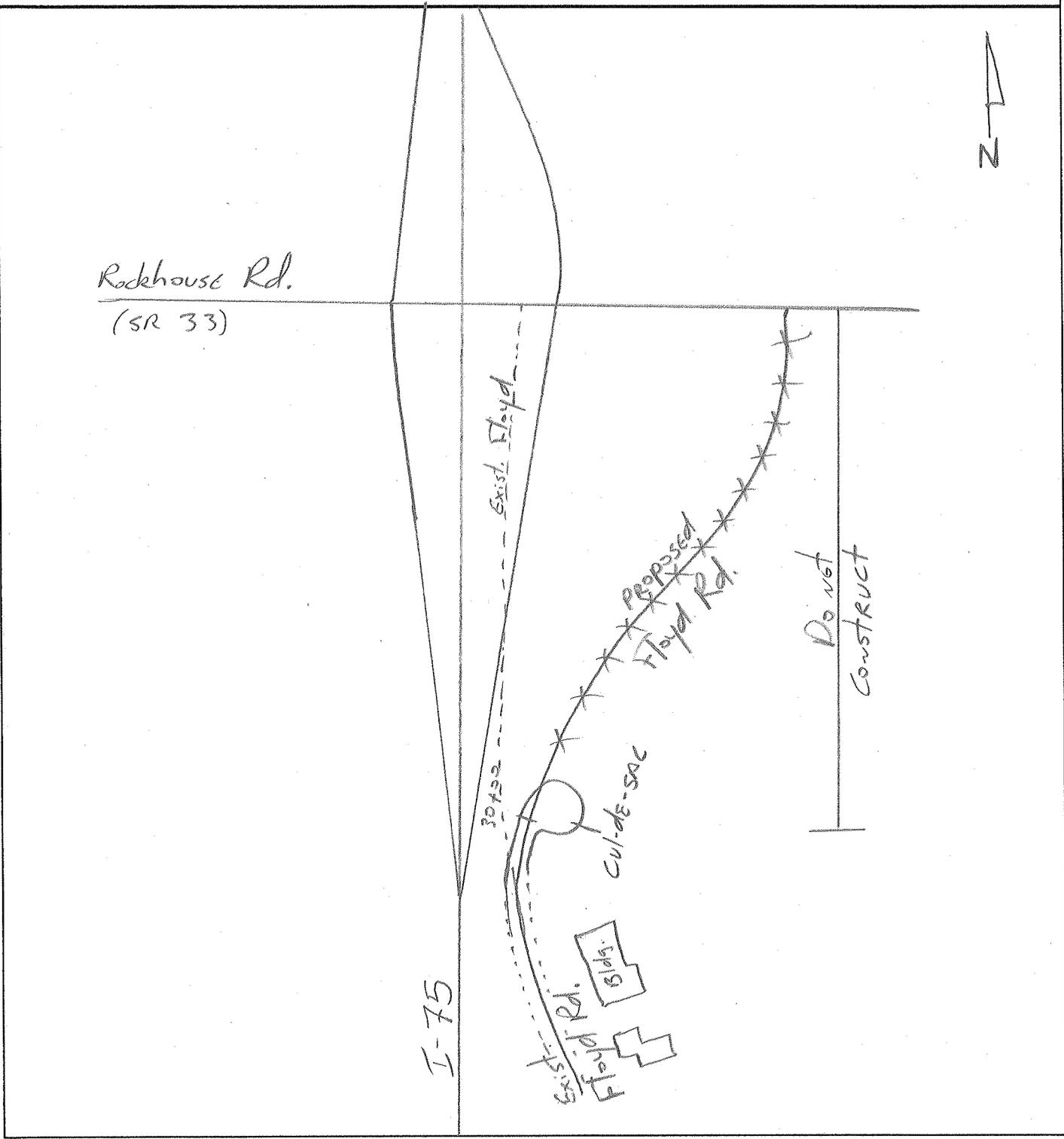
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,098,844	•	\$ 1,098,844
ALTERNATIVE	\$ 19,283	•	\$ 19,283
SAVINGS	\$ 1,079,561	\$	\$ 1,079,561

PROJECT: NHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
Preliminary Design Stage

ALTERNATIVE NO.: 805-36

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 5



CALCULATIONS



PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, ALTERNATIVE NO.:
 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
 Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
 Preliminary Design Stage

805-36

SHEET NO.: 3 of 5



Paving Cost: Roadway AREA = 3868 LF x 28' wide = 108,304 SF
 = 12,034 SY

9.5 mm Asph → 12,034 sy (135 lb/sy) (1/2000 lb) (\$85/Ton) = \$69,045

19 mm Asph → 12,034 sy (220 lb/sy) (1/2000 lb) (\$85/Ton) = \$112,518

GAB (8") → 12,034 sy (880 lb/sy) (1/2000) (\$25/Ton) = \$152,374

Total = \$313,937
 (\$81.16/LF)

Grading: Embank 31+50 to 37+00 → Avg 4' height.



Avg. Area = 4(44) + 4(16) = 240 SF

Vol = 550 LF (240 SF) = 132,000 CF = 4889 CY

@ \$14/cy = \$68,446

Wetland: AREA = ~80' x 200' = 16,000 SF

Mitigation cost unknown

Drq: 100 LF 24" RCP (2 F.E.S.) = 100 LF (\$65/LF) + 2 (\$900/FES) = \$8,300

300 + 340 LF = 640 LF 18" F.E.S. = 640 (\$55/LF) + 2 (\$935/FES) = \$37,070
 (4 F.E.S.)

RW: Assume \$10,000/AC

AREA = 150' width x ~ 3750' Length = 562,500 SF = 12.90 AC

Cost = 12.9 AC (\$10,000/AC) = \$129,000

CALCULATIONS



PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, ALTERNATIVE NO.:
 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
 Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
 Preliminary Design Stage

SHEET NO.: 4 of 5

Guardrail: 750 LF w beam GR \Rightarrow 750 LF ($\$15.23/\text{LF}$) = $\$11,423$
 2 TP. 12 Anchors \Rightarrow 2 ($\$1674/\text{EA}$) = $\$3,348$

Clear + Grub: AREA = 20.7 (12.9 AC) = 9.03 AC
 ASSUME $\$8,000/\text{AC} \Rightarrow$ $\$8,000/\text{AC}$ (9.03 AC) = $\$72,240$

Erosion Control: Silt Fence sta 31+50 to 37+00 \rightarrow 2(550 LF) ($\$4/\text{LF}$)
 = $\$4,400$

Maint Silt Fence \rightarrow 2(550 LF) ($\$2/\text{LF}$) = $\$2,200$

Grass (Temp. + Perm.): 7.1 AC ($\$838/\text{AC}$)^{Perm} + $\frac{1}{2}$ (7.1 ($\$520/\text{AC}$))^{Temp.}
 = $\$7,796$

Mulch: 3 ton/AC (7.1 AC + $\frac{7.1 \text{ AC}}{2}$) ($\$203/\text{AC}$)
 = $\$6,486$

*Disturbed Area For Grass = 0.55 (12.9) = 7.1 AC
 sub = $\$20,882$
 + 10% extra = $\$22,970$

Cul-de-sac Cost: PAVE AREA = $\pi 40^2 = 5026 \text{ SF} = 559 \text{ SY}$

(40' radius) @ $\$85/\text{TON}$ ASPHALT \Rightarrow 559 SY (135 + 220 LB/SY) \times $\frac{1}{2000}$ (lb) ($\$85$)
 = $\$8,433$

GAB \Rightarrow 559 SY (880 LB/SY) \times $\frac{1}{2000}$ ($\$25$) = $\$6,149$
 @ $\$25/\text{TON}$

R/W + Clearing: AREA = APPX. 80 LF \times 20 LF = 1600 SF
 = 0.037 AC

COST = 0.037 AC ($\$10,000$ ^{R/W} + $\$8,000$ ^{CLR.}) = $\$666$

COST WORKSHEET



**PROJECT: NHS-0000-00(764, 765, 803, 804 and 805), P. I. Nos. 0000764, 0000765, 0008458, 0000803, 0000804, and 0000805;
I-75 INTERCHANGE IMPROVEMENTS
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
Preliminary Design Stage**

**ALTERNATIVE NO:
805-36**

SHEET NO.: 5 of 5

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
Pave Cul-de-Sac	TN				99	85.00	8,415
G.A.B. Cul-de-Sac	TN				246	25.00	6,150
Cul-de-Sac Clearing	AC				0.037	8,000	296
Asphalt 9.5mm, 135 lbs/sy	TN	812	85.00	69,020			
Asphalt 19.5mm, 220 lbs/sy	TN	1,324	85.00	112,540			
8" G.A.B.	TN	5,295	25.00	132,375			
Embankment	CY	4,889	14.00	68,446			
18" RCP	LF	640	55.00	35,200			
24" RCP	LF	100	65.00	6,500			
18" F.E.S.	EA	2	935.00	1,870			
24" F.E.S.	EA	2	900.00	1,800			
W Beam Guardrail	LF	750	15.23	11,423			
TP 12 Anchorage	EA	2	1,674	3,348			
Clear and Grubbing	AC	9	8,000	72,000			
Erosion Control	LS	1	22,970	22,970			
Construction Subtotal				537,492			14,861
Construction Markup at 21.11%				113,464			3,137
Construction Total				650,956			17,998
Right-of-Way							
As-Designed	AC	12.90	10,000	129,000			
Cul-de-Sac	AC				0.037	10,000	370
Right-of-Way Subtotal				129,000			370
Right-of-Way Markup at 247.20%				318,888			915
Right-of-Way Total				447,888			1,285
Sub-total				1,098,844			19,283
Mark-up at				INCL			INCL
TOTAL				1,098,844			19,283

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **805-38**

DESCRIPTION: **RELOCATE THE ROCKHOUSE ROAD NORTHBOUND LOOP OFF RAMP TO THE NORTHEAST QUADRANT OF THE INTERCHANGE** SHEET NO.: **1 of 5**

ORIGINAL DESIGN:

The current design establishes a standard northbound ramp onto I-75 from Rockhouse Road.

ALTERNATIVE: (Sketch attached)

The alternative ingress ramp would eliminate the standard ramp and offer a loop egress ramp that would allow the existing commercial properties to remain without a complete buy-out.

ADVANTAGES:

- Initial cost savings
- Provides egress with minimum impacts
- Reduces right-of-way takes
- Improves safety

DISADVANTAGES:

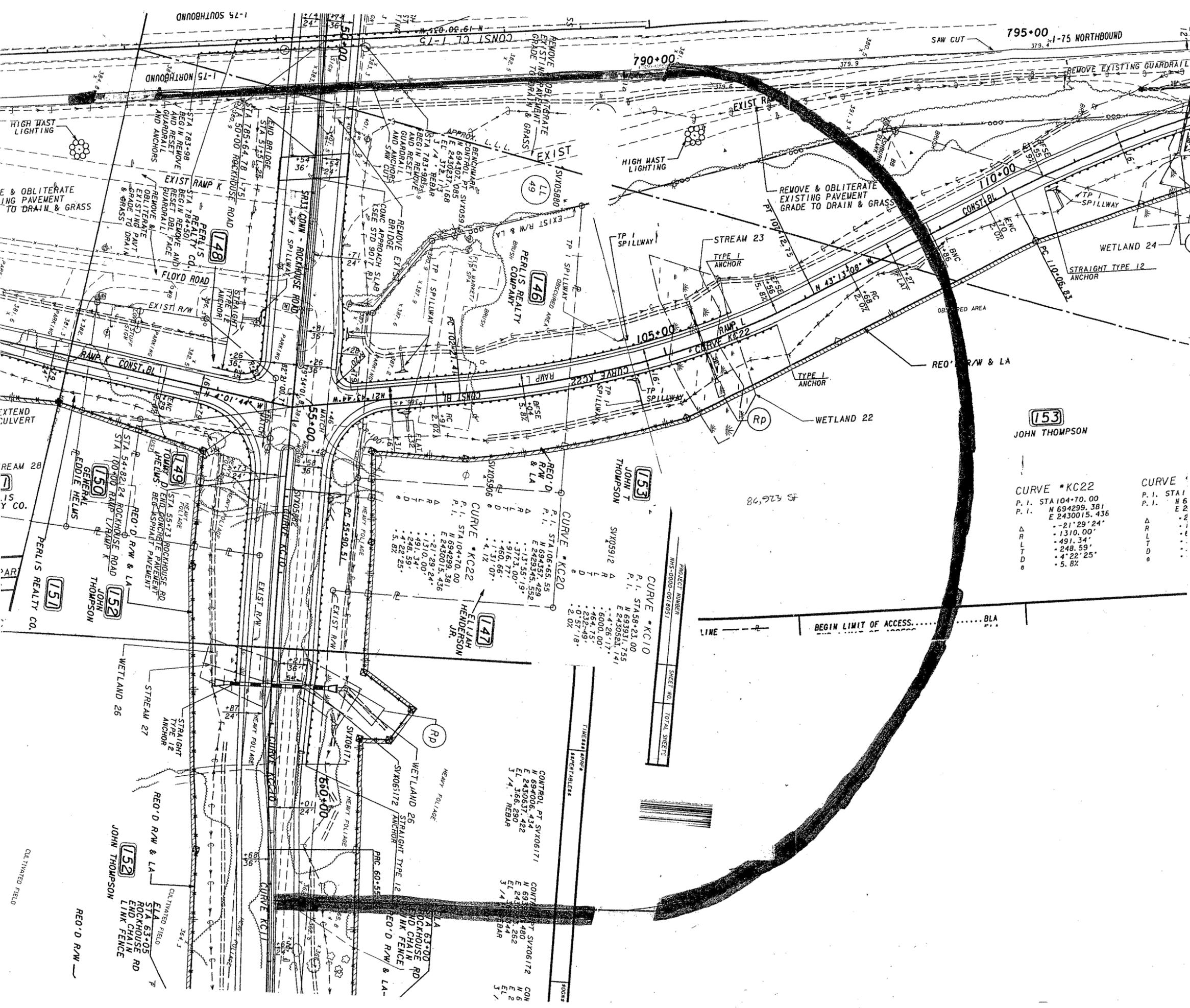
- None apparent

DISCUSSION:

The relocation of the loop ramp will establish a safer and calmer egress ramp for northbound traffic and will significantly reduce the right-of-way costs while providing a cost savings for long-term projects.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,863,634	•	\$ 1,863,634
ALTERNATIVE	\$ 1,147,549	•	\$ 1,147,549
SAVINGS	\$ 716,085	•	\$ 716,085

805-38
SHEET 2 OF 5



CURVE *KC22		CURVE *KC10	
P. I.	STA	P. I.	STA
	104+70.00		58+23.00
	694299.381		693931.755
	2430015.436		2430523.741
Δ	-21°29'24"	Δ	-4°26'17"
R	-1310.00'	R	6000.00'
L	-491.34'	L	464.75'
T	248.59'	T	332.49'
D	4°22'25"	D	0°57'18"
e	5.8%	e	2.0%

CURVE NUMBER	SHEET NO.	TOTAL SHEETS
NHS-0000-0018051		

CONTROL PT	SYMBOL	COORDINATES
SVX06171	●	N 6940067.134 E 2430057.722 EL. 366.294 3/4" REBAR
SVX06172	●	N 693931.480 E 2430057.722 EL. 366.294 3/4" REBAR

CURVE *KC22	CURVE *KC10
P. I. STA 104+70.00	P. I. STA 58+23.00
N 694299.381	N 693931.755
E 2430015.436	E 2430523.741
Δ -21°29'24"	Δ -4°26'17"
R -1310.00'	R 6000.00'
L -491.34'	L 464.75'
T 248.59'	T 332.49'
D 4°22'25"	D 0°57'18"
e 5.8%	e 2.0%

REO'D R/W

WETLAND 26

WETLAND 27

WETLAND 28

WETLAND 29

WETLAND 30

WETLAND 31

WETLAND 32

WETLAND 33

WETLAND 34

WETLAND 35

WETLAND 36

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WETLAND 104

WETLAND 105

WETLAND 106

WETLAND 107

WETLAND 108

WETLAND 109

WETLAND 110

CALCULATIONS



PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, ALTERNATIVE NO.:
 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
 Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4 805-38
 Preliminary Design Stage

NORTH BOULDER LOOP OFF RAMP IN THE NORTHEAST QUADRANT

SHEET NO.: 3 of 5

THE ESTIMATED COST FOR THE NORTH BOUND LOOP

PROPOSED LOOP RAMP

REVISION: RAMP L

ESTIMATED LENGTH OF RAMP 3500 LF

ESTIMATED WIDTH 30 FT.

$$A = 3500' \times 30' = 105,000 \text{ SF} / 9 = \underline{11,666.67 \text{ SYDS}}$$

FEE ESTM. ASPHALT QUANTITIES:

$$\begin{aligned} \text{ASPH. POLYMER} &= 90 \text{ LBS/SYDS } (11,666.67 \text{ SYDS}) / 2000 \\ &= 525 \text{ TNS} \times \$85.00 \\ &= \underline{\$44,625} \checkmark \end{aligned}$$

$$\begin{aligned} \text{ASPH. POLYMER} &= 165 \text{ LBS/SYDS } (11,666.67 \text{ SYDS}) / 2000 \\ &= 962.50 \text{ TNS} \times \$85.00 \\ &= \underline{\$81,812.50} \checkmark \end{aligned}$$

$$\begin{aligned} 19\text{mm SUPER PAVE} &= 440 \text{ LBS/SYDS } (11,666.67 \text{ SYDS}) / 2000 \\ &= 2566.67 \text{ TNS} \times \$85.00 \\ &= \underline{\$218,166.725} \checkmark \end{aligned}$$

$$\begin{aligned} 25\text{mm ASPH.} &= 660 \text{ LBS/SYDS } (11,666.67 \text{ SYDS}) / 2000 \\ &= 3850.00 \text{ TNS} \times \$85.00 \\ &= \underline{\$327,250.00} \checkmark \end{aligned}$$

$$\begin{aligned} \text{GAD} &= 110 \text{ LBS/SYD } (11,666.67 \text{ SYDS}) / 2000 \checkmark \\ &= 641.66 \text{ TNS} \times 25.00 \\ &= \underline{\$16,041.67} \end{aligned}$$

$$\text{TOTAL ESTM'D FEE FOR NEW LOOP RAMP "L" = } \underline{687,896}$$

PROPOSED RIGHT OF WAY 160 FT WIDE CORRIDOR

ESTM'D R.O.W LENGTH 1500 LF

$$\begin{aligned} A &= 1500 \times 160 = 240,000.00 \text{ SF} \\ &= 5.50 \text{ ACS} \end{aligned}$$

$$\text{COST } 5.50 \text{ ACS} \times 6500 \text{ (RURAL/RESIDENTIAL)} = 35,750.00$$

$$\begin{aligned} * \text{CLEANING } \frac{1}{4} \text{ GRUBBING} \\ A = 1500 \times 160 = 240,000 / 43560 = 5.50 \text{ ACS} \\ \text{COST} = 5.50 \text{ ACS} \times 28,571.42 \\ = \underline{\$157,142.85} \checkmark \end{aligned}$$

7/10/00

CALCULATIONS



PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, ALTERNATIVE NO.:
 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
 Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4 805-38
 Preliminary Design Stage

NORTH BOUND LOOP OFF RAMP IN THE NORTHEAST QUADRANT

SHEET NO.: 4 of 5

REMOVAL OF PROPOSED LOOP

RAMP L

42 ACS FOR GRUBBING (TOTAL PRAS)

4040.50 LF

TYP. SECTION PAVEMENT WIDTH = 30'

CLEANING & GRUBBING USE 0.50 \$/SF

EXISTING RAMP L
 PAVEMENT QUANTITIES:

$$4040.58 \times 30' = 121,217.40 \text{ SF} / 9 = \underline{13,468.60 \text{ SYDS}}$$

CLEANING AND GRUBBING REDUCTION

0.50 \$/SF

$$45' (.5) \times 950 \text{ LF} = A_1$$

$$\underline{21,375 \text{ SF}} = A_1$$

$$A_2 = 342 \cdot \frac{12 + 45}{2}$$

$$= \underline{9747 \text{ SF}}$$

$$A_3 = 1400 \cdot \frac{300 + 12}{2}$$

$$= \underline{218,400 \text{ SF}}$$

$$\text{TOTAL AREA} = 249,522 \text{ SF} \times 0.50 \text{ \$}$$

$$\text{COST} = \underline{\$124,761}$$

$$\text{TOTAL COST TO REMOVE} = \underline{\$918,926.92}$$

RAMP L

R.O.W. CALCULATIONS

PERLIS REALTY CO. - TOTAL TAKE

ESTIM. ACRES = 1.99 ACS

$$1.99 \text{ ACS} - \text{TOTAL TAKE} = \underline{\$750,000.00}$$

ELIJAH HENDERSON, JR.

$$A = 150 \left(\frac{26 + 18}{2} \right)$$

$$= 3300 \text{ SF} (.20)$$

$$= \underline{\$660.00}$$

TOTAL RIGHT OF WAY COST

$$\underline{\$750,660.00}$$

$$\textcircled{H} \quad 90 \text{ lbs/SY} (13,469 \text{ SYDS}) / 2000$$

$$= 606.10 \text{ TNS} \times \$85.00 = \underline{\$51,518.92}$$

$$\textcircled{I} \quad 145 \text{ lbs/SYDS} (13,469 \text{ SYDS}) / 2000$$

$$= 1111.19 \text{ TNS} \times \$85.00$$

$$= \underline{\$94,451.30}$$

$$\textcircled{J} \quad 440 \text{ lbs/SYDS} (13,469 \text{ SYDS}) / 2000$$

$$= 2963.18 \text{ TNS} \times \$85.00$$

$$= \underline{\$251,870.30}$$

$$\textcircled{K} \quad 660 \text{ lbs/SYDS} (13,469 \text{ SYDS}) / 2000$$

$$= 4444.77 \text{ TNS} \times \$85.00$$

$$= \underline{\$377,805.45}$$

$$\textcircled{L} \quad 110 \text{ lbs/SYDS} (13,469 \text{ SYDS}) / 2000$$

$$= 740.80 \text{ TNS} \times \$25.00$$

$$= \underline{\$18,519.88}$$

SUB TOTAL TO REMOVE NORTHBOUND ENTRANCE
 RAMP = \$794,165.92

TOTAL REDUCTION FOR RAMP L = 947,356.02
 (INCLUDES R.O.W. COST)

VALUE ENGINEERING ALTERNATIVE



PROJECT:	NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage	ALTERNATIVE NO.:	805-39
DESCRIPTION:	USE MECHANICALLY STABILIZED EMBANKMENT WALLS TO ELIMINATE BRIDGE END SPANS AT ROCKHOUSE ROAD	SHEET NO.:	1 of 4

ORIGINAL DESIGN: (Sketch attached)

The bridge has 2:1 end slopes with end span.

ALTERNATIVE: (Sketch attached)

Construct mechanically stabilized embankment (MSE) wall at Bents 2 and 4 to eliminate end spans.

ADVANTAGES:

- Reduces cost
- Less bridge to maintain

DISADVANTAGES:

- Eliminates end span and potential future location for additional lanes

DISCUSSION:

Construction of MSE walls eliminates the construction of two end spans and two intermediate bents, reducing the construction cost of the bridge. Also, there is less bridge area to maintain. The negative is that, if additional space is needed for lanes in the future, the space provided by the end spans would not be available. However, this bridge is in a rural location, so the likelihood of needing that additional space is low.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 774,656	•	\$ 774,656
ALTERNATIVE	\$ 428,906	•	\$ 428,906
SAVINGS	\$ 345,750	•	\$ 345,750

SKETCHES



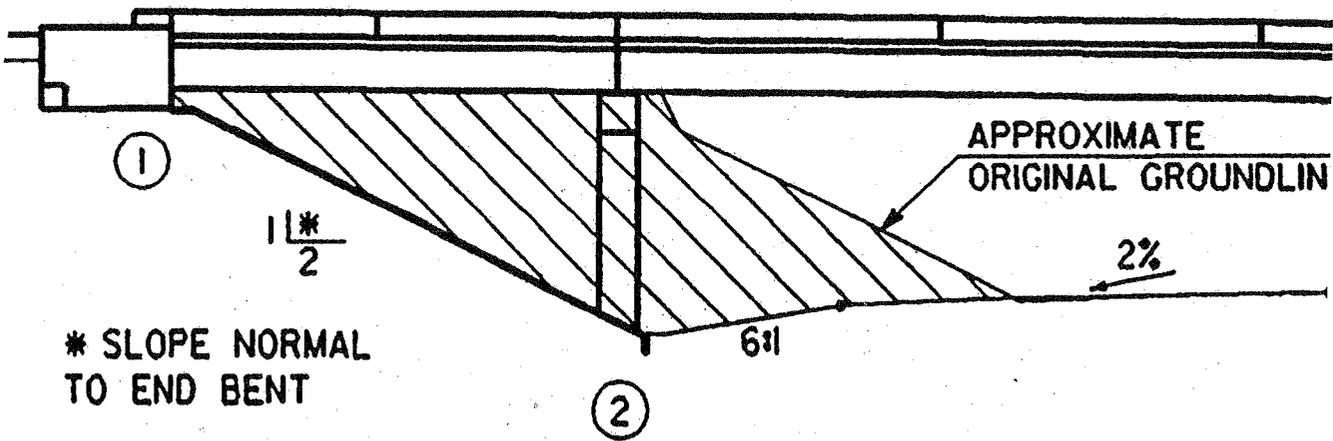
PROJECT: NHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765,
0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
Preliminary Design Stage

ALTERNATIVE NO.:

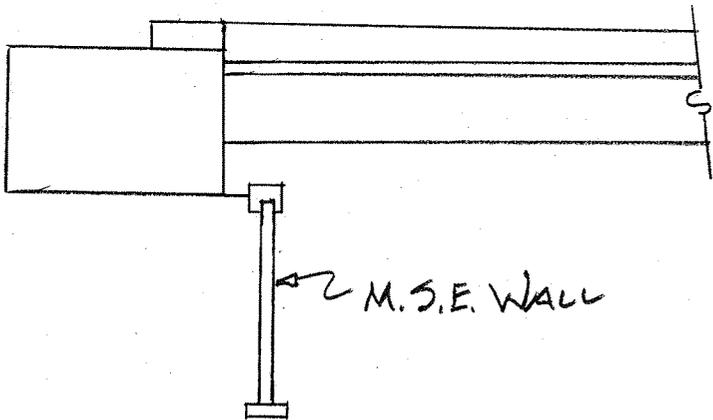
905-39

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: NNHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765,
0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
Preliminary Design Stage

ALTERNATIVE NO.:

805-39

SHEET NO.: 3 of 4

$$\text{Skew angle} = \alpha = 82-11$$

$$\text{Bridge width (out-to-out)} = 91.25$$

$$\text{Span 1 length} = 46.5$$

$$\text{Span 4 length} = 43.5$$

$$\text{Bridge area} = W [(L_1 + L_4) - 2(6)/\sin \alpha] = 7107 \text{ ft}^2$$

$$\text{Assume wall height} = 4' \text{ at end}$$

$$\text{Height under bridge} = H = 24$$

$$\begin{aligned} \text{Wall Area} &= 2[(W/\sin \alpha)H + .5(4 + H)[2(H - 4)/\sin \alpha](2)] \\ &= 6682 \text{ ft}^2 \end{aligned}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT:	NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage	ALTERNATIVE NO.:	804-2
DESCRIPTION:	USE MECHANICALLY STABILIZED EMBANKMENT WALLS TO ELIMINATE BRIDGE END SPANS AT INAHA ROAD	SHEET NO.:	1 of 4

ORIGINAL DESIGN: (Sketch attached)

The bridge has 2:1 end slopes with end span.

ALTERNATIVE: (Sketch attached)

Construct mechanically stabilized embankment (MSE) wall at Bents 2 and 4 to eliminate end spans.

ADVANTAGES:

- Reduces costs
- Less bridge to maintain

DISADVANTAGES:

- Eliminates end span and potential future location for additional lanes

DISCUSSION:

Construction of MSE walls eliminates the construction of two end spans and two intermediate bents, reducing the construction cost of the bridge. Also, there is less bridge area to maintain. The negative is that if additional space is needed for lanes in the future, the space provided by the end spans would not be available. However, this bridge is in a rural location, so the likelihood of needing that additional space is low.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 520,663	•	\$ 520,663
ALTERNATIVE	\$ 366,483	•	\$ 366,483
SAVINGS	\$ 154,180	•	\$ 154,180

SKETCHES



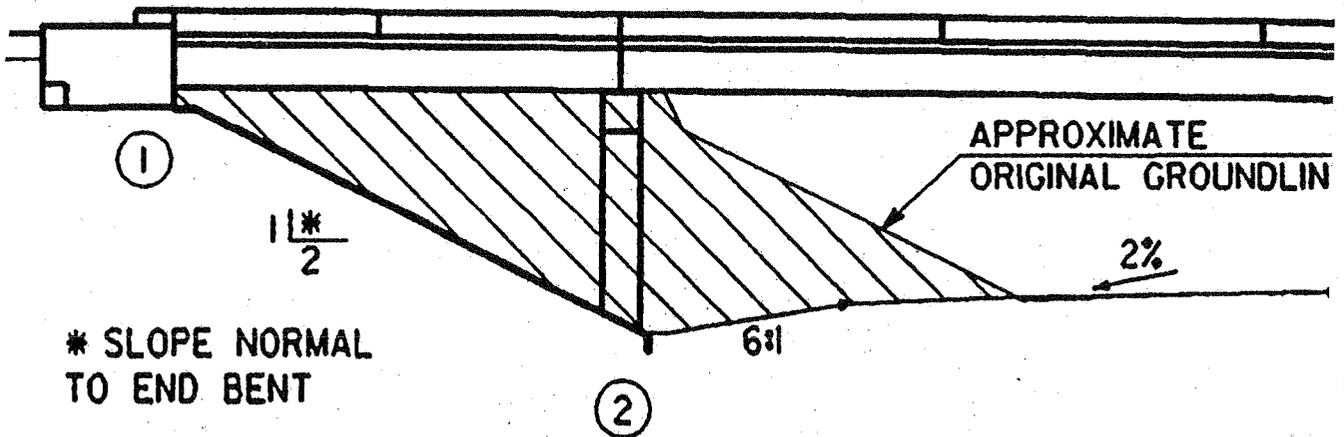
PROJECT: NHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
Preliminary Design Stage

ALTERNATIVE NO.:

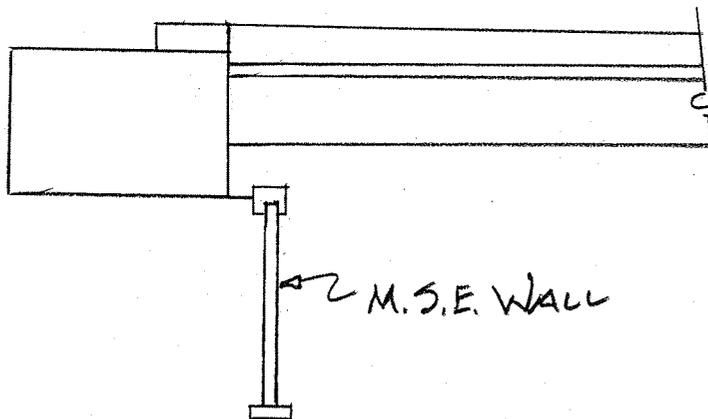
B04-2

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage**

ALTERNATIVE NO.: **804-2**

SHEET NO.: **3 of 4**

Skew angle = $\alpha = 78.57$

Bridge width (out-to-out) = 45.25

Span 1 length = 38

Span 4 length 47

Bridge area = $W [(L_1 + L_4) - 2(6)/\sin \alpha] = 3293 \text{ ft}^2$

Assume wall height = 4' at end

Height under bridge = $H = 22$

Wall Area = $2[(W/\sin \alpha)H + .5(4 + H)[2(H - 4)/\sin \alpha](2)]$
 $= 3936 \text{ ft}^2$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage**

ALTERNATIVE NO.: **804-3**

DESCRIPTION: **DO NOT RELOCATE SUMNER ROAD**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The current design shows pavement limits for the relocation of Sumner Road.

ALTERNATIVE: (Sketch attached)

Do not relocate Sumner Road.

ADVANTAGES:

- Reduces costs
- Simplifies design
- Simplifies construction
- Reduces overall work effort

DISADVANTAGES:

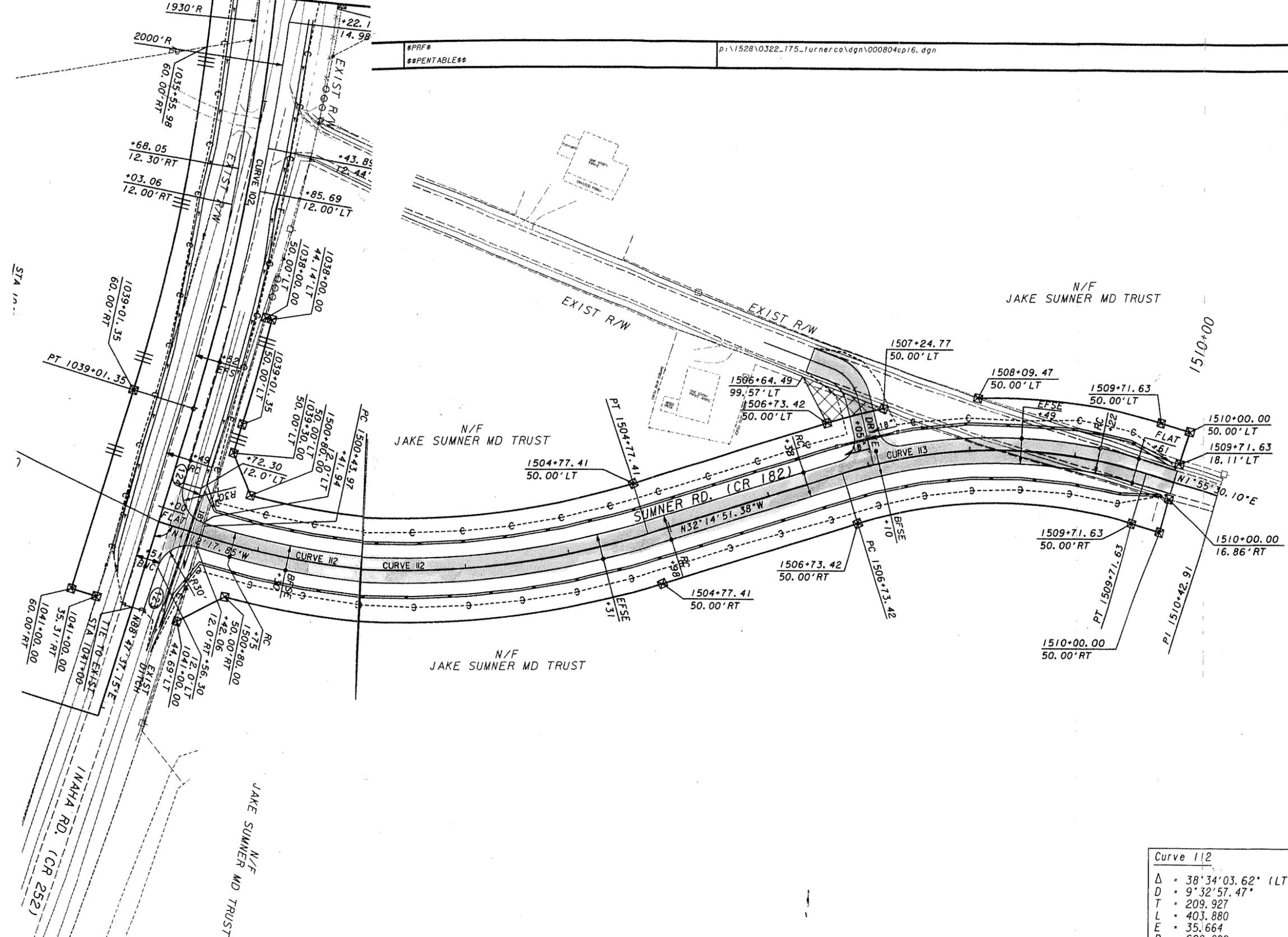
- Shorter distance between road and ramp
- Challenges a Department preference

DISCUSSION:

By not relocating Sumner Road, there will be ±300 feet between the existing Sumner Road intersection and Ramp B. Although this is a direct challenge to a Department preference, the cost of relocating of Sumner Road warrants a second look.

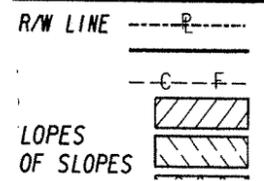
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 248,200	•	\$ 248,200
ALTERNATIVE	\$ 0	•	\$ 0
SAVINGS	\$ 248,200	•	\$ 248,200

804-3
 2 of 4



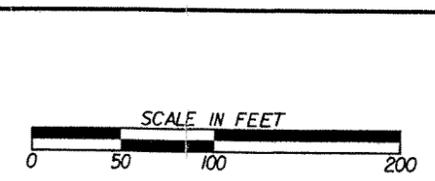
Curve 112	
Δ	38°34'03.62" (LT)
D	9°32'57.47"
T	209.927
L	403.880
E	35.664
R	600.000
PI STA	1502+53.091
N	592664.784
E	2481545.803
S.E.	?

Curve 113	
Δ	41°41'55.59" (RT)
D	11°27'32.96"
T	190.426
L	363.890
E	35.034
R	500.000
PI STA	1507+21.053
N	593036.725
E	2481236.200
S.E.	?



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

URS
 400 NORTHPARK TOWN CENTER
 1000 ABERNATHY ROAD, N.E., SUITE 900
 ATLANTA, GEORGIA 30328
 TEL: (478) 898-8800 FAX: (478) 898-8800



REVISION DATES	

CALCULATIONS



PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, ALTERNATIVE NO.:
0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS 804-3
Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
Preliminary Design Stage

Do Not Relocate Sumner Rd.

SHEET NO.: 3 of 4

$$\text{Asphalt Paving} - (988 \times 28) + (110 \times 28) + (280 \times 2) + (210 \times 2) =$$
$$31,724 \div 9 =$$

352559

$$15" \text{ Pipe} - 155 \text{ LF}$$

$$\text{Silt Fence} - (988 \times 2) + (110 \times 2) = 2196 \text{ LF}$$

$$\text{Excavation} - 2050 \text{ CY}$$

$$\text{Check Dams} - 2 \text{ Ea}$$

$$\text{R/W} - 988 \times 100 \div 43560 = 2.3 \text{ AC}$$

$$\text{Paint Markings} - 1098 \times 3 = 3294 \text{ LF}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT:	NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 <i>Preliminary Design Stage</i>	ALTERNATIVE NO.: 804-7
DESCRIPTION:	REDUCE BRIDGE WIDTH AT SR 32 (JEFFERSON DAVIS HIGHWAY) OVER HAT CREEK TO MATCH BRIDGE POLICY MANUAL	SHEET NO.: 1 of 3

ORIGINAL DESIGN:

The bridge over Hat Creek has four lanes at 12 feet with a 20-foot median and two shoulders at 10 feet.

ALTERNATIVE:

Provide a new bridge with four lanes at 12 feet with a 20-foot median and two shoulders at 8 feet.

ADVANTAGES:

- Reduces initial bridge cost
- Complies with GDOT policy
- Less bridge to maintain

DISADVANTAGES:

- None apparent

DISCUSSION:

The GDOT Bridge and Structures Policy Manual defines widths for bridges for both state routes and non-state routes. Reducing the bridge width to the alternative width reduces the cost of the bridge and provides a bridge width in compliance with the Manual. The average daily traffic count at this site is 2,500 vehicles per day, the speed design is 45 mph, and this is a state route, so the shoulder width should be 8 feet.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 2,034,761	•	\$ 2,034,761
ALTERNATIVE	\$ 1,946,218	•	\$ 1,946,218
SAVINGS	\$ 88,543	•	\$ 88,543

CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764,
0008458, 0000765, 0000803, 0000804, and 0000805; I-75
INTERCHANGE IMPROVEMENTS
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
*Preliminary Design Stage***

ALTERNATIVE NO.: **804-7**

SHEET NO.: **2 of 3**

Bridge Length = 180'

Proposed bridge width (out-to-out) = 91.92'

Proposed bridge area = 16546 ft²

Alternative bridge width (out-to-out) = 87.92'

Alternative bridge area = 15826 ft²

VALUE ENGINEERING ALTERNATIVE



PROJECT:	NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 <i>Preliminary Design Stage</i>	ALTERNATIVE NO.: 804-8
DESCRIPTION:	USE MECHANICALLY STABILIZED EMBANKMENT WALLS TO ELIMINATE BRIDGE END SPANS AT JEFFERSON DAVIS HIGHWAY	SHEET NO.: 1 of 4

ORIGINAL DESIGN: (Sketch attached)

The bridge has 2:1 end slopes with end span.

ALTERNATIVE: (Sketch attached)

Construct mechanically stabilized embankment (MSE) wall at Bents 2 and 4 to eliminate end spans.

ADVANTAGES:

- Reduces costs
- Less bridge to maintain

DISADVANTAGES:

- Eliminates end span and potential future location for additional lanes

DISCUSSION:

Construction of MSE walls eliminates the construction of two end spans and two intermediate bents, reducing the construction cost of the bridge. Also, there is less bridge area to maintain. The negative is that if additional space is needed for lanes in the future, the space provided by the end spans would not be available. However, this bridge is in a rural location, so the likelihood of needing that additional space is low.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,329,406	•	\$ 1,329,406
ALTERNATIVE	\$ 758,570	•	\$ 758,570
SAVINGS	\$ 570,836	•	\$ 570,836

SKETCHES



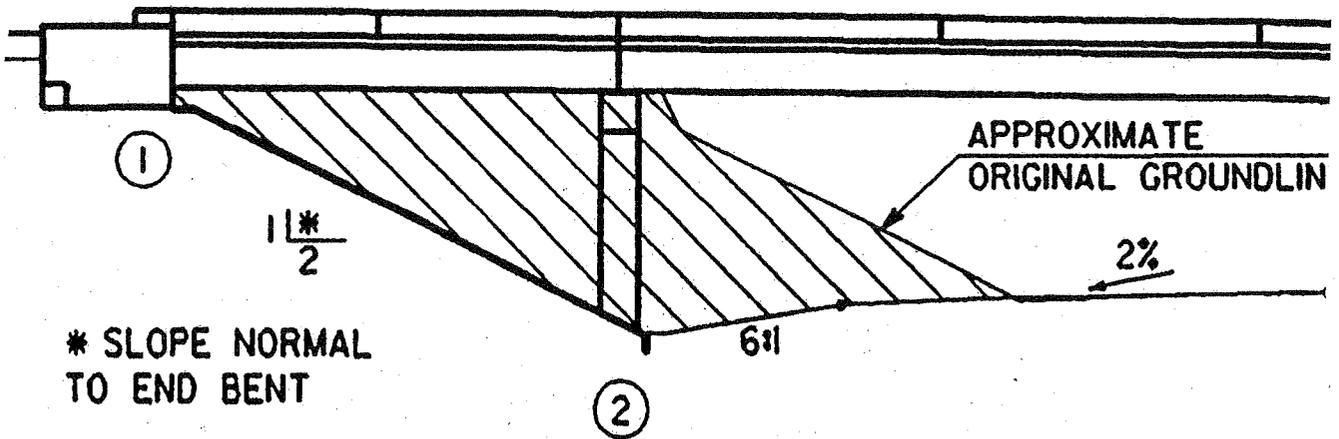
PROJECT: NHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765,
0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
Preliminary Design Stage

ALTERNATIVE NO.:

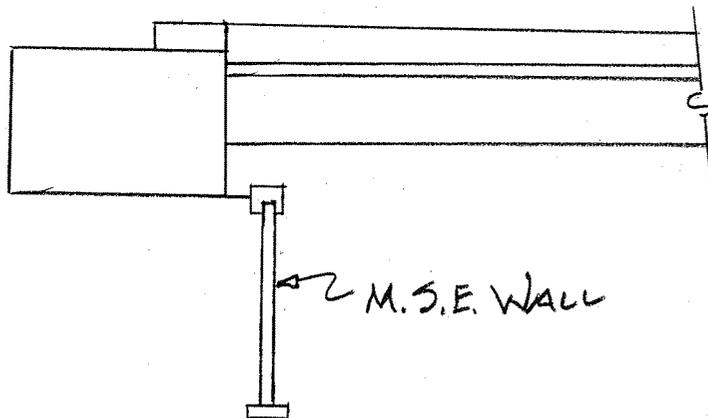
804-B

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764,
0008458, 0000765, 0000803, 0000804, and 0000805; I-75
INTERCHANGE IMPROVEMENTS
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
Preliminary Design Stage**

ALTERNATIVE NO.: **804-8**

SHEET NO.: **3 of 4**

Skew angle = $\alpha = 46-34$

Bridge width (out-to-out) = 91.92

Span 1 length = 52

Span 4 length = 56

Bridge area = $W [(L_1 + L_4) - 2(6)/\sin \alpha] = 8408 \text{ ft}^2$

Assume wall height = 4' at end

Height under bridge = $H = 22$

Wall Area = $2[(W/\sin \alpha)H + .5(4 + H)[2(H - 4)/\sin \alpha](2)]$
 $= 8147 \text{ ft}^2$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **804-16**

DESCRIPTION: **LEAVE THE BUSSEY ROAD INTERCHANGE AS IS** SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

The current design calls for the removal of the existing Bussey Road Interchange bridge and replacing it with a longer bridge to accommodate future I-75 widening to four lanes in each direction. The design also removes and replaces 12 feet of outside shoulder on I-75 for the future widening of I-75.

ALTERNATIVE:

Leave the Bussey Road interchange as is.

ADVANTAGES:

- Cost savings up front
- Eliminates potentially unneeded work
- May never be required
- Reduces construction time
- Precludes expenditure of capital costs needed elsewhere

DISADVANTAGES:

- Increases future cost to accommodate an additional fourth lane on I-75
- Substandard horizontal clearance on I-75

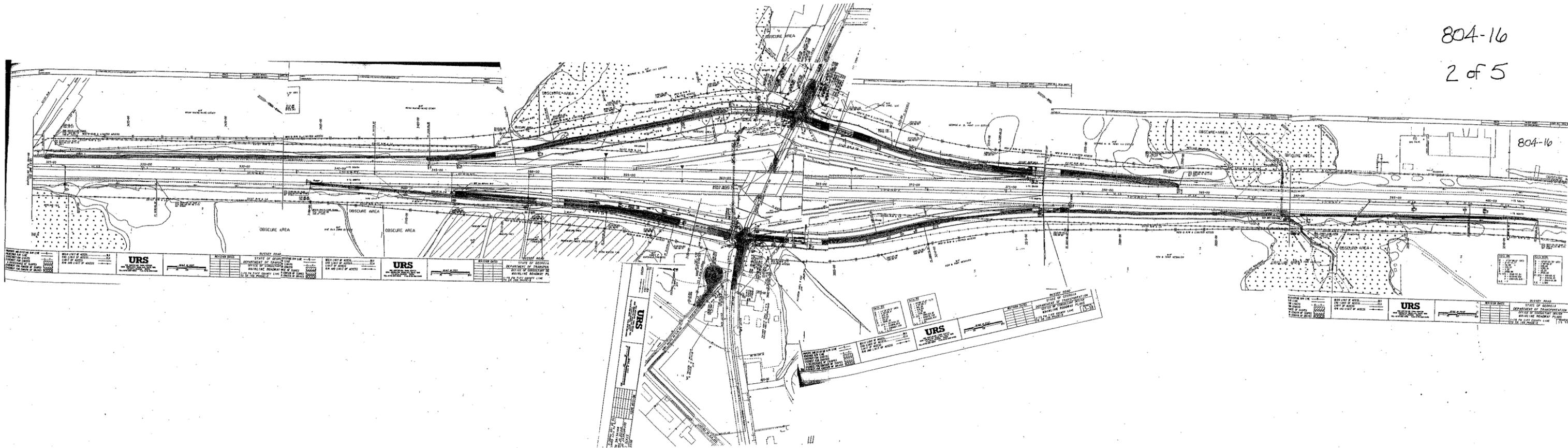
DISCUSSION:

This is a rural widening of I-75 with a low average daily traffic count. The addition of the fourth lane to I-75 is a long-range project and may never be constructed. As such, expenditure of this capital should be avoided or used elsewhere in the State for needed improvements.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 4,862,105	•	\$ 4,862,105
ALTERNATIVE	\$ 0	•	\$ 0
SAVINGS	\$ 4,862,105	•	\$ 4,862,105

804-16

2 of 5



804-16

URS		STATE OF ARIZONA		URS	
DEPARTMENT OF TRANSPORTATION		DEPARTMENT OF TRANSPORTATION		DEPARTMENT OF TRANSPORTATION	
DIVISION OF HIGHWAY DESIGN		DIVISION OF HIGHWAY DESIGN		DIVISION OF HIGHWAY DESIGN	
PROJECT NO. 100-0000000000000000		PROJECT NO. 100-0000000000000000		PROJECT NO. 100-0000000000000000	
SHEET NO. 100-0000000000000000		SHEET NO. 100-0000000000000000		SHEET NO. 100-0000000000000000	

URS		STATE OF ARIZONA		URS	
DEPARTMENT OF TRANSPORTATION		DEPARTMENT OF TRANSPORTATION		DEPARTMENT OF TRANSPORTATION	
DIVISION OF HIGHWAY DESIGN		DIVISION OF HIGHWAY DESIGN		DIVISION OF HIGHWAY DESIGN	
PROJECT NO. 100-0000000000000000		PROJECT NO. 100-0000000000000000		PROJECT NO. 100-0000000000000000	
SHEET NO. 100-0000000000000000		SHEET NO. 100-0000000000000000		SHEET NO. 100-0000000000000000	

URS		STATE OF ARIZONA		URS	
DEPARTMENT OF TRANSPORTATION		DEPARTMENT OF TRANSPORTATION		DEPARTMENT OF TRANSPORTATION	
DIVISION OF HIGHWAY DESIGN		DIVISION OF HIGHWAY DESIGN		DIVISION OF HIGHWAY DESIGN	
PROJECT NO. 100-0000000000000000		PROJECT NO. 100-0000000000000000		PROJECT NO. 100-0000000000000000	
SHEET NO. 100-0000000000000000		SHEET NO. 100-0000000000000000		SHEET NO. 100-0000000000000000	

CALCULATIONS



PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765,
 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
 Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
 Preliminary Design Stage

ALTERNATIVE NO.:
 804-16

Do Nothing to the Bussey Rd. Interchange

SHEET NO.: 3 of 5

Pavement Conc

$$\text{Ramp I} - (2255.50 \text{ LF} \times 28') + (555 \times 12) + (750 \times 10) + (280 \times 2) =$$

$$77874 \text{ SF} \div 9 = 8653 \text{ SY}$$

$$\text{Ramp J} - (1717.83 \text{ LF} \times 28') + (2446 \times 12) + (125 \times 12) + (280 \times 2) =$$

$$79,511 \text{ SF} \div 9 = 8,835 \text{ SY}$$

$$\text{Ramp K} - (1238.71 \text{ LF} \times 28') + (800 \times 12) + (475 \times 12) + (280 \times 2) =$$

$$50,544 \div 9 = 5,616 \text{ SY}$$

$$\text{Ramp L} - (1940.68 \text{ LF} \times 28') + (2000 \times 12) + (125 \times 12) + (280 \times 2) =$$

$$80,399 \div 9 = 8,933 \text{ SY}$$

Leveling - 10 Tons

32,037 SY

Drainage

Culvert - 110 LF = 67.2 CY Class A Concrete

15" Pipe - 220 LF

Silt Fence - 3940 + 2255 + 2038 + 4175 = 11808 LF

Check Dams - 24 Ea

Excavation - 6000 CY

Pavement Markings - 11808 LF \times 2 = 23616 LF

Asphalt Pav⁴ - $(3.14 \times 50^2) + (70 \times 20) = 9250 \text{ SF} \div 9 = 1028 \text{ SY}$

CALCULATIONS



PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765,
0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
Preliminary Design Stage

ALTERNATIVE NO.:
804-16

Continued

SHEET NO.: 4 of 5

R/W-

$$\text{Ramp I} - 61' \times 2100 \text{ LF} = 128,100 \text{ SF}$$

$$\text{Ramp J} - 100' \times 2600 \text{ LF} = 260,000 \text{ SF}$$

$$\text{Ramp K} - 100' \times 2000 \text{ LF} = 200,000 \text{ SF}$$

$$\text{Ramp L} - (1150 \times 70 \div 2) + (190' \times 1700) = 368,250 \text{ SF}$$

$$951,350 \text{ SF} \div 43560 = 21.8 \text{ AC}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **804-17**

DESCRIPTION: **LEAVE THE EAST WASHINGTON ROAD INTERCHANGE AS IS** SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

The current design calls for the removal of the existing bridge and replacing it with a longer bridge to accommodate future I-75 widening to four lanes in each direction. The design also removes and replaces 12 feet of outside shoulder on I-75 for the future widening of I-75.

ALTERNATIVE:

Leave the East Washington Road interchange as is.

ADVANTAGES:

- Cost savings up front
- Eliminates potentially unneeded work
- May never be required
- Reduces construction time
- Precludes expenditure of capital costs needed elsewhere

DISADVANTAGES:

- Increases future cost to accommodate an additional fourth lane on I-75
- Substandard horizontal clearance on I-75

DISCUSSION:

This is a rural widening of I-75 with a low average daily traffic count. The addition of the fourth lane to I-75 is a long-range project and may never be constructed. As such, expenditure of this capital should be avoided or used elsewhere in the State for needed improvements.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 6,084,698	•	\$ 6,084,698
ALTERNATIVE	\$ 0	•	\$ 0
SAVINGS	\$ 6,084,698	•	\$ 6,084,698

CALCULATIONS



PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
 Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
 Preliminary Design Stage

ALTERNATIVE NO.:
 804-17

Do Nothing to the E. Washington Rd. Interchange

SHEET NO.: 3 of 5

Conc. Pavement

$$\text{Ramp M} - (2625 \times 28) + (744.24 \times 12) + (385 \times 12) + (280 \times 2) =$$

$$87,611.5F \div 9 = 9,735.59$$

$$\text{Ramp N} - (2111.2 \times 28) + (1961.97 \times 12) + (250 \times 12) + (280 \times 2) =$$

$$86,217.24 \div 9 = 9,580.59$$

$$\text{Ramp O} - (1370 \times 28) + (737.52 \times 12) + (438 \times 12) + (280 \times 2) =$$

$$53,026.5F \div 9 = 5,892.59$$

$$\text{Ramp P} - (2126.17 \times 28) + (2011.31 \times 12) + (280 \times 2) =$$

$$84,228.5F \div 9 = 9,359.59$$

34,546.59

Leveling - 20 Tons

$$\text{Asphalt Pav't} - (2610 \times 24) + (280 \times 2) + 2625 (\text{Ride share}) =$$

$$63,200.5F \div 9 = 7,022.59$$

15" Pipe - 65 LF

24" Pipe - 180 LF

$$\text{Silt Fence} - 3369 + 4073 + 2098 + 4137 + 4000 + 600 = 18,877 LF$$

Check Dams - 34 Ea

Excavation - 12,000 CY

Borrow - 15,000 CY

CALCULATIONS



PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765,
0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
Preliminary Design Stage

ALTERNATIVE NO.:
804-17

Continued

SHEET NO.: 4 of 5

$$\text{Pavement Markings} - (13,680 \text{ LF} \times 2) + (4700 \times 3) = 41,460 \text{ LF}$$

$$\text{R/W} - \text{Ramp M} - 350' \times 2500 = 875,000 \text{ SF}$$

$$\text{Ramp N} - 360' \times 2200 = 792,000 \text{ SF}$$

$$\text{Ramp O} - 40' \times 1250 = 50,000 \text{ SF}$$

$$\text{Ramp P} - 20' \times 800 = 16,000 \text{ SF}$$

$$\text{Reloc. Peacock Rd} - 100' \times 2300 = 230,000$$

$$1,963,000 \text{ SF} \div 43,560 = 45.1 \text{ Ac}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **804-22**

DESCRIPTION: **CUL-DE-SAC EWING FARM ROAD AT NORTH STREET** SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The current design calls for Ewing Farm Road to intersect SR 159 approximately 600 feet from the on/off ramps intersection.

ALTERNATIVE:

Cul-de-sac Ewing Farm Road at North Street.

ADVANTAGES:

- Initial cost savings
- Eliminates unneeded work
- Alternate route is available
- Reduces construction time
- Simplifies design and construction

DISADVANTAGES:

- Additional access travel of about three miles
- Loss of amenity

DISCUSSION:

Very few residents would benefit from the Ewing Farm Road extension and, although an acknowledgement is made of having to travel an additional three miles, savings nearing \$600,000 warrant a re-evaluation of this proposed work.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 594,652	•	\$ 594,652
ALTERNATIVE	\$ 3,821	•	\$ 3,821
SAVINGS	\$ 590,831	•	\$ 590,831

CALCULATIONS



PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765,
 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
 Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
 Preliminary Design Stage

ALTERNATIVE NO.:

804-22

SHEET NO.: 3 of 4

ROADWAY PAVEMENT: 24' WIDTH

$$L = (5543 + 41.73) - (5500 + 00.00) = \underline{4,342'}$$

COST:	12.5 mm \Rightarrow	$\frac{1}{4}(24' \times 1')$	(165 #/SY)	$\frac{1}{2000}$	(78.47 $\frac{\$}{ft}$)	=	17.26
	19 mm \Rightarrow	"	(220)	"	(65.12)	=	19.10
	25 mm \Rightarrow	"	(330)	"	(42.71)	=	18.79
	12" GAB \Rightarrow	"	(135)	$\frac{1}{2000}$	(15.95)	=	2.87

$\Sigma = \$58.02/ft$

R/W 100' W

CALC-DE-SAC \Rightarrow 20' R $\Rightarrow \pi(20')^2 \times \frac{1}{4} = 139.654$

CLRG & GRABBING \Rightarrow 10 $\$/sf$

SURFACE TREATMENT (AGGR/DIRT RD.) \Rightarrow 2 $\$/sf$

$139.6 \times 12 \frac{\$}{sf} = \$1,675.2$

BARRICADE \Rightarrow \$500

$\$2,175$ TOTAC

R/W \Rightarrow

120' x	[556612.35 - 550000]	=	43,560	=	1.69 AC
100'	[551480.00 - 550612.35]	+	"	=	2.00
VARIES $(\frac{150-75}{2})$	[552111.62 - 551480.00]	"	"	=	1.63
75'	[554106.6 - 552111.62]	"	"	=	3.44

$\Sigma = 8.76$ AC

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS**
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
Preliminary Design Stage

ALTERNATIVE NO.: **803-3**

DESCRIPTION: **CUL-DE-SAC CARRINGTON DREXLER ROAD**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The current design relocates Carrington Drexler Road parallel to the new I-75 northbound off ramp at the Brighton Road interchange. The relocated Carrington Drexler Road terminates at Brighton Road with an off-set intersection approximately 600 feet from the off/on ramps of the interchange.

ALTERNATIVE:

Cul-de-sac Carrington Drexler Road.

ADVANTAGES:

- Initial cost savings
- Eliminates unneeded work
- Alternate route is available
- Reduces construction time
- Simplifies design and construction

DISADVANTAGES:

- Additional access travel of about one mile
- Loss of amenity

DISCUSSION:

Few residents would benefit from the Carrington Drexler Road relocation, and although an acknowledgement is made of having to travel an additional mile, savings nearing \$900,000 warrant a reevaluation of this proposed work. Furthermore, safety is greatly enhanced at the Brighton Road/I-75 interchange.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 936,193	•	\$ 936,193
ALTERNATIVE	\$ 31,464	•	\$ 31,464
SAVINGS	\$ 904,729	•	\$ 904,729

CALCULATIONS



PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765,
 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
 Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
 Preliminary Design Stage

ALTERNATIVE NO.:

803-3

SHEET NO.: 3 of 4

ROADWAY PAVEMENT:

TYPICAL SECTION =>

$$L = (152995.07 - 152754.33) + (151568.66 - 150778.95) + (150376.9 - 150276.79) = \underline{1,131.06 \text{ LF}}$$

COST = 9.5 mm SP = (28' x 1') $\frac{1}{4}$ (135 $\frac{\text{#}}{\text{SY}}$) $\frac{1}{2000}$ (75 $\frac{\text{\$/T}}$) = \$ 15.75
 (LF) 19 mm SP = " (220 $\frac{\text{#}}{\text{SY}}$) " " = \$ 25.67
 25 mm SP = (29' x 1') $\frac{1}{4}$ (330 $\frac{\text{#}}{\text{SY}}$) " " = \$ 39.88
 GAB 8" = (29' x 1') $\frac{1}{4}$ (11.34 $\frac{\text{\$/SY}}$) = \$ 136.54

\$17.843/LF

S.E. SECTION =>

$$L = (153740.93 - 152995.07) + (152754.33 - 151568.66) + (150778.95 - 150376.9) = \underline{2,333 \text{ LF}}$$

COST (LF) = (37'-28' = 9' ADD'L)
 9' x (1/4) 135 (1/2000) 75 = \$ 5.06
 " 220 " " = \$ 8.25
 " 330 " " = \$ 12.38
 " 11.34 = \$ 11.34

37.03
+117.84
\$154.87 \$/LF

R/W => (1,131.06 + 2333) 135' \div 43,560 = 10.74 AC

Cal-De-Sac => 40' RAD = $\pi(40')^2(\frac{1}{4}) = 55954 \times 37.13 \frac{\text{\$/SY}}{\text{PUMNT}}$ (SEE 803-7)
= \$20,756

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **803-7**

DESCRIPTION: **LEAVE THE WESLEY RIGDON ROAD OVERPASS AS IS** SHEET NO.: **1 of 5**

ORIGINAL DESIGN:

The current design calls for the removal of the existing Rigdon Road overpass bridge and replacing it with a longer bridge to accommodate future I-75 widening to four lanes in each direction. The design also removes and replaces 12 feet of outside shoulder on I-75 for the future widening of I-75.

ALTERNATIVE:

Leave the Wesley Rigdon Road overpass as is.

ADVANTAGES:

- Cost savings up front
- Eliminates potentially unneeded work
- May never be required
- Reduces construction time
- Precludes expenditure of capital costs needed elsewhere

DISADVANTAGES:

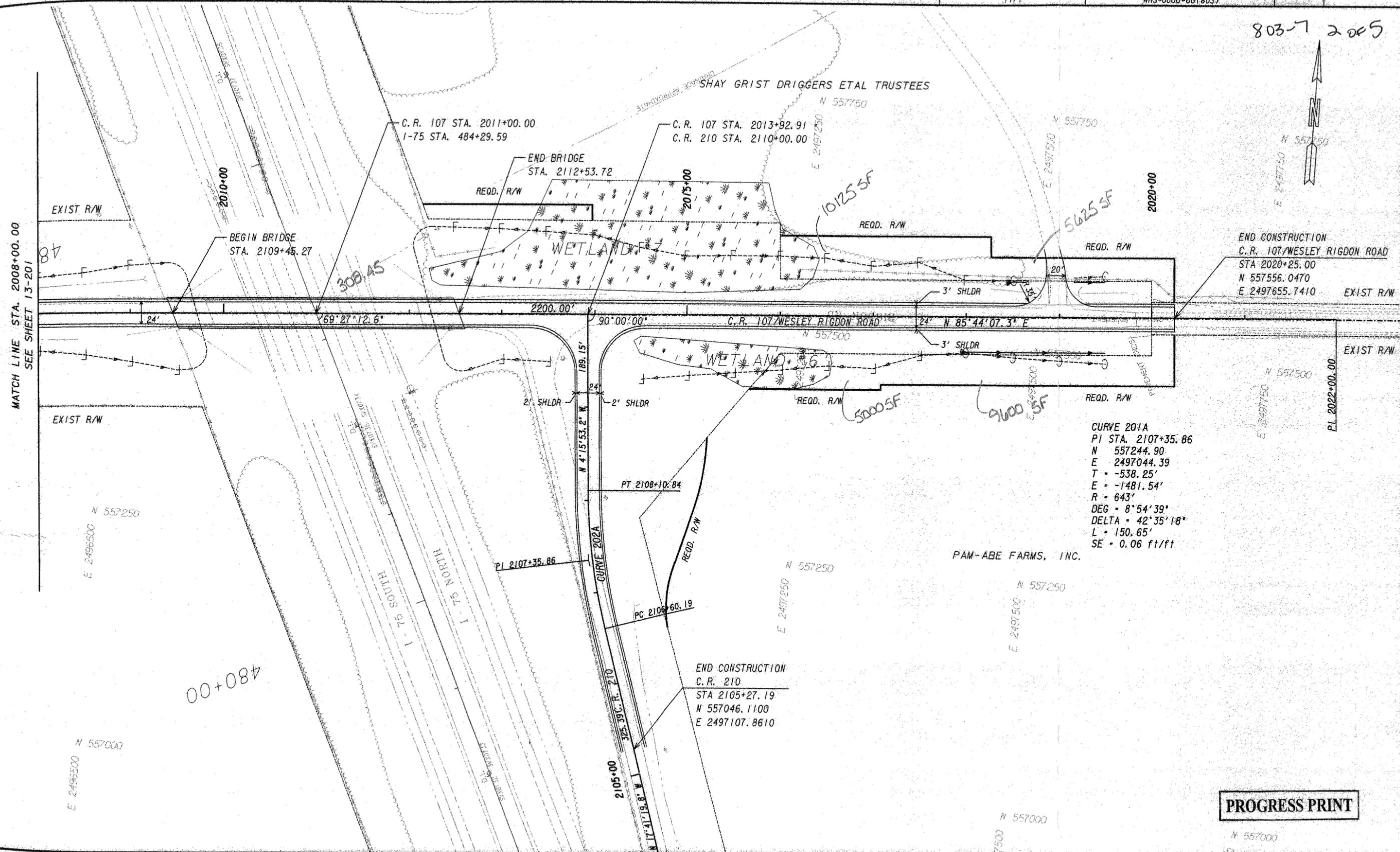
- Increases future cost to accommodate an additional fourth lane on I-75
- Substandard horizontal clearance on I-75

DISCUSSION:

This is a rural widening of I-75 with a low average daily traffic count. The addition of the fourth lane to I-75 is a long-range project and may never be constructed. As such, expenditure of this capital should be avoided or used elsewhere in the State for needed improvements.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 3,247,020	•	\$ 3,247,020
ALTERNATIVE	\$ 0	•	\$ 0
SAVINGS	\$ 3,247,020	•	\$ 3,247,020

803-7 2005



PROGRESS PRINT

PROPERTY AND EXISTING R/W LINE ———
 REQUIRED R/W LINE ———
 CONSTRUCTION LIMITS ———
 EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES [Hatched Box]
 EASEMENT FOR CONSTR OF SLOPES [Hatched Box]

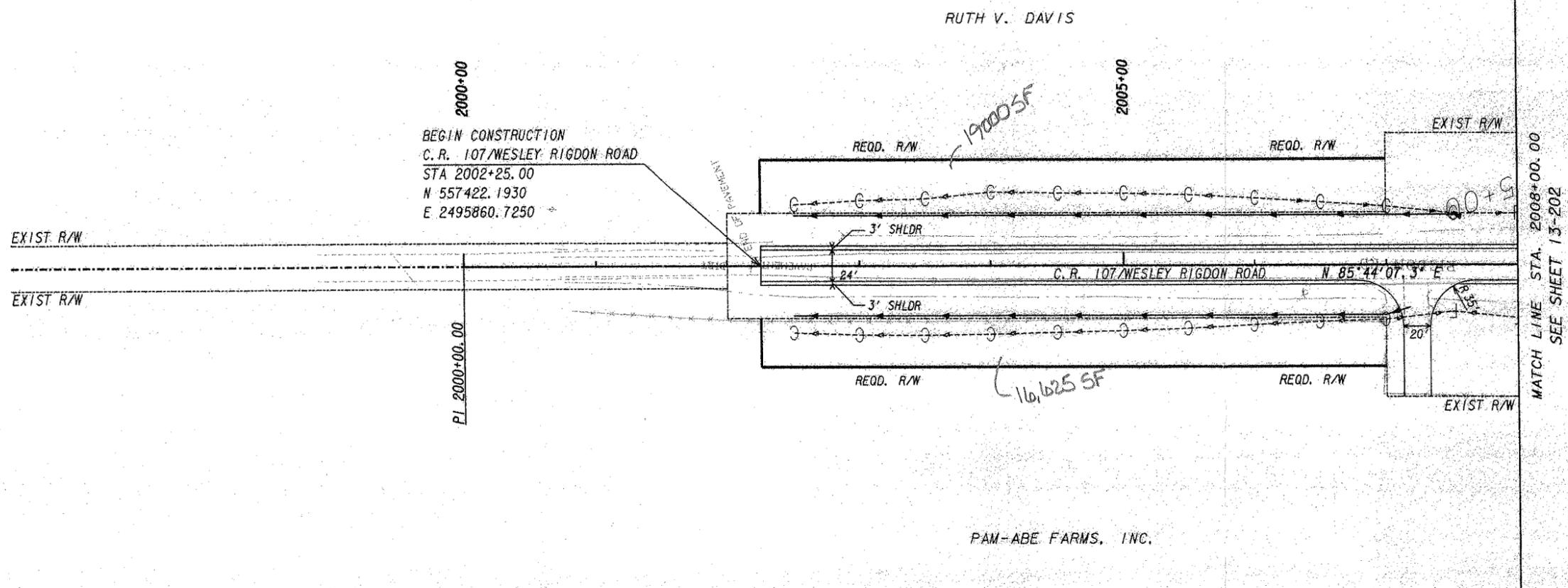
END LIMIT OF ACCESS.....ELA
 LIMIT OF ACCESS ———
 REQ'D R/W & LIMIT OF ACCESS ———
 SCALE IN FEET
 0 50 100 200

PARSONS
 5390 TRIANGLE PARKWAY, SUITE 100
 NORCROSS, GA 30092

REVISION DATES

STATE OF GEORGIA
 DEPARTMENT OF TRANSPORTATION
 OFFICE: CONSULTANT DESIGN
MAINLINE PLAN
 CR 107/WESLEY RIGDON ROAD

803-7
3 of 5



BEGIN CONSTRUCTION
C.R. 107/WESLEY RIGDON ROAD
STA 2002+25.00
N 557422.1930
E 2495860.7250

RUTH V. DAVIS

PAM-ABE FARMS, INC.

MATCH LINE STA. 2008+00.00
SEE SHEET 13-202

PROGRESS PRINT

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

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

PARSONS

REVISION DATES

STATE OF GEORGIA
 DEPARTMENT OF TRANSPORTATION
 OFFICE: CONSULTANT DESIGN
MAINLINE PLAN

CALCULATIONS



PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
 Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
 Preliminary Design Stage

ALTERNATIVE NO.:
 803-7

Do Nothing to Wesley Rigdon Rd Overpass

SHEET NO.: 4 of 5

$$\text{Wesley Rigdon Rd} - 1800 \text{ LF} - 308.45 \text{ (bridge)} = 1,491.55 \text{ LF} \times 30 \div 9 = 4972.59$$

$$\text{CR 210} - 472.81 \text{ LF} \times 28' \div 9 = 1471.54$$

$$\text{Driveways (2)} - (280 \text{ SF}(2) + 20 \times 50) + (280 \text{ SF}(2) + 85 \times 20) = \frac{3820}{9} = 424.59$$

$$\text{Silt Fence} - 1,491.55 \times 2 = \underline{2983 \text{ LF}}$$

$$\underline{6867.59}$$

$$\text{R/W} - 19,000 + 16,625 + 10,125 + 5,625 + 5,000 + 9,600 = 70,975 \text{ SF} \div 43,560 = \underline{1.6 \text{ Ac.}}$$

$$+ 5,000$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **803-9**

DESCRIPTION: **USE MECHANICALLY STABILIZED EMBANKMENT WALLS TO ELIMINATE BRIDGE END SPANS AT WESLEY RIGDON ROAD** SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The bridge has 2:1 end slopes with end span.

ALTERNATIVE: (Sketch attached)

Construct mechanically stabilized embankment (MSE) wall at Bents 2 and 4 to eliminate end spans.

ADVANTAGES:

- Reduces costs
- Less bridge to maintain

DISADVANTAGES:

- Eliminates end span and potential future location for additional lanes

DISCUSSION:

Construction of MSE walls eliminates the construction of two end spans and two intermediate bents, reducing the construction cost of the bridge. Also, there is less bridge area to maintain. The negative is that if additional space is needed for lanes in the future, the space provided by the end spans would not be available. However, this bridge is not at an interchange and is in a rural location, so the likelihood of needing that additional space is low.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 495,245	•	\$ 495,245
ALTERNATIVE	\$ 190,734	•	\$ 190,734
SAVINGS	\$ 304,511	•	\$ 304,511

SKETCHES



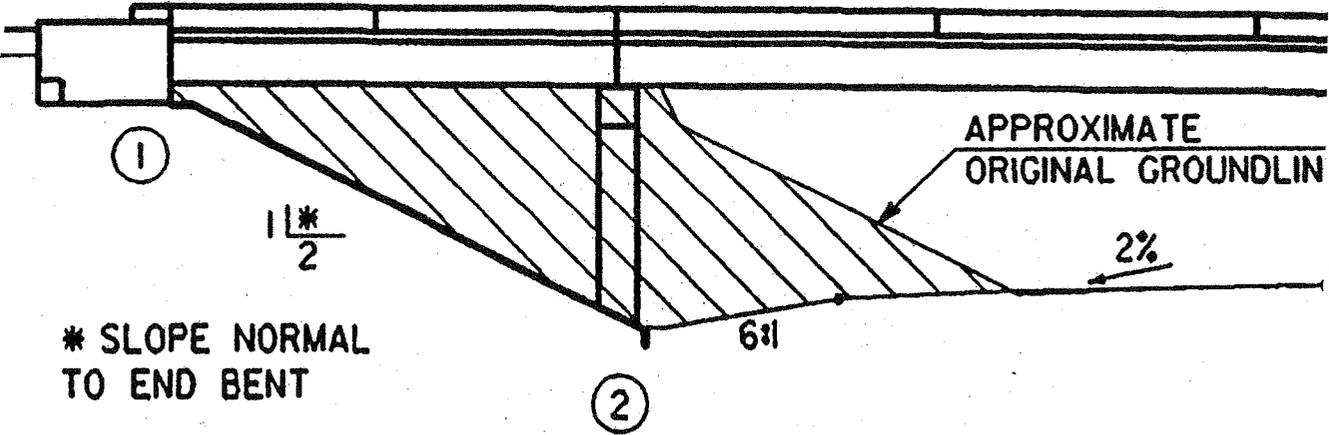
PROJECT: NHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765,
0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
Preliminary Design Stage

ALTERNATIVE NO.:

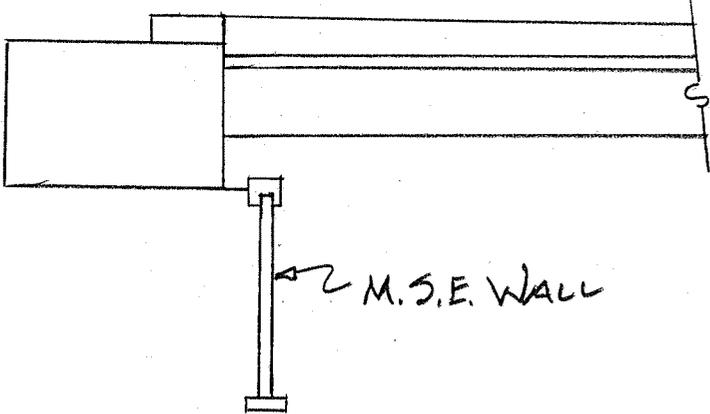
803-9

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764,
0008458, 0000765, 0000803, 0000804, and 0000805; I-75
INTERCHANGE IMPROVEMENTS
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
*Preliminary Design Stage***

ALTERNATIVE NO.: **803-9**

SHEET NO.: **3 of 4**

Skew angle = $\alpha = 69-27$

Bridge width (out-to-out) = 33.25

Span 1 length = 61

Span 4 length = 61

Bridge area = $W [(L_1 + L_4) - 2(6)/\sin \alpha] = 3630 \text{ ft}^2$

Assume wall height = 4' at end

Height under bridge = $H = 17$

Wall Area = $2[(W/\sin \alpha)H + .5(4 + H)[2(H - 4)/\sin \alpha](2)]$
 $= 2374 \text{ ft}^2$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **803-10**

DESCRIPTION: **ELIMINATE THE WESLEY RIGDON ROAD OVERPASS** SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The current design calls for the removal of the existing Rigdon Road overpass bridge and replacing it with a longer bridge to accommodate future I-75 widening to four lanes in each direction. The design also removes and replaces 12 feet of outside shoulder on I-75 for the future widening of I-75.

ALTERNATIVE:

Remove the Wesley Rigdon Road overpass bridge and cul-de-sac the road at both ends.

ADVANTAGES:

- Cost savings up front
- Eliminates potentially unneeded work
- May never be required
- Reduces construction time
- Precludes expenditure of capital costs needed elsewhere

DISADVANTAGES:

- Access diverted approximately 1.5 miles

DISCUSSION:

The principal reason for this bridge replacement is the potential addition of a fourth lane to I-75. The addition of the fourth lane to I-75 is a long-range project and may never be constructed. As such, expenditure of this capital should be avoided or used elsewhere in the State for needed improvements.

In addition, the average daily traffic count on the Wesley Rigdon bridge is very low and the bridge itself has a low sufficiency rating. This, coupled with the uncertainty of the future fourth lane on I-75 and the high cost of replacement, warrants another look.

It is acknowledged that an additional 1.5 miles would have to be traveled to make the appropriate connections.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 3,019,635	•	\$ 3,019,635
ALTERNATIVE	\$ 235,510	•	\$ 235,510
SAVINGS	\$ 2,784,125	•	\$ 2,784,125

CALCULATIONS



PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, ALTERNATIVE NO.:
 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
 Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
 Preliminary Design Stage

803-10

SHEET NO.: 2 of 3

$$\text{WESLEY RIGDON RD.} = 1800 \text{ LF} - 308.45 (\text{AP}) = 1491.55 \text{ LF} \div 30 \div 9 = \underline{57.25 \text{ SY}}$$

$$\text{CR 10} = 472.81 \text{ LF} \times 28' \div 9 = \underline{1471 \text{ SY}}$$

$$\text{DRIVEWAYS} = (x2) \Rightarrow (280 \text{ SF}(2) + 20' \times 50') + (280 \text{ SF}(2) + 85' \times 20') = 3820' \div 9 = \underline{6867 \text{ SY}}$$

$$\text{SILT FENCE} = 1491.55 \times 2 = \underline{2983 \text{ LF}}$$

$$\text{R/W} = 19,000 + 16,625 + 10,125 + 5,625 + 5,000 + 9,600 = 70,975 \text{ SF} \div 43,560 = \underline{1.6 \text{ AC}}$$

CUC-DE-SAC

$$40' \text{ DIA.} = \pi(20')^2 \times 1/4 = 140 \text{ SY}$$

$$\text{CLEARING + GRUBBING} = 10 \$/\text{SY} \Rightarrow 1,400$$

$$\text{SURFACE TREATMENT (AGGR/DIRT ROAD)} = 2 \$/\text{SY} \Rightarrow 280$$

$$\text{BARRICADE} \Rightarrow 500 \text{ \$}$$

$$\begin{array}{r} \Rightarrow 1,400 \\ \Rightarrow 280 \\ \hline \Rightarrow 1,680 \\ \times 2 \\ \hline \Rightarrow 5,360 \end{array}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **803-13**

DESCRIPTION: **EXPAND THE CHULA BROOKFIELD ROAD/I-75 INTERCHANGE TO THE EAST SIDE OF I-75 ONLY** SHEET NO.: **1 of 5**

ORIGINAL DESIGN:

The current design calls for the complete re-build of the Chula Brookfield Road/I-75 Interchange with approximately 1,050 feet between ramp intersections.

ALTERNATIVE: (Sketch attached)

Relocate only the northbound ramps and provide approximately 700 feet between intersections. Eliminate all the construction west of the current I-75 right-of-way and extend the eastbound ramps as needed for the known I-75 lane addition.

ADVANTAGES:

- Cost savings up front
- Eliminates potentially unneeded work
- May never be required
- Reduces wetlands impact

DISADVANTAGES:

- Current southbound intersection not at an ideal angle

DISCUSSION:

700-foot spacing between ramp intersections is sufficient to provide a 300-foot queue and a 100-foot left-turn taper in each direction in Chula Brookfield Road. Localizing impacts to one side of I-75 reduces local, right-of-way, wetlands, and cost impacts.

Note: The implementation of this alternative will depend on the ultimate configuration of the proposed bridge because of existing intersection proximity to the bridge proper.

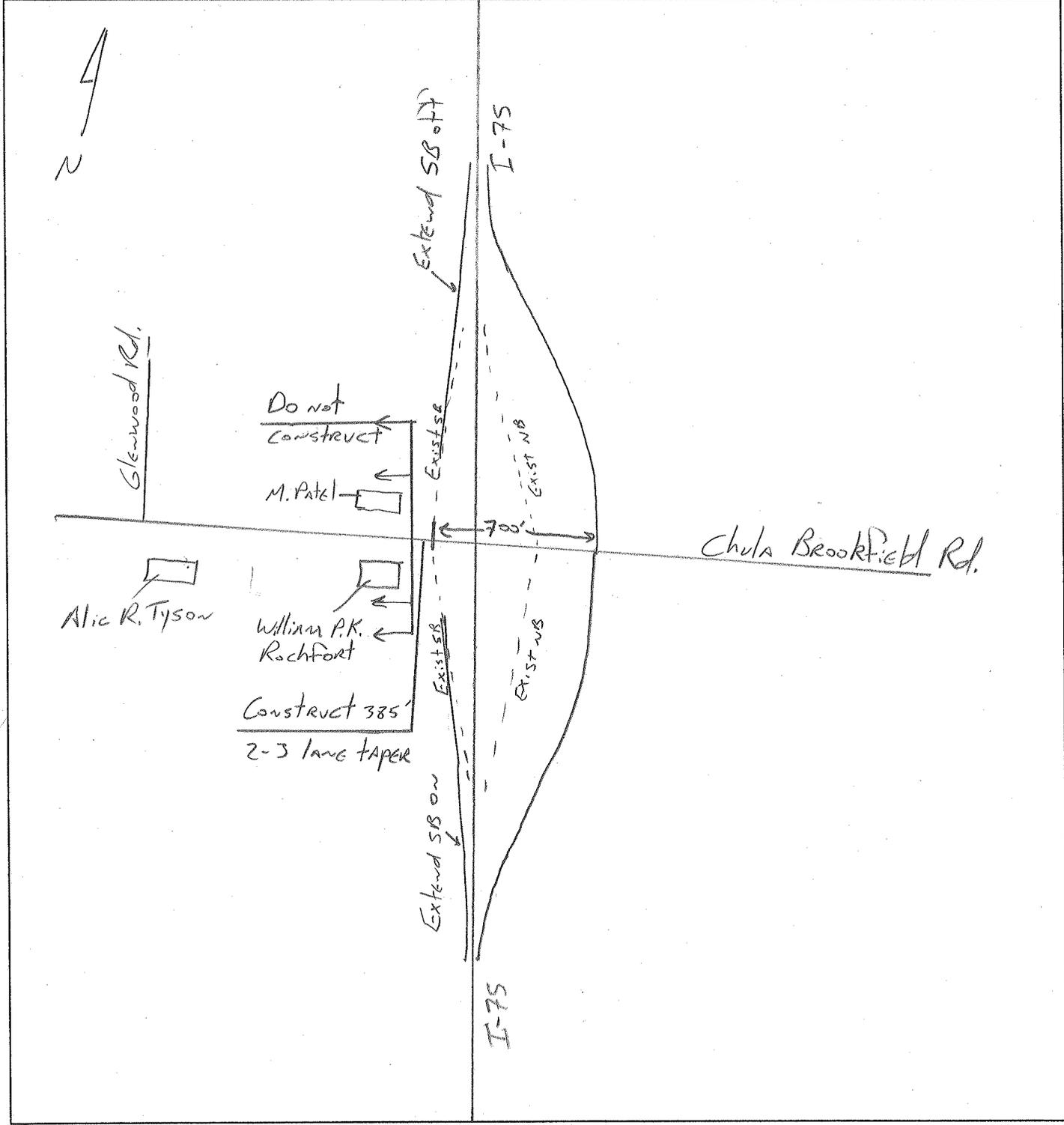
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 2,302,762	•	\$ 2,302,762
ALTERNATIVE	\$ 0	•	\$ 0
SAVINGS	\$ 2,302,762	•	\$ 2,302,762

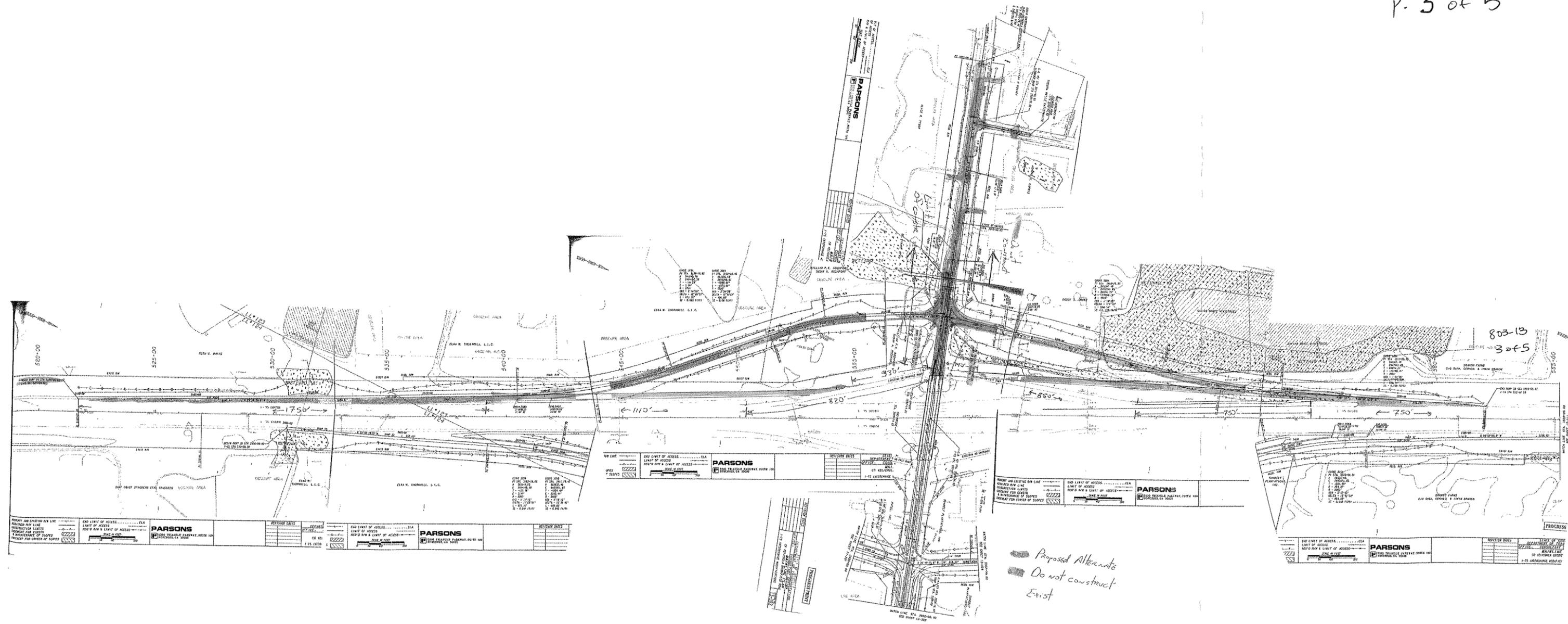
PROJECT: NHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765,
 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
 Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
 Preliminary Design Stage

ALTERNATIVE NO.: 803-13

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 5





803-13
 3 of 5

Proposed Alternate
 Do not construct
 Exist

CALCULATIONS



PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
 Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
 Preliminary Design Stage

ALTERNATIVE NO.: 803-13

SHEET NO.: 4 of 5

* Assume that actual SB Ramp construction will be the same minus 330' + 140' of existing ramps utilized.

Ramp Not constr. Area = (4' + 16' + 10') (330 + 140) = 14,100 sf = 1567 sy ✓

Asphalt = (330)(1567)(1/2000) = 259 Ton ✓

~~12" PC Conc (\$65/sy)~~
~~19mm, 330 lb (\$75/TN)~~
 12" GAB (\$15.34/sy)

Chula Brookfield / Glenwood → SEE 803-15

Asphalt → 1851 TN - ^{Proposed} 645 TN = 1206 TN ✓

GAB 8" → 5266 sy - 1882 sy = 3384 sy ✓

GAB 6" → 416 sy ✓

Additional Chula / Glenwood not constr.: L = 350' W = 2(6.5) + 36 = 49'

A = 350' x 49' = 17,150 sf = 1906 sy

~~135 lb~~
~~220 lb~~
~~330 lb~~
 8" GAB

GAB 8" = 1906 sy ✓

Asphalt = (135 + 220 + 330)(1906)(1/2000) = 653 TN ✓

R/W: SEE 803-15 R/W = 1.34 AC

Add'l. Chula Brookfield R/W not needed:

A = (301800 - 301470)(45 + 35) + (301800 - 301620)(20) = 30,000 sf = 0.69 AC

26,400 3,600

Ramp R/W:

SB off ⇒ A = ((250 + 0) / 2) (1570') = 196,250 sf = 4.51 AC

SB on ⇒ A = ((270 + 20) / 2) (2210') = 320,450 = 7.36 AC

Total R/W = 13.9 AC

Wetland Saved = ((110 + 20) / 2) 450' = 24,750 = 0.57 AC

COST WORKSHEET



PROJECT: NHS-0000-00(764, 765, 803, 804 and 805), P. I. Nos. 0000764, 0000765, 0008458, 0000803, 0000804, and 0000805;
I-75 INTERCHANGE IMPROVEMENTS
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
Preliminary Design Stage

ALTERNATIVE NO:
803-13

SHEET NO.: **5 of 5**

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
Ramp Asphalt	TN	259	75.00	19,425			
Ramp Concrete	SY	1,567	65.00	101,855			
Ramp GAB 12"	SY	1,567	15.34	24,038			
Surface Road Asphalt	TN	1,859	75.00	139,425			
Surface Road GAB 8"	SY	5,290	11.34	59,989			
Surface Road GAB 6"	SY	416	8.40	3,494			
Construction Subtotal				348,226			
Markup at 51.59%				179,650			
Construction Total				527,875			
Right-of-Way Acquisition	AC	13.90	8,000	111,200			
Patel Structure	EA	1.00	100,000	100,000			
Rochfort Structure	EA	1	200,000	200,000			
Tyson Structure	EA	1	100,000	100,000			
Right-of-Way Subtotal				511,200			
R/W Markup (247.2%)				1,263,686			
Right-of-Way Total				1,774,886			
Wetlands Saved	AC	0.57	N/A	—			
* See 803-15 for quantities adjusted for Chula Brookfield construction.							
Sub-total				2,302,762			
Mark-up at				INCL			
TOTAL				2,302,762			

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **803-15**

DESCRIPTION: **SHORTEN THE LIMITS OF CONSTRUCTION ON CHULA BROOKFIELD ROAD** SHEET NO.: **1 of 4**

ORIGINAL DESIGN:

The current design calls for the reconstruction of Chula Brookfield Road to approximately 270 feet west of Glenwood Road.

ALTERNATIVE: (Sketch attached)

Change the limit of construction to approximately Station 3014+70 on Chula Brookfield Road. Taper the median from this point to the intersection with the I-75 southbound ramps. Eliminate all construction on Glenwood Road.

ADVANTAGES:

- Cost savings up front
- Eliminates potentially unneeded work
- Reduces right-of-way takes

DISADVANTAGES:

- None apparent

DISCUSSION:

The median on Chula Brookfield Road is established at its full 14-foot width approximately 240 feet before the intersection with the southbound I-75 ramps. Reduce full width median length and place the limit of construction where the proposed construction matches the existing roadway width.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 343,549	•	\$ 343,549
ALTERNATIVE	\$ 105,684	•	\$ 105,684
SAVINGS	\$ 237,865	•	\$ 237,865

CALCULATIONS



PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, ALTERNATIVE NO.:
 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
 Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
 Preliminary Design Stage

803-15

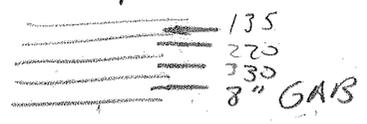
SHEET NO.: 3 of 4

Paving: Chula Brook Field AREA = $(301338.81 - 300878.46)(37) + 385\left(\frac{37+51}{2}\right)$
 (width normal = $2(12+6.5) = 37$) 17,033 16,940
 (taper L = 385) + (301855 - 301723.81)(51) = 42,664 sf

* Right turn omitted purposely, 6,691 = 4518.54 *

Glenwood Rd AREA = $(350247.82 - 350018.5)(28) + 2(13 \times 12)$
 (Typ sec. width = $2(12+2) = 28$) = 6733 sf
= 748 sy

Asphalt = $(135+220+330)(4518+748 sy) \frac{1}{2000} lb = 1804 Ton$



GAB = $(4518 + 748) = 5266 sy (8")$

DRIVEWAYS $\Rightarrow A = (75+85)(14') = 249 sy$ RESID. $\Rightarrow 17 Ton$
 $= 75(20) = 167 sy$ COMMERCIAL $\Rightarrow 30 Ton$

GAB_{DRIVE} = $249 + 167 = 416 sy (6")$

TOTAL TONS = 185

R/W: $(55745') (301460 - 300878.46) = 58,154 sf$
= 1.34 AC

Proposed Pave: Asph Area = $385\left(\frac{37+51}{2}\right) = 16,940 sf = 1,882 sy$

Asphalt = $(135+220+330)(1882)\left(\frac{1}{2000}\right) = 645 Ton$

GAB = 1,882 sy

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **803-16**

DESCRIPTION: **USE MECHANICALLY STABILIZED EMBANKMENT WALLS TO ELIMINATE BRIDGE END SPANS AT CHULA BROOKFIELD ROAD** SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The bridge has 2:1 end slopes with end span.

ALTERNATIVE: (Sketch attached)

Construct mechanically stabilized embankment (MSE) wall at Bents 2 and 4 to eliminate end spans.

ADVANTAGES:

- Reduces costs
- Less bridge to maintain

DISADVANTAGES:

- Eliminates end span and potential future location for additional lanes

DISCUSSION:

Construction of MSE walls eliminates the construction of two end spans and two intermediate bents, reducing the construction cost of the bridge. Also, there is less bridge area to maintain. The negative is that if additional space is needed for lanes in the future, the space provided by the end spans would not be available. However, this bridge is in a rural location, so the likelihood of needing that additional space is low.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 897,034	•	\$ 897,034
ALTERNATIVE	\$ 333,904	•	\$ 333,904
SAVINGS	\$ 563,130	•	\$ 563,130

SKETCHES

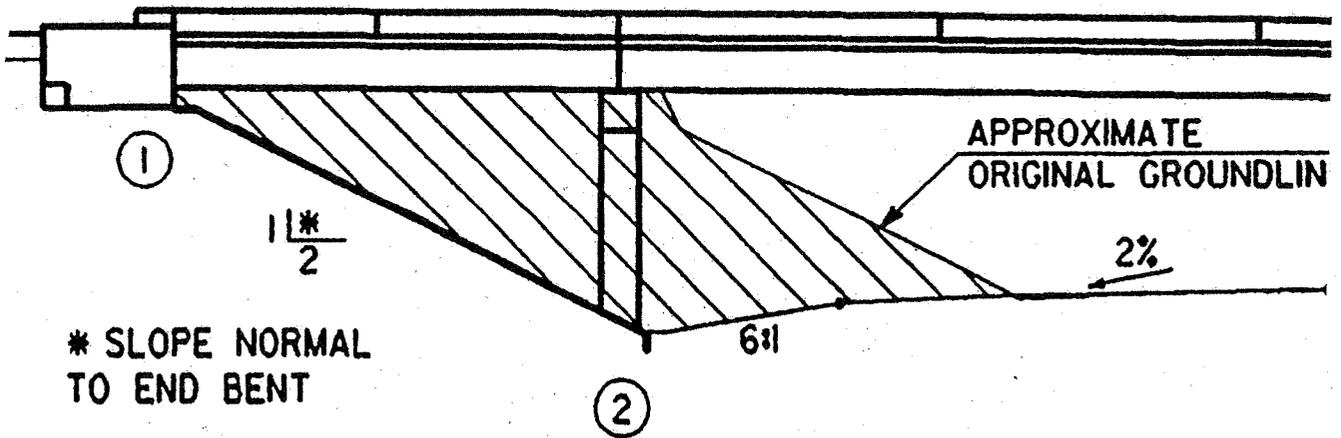


PROJECT: NHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
Preliminary Design Stage

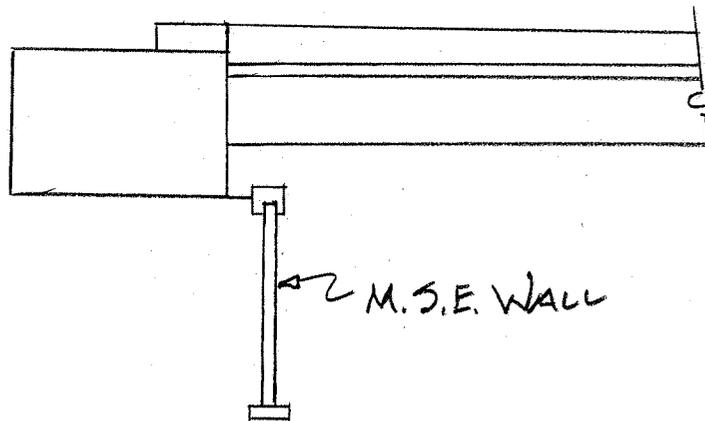
803-16

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS**
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
Preliminary Design Stage

ALTERNATIVE NO.: **803-16**

SHEET NO.: **3 of 4**

Skew angle = $\alpha = 80.56$

Bridge width (out-to-out) = 57.25

Span 1 length = 63.5

Span 4 length = 63.5

Bridge area = $W [(L_1 + L_4) - 2(6)/\sin \alpha] = 6575 \text{ ft}^2$

Assume wall height = 4' at end

Height under bridge = $H = 21$

Wall Area = $2[(W/\sin \alpha)H + .5(4 + H)[2(H - 4)/\sin \alpha](2)]$
 $= 4156 \text{ ft}^2$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **803-17**

DESCRIPTION: **CUL-DE-SAC ACADEMY ROAD** SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The current design relocates Academy Road to intersect with Willis Still Road approximately 300 feet from the off/on ramps of the intersection.

ALTERNATIVE:

Cul-de-sac Academy Road.

ADVANTAGES:

- Initial cost savings
- Eliminates unneeded work
- Alternate route is available
- Reduces construction time
- Simplifies design and construction

DISADVANTAGES:

- Additional access travel of about one mile
- Loss of amenity
- Public Information Open House (PIOH) yielded resistance to cul-de-sacs

DISCUSSION:

Due to the short alternative travel route and the low traffic volume, the additional cost is not warranted. The original concept had a cul-de-sac and was altered due to PIOH resistance.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 522,814	•	\$ 522,814
ALTERNATIVE	\$ 31,464	•	\$ 31,464
SAVINGS	\$ 491,350	•	\$ 491,350

CALCULATIONS



PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, ALTERNATIVE NO.:
 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
 Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
 Preliminary Design Stage

803-17

SHEET NO.: 3 of 4

ROADWAY PAVEMENT =

$$37' \text{ ROWY} \Rightarrow 451341.36 - 450000 = 1,341.36'$$

$$\text{TRANSITION} \Rightarrow 451605.16 - 451341.36 = 263.8'$$

$$49' \text{ ROWY} \Rightarrow 451751.65 - 451605.16 = 146.5'$$

$$\text{COST} \Rightarrow 37' = \boxed{154.87 \text{ \$/LF}} \quad (\text{SEE } 803-3)$$

$$49' = (12' \text{ APPROX } W)$$

$$12 (1/4) \quad 135/2000 (75) = \$6.75$$

$$" \quad 220 \quad " \quad " = 11.00$$

$$" \quad 330 \quad " \quad " = 16.50$$

$$" \quad 11.34 \quad " \quad " = 15.12$$

$$49.37$$

$$+ 154.87$$

$$\boxed{204.24 \text{ \$/LF}}$$

$$\text{TRANSITION} = \frac{154.87 + 204.24}{2}$$

$$\boxed{179.56 \text{ \$/LF}}$$

$$\text{R/W} \Rightarrow (1,341.36 + 263.8 + 146.5) \times 130' \div 43,500 = \underline{5.22 \text{ AC}}$$

$$\text{CUL-DE-SAC} \Rightarrow 40' \text{ RAD.} = \pi (40')^2 (1/4) = 55954$$

$$\times 37.13 \text{ \$/SQ PAVMT (SEE } 803-7)$$

$$\boxed{\$ 20,756}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **803-18**

DESCRIPTION: **USE MECHANICALLY STABILIZED EMBANKMENT WALLS TO ELIMINATE BRIDGE END SPANS AT WILLIS STILL ROAD** SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The bridge has 2:1 end slopes with end span.

ALTERNATIVE: (Sketch attached)

Construct mechanically stabilized embankment (MSE) wall at Bents 2 and 4 to eliminate end spans.

ADVANTAGES:

- Reduces costs
- Less bridge to maintain

DISADVANTAGES:

- Eliminates end span and potential future location for additional lanes

DISCUSSION:

Construction of MSE walls eliminates the construction of two end spans and two intermediate bents, reducing the construction cost of the bridge. Also, there is less bridge area to maintain. The negative is that if additional space is needed for lanes in the future, the space provided by the end spans would not be available. However, this bridge is in a rural location, so the likelihood of needing that additional space is low.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,070,574	•	\$ 1,070,574
ALTERNATIVE	\$ 355,436	•	\$ 355,436
SAVINGS	\$ 715,138	•	\$ 715,138

SKETCHES

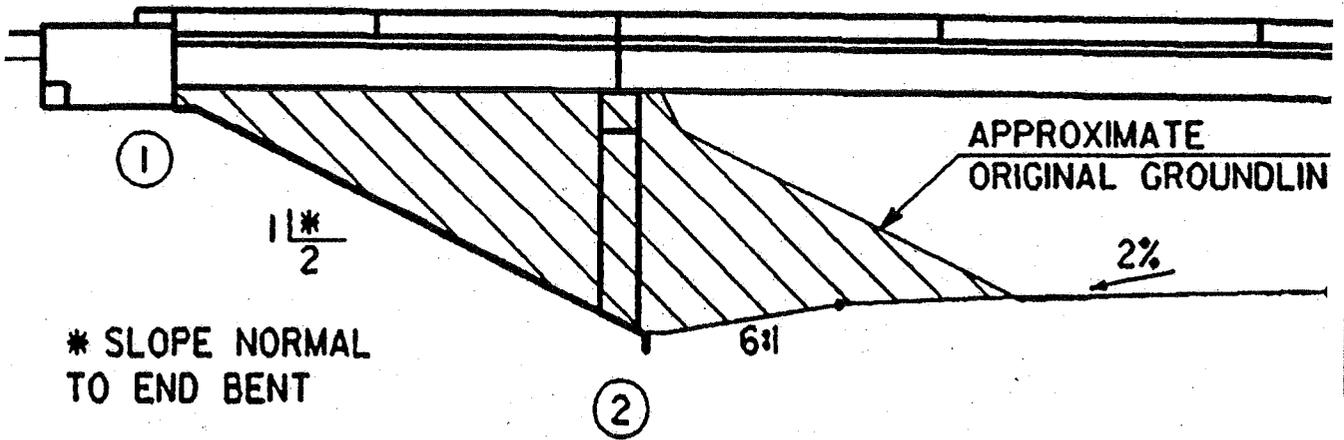


PROJECT: NHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
Preliminary Design Stage

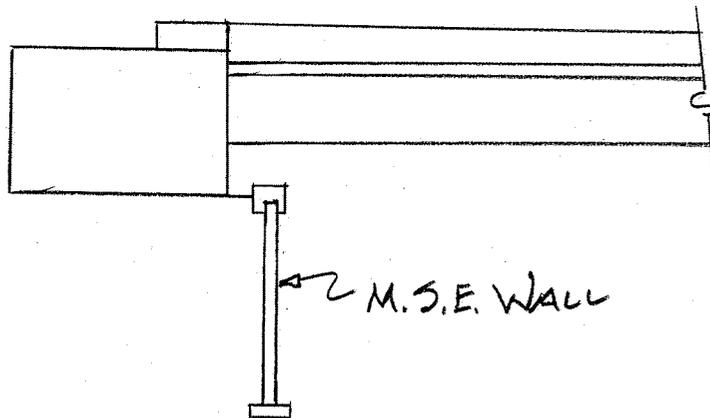
803-18

SHEET NO.: 2 of 4

AS DESIGNED ALTERNATIVE



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS**
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
Preliminary Design Stage

ALTERNATIVE NO.: **803-18**

SHEET NO.: **3 of 4**

Skew angle = $\alpha = 68-06$

Bridge width (out-to-out) = 57.25

Span 1 length = 75

Span 4 length = 75

Bridge area = $W [(L_1 + L_4) - 2(6)/\sin \alpha] = 7847 \text{ ft}^2$

Assume wall height = 4' at end

Height under bridge = $H = 21$

Wall Area = $2[(W/\sin \alpha)H + .5(4 + H)[2(H - 4)/\sin \alpha](2)]$

= 4424 ft^2

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **803-21**

DESCRIPTION: **REMOVE CR 114 SOUTH OF WILLIS STILL ROAD AT THE WILLIS STILL ROAD/I-75 INTERCHANGE** SHEET NO.: **1 of 4**

ORIGINAL DESIGN:

The current design realigns County Road (CR) 114 to intersect with Willis Still Road approximately 275 feet east of the I-75 northbound ramp intersection.

ALTERNATIVE: (Sketch attached)

Remove existing CR 114 south of Willis Still Road and provide access to properties using a new asphalt driveway.

ADVANTAGES:

- Cost savings up front
- Eliminates potentially unneeded work
- Reduces right-of-way takes
- Reduces wetlands impact

DISADVANTAGES:

- Access along CR 114 relinquished

DISCUSSION:

The existing CR 114 dead ends approximately 2,200 feet south of Willis Still Road. The road currently serves only two parcels. Acquisition right-of-way for a two-lane road that ultimately serves (existing and proposed) only as a driveway is unnecessary. This proposal also minimizes impacts on existing wetlands.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 649,242	•	\$ 649,242
ALTERNATIVE	\$ 168,444	•	\$ 168,444
SAVINGS	\$ 480,798	•	\$ 480,798

SKETCHES



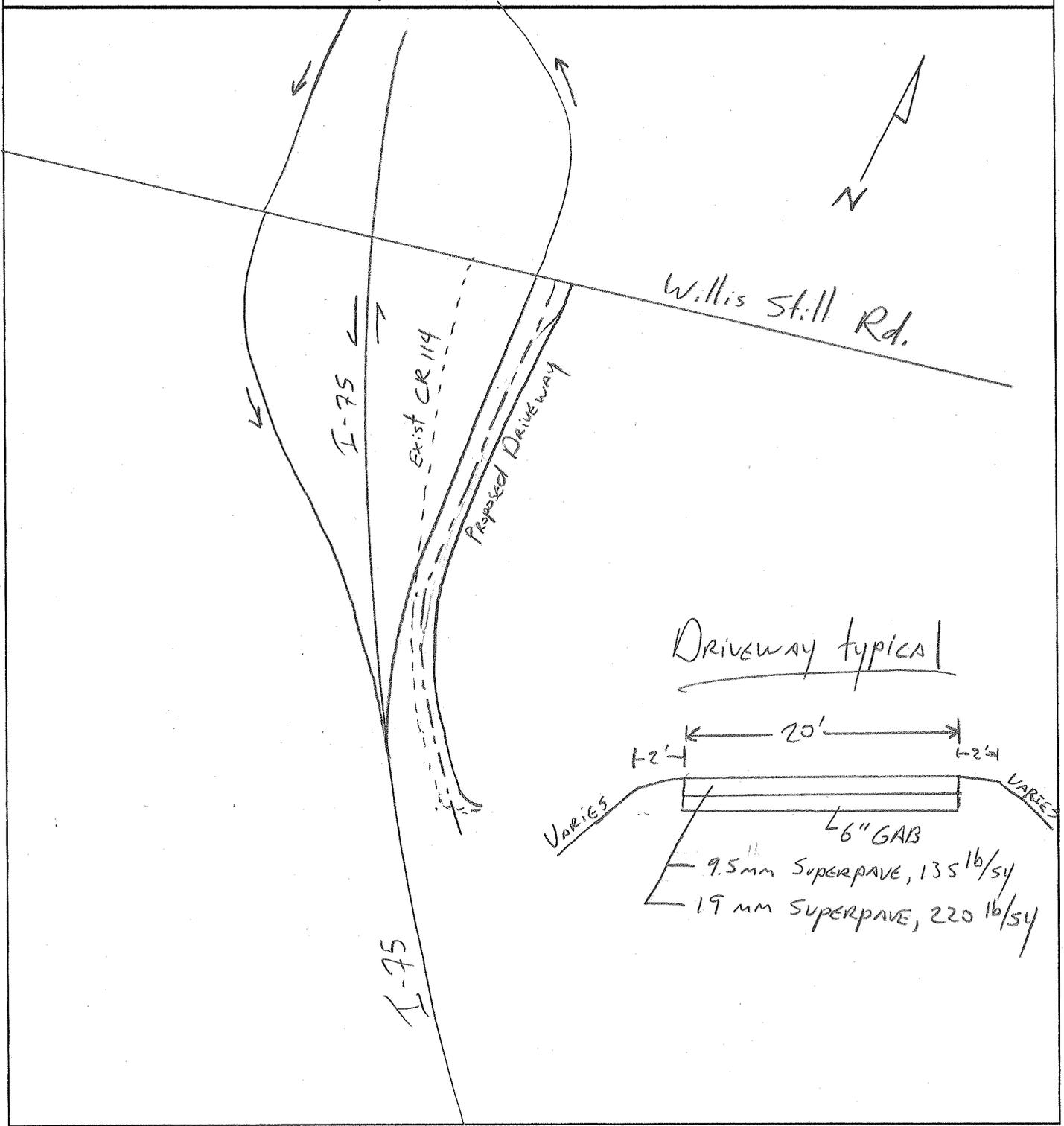
PROJECT: NHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
Preliminary Design Stage

ALTERNATIVE NO.:

803-21

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



CALCULATIONS

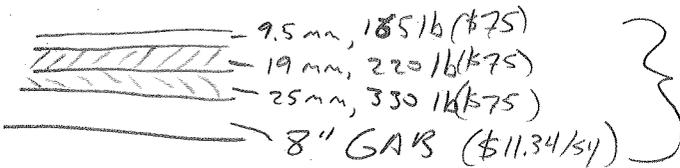


PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, ALTERNATIVE NO.:
 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
 Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4 803-21
 Preliminary Design Stage

SHEET NO.: 3 of 4

Design: Length = 2109 LF

Paving: PAVE AREA = $2(6.5 + 12)(2109 \text{ LF}) = 78,033 \text{ SF}$
 $= 8,670 \text{ SY}$



$\frac{715}{2000} = 0.3575 \text{ Ton asphalt/sy}$
 $\rightarrow 3100 \text{ Ton total}$

R/W: Avg width = 158'

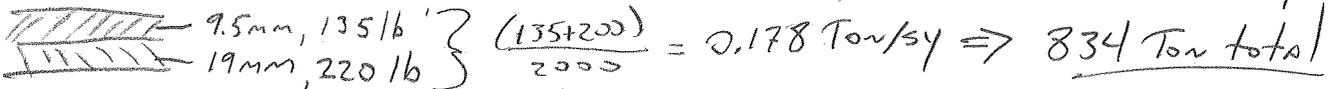
AREA = $158' \times 2100 \text{ LF} = 331,800 \text{ SF} = 7.62 \text{ AC}$

Erosion: Grassing $\Rightarrow 0.55(7.62 \text{ AC}) = 4.191 \text{ AC}$ (permanent)
 Mulch $\Rightarrow 3 \text{ ton/AC}(4.191) = 12.57 \text{ ton}$

Ditch Check $\Rightarrow 2/100 \text{ LF} \Rightarrow 42 \text{ EA}$

Proposed: L = 2109 LF

PAVE AREA = $20W(2109 \text{ LF}) = 42,180 \text{ SF} = 4687 \text{ SY}$



$\frac{(135+220)}{2000} = 0.178 \text{ Ton/sy} \Rightarrow 834 \text{ Ton total}$

6" GAB (\$8.5/sy)

R/W: * No cost. Driveway easment only

Erosion Note: This footprint is appx. 55% of that above

GRASS $\Rightarrow 0.55(4.19 \text{ AC}) = 2.30 \text{ AC}$

Mulch $\Rightarrow 0.55(12.57 \text{ TN}) = 6.914 \text{ TN}$

Checks $\Rightarrow 42 \text{ EA}$ (same length)

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **803-22**

DESCRIPTION: **CUL-DE-SAC CR 114 IN THE NORTHEAST QUADRANT OF THE WILLIS STILL ROAD/I-75 INTERCHANGE** SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The current design relocates County Road (CR) 114 to intersect with Willis Still Road approximately 600 feet from the off/on ramps intersection.

ALTERNATIVE:

Cul-de-sac CR 114.

ADVANTAGES:

- Initial cost savings
- Eliminates unneeded work
- Alternate route is available
- Reduces construction time
- Simplifies design and construction

DISADVANTAGES:

- Additional access travel of about one mile
- Loss of amenity

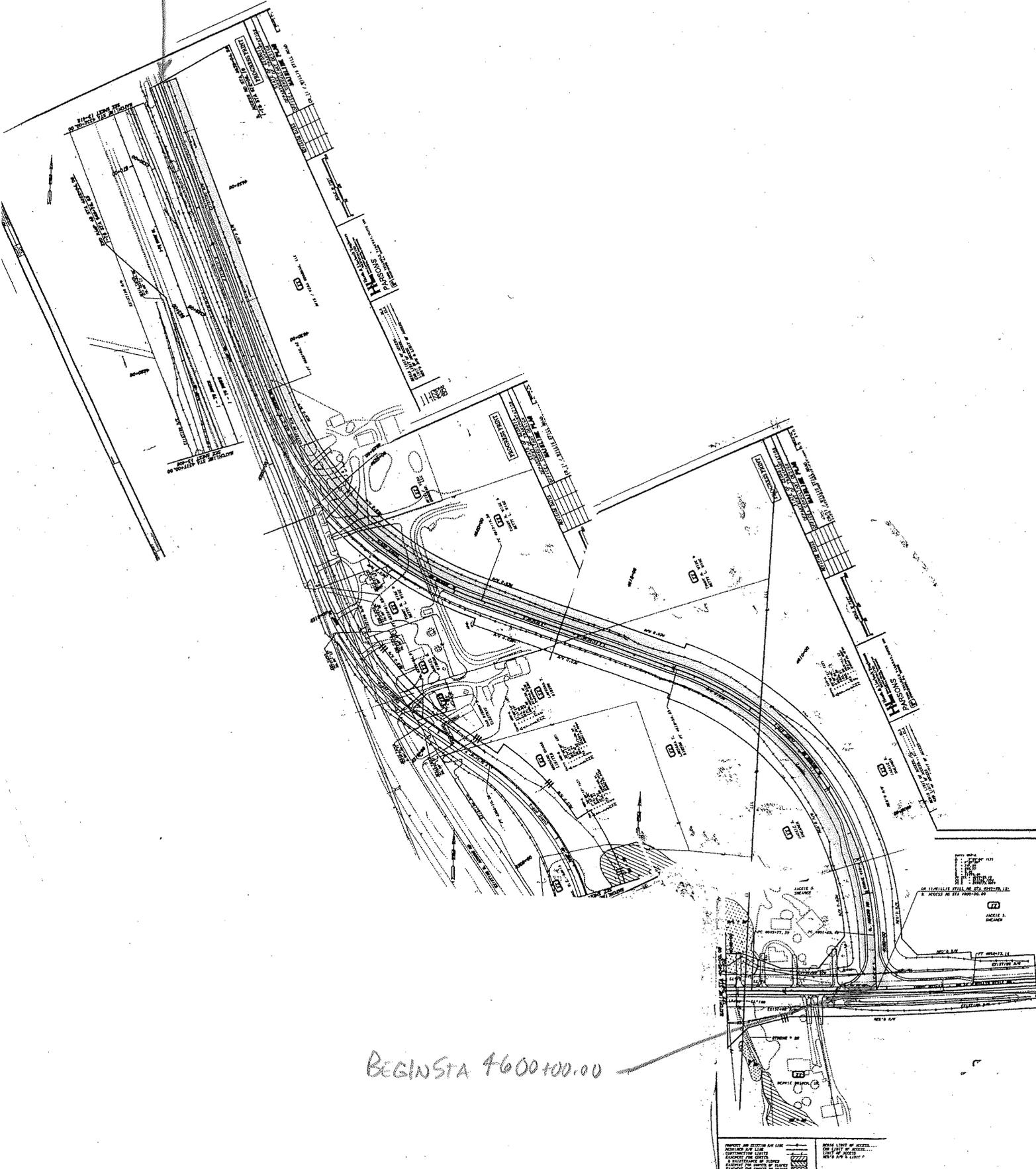
DISCUSSION:

Few parcels (existing or future) would benefit from the CR 114 relocation and although an acknowledgement is made of having to travel an additional mile, savings of over \$1,000,000 warrants a reevaluation of this proposed work. Furthermore, safety is greatly enhanced at the Willis Still Road/I-75 interchange.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,063,600	•	\$ 1,063,600
ALTERNATIVE	\$ 7,857	•	\$ 7,857
SAVINGS	\$ 1,055,743	•	\$ 1,055,743

803-22
20F4

END STA. 4636+04.56



BEGIN STA 4600+00.00

EXISTING AND PROPOSED LANE LINE
PROPOSED AND EXISTING SIGHT TRIANGLE
EXISTING AND PROPOSED UTILITY LINES
EXISTING AND PROPOSED RIGHT OF WAY

SCALE LIST OF SHEETS
SEE SHEET NO. 20F3
DATE: 10/1/88

CALCULATIONS



PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
 Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
 Preliminary Design Stage

ALTERNATIVE NO.: 803-22

SHEET NO.: 3 of 4

ROADWAY PAVEMENT:

$$37' \text{ RDWY} = 463604.56 - 460486.0 = \underline{3,118.56'}$$

$$49' \text{ ROWY} = 460486.0 - 460000.0 = \underline{486.0'}$$

$$\text{COST} \Rightarrow 37' = \underline{154.87 \text{ \$/LF}} \quad (\text{SEE } 803-3)$$

$$49' = \underline{204.24 \text{ \$/LF}} \quad (\text{SEE } 803-17)$$

$$\text{R/W} \Rightarrow 175' \text{ W} \times (461258.89 - 460000.0) = 220,306 \text{ SF}$$

$$150' \text{ W} \times (461912.50 - 461258.89) = 98,041.5 \text{ SF}$$

$$130' \text{ W} \times (462450.0 - 461912.50) = 69,875 \text{ SF}$$

$$45' \text{ W} \times (463904.56 - 462450.0) = 65,455 \text{ SF}$$

$$\Sigma = 453,677$$

$$= 93,560$$

$$\boxed{10.42 \text{ AC}}$$

$$\text{CUL-DE-SAC} \Rightarrow 20' \text{ R} = \pi (20)^2 (1/4) = 139.6 \text{ SF}$$

$$\times 37.13 \text{ \$/SF} \quad (\text{SEE } 803-7)$$

$$\boxed{\$5,183}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **803-24**

DESCRIPTION: **REDUCE BRIDGE WIDTH AT WILLIS STILL ROAD TO MATCH BRIDGE POLICY MANUAL** SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The bridge has two lanes at 12 feet, one lane at 14 feet, and two shoulders at 8 feet.

ALTERNATIVE:

Provide a bridge with two lanes at 12 feet, one lane at 14 feet, and two shoulders at 7 feet.

ADVANTAGES:

- Reduces bridge cost
- Complies with GDOT policy

DISADVANTAGES:

- None apparent

DISCUSSION:

The GDOT Bridge and Structures Policy Manual defines widths for bridges for both state routes and non-state routes. Reducing the bridge width to the alternative width reduces the cost of the bridge and provides a bridge width in compliance with the Manual. The average daily traffic count at this site is 1,225 vehicles per day, the speed design is 55 mph, and this is a county road, so the shoulder width should be 7 feet.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 3,132,046	•	\$ 3,132,046
ALTERNATIVE	\$ 3,022,629	•	\$ 3,022,629
SAVINGS	\$ 109,417	•	\$ 109,417

CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS**
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
Preliminary Design Stage

ALTERNATIVE NO.: **803-24**

SHEET NO.: **2 of 3**

Bridge Length = 401'

Proposed bridge width (out-to-out) = 57.25'

Proposed bridge area = 22957 ft²

Alternative bridge width (out-to-out) = 55.25'

Alternative bridge area = 22155 ft²

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **765-3**

DESCRIPTION: **USE MECHANICALLY STABILIZED EMBANKMENT WALLS TO ELIMINATE BRIDGE END SPANS AT OMEGA EL DORADO ROAD** SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The bridge has 2:1 end slopes with end span.

ALTERNATIVE: (Sketch attached)

Construct mechanically stabilized embankment (MSE) wall at Bents 2 and 4 to eliminate end spans.

ADVANTAGES:

- Reduces costs
- Less bridge to maintain

DISADVANTAGES:

- Eliminates end span and potential future location for additional lanes

DISCUSSION:

Construction of MSE walls eliminates the construction of two end spans and two intermediate bents, reducing the construction cost of the bridge. Also, there is less bridge area to maintain. The negative is that if additional space is needed for lanes in the future, the space provided by the end spans would not be available. However, this bridge is in a rural location, so the likelihood of needing that additional space is low.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 566,750	•	\$ 566,750
ALTERNATIVE	\$ 260,121	•	\$ 260,121
SAVINGS	\$ 306,629	•	\$ 306,629

SKETCHES



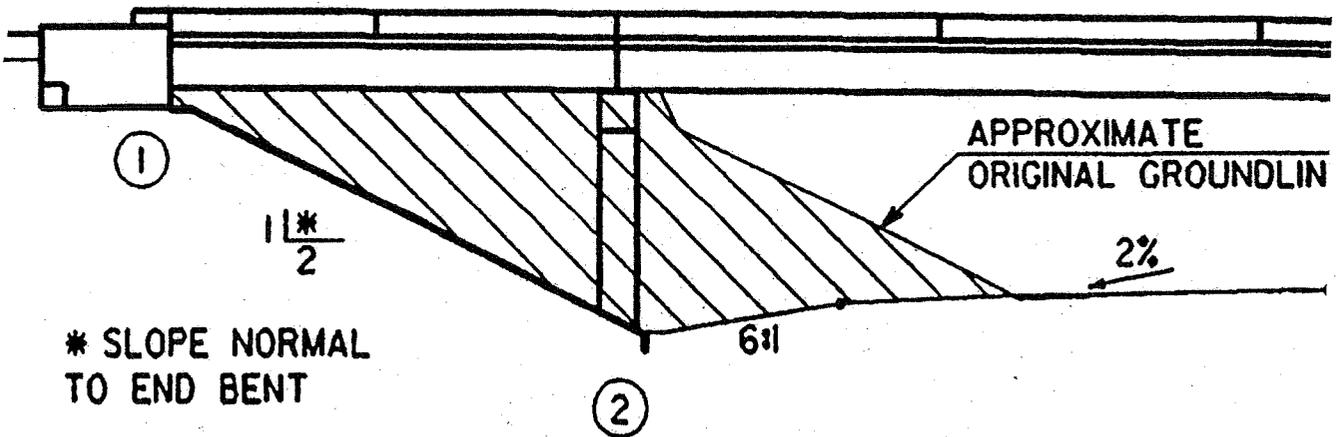
PROJECT: NHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765,
0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
Preliminary Design Stage

ALTERNATIVE NO.:

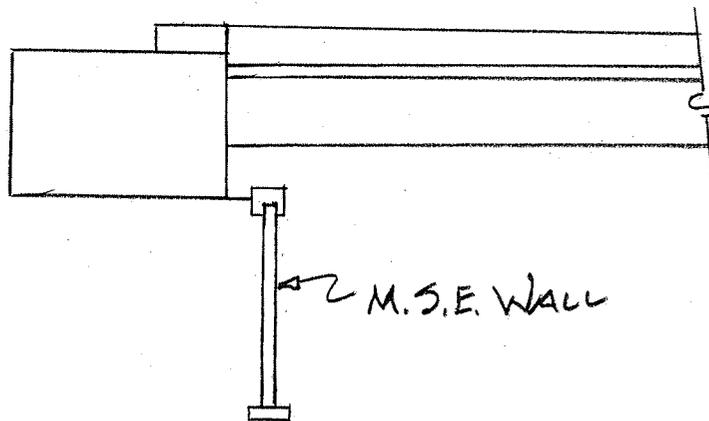
765-3

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage**

ALTERNATIVE NO.: **765-3**

SHEET NO.: **3 of 4**

Skew angle = $\alpha = 90$

Bridge width (out-to-out) = 57.25

Span 1 length = 52

Span 4 length = 52

Bridge area = $W [(L_1 + L_4) - 2(6)/\sin \alpha] = 5267 \text{ ft}^2$

Assume wall height = 4' at end

Height under bridge = $H = 21$

Wall Area = $2[(W/\sin \alpha)H + .5(4 + H)[2(H - 4)/\sin \alpha](2)]$
 $= 4105 \text{ ft}^2$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **765-4**

DESCRIPTION: **REDUCE BRIDGE WIDTH AT OMEGA EL DORADO ROAD TO MATCH BRIDGE POLICY MANUAL** SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The bridge has two lanes at 12 feet, one lane at 14 feet, and two shoulders at 8 feet.

ALTERNATIVE:

Provide a bridge with two lanes at 12 feet, one lane at 14 feet, and two shoulders at 7 feet.

ADVANTAGES:

- Reduces bridge cost
- Complies with GDOT policy

DISADVANTAGES:

- None apparent

DISCUSSION:

The GDOT Bridge and Structures Policy Manual defines widths for bridges for both state routes and non-state routes. Reducing the bridge width to the alternative width reduces the cost of the bridge and provides a bridge width in compliance with the Manual. The average daily traffic count at this site is 2,600 vehicles per day, the speed design is 45 mph, and this is a county road, so the shoulder width should be 7 feet.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 2,094,512	•	\$ 2,094,512
ALTERNATIVE	\$ 2,021,341	•	\$ 2,021,341
SAVINGS	\$ 73,171	•	\$ 73,171

CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS**
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
Preliminary Design Stage

ALTERNATIVE NO.: **765-4**

SHEET NO.: **2 of 3**

Bridge Length = 340'

Proposed bridge width (out-to-out) = 57.25'

Proposed bridge area = 19465 ft²

Alternative bridge width (out-to-out) = 55.25'

Alternative bridge area = 18785 ft²

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **765-5**

DESCRIPTION: **REDUCE THE DEPARTURE TANGENT ON RAMPS AT THE OMEGA ELDORADO ROAD/I-75 INTERCHANGE** SHEET NO.: **1 of 4**

ORIGINAL DESIGN:

The current design indicates that all four ramps of the Omega Eldorado Road/I-75 interchange have fairly long tangents before the first curve.

ALTERNATIVE: (Sketch attached)

Reduce the southbound off ramp's tangent 140 feet and the southbound on ramp's tangent 160 feet.

ADVANTAGES:

- Initial cost savings
- Smaller footprint
- Reduces construction time
- Simplifies design and construction
- Minimizes right-of-way takes

DISADVANTAGES:

- None apparent

DISCUSSION:

The tangents only need to be long enough to account for sight distance and super-elevation transitions.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 188,008	•	\$ 188,008
ALTERNATIVE	\$ 0	•	\$ 0
SAVINGS	\$ 188,008	•	\$ 188,008

SKETCHES



PROJECT: NHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765,
0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
Preliminary Design Stage

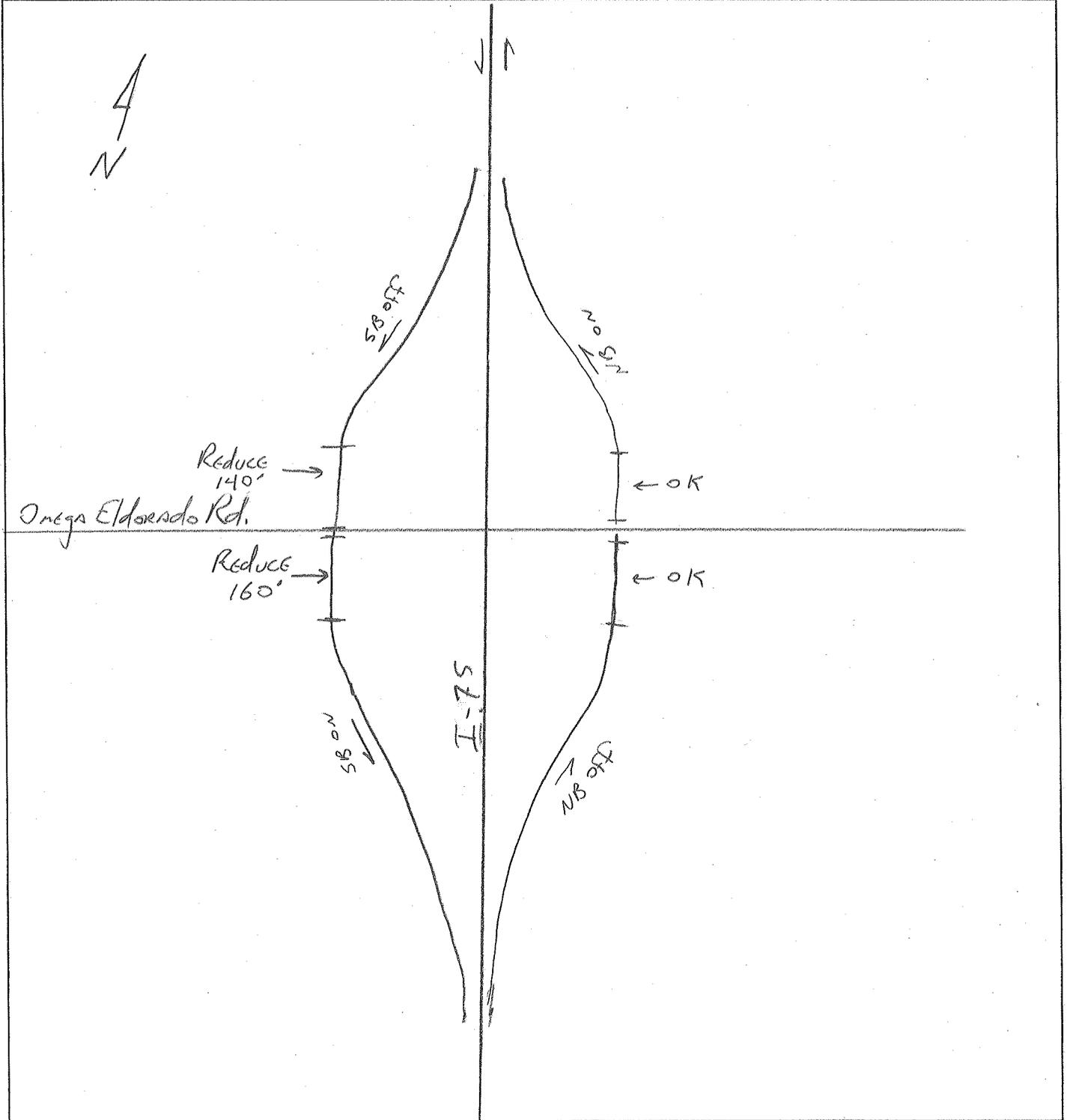
ALTERNATIVE NO.:

765-5

AS DESIGNED

ALTERNATIVE

SHEET NO.: 2 of 4



CALCULATIONS

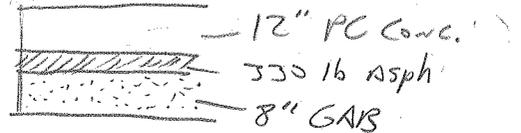


PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, ALTERNATIVE NO.:
 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
 Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
 Preliminary Design Stage

765-5

SHEET NO.: 3 of 4

Tan Lengths	Exist	Prop	Reduce
NB OFF	120		0
ON	185		0
SB OFF	330	190	140'
ON	430	270	160'



Paving Area = $(140 + 160)(4 + 16 + 10) = 6,000 \text{ sf} = \underline{667 \text{ sy}}$

Asphalt = $330(667)(\frac{1}{2000}) = 110 \text{ Ton}$

GAB = $880(667)(\frac{1}{2000}) = 293 \text{ Ton}$

R/W: SB ON Ramp shift reduces r/w width approx 60'

For $(93 + 4.73 - 83 + 0) = 1005'$

$A = 60(1005) + \left(\frac{60+0}{2}\right)(244') = 67,620 \text{ sf} = \underline{1.55 \text{ AC}}$
↑ CURVE

SB OFF RAMP shift reduce R/W approx. 55'

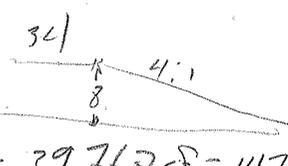
For $(106 + 18 - 113 + 80) = 762'$

$A = 55(762) + \left(\frac{55}{2}\right)(485) + \frac{55}{2}(11380 - 11985) = 71,885 \text{ sf}$
↑ CURVE ↑ TAPER
 $= \underline{1.65 \text{ AC}}$

Tot = 3.2 AC

* There could be a small reduction in Erosion, Grassing, and drainage, but not significant.

Grading: $140' \left[\frac{272}{8(34) + \frac{1}{2}(8 \cdot 8 \cdot 4)} + \frac{136}{4(34) + \frac{1}{2}(4 \cdot 4 \cdot 4)} \right] = 39,760 \text{ cf} = 1473 \text{ cy}$
 $160' [284] = 45,440 \text{ cf} = 1683 \text{ cy}$



VALUE ENGINEERING ALTERNATIVE



PROJECT:	NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage	ALTERNATIVE NO.: 764-3
DESCRIPTION:	USE MECHANICALLY STABILIZED EMBANKMENT WALLS TO ELIMINATE BRIDGE END SPANS AT BARNEYVILLE ROAD	SHEET NO.: 1 of 4

ORIGINAL DESIGN: (Sketch attached)

The bridge has 2:1 end slopes with end span.

ALTERNATIVE: (Sketch attached)

Construct mechanically stabilized embankment (MSE) wall at Bents 2 and 4 to eliminate end spans.

ADVANTAGES:

- Reduces costs
- Less bridge to maintain

DISADVANTAGES:

- Eliminates end span and potential future location for additional lanes

DISCUSSION:

Construction of MSE walls eliminates the construction of two end spans and two intermediate bents, reducing the construction cost of the bridge. Also, there is less bridge area to maintain. The negative is that if additional space is needed for lanes in the future, the space provided by the end spans would not be available. However, this bridge is in a rural location, so the likelihood of needing that additional space is low.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 562,984	•	\$ 562,984
ALTERNATIVE	\$ 303,527	•	\$ 303,527
SAVINGS	\$ 259,457	•	\$ 259,457

SKETCHES



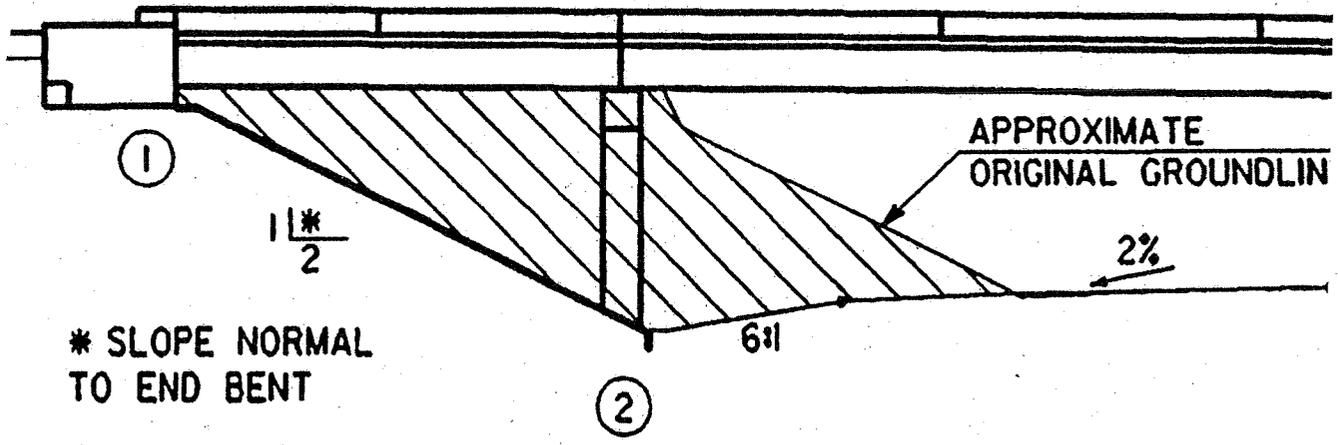
PROJECT: NHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765,
0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
Preliminary Design Stage

ALTERNATIVE NO.:

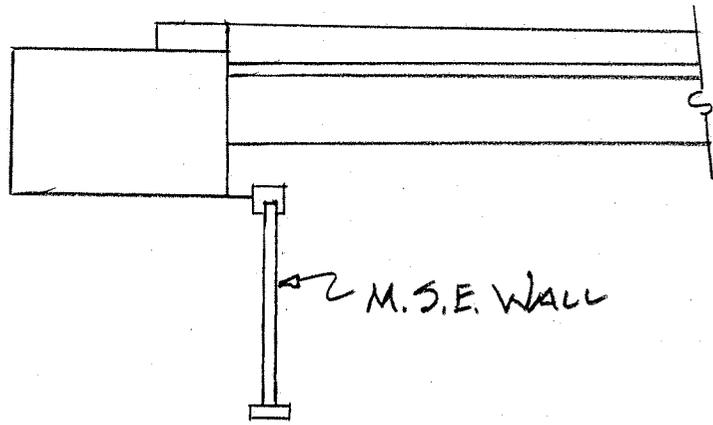
764-3

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS**
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
Preliminary Design Stage

ALTERNATIVE NO.: **764-3**

SHEET NO.: **3 of 4**

Skew angle = $\alpha = 72-28$

Bridge width (out-to-out) = 61.25

Span 1 length = 49

Span 4 length = 49

Bridge area = $W [(L_1 + L_4) - 2(6)/\sin \alpha] = 5232 \text{ ft}^2$

Assume wall height = 4' at end

Height under bridge = $H = 22$

Wall Area = $2[(W/\sin \alpha)H + .5(4 + H)[2(H - 4)/\sin \alpha](2)]$
 $= 4790 \text{ ft}^2$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **764-6**

DESCRIPTION: **REDUCE BRIDGE WIDTH AT BARNEYVILLE ROAD TO MATCH BRIDGE POLICY MANUAL** SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The bridge has two lanes at 12 feet each, one lane at 14 feet, and two shoulders at 10 feet each.

ALTERNATIVE:

Provide a bridge with two lanes at 12 feet each, one lane at 14 feet, and two shoulders at 7 feet each.

ADVANTAGES:

- Reduces bridge cost
- Complies with GDOT policy

DISADVANTAGES:

- None apparent

DISCUSSION:

The GDOT Bridge and Structures Policy Manual defines widths for bridges for both state routes and non-state routes. Reducing the bridge width to the alternative width reduces the cost of the bridge and provides a bridge width in compliance with the Manual. The average daily traffic count at this site is 4,000 vehicles per day, the speed design is 45 mph, and this is a county road, so the shoulder width should be 7 feet.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 2,280,452	•	\$ 2,280,452
ALTERNATIVE	\$ 1,833,680	•	\$ 1,833,680
SAVINGS	\$ 446,772	•	\$ 446,772

CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS**
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
Preliminary Design Stage

ALTERNATIVE NO.:

764-6

SHEET NO.: 2 of 3

Bridge Length = 346'

Proposed bridge width (out-to-out) = 61.25'

Proposed bridge area = 21193 ft²

Alternative bridge width (out-to-out) = 49.25'

Alternative bridge area = 17041 ft²

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **764-7**

DESCRIPTION: **RELOCATE THE TEMPORARY BARRIER AT THE ROUNTREE BRIDGE ROAD INTERCHANGE** SHEET NO.: **1 of 2**

ORIGINAL DESIGN: (Sketch attached)

The current design indicates the temporary barrier is to be placed over a beam's top flange.

ALTERNATIVE:

Relocate the temporary barrier so it will not be over the beam's top flange.

ADVANTAGES:

- Allows barrier to be bolted to the deck

DISADVANTAGES:

- May require adjustments to staging

DISCUSSION:

Method 2 temporary barrier will not be required due to its proximity to the edge of the new deck. This type of barrier must be bolted to the deck with bolts through the deck. This is not possible over the beam's top flange.

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

SKETCHES

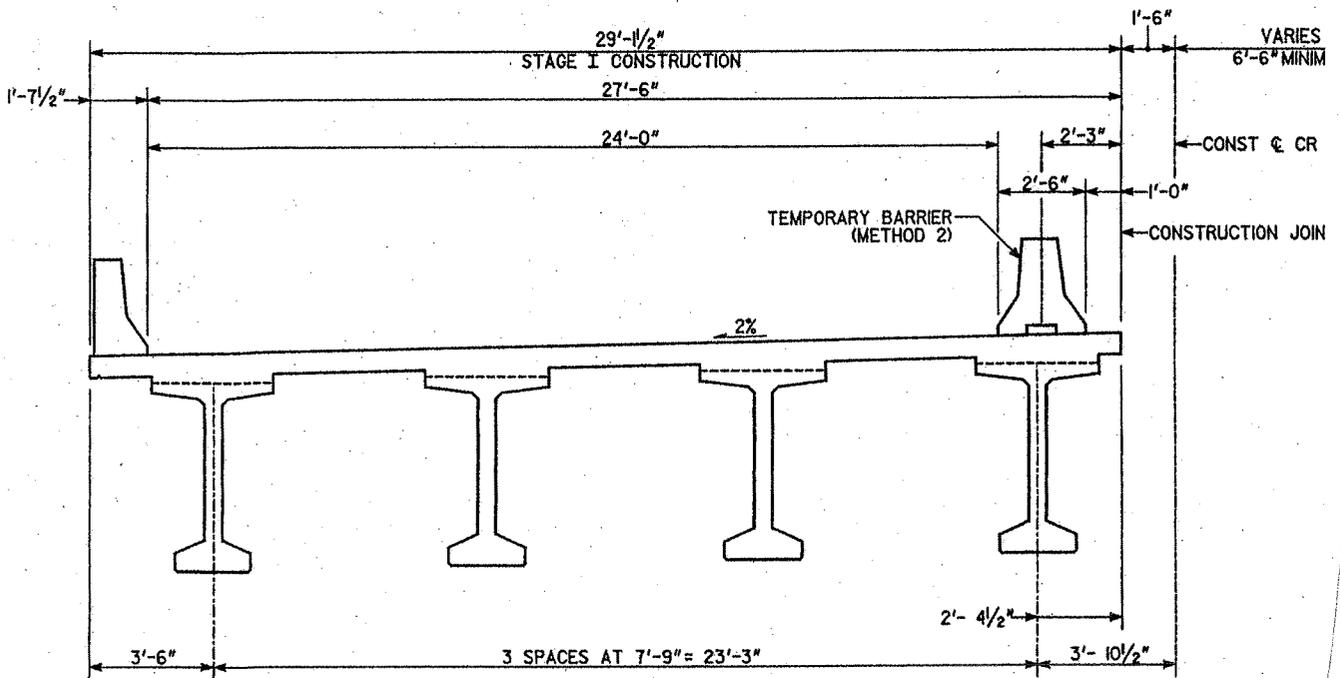


PROJECT: NHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
 Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
 Preliminary Design Stage

ALTERNATIVE NO.: 764-7

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 2



METHOD 2 TEMPORARY
 BARRIER CAN NOT BE
 INSTALLED OVER BEAM
 FLANGE.

STAGE I
 LOOKING AHEAD
 SPAN 2 AND 3 SHOWN
 SPAN 1 AND 4 SIMILAR

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **764-8**

DESCRIPTION: **COMPRESS THE DIAMOND AT THE ROUNTREE BRIDGE ROAD/I-75 INTERCHANGE** SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (Sketch attached)

The current design calls for Rountree Bridge Road to be relocated west of its present location and a new off ramp to be located west of the existing ramp location.

ALTERNATIVE: (Sketch attached)

Eliminate relocating Rountree Bridge Road west and instead relocate it at the proposed southbound ramp.

ADVANTAGES:

- Reduces initial cost
- Minimizes right-of-way
- Simplifies design and construction
- Reduces wetlands impact

DISADVANTAGES:

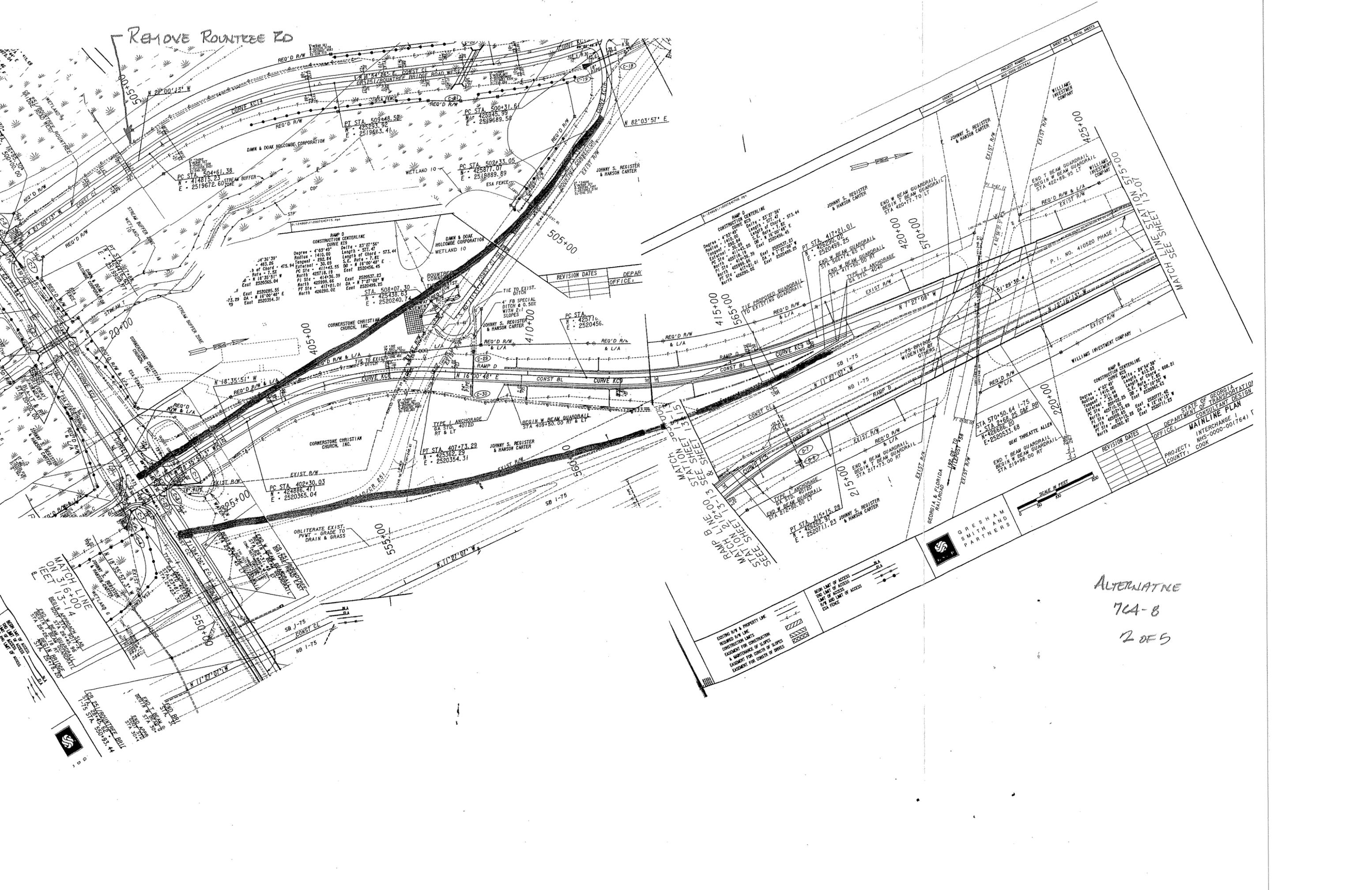
- None apparent

DISCUSSION:

Primarily, this alternative explores the possibility of reducing the amount of right-of-way takes as well as the impacts on the surrounding wetlands.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 2,386,997	•	\$ 2,386,997
ALTERNATIVE	\$ 855,281	•	\$ 855,281
SAVINGS	\$ 1,531,716	•	\$ 1,531,716

REMOVE ROUTE 20



CURVE K12
 Degree = 4°03'49"
 Radius = 1410.00
 Length = 232.84
 Tangent = 411.45
 Chord = 411.45
 PC Sta = 425718.19
 PT Sta = 414+36.39
 PI Sta = 417+48.01
 North = 425994.66
 East = 252035.04

CURVE K13
 Degree = 4°03'49"
 Radius = 1410.00
 Length = 232.84
 Tangent = 411.45
 Chord = 411.45
 PC Sta = 425718.19
 PT Sta = 414+36.39
 PI Sta = 417+48.01
 North = 425994.66
 East = 252035.04

REVISION	DATE	DESCRIPTION

REVISION	DATE	DESCRIPTION

ALTERNATIVE
 7CA-B
 2 OF 5



GRESHAM SMITH AND PARTNERS

STATE OF GEORGIA
 DEPARTMENT OF TRANSPORTATION
 INTERCHANGE 1
 PROJECT: NPS-0000-00(764) I
 COUNTY: COOK

CALCULATIONS



PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, ALTERNATIVE NO.:
 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
 Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
 Preliminary Design Stage

764-8

ROULDTREE BRIDGE RD. - COMPLETE DIAMOND

SHEET NO.: 3 of 5

PROPOSED ROULDTREE ROAD EAST

$$2279.47 \text{ LF} \times 37' / 9 = 9371.15 \text{ SYAS}$$

TYP. SECTION 37' ASPH. AVENUE

- Ⓐ 1 1/4" - ASPH E $9371.15 (110 \text{ lbs/sy}) \cdot 1.25 + 2000 = 644.26 \text{ TNS} \times \$85.00 = 54,762.10$
- Ⓑ 3" - ASPH B $9371.15 (220 \text{ lbs/sy}) \cdot 3' + 2000 = 3092.48 \text{ TNS} \times \$85.00 = 262,860.80$
- Ⓒ 8" - G.A.B $9371.15 (135 \text{ lbs/sy}) \cdot 8 + 2000 = 5060.42 \text{ TNS} \times \$25.00 = 126,510.52$

R.O.W

$$A = 1962.63 \text{ LF} \times 130' = 255,141.90 \text{ SF} / 43560 = \underline{5.857 \text{ ACS}}$$

$$A_c = 337 \cdot \frac{130 + 80}{2} = 35,385 \text{ SF} / 43560 = \underline{0.81 \text{ ACS}}$$

REQ'D
TOTAL ROW = 6.66 ACS

EXIST. ROW = -1.202 ACS

5.466 ACS REQ'D ROW $\times 6500 = \underline{\$35,533.10}$

EXIST R.O.W

$$A = \frac{L_1 + L_2}{2} \cdot 80 = \frac{780 + 570}{2} \cdot 80 = 52,400 \text{ SF} / 43560 = 1.20 \text{ ACS}$$

PROP. CURVE - 95 LF
DBL 7' x 4'

$$95 (1.40 \text{ CY} \cdot \text{FT}) \cdot \$470 = \underline{\$62,510.00}$$

$$95 \text{ LF} (180 \text{ lbs} \cdot \text{FT}) \cdot \$1.00 = \underline{\$17,100.00}$$

$$\underline{\$79,610.00}$$

18" RCP

$$65 \text{ LF} \times \$55 = \underline{\$3,575}$$

CLEARING & GRUBBING

$$\underline{\$20,000.00} \text{ AC} \times 5.466 = \underline{\$109,320}$$

TOTAL COST TO REMOVE ROULDTREE ROAD

$\$672,171.58$ SAVINGS TO PROJECT

CALCULATIONS



PROJECT: NNHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, ALTERNATIVE NO.:
 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
 Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
 Preliminary Design Stage

764-8

ROVILTREE BRIDGE RA - COMPRESS DIAMOND

SHEET NO.: 4 of 5

Ramp D Prop. Cost.

LENGTH = 2,615.67

WIDTH = 28'

$A = 2,615.67 \times 28' / 9 = 8,137.64 \text{ SY}$
 $= 8,137.64 \text{ SY}$

① Plain Conc. PVT #45 @ $\$45.00 \times 8,137.64 = \$528,994.6$

② 3" 220 lbs/sy = $8,137.64 \text{ SY} (220) \cdot 3 \div 2000 = 2685.42 \times 85.00 = 228,240.70$

③ 6" 440 lbs/sy = $8,137.64 \text{ SY} (440) \cdot 6 \div 2000 = 10,741.68 \times 25.00 = 268,542.00$

CLEARING & GRUBBING

$2615.67 \times 180' = 470,820.6 \text{ SF} / 43560$
 $= 10.80 \text{ ACS}$

$\$20,000.00 \times 10.80 \text{ ACS} = \$216,000$

TOTAL COST
\$1,311,948.60

R.O.W. COST

$10.80 \text{ ACS} \times \$6500 = \$70,200$

RELOCATED RAMPA

LENGTH = 1500 LF

WIDTH = 28'

$A = 1500 \times 28 = 42000 \text{ SF}$
 $= 4666.66$

① Plain Conc. PVT #45 @ $\$45.00 \times 4666.66 = 303,333.33$

② 3" 220 lbs/sy = $4666.66 (220) \cdot 3 \div 2000 = 1540 \text{ TNS} \times 85 = \$130,900$

③ 6" 440 lbs/sy = $4666.66 (440) \cdot 6 \div 2000 = 6160 \text{ TNS} \times 25 = \$154,000$

CLEARING & GRUBBING

$1500 \text{ LF} \times 95' / 43560 = 3.27 \text{ ACS}$

$20,000 \times 3.27 \text{ ACS} = \$65,400$

R.O.W. COST

$3500.00 \times \text{ROW MARK UP } 2.472\% = 8652$

$\text{COST } 3500 + 8652 = 12,152$

TOTAL COST
\$653,659.33 x MARK UP 19.56%
 + 127,859.74
781,519.09
12,152.00
= 793,671.09

VALUE ENGINEERING ALTERNATIVE



PROJECT:	NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 <i>Preliminary Design Stage</i>	ALTERNATIVE NO.: 764-9
DESCRIPTION:	USE MECHANICALLY STABILIZED EMBANKMENT WALLS TO ELIMINATE BRIDGE END SPANS AT ROUNDTREE BRIDGE ROAD	SHEET NO.: 1 of 4

ORIGINAL DESIGN: (Sketch attached)

The bridge has 2:1 end slopes with end span.

ALTERNATIVE: (Sketch attached)

Construct mechanically stabilized embankment (MSE) wall at Bents 2 and 4 to eliminate end spans.

ADVANTAGES:

- Reduces costs
- Less bridge to maintain

DISADVANTAGES:

- Eliminates end span and potential future location for additional lanes

DISCUSSION:

Construction of MSE walls eliminates the construction of two end spans and two intermediate bents, reducing the construction cost of the bridge. Also, there is less bridge area to maintain. The negative is that if additional space is needed for lanes in the future, the space provided by the end spans would not be available. However, this bridge is in a rural location, so the likelihood of needing that additional space is low.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 589,240	•	\$ 589,240
ALTERNATIVE	\$ 272,857	•	\$ 272,857
SAVINGS	\$ 316,383	•	\$ 316,383

SKETCHES

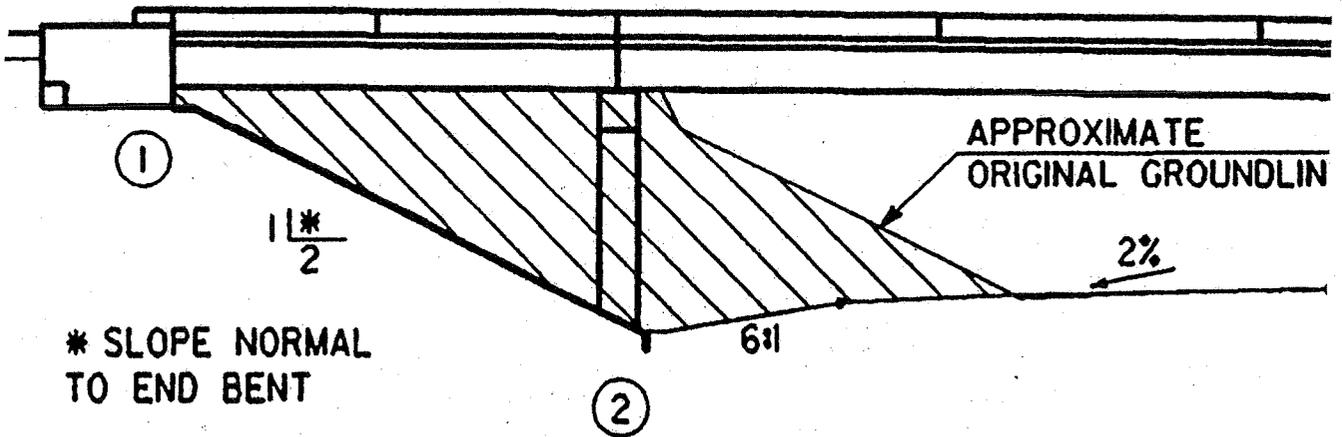


PROJECT: NHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765, ALTERNATIVE NO.:
0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
Preliminary Design Stage

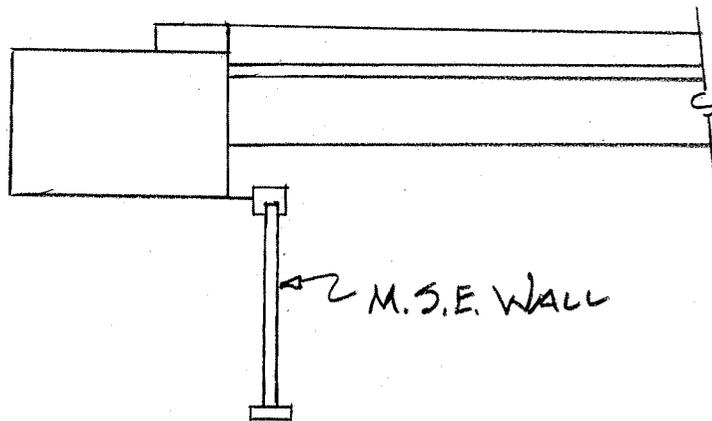
764-9

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS**
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
Preliminary Design Stage

ALTERNATIVE NO.: **764-9**

SHEET NO.: **3 of 4**

Skew angle = $\alpha = 82.51$

Bridge width (out-to-out) = 61.25

Span 1 length = 50.75

Span 4 length = 50.75

Bridge area = $W [(L_1 + L_4) - 2(6)/\sin \alpha] = 5476 \text{ ft}^2$

Assume wall height = 4' at end

Height under bridge = $H = 21$

Wall Area = $2[(W/\sin \alpha)H + .5(4 + H)[2(H - 4)/\sin \alpha](2)]$
 $= 4306 \text{ ft}^2$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **764-10**

DESCRIPTION: **REDUCE BRIDGE WIDTH AT ROUNTREE BRIDGE ROAD TO MATCH BRIDGE POLICY MANUAL** SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The bridge has two lanes at 12 feet, one lane at 14 feet, and two shoulders at 10 feet.

ALTERNATIVE:

Provide a bridge with two lanes at 12 feet, one lane at 14 feet, and two shoulders at 4 feet.

ADVANTAGES:

- Reduces bridge cost
- Complies with GDOT policy

DISADVANTAGES:

- None apparent

DISCUSSION:

The GDOT Bridge and Structures Policy Manual defines widths for bridges for both state routes and non-state routes. Reducing the bridge width to the alternative width reduces the cost of the bridge and provides a bridge width in compliance with the Manual. The average daily traffic count at this site is 1,900 vehicles per day, the speed design is 55 mph, and this is a county road, so the shoulder width should be 4 feet.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 2,233,106	•	\$ 2,233,106
ALTERNATIVE	\$ 2,014,347	•	\$ 2,014,347
SAVINGS	\$ 218,759	•	\$ 218,759

CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764,
0008458, 0000765, 0000803, 0000804, and 0000805; I-75
INTERCHANGE IMPROVEMENTS
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
*Preliminary Design Stage***

ALTERNATIVE NO.: **764-10**

SHEET NO.: **2 of 3**

Bridge Length = 338.83'

Proposed bridge width (out-to-out) = 61.25

Proposed bridge area = 20753 ft²

Alternative bridge width (out-to-out) = 55.25

Alternative bridge area = 18720 ft²

VALUE ENGINEERING ALTERNATIVE



PROJECT:	NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage	ALTERNATIVE NO.:	8458-2
DESCRIPTION:	USE MECHANICALLY STABILIZED EMBANKMENT WALLS TO ELIMINATE BRIDGE END SPANS AT KINARD BRIDGE ROAD	SHEET NO.:	1 of 4

ORIGINAL DESIGN: (Sketch attached)

The bridge has 2:1 end slopes with end span.

ALTERNATIVE: (Sketch attached)

Construct mechanically stabilized embankment (MSE) walls at Bents 2 and 4 to eliminate end spans.

ADVANTAGES:

- Reduces costs
- Less bridge to maintain

DISADVANTAGES:

- Eliminates end span and potential future location for additional lanes

DISCUSSION:

Construction of MSE walls eliminates the construction of two end spans and two intermediate bents, reducing the construction cost of the bridge. Also, there is less bridge area to maintain. The negative is that if additional space is needed for lanes in the future, the space provided by the end spans would not be available. However, this bridge is in a rural location, so the likelihood of needing that additional space is low.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 848,737	•	\$ 848,737
ALTERNATIVE	\$ 467,675	•	\$ 467,675
SAVINGS	\$ 381,062	•	\$ 381,062

SKETCHES



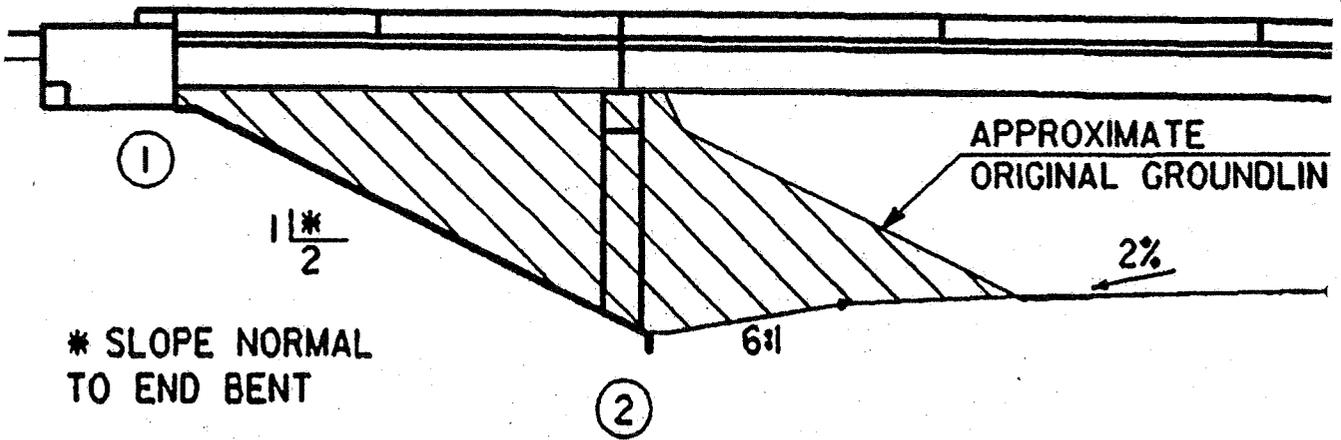
PROJECT: NHS-0000-00(764, 765, 803, 805 and 805) P. I. Nos. 0000764, 0008458, 0000765,
0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS
Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4
Preliminary Design Stage

ALTERNATIVE. NO.:

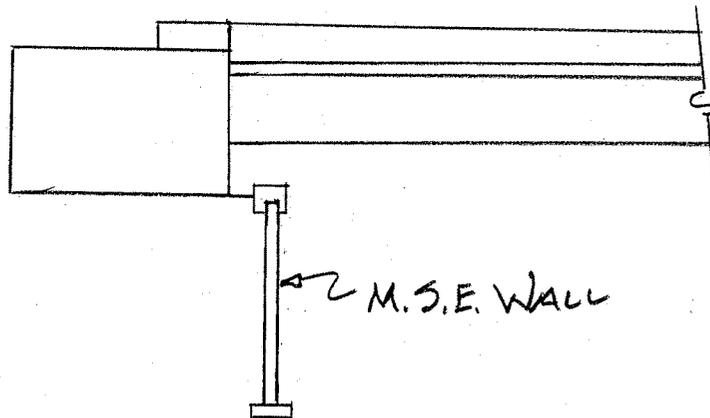
8458.2

AS DESIGNED ALTERNATIVE

SHEET NO.: 2 of 4



AS DESIGNED ALTERNATIVE



CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS**
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
Preliminary Design Stage

ALTERNATIVE NO.: **8458-2**

SHEET NO.: **3 of 4**

$$\text{Skew angle} = \alpha = 56.77$$

$$\text{Bridge width (out-to-out)} = 61.25$$

$$\text{Span 1 length} = 63.92$$

$$\text{Span 4 length} = 52 \text{ (portion of Span 4 that can be omitted)}$$

$$\text{Bridge area} = W [(L_1 + L_4) - 2(6)/\sin \alpha] = 6221 \text{ ft}^2$$

$$\text{Assume wall height} = 4' \text{ at end}$$

$$\text{Height under bridge} = H = 23$$

$$\begin{aligned} \text{Wall Area} &= 2[(W/\sin \alpha)H + .5(4 + H)[2(H - 4)/\sin \alpha](2)] \\ &= 5821 \text{ ft}^2 \end{aligned}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 Preliminary Design Stage** ALTERNATIVE NO.: **8458-3**

DESCRIPTION: **REDUCE BRIDGE WIDTH AT KINARD BRIDGE ROAD TO MATCH BRIDGE POLICY MANUAL** SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

The bridge has two lanes at 12 feet, one lane at 14 feet, and two shoulders at 10 feet.

ALTERNATIVE:

Provide a bridge with two lanes at 12 feet, one lane at 14 feet, and two shoulders at 8 feet.

ADVANTAGES:

- Reduces bridge cost
- Complies with GDOT policy

DISADVANTAGES:

- None apparent

DISCUSSION:

The GDOT Bridge and Structures Policy Manual defines widths for bridges for both state routes and non-state routes. Reducing the bridge width to the alternative width reduces the cost of the bridge and provides a bridge width in compliance with the Manual. The average daily traffic count at this site is 5,800 vehicles per day, and this is a county road, so the shoulder width should be 8 feet.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 3,854,994	•	\$ 3,854,994
ALTERNATIVE	\$ 3,603,279	•	\$ 3,603,279
SAVINGS	\$ 251,715	•	\$ 251,715

CALCULATIONS



PROJECT: **NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764,
0008458, 0000765, 0000803, 0000804, and 0000805; I-75
INTERCHANGE IMPROVEMENTS
Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
*Preliminary Design Stage***

ALTERNATIVE NO.: **8458-3**

SHEET NO.: **2 of 3**

Bridge Length = 461.33'

Proposed bridge width (out-to-out) = 61.25'

Proposed bridge area = 28256 ft²

Alternative bridge width (out-to-out) = 57.25'

Alternative bridge area = 26411 ft²

PROJECT DESCRIPTION

BACKGROUND AND HISTORY

Projects NHS-0000-00(764, 765, 803, 804, and 805) are five of eight programmed projects to widen U. S. Interstate Highway 75 (I-75) from four to six lanes from State Route (SR) 133 in Valdosta to the Crisp/Dooly County line north of Cordele. The southern terminus is just north of SR 37 near Adel, Georgia in Cook County, and the northern terminus is just south of SR 300 near Cordele, Georgia south of the Crisp County line.

During Phase 1 of these projects, I-75 was or is being widened to accommodate the aforementioned six lanes that unfortunately resulted in Design Exceptions for substandard horizontal clearances from the mainline to side barriers in front of bridge columns. The I-75 widening requires 14-foot shoulders based on design speed and average daily traffic (ADT).

Phase 2 basically proposes to remedy the substandard conditions of the noted projects and further proposes to accommodate a potential fourth lane on I-75. The fourth lane addition is currently in long range planning with no real necessity foreseen until well beyond the year 2050.

SUMMARY SPECIFIC PROJECT DETAILS

Project 764 was to consist of improving the following interchanges in Cook County:

- I-75 at County Road (CR) 251 – Rountree Bridge Road (Exit 41);
- I-75 at CR 253 – Barneyville Road (Exit 45); and
- I-75 at CR 246 – Kinard Bridge Road (Exit 49).

However, due to significant environmental impacts resulting from the work at Kinard Bridge, an Environmental Assessment (EA) will be required for the project. This lengthy process would have delayed the reconstruction of the other two intersections so it was decided to remove the work on Kinard Bridge Road from Project 764 and program it as a separate project now known as Project 8458. In addition, the cross section for the Kinard Bridge Road was revised to two partial diamond ramps in the northeast and southwest quadrants.

Project 765 consists of improving the following interchange in Tift County:

- I-75 at CR 418 – Omega – Eldorado Road (Exit 55).

The revised project changes the typical section from four 12-foot travel lanes with a 20-foot raised median and 4-foot paved outside shoulders to two 12-foot travel lanes, one 14-foot center lane and 10-foot shoulders with 6.5-feet being paved. In addition, the bridge is being shifted to the north, and the distance between the ramp alignments was increased from 822 feet of separation to 1,000 feet of separation.

Project 803, was to consist of improving the following interchanges in Tift County:

- I-75 at CR 410 – Brighton Road (Exit 66)
- I-75 at CR 421 – Chula Brookfield Road (Exit 69)
- I-75 at CR 11 – Willis Still Road (Exit 71)
- I-75 at CR 107 - Wesley Rigdon Road Overpass Bridge (not an interchange)

The revised project changes the typical section for all interchanges cross roads consist of two 12-foot travel lanes and 6.5-foot paved outside shoulders. Typical section on bridges would consist of two 12-foot travel lanes, one 14-foot median turn lane and 10-foot shoulders. In addition, the revised concept proposes a partial cloverleaf at the Brighton Road interchange from a full diamond interchange to minimize the impact on the University of Georgia Veterinary Diagnostics and Investigational Laboratory in the northwest quadrant. Furthermore, overpass bridge ay Wesley Rigdon Road will be bought up to current standards.

Project 804 now consists of improving the following interchanges in Turner County:

- I-75 at CR 252 – Inaha Road (Exit 75)
- I-75 at SR 32 – (Exit 78)
- I-75 at CR 33 – Bussey Road (Exit 80)
- I-75 at SR 112 – East Washington Avenue (Exit 82)
- I-75 at SR 159 – (Exit 84)
- SR 32 Bridge Over Hat Creek (assist in accommodating the SR 32 interchange reconstruction).

Project 805 now consists of improving the following interchanges in Crisp County:

- I-75 at CR 357 – Hawpond Road (Exit 92)
- I-75 at SR 33 CONN – Rockhouse Road (Exit 97)
- I-75 at CR 251 – Wardlow Road Overpass Bridge (not an interchange)
- I-75 at CR 159 – Alberson Road Overpass Bridge (not an interchange)
- I-75 at CR 116 – Bedgood Road Overpass Bridge (not an interchange)
- I-75 at CR 117 – Musselwhite Road Overpass Bridge (not an interchange)
- I-75 at CR 355 – Old Hatley Road Overpass Bridge (not an interchange)

CONSTRUCTION COSTS

The probable cost of construction for these projects is based on the six cost estimates provided by the design teams:

- Revised Concept Report Cost Estimate NHS-0000-00(764) dated October 6, 2006; prepared by Gresham, Smith and Partners
- Detailed Estimate: Cost Estimate Report; Estimated Report for file “PI 0000765 PFPR” dated January 6, 2007; prepared by American Engineers, Inc.
- Detailed Estimate: Cost Estimate Report; Estimated Report for file “NHS-0000-00(803)” dated August 8, 2006; prepared by Parsons
- Detailed Estimate: Cost Estimate Report; Estimated Report for file “0000-00(804) (I-75 Turner Co. Phase 2)” dated November 20, 2006; prepared by URS Corporation
- Detailed Estimate: Cost Estimate Report; Estimated Report for file “I-75 NHS 0000-00(805)” dated February 19, 2007; prepared by Greenhorne & O’Mara
- Revised Concept Report Cost Estimate Project Number to be Assigned [8458] dated October 2, 2006; prepared by Gresham, Smith and Partners

Project 764:

Construction Costs =	\$21,186,054
Engineering and Construction (at 10.00%) =	2,118,605
Inflation (at 8.69%) =	<u>2,026,311</u>
Total Construction =	25,330,970
Total Right-of-Way Costs =	9,703,313
Total Reimbursable Utilities =	<u>522,750</u>
TOTAL =	<u>\$35,557,033</u>

Project 765:

Construction Costs =	\$12,006,486
Engineering and Construction (at 10.00%) =	1,200,649
Inflation (at 8.69%) =	<u>1,148,344</u>
Total Construction =	14,355,478
Total Right-of-Way Costs =	4,064,500
Total Reimbursable Utilities =	<u>299,788</u>
TOTAL =	\$18,719,767

Project 803:

Construction Costs =	\$21,294,427
Engineering and Construction (at 10.00%) =	2,129,443
Inflation (at 37.81%) =	<u>8,855,444</u>
Total Construction =	32,279,314
Total Right-of-Way Costs =	8,780,001
Total Reimbursable Utilities =	<u>2,500,000</u>
TOTAL =	\$43,559,314

Project 804:

Construction Costs =	\$37,579,629
Engineering and Construction (at 10.00%) =	3,757,963
Inflation (at 59.71%) =	<u>24,682,028</u>
Total Construction =	66,019,620
Total Right-of-Way Costs =	10,823,769
Total Reimbursable Utilities =	<u>369,010</u>
TOTAL =	\$77,212,399

Project 805:

Construction Costs =	\$35,206,614
Engineering and Construction (at 10.00%) =	3,520,661
Inflation (at 10.10%) =	<u>3,910,706</u>
Total Construction =	42,637,982
Total Right-of-Way Costs =	8,907,499
Total Reimbursable Utilities =	<u>237,000</u>
TOTAL =	\$51,782,481

Project 8458:

Construction Costs =	\$12,440,620
Engineering and Construction (at 10.00%) =	1,244,062
Inflation (at 37.81%) =	<u>5,173,523</u>
Total Construction =	18,858,205
Total Right-of-Way Costs =	4,195,652
Total Reimbursable Utilities =	<u>332,800</u>
TOTAL =	\$23,386,657

GRAND TOTALS:

Project 764 =	\$35,557,033
Project 765 =	18,719,767
Project 803 =	43,559,314
Project 804 =	77,212,399
Project 805 =	51,782,481
Project 8458 =	<u>23,386,657</u>
GRAND TOTAL =	\$250,217,561

VALUE ANALYSIS AND CONCLUSIONS

INTRODUCTION

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

- Value Engineering Study Agenda
- Value Engineering Workshop Participants
- Economic Data
- Cost Estimate Summary and Cost Models
- 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

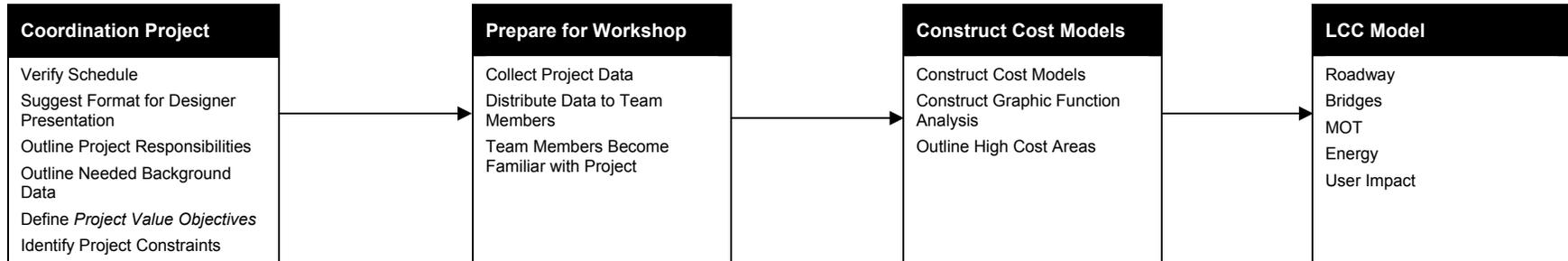
The VE workshop was a three and a half-day effort (see attached agenda). During the workshop, the VE job plan was followed. The job plan guided the search for high cost areas in the project and included procedures for developing alternative solutions for consideration. It included six phases:

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

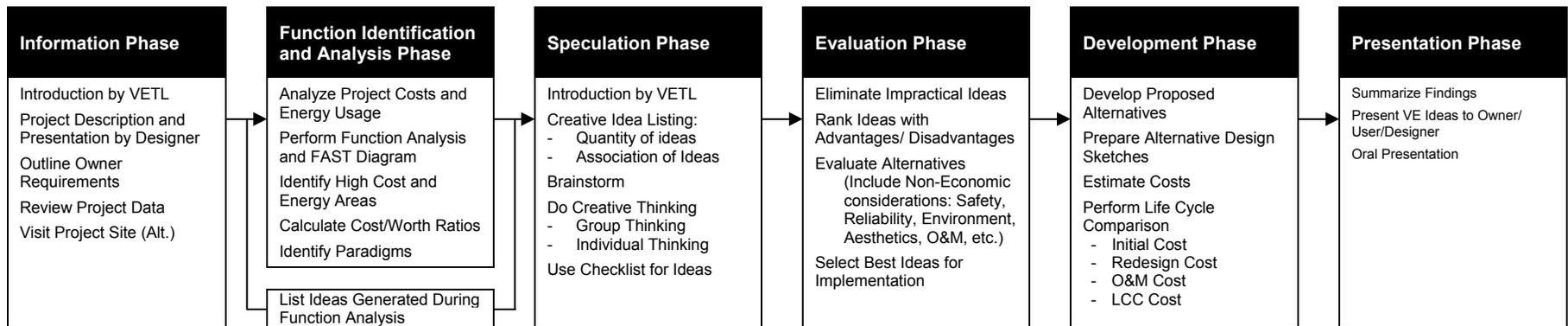


Value Engineering Study Task Flow Diagram

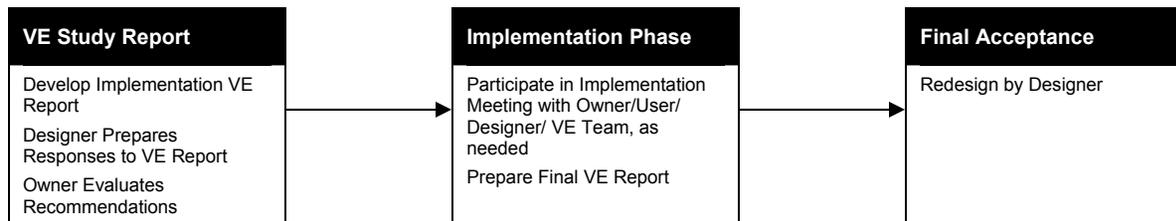
Preparation Effort



Workshop Effort



Post-Workshop Effort



Information Phase

At the beginning of the study, the 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:

- **Revised Project Concept Report** for GDOT NHS-0000-00(805), P. I. No. 0000805, Turner/Crisp Counties, Project NH-IM-75-1(157); print dated of March 29, 2006;
- **Estimate Report** for file “I-75 NHS-0000-00(805);” prepared by Greenhorne & O’Mara; dated February 19, 2007;
- **Half Size Drawings** for Plan and Profile of Proposed I-75 Interchange Improvements from SR 159 north of Ashburn to SR 300/Turner and Crisp Counties – Phase 2; Federal Aid Project NHS-0000-00(805); Georgia DOT P. I. No. 0000805; State Route No, 401; Federal Route No. I-75; prepared for the Department of Transportation, State of Georgia by Greenhorne & O’Mara; plotted February 14, 2007;
- **Half Size Drawings** for existing bridges for the Proposed I-75 Interchange Improvements from SR 159 north of Ashburn to SR 300/Turner and Crisp Counties; provided by Greenhorne & O’Mara;
- **Compact Disc** for VE Study; NHS-0000-00(805), P. I. 0000805; provided by Greenhorne & O’Mara; dated March 13, 2007;
- **Aerial Map** depicting Proposed I-75 Interchange Improvements from SR 159 north of Ashburn to SR 300/Turner and Crisp Counties – Phase 2;
- **Revised Project Concept Report** for P. I. No. 0000804, Turner County; NHS-0000-00(804); I-75 from Tift County Line to SR 159; dated of December 7, 2006;
- **Estimate Report** for file “0000-00(804) (I-75 Turner Co. Phase 2);” prepared by URS Corporation; dated November 20, 2006;
- **Half Size Drawings** for Plan and Profile of Proposed I-75 Widening and Improvements from Tift County Line to SR 159, Phase II; Federal Aid Project NHS-0000-00(804) Turner County; Federal Route No. I-75; State Route No. 401; P. I. No. 0000804; prepared for the Department of Transportation, State of Georgia by URS Corporation; plotted February 14, 2007;
- **Full Size Drawings** for existing bridges for the Proposed I-75 Widening and Improvements from Tift County Line to SR 159, Phase II; provided by URS Corp[oration];
- **Compact Disc** for VE Study; NHS-0000-00(804), P. I. 0000805 Turner; I-75 Turner County, Microstation Design Files; provided by URS Corporation; undated;
- **Aerial Map** depicting Proposed I-75 Widening and Improvements from Tift County Line to SR 159, Phase II;
- **Revised Project Concept Report** for I-75 Improvements from North of Tifton City Limits to Turner County Line, Phase II; Project Number: NHS-0000-00(803), P. I. No. 0000803, undated;
- **Estimate Report** for file “0000-00(803);” prepared by Parsons; dated August 22, 2006;
- **Half Size Drawings** for Plan and Profile of Proposed I-75 Interchange Improvements from North of Tifton City Limits to Turner County Line, Tift County; Federal Aid Project NHS-0000-00(803) Federal Route No. I-75; State Route No. (None Provided); P. I. No. 0000804; prepared for the Department of Transportation, State of Georgia by Parsons; plotted February 16, 2007;
- **Half Size Drawings** for existing bridges for the Proposed I-75 Interchange Improvements from North of Tifton City Limits to Turner County Line; provided by Parsons;
- **Off Site Detour Map** for Bridge Construction at Brighton Road and Willis Still Road; prepared for the Department of Transportation, State of Georgia by Parsons; dated October 12, 2006;
- **Compact Disc** for NHS-0000-00(803), P. I. 0000803 Tift County; Electronic Files for VE Study; provided by Parsons; dated March 13, 2007;

- **Aerial Map** depicting Proposed I-75 Interchange Improvements from North of Tifton City Limits to Turner County Line;
- **Revised Project Concept Report** for I-75 from CR 246/Cook to CR 204 in Tift County – Phase 2; NHS-0000-00(765), P. I. No. 0000765, dated August 2, 2006;
- **Estimate Report** for file “0000-00765 PFPR;” prepared by American Engineers, Inc.; dated January 16, 2007;
- **Half Size Drawings** for Plan and Profile of the Proposed Interchange Reconstruction at Omega-Eldorado Road/CR 418 & Interstate 75; Partial Limited Access; NHS-0000-00(765); Tift County; Georgia D.O.T. P. I. 0000765; Federal Route No. I-75; State Route No. 401; prepared for the Department of Transportation, State of Georgia by American Engineers, Inc.; undated;
- **Half Size Drawings** for Proposed Right of Way plan for Interchange Reconstruction at Omega-Eldorado Road/CR 418 & Interstate 75; Partial Limited Access; Federal Aid Project NHS-0000-00(765); Federal Route No. I-75; State Route No. 401; P. I. No. 0000765; prepared for the Department of Transportation, State of Georgia by American Engineers, Inc.; dated February 14, 2007;
- **Half Size Drawings** for existing bridges for the Proposed Interchange Reconstruction at Omega-Eldorado Road/CR 418 & Interstate 75; provided by American Engineers, Inc.;
- **Interchange Modification Report** for I-75 at Omega – Eldorado Road/CR 418, Tift County; prepared for American Engineers, Inc. by Carter Burgess; dated November 2006;
- **Compact Disc** for Omega-Eldorado Road/CR 418; P. I. 0000765; NHS-0000-00(765) for VE Study; provided by American Engineers, Inc.; dated March 9, 2007;
- **Aerial Map** depicting Proposed Interchange Reconstruction at Omega-Eldorado Road/CR 418 & Interstate 75;
- **Revised Project Concept Report** for I-75 from SR 37 to CR 246/Kinard Bridge Road – Phase 2; P. I. No. 0000764, Cook County; NHS-0000-00(764); dated January 8, 2007;
- **Construction Estimate Report** for GDOT Project NHS-0000-00(764); Gresham Smith & Partners; dated January 8, 2007;
- **Half Size Drawings** for Plan and Profile of the Proposed I-75/SR 401/CR 251 – Rountree Bridge Road (Exit 41) CR 253 – Barneyville Road (Exist 45) Interchange Reconstruction; Georgia D.O.T. P. I. 0000764; Federal Route No. I-75; State Route No. 401; prepared for the Department of Transportation, State of Georgia by Gresham Smith & Partners and Thompson Engineering; undated;
- **Aerial Map** depicting Proposed I-75/SR 401/CR 251 – Rountree Bridge Road (Exit 41) CR 253 – Barneyville Road (Exist 45) Interchange Reconstruction;
- **Revised Project Concept Report** for I-75 from SR 37 to CR 246/Kinard Bridge Road – Phase 2; P. I. No. 0000764, Cook County; NHS-0000-00(764); dated January 8, 2007;
- **Construction Estimate Report** for GDOT Project P. I. 0008458; Gresham Smith & Partners; dated January 8, 2007;
- **Half Size Drawings** for Plan and Profile of the Proposed I-75/SR 401/CR 246 – Kinard Bridge Road (Exit 49) Interchange Reconstruction; Georgia D.O.T. P. I. 0008458; Federal Route No. I-75; State Route No. 401; prepared for the Department of Transportation, State of Georgia by Gresham Smith & Partners; undated;
- **Aerial Map** depicting Proposed I-75/SR 401/CR 246 – Kinard Bridge Road (Exit 49) Interchange Reconstruction;
- **General Highway Map**, Cook County, Georgia, prepared by the Department of Transportation, Division of Planning and Programming, Planning Data Services in cooperation with the U.S. Department of Transportation, Federal Highway Administration, dated 1987;
- **General Highway Map**, Crisp County, Georgia, prepared by the Department of Transportation, Division of Planning and Programming, Planning Data Services in cooperation with the U.S. Department of Transportation, Federal Highway Administration, dated 1985;

- **General Highway Map**, Tift County, Georgia, prepared by the Department of Transportation, Division of Planning and Programming, Planning Data Services in cooperation with the U.S. Department of Transportation, Federal Highway Administration, dated 1987;
- **General Highway Map**, Turner County, Georgia, prepared by the Department of Transportation, Division of Planning and Programming, Planning Data Services in cooperation with the U.S. Department of Transportation, Federal Highway Administration, dated 1987;
- **Item Mean Summary** for 01/2006 to 12/2006 for Specification Year 2001 Contracts – (English); prepared by the Georgia Department of Transportation; dated January 08, 2007.

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 to 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.

Speculation/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.

GDOT and design team 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 Speculation/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 0-5, 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 section entitled Study Results.

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 Potential Cost Savings worksheets were provided to GDOT representatives during an informal oral presentation on the last day of the study. 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 included the preparation of this Value Engineering Study Report. Personnel from GDOT 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 28-hour Value Engineering (VE) study on the following projects: NHS-0000-00(764, 8458, 765, 803, 804 and 805), P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804 and 0000805, Interstate 75 (I-75) Improvements from CR 251 – Roundtree Bridge Road (Exit 41) in Cook County to SR 300 in Crisp County, Georgia. These projects are located in the Cook, Tift, Turner, and Crisp Counties, Georgia. It is expected the owner, the Georgia Department of Transportation (GDOT) and the design consultants: Gresham Smith and Partners (GSP); American Engineers, Inc. (AEI); Parsons Corporation (Parsons); URS Corporation (URS); and Greenhorne & O’Mara, Inc. (G&O) 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 13 – 16, 2007. The study will be conducted in the Bridge Design’s Conference Room, Room 260 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 13th

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

9:15 am - 12:00 noon **Owner's / Designer's Presentation**

GDOT and Wolverton & Associates 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.

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

1:00 am - 2:00 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.

2:00 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 14th

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 15th

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 16th

8:00 am - 9:00 am **Finalize Summary Worksheets and Prepare for Oral Presentation Strategies**

9:00 am – 12:00 am **Informal Oral Presentation**

The VE team presents its alternatives to the owner and design teams' 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.

12:00 noon **Adjourn**

VALUE ENGINEERING WORKSHOP PARTICIPANTS

The VE team was organized to provide specific expertise on the unique 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:

Tyler Denning, PE	Roadway Engineer	ARCADIS-US, Inc.
John P. Tiernan, PE	Bridge Engineer	ARCADIS-US, Inc.
Harley G. Griffin	Construction Specialist/ Transportation Engineer	Delon Hampton and Associates
Lawrence D. Prescott, Jr., PE	Bridge Engineering	HNTB
Dominic F. Saulino	Transportation Engineer	HNTB
Luis M. Venegas, PE, CVS-Life, LEED® AP	Value Engineering Facilitator	Lewis & Zimmerman Associates, Inc.

OWNER/DESIGNER PRESENTATION

GDOT, and the design teams, Gresham Smith and Partners, Thompson Engineering, American Engineers, Inc., Parsons, Heath & Lineback, Inc., URS Corporation, and Greenhorne & O'Mara, presented an overview of the projects on Tuesday, March 13, 2007. 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 TEAM FINAL PRESENTATION

The VE team conducted an informal oral presentation on Friday, March 16, 2007 to GDOT representatives where copies of the draft Summary of Potential Cost Savings worksheets were provided for interim use by GDOT personnel and all of the design teams.

A copy of the meeting participants is attached for reference.

VALUE ENGINEERING ATTENDEES

MEETING PARTICIPANTS



PROJECT: NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4 Preliminary Design Stage		Date: March 13 – 16, 2007
NAME & E-MAIL (PLEASE PRINT)	ORGANIZATION/TITLE	PHONE/FAX
Name: Nicoe Alexander, EIT GDOT Employee No.: em: nicoe.alexander@dot.state.ga.us	Organization: Georgia Department of Transportation (GDOT), Office of Program Consultant Design (OPCD) Title: Design Group Manager	ph: 404-463-6135 cell: fx: 404-463-6131
Name: Scott Chambers GDOT Employee No.: em: scott.chambers@dot.state.ga.us	Organization: GDOT, District 4, Construction Title: Area Engineer	ph: 229-556-9433 cell: fx: 229-556-9590
Name: Joseph (Joe) Cowan, PE GDOT Employee No.: em: joe.cowan@dot.state.ga.us	Organization: GDOT, District 4, Construction Title: District Construction Engineer	ph: 229-386-3304 cell: fx: 229-386-3612
Name: Gerald (Jerry) A. Milligan GDOT Employee No.: em: jerry.milligan@dot.state.ga.us	Organization: GDOT, Office of Right of Way Title: Supervisor Appraisal Estimator	ph: 770-986-1541 cell: fx: 770-986-1558
Name: Lisa L. Myers GDOT Employee No.: em: lisa.myers@dot.state.ga.us	Organization: GDOT, Engineering Services Title: Design Review Engineer Manager, Value Engineering Coordinator	ph: 404-651-7468 cell: fx: 404-463-6131
Name: Melanie Nable GDOT Employee No.: em: melanie.nable@dot.state.ga.us	Organization: GDOT, Office of Environmental Location Title: Transportation Environmental Planner Associate	ph: 404-699-4432 cell: fx: 404-699-6131
Name: Vinesha C. Pegram, PE GDOT Employee No.: em: vinesha.pegram@dot.state.ga.us	Organization: GDOT, OPCD Title: Assistant Design Group Manager	ph: 404-463-2988 cell: fx: 404-463-6131
Name: Brian K. Summers, PE GDOT Employee No.: em: brian.summers@dot.state.ga.us	Organization: GDOT, Engineering Services Title: Project Review Engineer	ph: 404-656-6846 cell: fx: 404-463-6131
Name: Mohsen Tehrani, EIT GDOT Employee No.: em: tehrani.mohsen@dot.state.ga.us	Organization: GDOT, OPCD Title: Assistant Design Group Manager	ph: 404-463-2988 cell: fx: 404-463-6131
Name: Ken Werho GDOT Employee No.: em: ken.werho@dot.state.ga.us	Organization: GDOT, Office of Traffic Safety and Design Title: Project Design / Concept Review Manager	ph: 404-635-8144 cell: fx: 404-635-8116

VALUE ENGINEERING ATTENDEES

MEETING PARTICIPANTS



PROJECT: NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4 <i>Preliminary Design Stage</i>		Date: March 13 – 16, 2007
NAME & E-MAIL (PLEASE PRINT)	ORGANIZATION/TITLE	PHONE/FAX
Name: Vince Wilson GDOT Employee No.: em: vince.wilson@dot.state.ga.us	Organization: GDOT, Office of Bridge Design Title: Assistant Group Leader	ph: 404-656-5302 cell: fx: 404-651-7076
Name: Ron Wishon GDOT Employee No.: em: ron.wishon@dot.state.ga.us	Organization: GDOT, Engineering Services Title: Assistant Project Review Engineer	ph: 404-651-7470 cell: fx: 404-463-6131
Name: Jeff Church, PE GDOT Employee No.: em: jeff_church@gspnet.com	Organization: Gresham Smith and Partners (GSP) Title: Project Manager	ph: 770-754-0755 cell: fx: 770-754-0750
Name: Eric J. Rickert, PE GDOT Employee No.: em: eric_rickert@gspnet.com	Organization: GSP Title: Project Engineer	ph: 678-518-3682 cell: fx: 770-754-0750
Name: Thomas (Tom) C. Harjung, PE GDOT Employee No.: em: tharjung@thompsonengineering.com	Organization: Thompson Engineering Title: Senior Project Manager	ph: 404-574-1985x102 cell: fx: 404-574-1990
Name: Emily Swearingen, EIT GDOT Employee No.: em: eswearingen@aei.cc	Organization: American Engineers, Inc. (AEI) Title: Project Engineer	ph: 770-421-8422 cell: fx: 770-421-0064
Name: Mark Wilkinson, PE GDOT Employee No.: em: mwilkinson@aei.cc	Organization: AEI Title: Project Manager	ph: 770-421-8422 cell: fx: 770-421-0064
Name: Saurabh Bhattacharya, EIT GDOT Employee No.: em: saurabh.bhattacharya@parsons.com	Organization: Parsons Title: Project Engineer	ph: 678-969-2315 cell: fx: 770-446-4910
Name: Aykut Urgan, PE GDOT Employee No.: em: aykut.urgan@parsons.com	Organization: Parsons Title: Project Manager	ph: 678-969-2327 cell: 404-391-2083 fx: 770-446-4910
Name: Rudolph Frampton, PE GDOT Employee No.: em: rframpton@heath-lineback.com	Organization: Heath & Lineback, Inc. Title: Assistant project Manager	ph: 770-424-1668 cell: fx: 770-424-2907

VALUE ENGINEERING ATTENDEES

MEETING PARTICIPANTS



PROJECT: NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4 <i>Preliminary Design Stage</i>		Date: March 13 – 16, 2007
NAME & E-MAIL (PLEASE PRINT)	ORGANIZATION/TITLE	PHONE/FAX
Name: Nick Castronova, PE GDOT Employee No.: em: nick_castronova@urscorp.com	Organization: URS Corporation Title: Project Manager	ph: 678-808-8821 cell: fx: 678-808-8400
Name: Rick Hartline GDOT Employee No.: em: rhartline@g-and-o.com	Organization: Greenhorne & O'Mara (G&O) Title: Senior Engineer, Technical Director	ph: 678-987-3906 cell: fx: 770-952-0653
Name: Tyler (Ty) Denning, PE GDOT Employee No.: em: tyler.denning@arcadis-us.com	Organization: ARCADIS, Inc. Title: Roadway Engineer	ph: 770-431-8666 cell: fx: 770-435-2666
Name: John P. Tiernan, PE GDOT Employee No.: em: john.tiernan@arcadis-us.com	Organization: ARCADIS, Inc. Title: Senior Bridge Engineer	ph: 770-431-8666 cell: fx: 770-435-2666
Name: Harley G. Griffin GDOT Employee No.: em: hgriffin@delonhampton.com	Organization: Delon Hampton & Associates, Chartered Title: Project Manager	ph: 404-524-8030 cell: fx: 404-524-2575
Name: Lawrence (Larry) D. Prescott, Jr., PE GDOT Employee No.: em: lprescott@hntb.com	Organization: HNTB Corporation Title: Director of Structural Engineering	ph: 404-946-5743 cell: 404-558-9627 fx: 404-841-2820
Name: Dominic (Dom) F. Saulino GDOT Employee No.: 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 GDOT Employee No.: em: lvenegas@lza.com	Organization: Lewis & Zimmerman Associates, Inc. Title: Value Engineering Facilitator	ph: 770-992-3032 cell: 678-488-4287 fx: 770-435-2666
Name: GDOT Employee No.: em:	Organization: Title:	ph: cell: fx:
Name: GDOT Employee No.: em:	Organization: Title:	ph: cell: fx:

ECONOMIC DATA

The VE team developed economic criteria used for evaluation with information gathered from the State of Georgia Department of Transportation and the following design teams: American Engineering, Inc., Greenhome & O'Mara, Gresham, Smith & Partners, Parsons, and URS Corporation. 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:	2007
Construction Start Up:	±2008 for 764 ±2008 for 765 ±2011 for 803 ±2013 for 804 ±2009 for 805 ±2011 for 8458
Construction Duration:	Varies (Between 36 to 48 months)
Economic Planning Life:	35 years for Pavement
Economic Planning Life:	50 years for Bridges
Discount Rate/Interest: (Extrapolated from latest United States Office of Management and Budget Circular A-94, Appendix C – January 2007)	2.50 for 764 2.50 for 765 2.55 for 803 2.65 for 804 2.50 for 805 2.55 for 8458
Inflation/Escalation Rate:	8.00% (Per GDOT)
Uniform Present Worth (UPW) Factor:	23.1452 for 35 years for 764 28.3623 for 50 years for 764 23.1452 for 35 years for 765 28.3623 for 50 years for 765 22.9710 for 35 years for 803 28.0810 for 50 years for 803 22.6284 for 35 years for 804 27.5310 for 50 years for 804 23.1452 for 35 years for 805 28.3623 for 50 years for 805 22.9710 for 35 years for 8458 28.0810 for 50 years for 8458
Cost of Power:	\$0.07/kWhr (kilowatt hour) (assumed)

Operation and Maintenance Costs (<i>Industry Norms</i>):	
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	.00%-2.00% (or less) of Capital Cost
Composite Mark-Up for Construction for 764: (Composed of: Engineering and Construction at 10.00% and Inflation (based on 8.00% per annum for 1.08 years) at 8.69%.)	19.56% (1.1956)
Composite Mark-Up for Construction for 765: (Composed of: Engineering and Construction at 10.00% and Inflation (based on 8.00% per annum for 1.08 years) at 8.69%.)	19.56% (1.1956)
Composite Mark-Up for Construction for 803: (Composed of: Engineering and Construction at 10.00% and Inflation (based on 8.00% per annum for 4.17 years) at 37.81%.)	51.59% (1.5959)
Composite Mark-Up for Construction for 804: (Composed of: Engineering and Construction at 10.00% and Inflation (based on 8.00% per annum for 6.08 years) at 59.71%.)	75.68% (1.7568)
Composite Mark-Up for Construction for 805: (Composed of: Engineering and Construction at 10.00% and Inflation (based on 8.00% per annum for 1.25 years) at 10.10%.)	21.11% (1.2111)
Composite Mark-Up for Construction for 8458: (Composed of: Engineering and Construction at 10.00% and Inflation (based on 8.00% per annum for 4.17 years) at 37.81%.)	51.56% (1.5156)
Composite Mark-Up (Right-of-Way) [All Projects]: (Composed of: Scheduling Contingency at 55.00%; Administration/Court Costs at 60.00%; and Inflation Factor at 40.00 %.)	247.20% (2.4720)

COST ESTIMATE SUMMARY AND COST MODELS

The VE team prepared several cost models for the project that are included following this page. The cost models are arranged in the Pareto Charting/Cost Histogram format to aid in identifying high cost areas and are based on the following:

- Revised Concept Report Cost Estimate NHS-0000-00(764) dated October 6, 2006; prepared by Gresham, Smith and Partners;
- Detailed Estimate: Cost Estimate Report; Estimated Report for file “PI 0000765 PFPR” dated January 6, 2007; prepared by American Engineers, Inc.;
- Detailed Estimate: Cost Estimate Report; Estimated Report for file “NHS-0000-00(803)” dated August 8, 2006; prepared by Parsons;
- Detailed Estimate: Cost Estimate Report; Estimated Report for file “0000-00(804) (I-75 Turner Co. Phase 2)” dated November 20, 2006; prepared by URS Corporation;
- Detailed Estimate: Cost Estimate Report; Estimated Report for file “I-75 NHS 0000-00(805)” dated February 19, 2007; prepared by Greenhorne & O’Mara; and
- Revised Concept Report Cost Estimate Project Number to be Assigned [8450] dated October 2, 2006; prepared by Gresham, Smith and Partners.

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 is a potential for initial savings in the following areas:

- Right-of-Way
- Roadway Items
- Bridges and
- Drainage

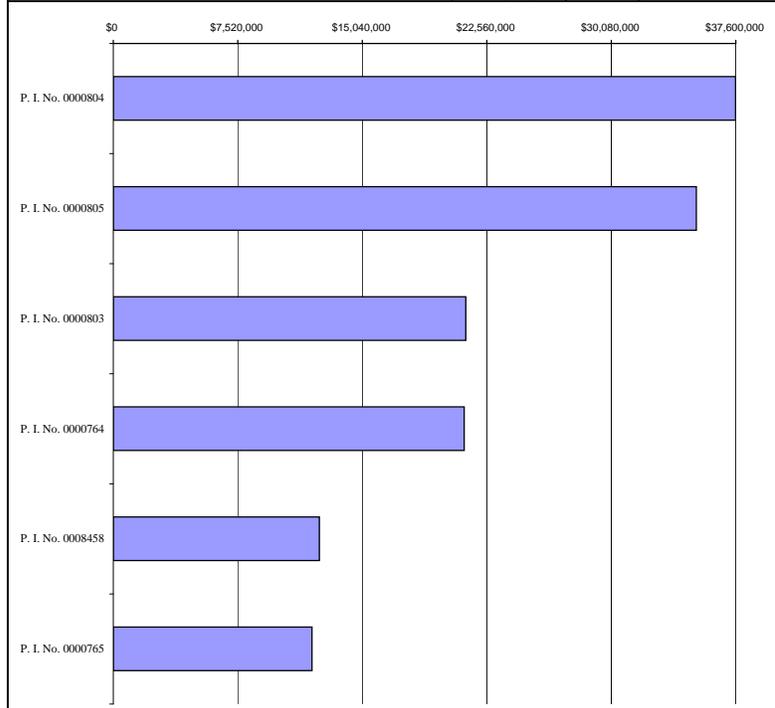
DESIGNER’S COST ESTIMATES

The cost estimates, as described above, did contain sufficiently detailed information to perform a VE when considering the current various levels of design.

COST HISTOGRAM

Project: NHS-0000-00(764, 765, 803, 804 and 805); P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805
I-75 INTERCHANGE IMPROVEMENTS
 Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
Preliminary Design Stage

TOTAL PROJECT(S): I-75 IMPROVEMENTS		COST	PERCENT	CUM. PERCENT
P. I. No. 0000804		37,579,628	26.90%	26.90%
P. I. No. 0000805		35,206,614	25.20%	52.10%
P. I. No. 0000803		21,294,428	15.24%	67.34%
P. I. No. 0000764		21,186,054	15.16%	82.50%
P. I. No. 0008458		12,440,620	8.90%	91.41%
P. I. No. 0000765		12,006,487	8.59%	100.00%
Construction Subtotal		\$ 139,713,831	100.00%	
764 Engineering and Construction at	10.00%	\$ 2,118,605		
8458 Engineering and Construction at	10.00%	\$ 1,244,062		
765 Engineering and Construction at	10.00%	\$ 1,200,649		
803 Engineering and Construction at	10.00%	\$ 2,129,443		
804 Engineering and Construction at	10.00%	\$ 3,757,963		
805 Engineering and Construction at	10.00%	\$ 3,520,661		
E&C Total		\$ 13,971,383		
			Construction	
			Mark-Ups for:	
764 Inflation Based on 8.00% per annum for 1.08 Years*	8.69%	\$ 2,026,311	764	19.56%
8458 Inflation Based on 8.00% per annum for 4.17 Years*	37.81%	\$ 5,173,523	8458	51.59%
765 Inflation Based on 8.00% per annum for 1.08 Years*	8.69%	\$ 1,148,344	765	19.56%
803 Inflation Based on 8.00% per annum for 4.17 Years*	37.81%	\$ 8,855,444	803	51.59%
804 Inflation Based on 8.00% per annum for 6.08 Years*	59.71%	\$ 24,682,027	804	75.68%
805 Inflation Based on 8.00% per annum for 1.25 Years*	10.10%	\$ 3,910,706	805	21.11%
Inflation Total		\$ 45,796,356		
Construction Total		\$ 199,481,570		
			Overall Const.	
			Mark-Up:	42.78%
Right-of-Way Costs: 0000764		\$ 2,794,733		
Right-of-Way Costs: 0008458		\$ 1,208,425		
Right-of-Way Costs: 0000765		\$ 1,170,651		
Right-of-Way Costs: 0000803		\$ 2,528,802		
Right-of-Way Costs: 0000804		\$ 3,117,445		
Right-of-Way Costs: 0000805		\$ 2,565,524		
Right-of-Way Subtotal		\$ 13,385,580		
Scheduling Contingency	55.00%	\$ 7,362,069		
Administration / Court Costs	60.00%	\$ 12,448,589		
Inflation Factor	40.00%	\$ 13,278,495		
Right-of-Way Total		\$ 46,474,734		
			ROW	
			Mark-Up:	247.20%
Reimbursable Utilities: 0000764		\$ 552,750		
Reimbursable Utilities: 0008458		\$ 332,800		
Reimbursable Utilities: 0000765		\$ 299,788		
Reimbursable Utilities: 0000803		\$ 2,500,000		
Reimbursable Utilities: 0000804		\$ 369,010		
Reimbursable Utilities: 0000805		\$ 237,000		
Reimbursable Utilities Total		\$ 4,291,348		
Total for 764		\$ 35,587,033		
Total for 8458		\$ 23,386,657		
Total for 765		\$ 18,719,768		
Total for 803		\$ 43,559,316		
Total for 804		\$ 77,212,397		
Total for 805		\$ 51,782,481		
GRAND TOTAL		\$ 250,247,652		
			Overall	
			Mark-Up:	79.11%



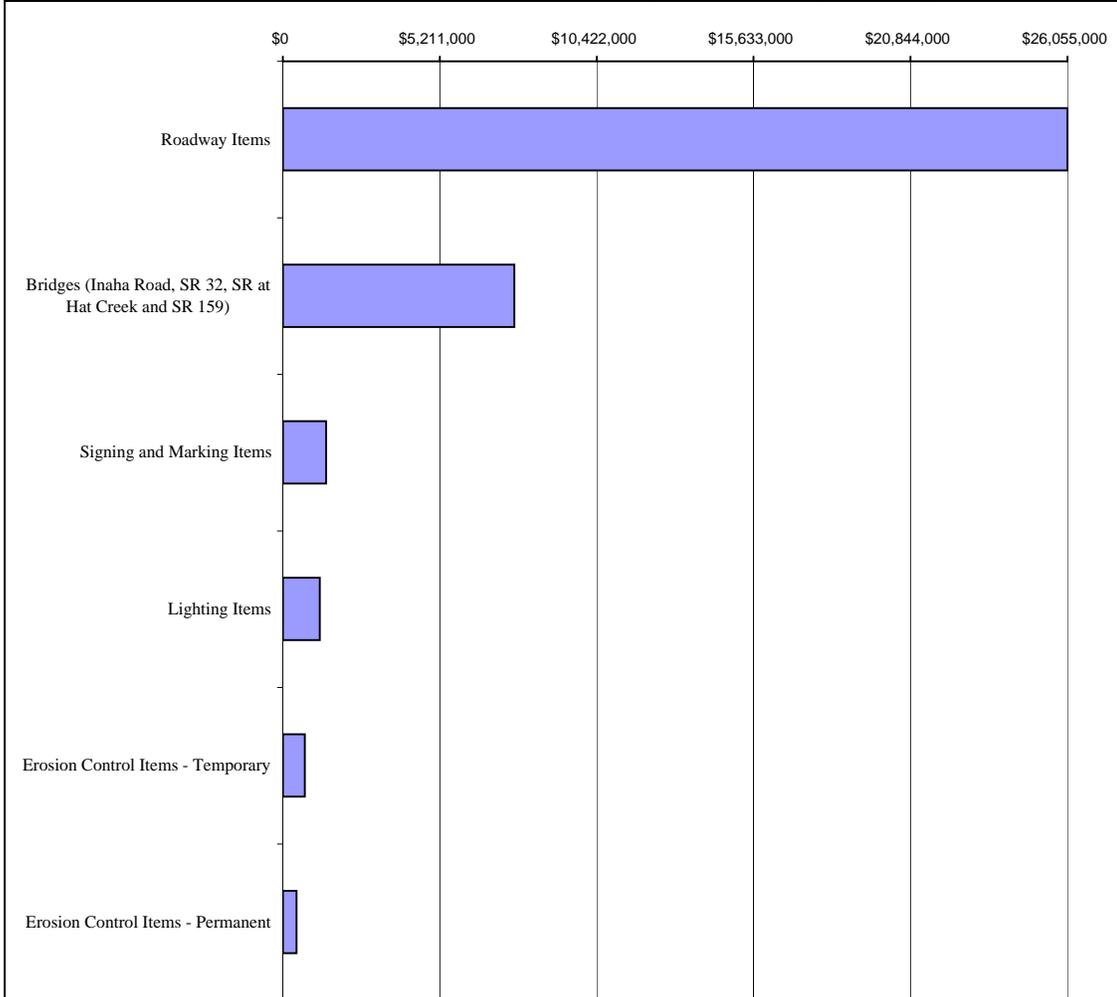
Costs in graph are not marked-up.
 * Escalation rate provided by GDOT based on immediate past experience.

COST HISTOGRAM



Project: NHS-0000-00(764, 765, 803, 804 and 805); P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805
I-75 INTERCHANGE IMPROVEMENTS
 Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
Preliminary Design Stage

P.I. No. 0000804: I-75 IMPROVEMENTS	COST	PERCENT	CUM. PERCENT
Roadway Items	26,054,329	69.33%	69.33%
Bridges (Inaha Road, SR 32, SR at Hat Creek and SR 159)	7,682,669	20.44%	89.77%
Signing and Marking Items	1,436,830	3.82%	93.60%
Lighting Items	1,225,000	3.26%	96.86%
Erosion Control Items - Temporary	728,520	1.94%	98.80%
Erosion Control Items - Permanent	452,281	1.20%	100.00%
Construction Subtotal	\$ 37,579,629	100.00%	
804 Engineering and Construction at 10.00%	\$ 3,757,963		
804 Inflation Based on 8.00% per annum for 6.08 Years*	\$ 24,682,028		
Construction Total	\$ 66,019,620		
		Construction	
		Mark-Up:	75.68%
Right-of-Way Costs; 0000804	\$ 3,117,445		
Scheduling Contingency 55.00%	\$ 1,714,595		
Administration / Court Costs 60.00%	\$ 2,899,224		
Inflation Factor 40.00%	\$ 3,092,505		
Right-of-Way Total	\$ 10,823,769		
		ROW	
		Mark-Up:	247.20%
Reimbursable Utilities; 0000804	\$ 369,010		
Reimbursable Utilities Total	\$ 369,010		
		Overall	
GRAND TOTAL 804	\$ 77,212,399		
		Mark-Up:	105.46%



Costs in graph are not marked-up.

* Escalation rate provided by GDOT based on immediate past experience.

COST HISTOGRAM



Project: NHS-0000-00(764, 765, 803, 804 and 805); P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805 I-75 INTERCHANGE IMPROVEMENTS Cook, Crisp, Tift, and Turner Counties, GDOT, District 4 <i>Preliminary Design Stage</i>			
P.I. No. 0000805: I-75 IMPROVEMENTS	COST	PERCENT	CUM. PERCENT
Drainage	9,671,300	27.47%	27.47%
Bridge and Walls	8,060,413	22.89%	50.36%
Concrete	7,367,014	20.93%	71.29%
Earthwork	4,583,600	13.02%	84.31%
Signing and Striping	1,535,699	4.36%	88.67%
Clearing and Grubbing	1,200,000	3.41%	92.08%
Erosion Control Items - Temporary	987,406	2.80%	94.88%
Drainage	507,648	1.44%	96.33%
Traffic Control	400,000	1.14%	97.46%
Miscellaneous	316,800	0.90%	98.36%
Guardrail	307,805	0.87%	99.24%
Erosion Control Items - Permanent	201,413	0.57%	99.81%
Concrete Barrier	67,516	0.19%	100.00%
Construction Subtotal		\$ 35,206,614	100.00%
805 Engineering and Construction at 10.00%		\$ 3,520,661	
805 Inflation Based on 8.00% per annum for 1.25 Years* 10.10%		\$ 3,910,706	Construction
Construction Total		\$ 42,637,982	Mark-Up: 21.11%
Right-of-Way Costs: 0000805		\$ 2,565,524	
Scheduling Contingency 55.00%		\$ 1,411,038	
Administration / Court Costs 60.00%		\$ 2,385,937	
Inflation Factor 40.00%		\$ 2,545,000	ROW
Right-of-Way Total		\$ 8,907,499	Mark-Up: 247.20%
Reimbursable Utilities: 0000805		\$ 237,000	
Reimbursable Utilities Total		\$ 237,000	Overall
GRAND TOTAL 805		\$ 51,782,481	Mark-Up: 47.08%

\$0 \$1,940,000 \$3,880,000 \$5,820,000 \$7,760,000 \$9,700,000

Costs in graph are not marked-up.

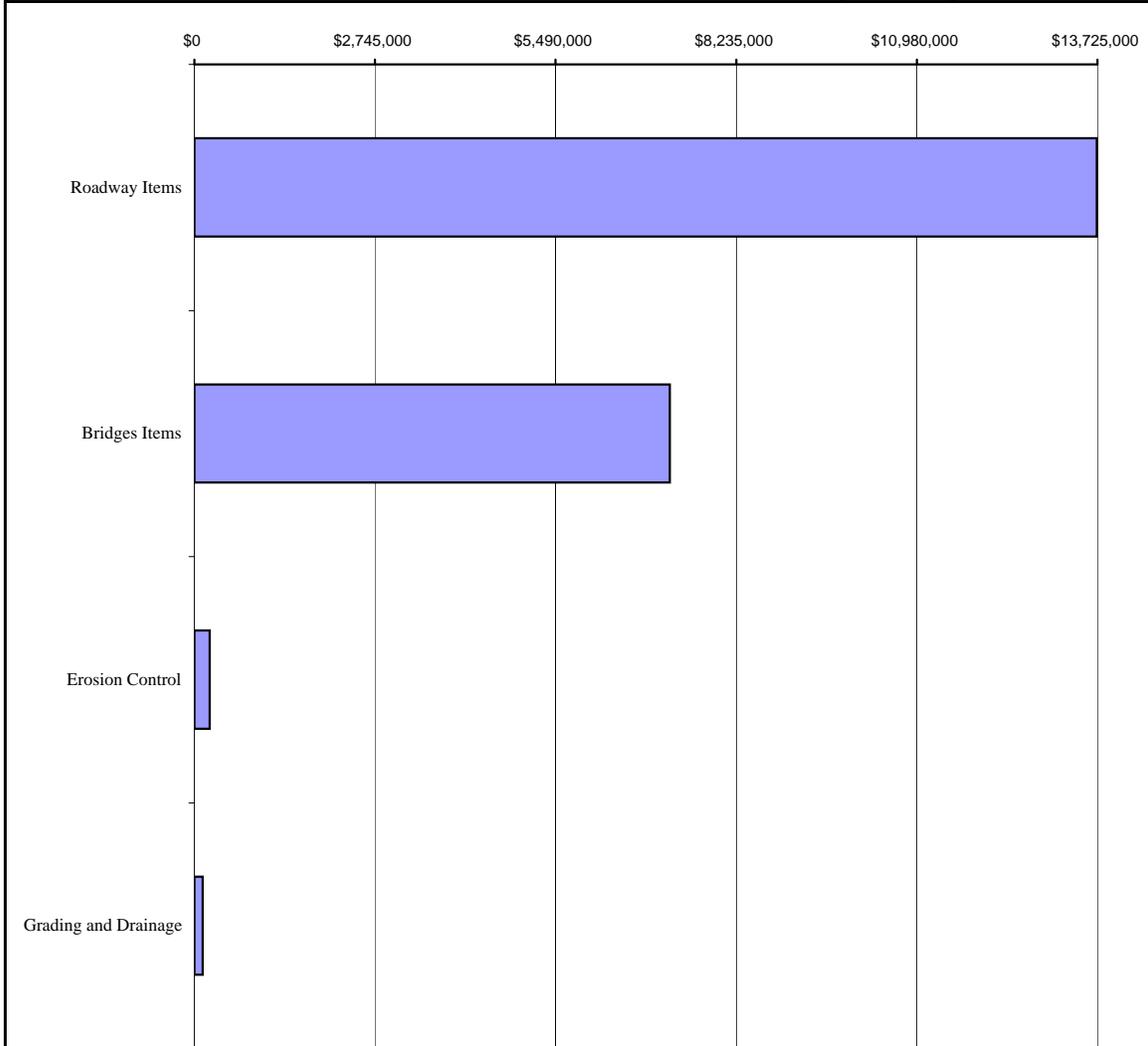
* Escalation rate provided by GDOT based on immediate past experience.

COST HISTOGRAM



Project: NHS-0000-00(764, 765, 803, 804 and 805); P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805
I-75 INTERCHANGE IMPROVEMENTS
 Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
Preliminary Design Stage

P.I. No. 0000803: I-75 IMPROVEMENTS		COST	PERCENT	CUM. PERCENT
Roadway Items		13,714,328	64.40%	64.40%
Bridges Items		7,224,001	33.92%	98.33%
Erosion Control		231,580	1.09%	99.42%
Grading and Drainage		124,518	0.58%	100.00%
Construction Subtotal		\$ 21,294,427	100.00%	
803 Engineering and Construction at	10.00%	\$ 2,129,443		
803 Inflation Based on 8.00% per annum for 4.17 Years*	37.81%	\$ 8,855,444	Construction	
Construction Total		\$ 32,279,314	Mark-Up:	51.59%
Right-of-Way Costs; 0000803		\$ 2,528,802		
Scheduling Contingency	55.00%	\$ 1,390,841		
Administration / Court Costs	60.00%	\$ 2,351,786		
Inflation Factor	40.00%	\$ 2,508,572	ROW	
Right-of-Way Total		\$ 8,780,001	Mark-Up:	247.20%
Reimbursable Utilities; 0000803		\$ 2,500,000		
Reimbursable Utilities Total		\$ 2,500,000	Overall	
GRAND TOTAL 803		\$ 43,559,314	Mark-Up:	104.56%



Costs in graph are not marked-up.

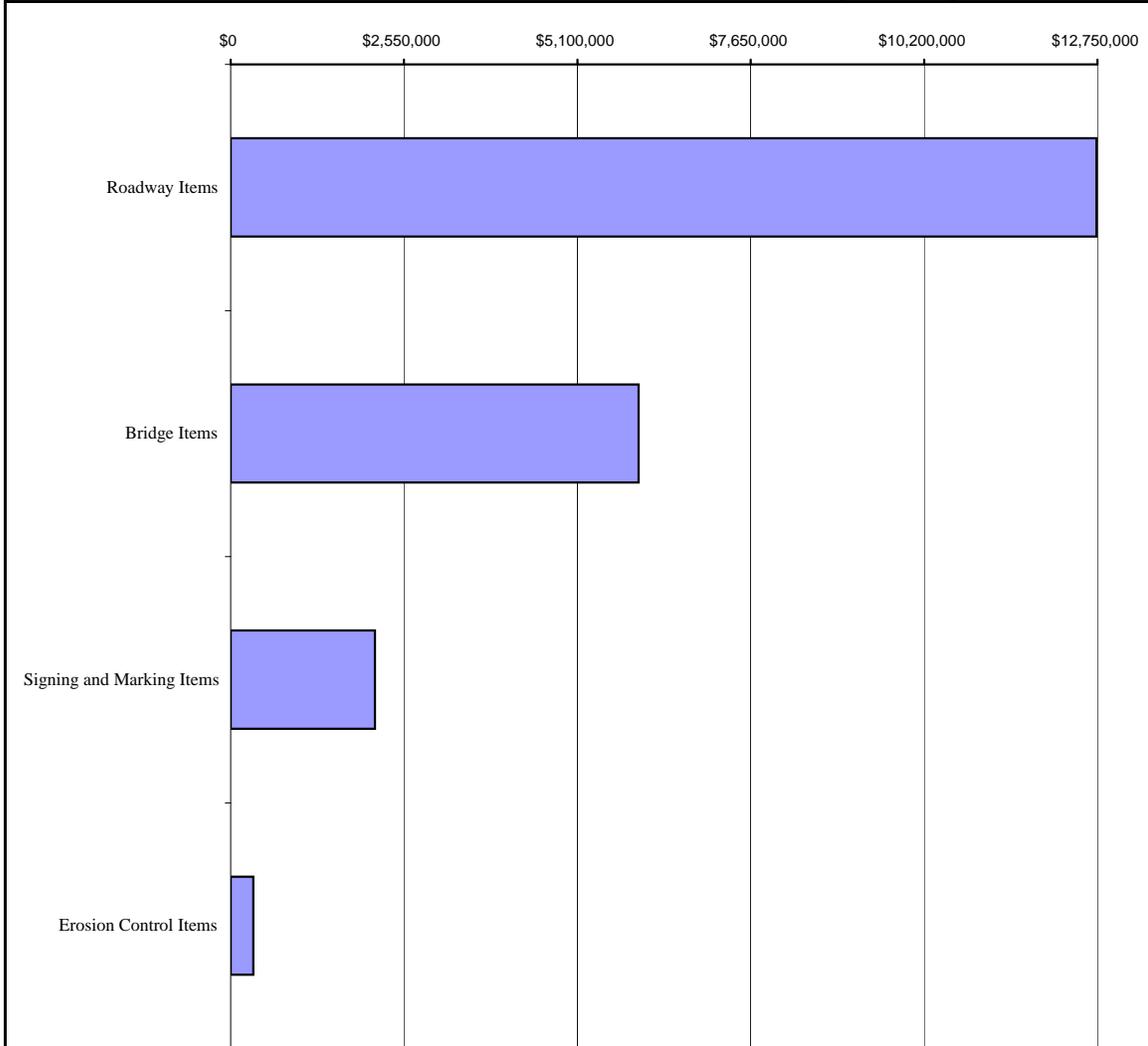
* Escalation rate provided by GDOT based on immediate past experience.

COST HISTOGRAM



Project: NHS-0000-00(764, 765, 803, 804 and 805); P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805
I-75 INTERCHANGE IMPROVEMENTS
 Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
Preliminary Design Stage

P.I. No. 0000764: I-75 IMPROVEMENTS		COST	PERCENT	CUM. PERCENT
Roadway Items		12,734,534	60.11%	60.11%
Bridge Items		6,000,000	28.32%	88.43%
Signing and Marking Items		2,120,069	10.01%	98.44%
Erosion Control Items		331,451	1.56%	100.00%
Construction Subtotal		\$ 21,186,054	100.00%	
764 Engineering and Construction at	10.00%	\$ 2,118,605		
764 Inflation Based on 8.00% per annum for 1.08 Years*	8.69%	\$ 2,026,311	Construction	
Construction Total		\$ 25,330,970	Mark-Up:	19.56%
Right-of-Way Costs; 0000764		\$ 2,794,733		
Scheduling Contingency	55.00%	\$ 1,537,103		
Administration / Court Costs	60.00%	\$ 2,599,102		
Inflation Factor	40.00%	\$ 2,772,375	ROW	
Right-of-Way Total		\$ 9,703,313	Mark-Up:	247.20%
Reimbursable Utilities; 0000764		\$ 522,750		
Reimbursable Utilities Total		\$ 522,750	Overall	
GRAND TOTAL 764		\$ 35,557,033	Mark-Up:	67.83%



Costs in graph are not marked-up.

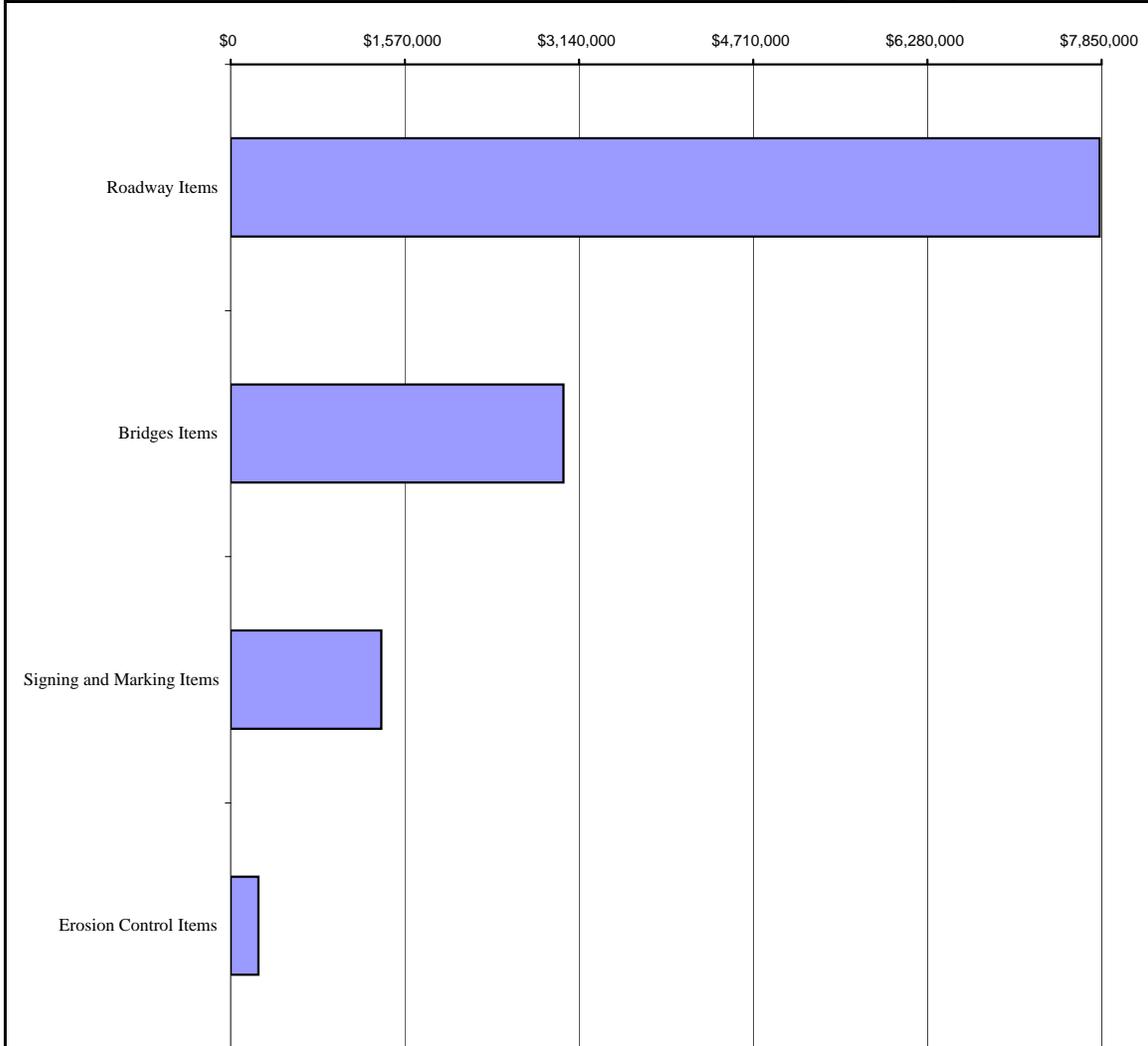
* Escalation rate provided by GDOT based on immediate past experience.

COST HISTOGRAM



Project: NHS-0000-00(764, 765, 803, 804 and 805); P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805
I-75 INTERCHANGE IMPROVEMENTS
 Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
Preliminary Design Stage

P.I. No. 0008458: I-75 IMPROVEMENTS	COST	PERCENT	CUM. PERCENT
Roadway Items	7,832,356	62.96%	62.96%
Bridges Items	3,000,000	24.11%	87.07%
Signing and Marking Items	1,357,634	10.91%	97.99%
Erosion Control Items	250,630	2.01%	100.00%
Construction Subtotal	\$ 12,440,620	100.00%	
8458 Engineering and Construction at 10.00%	\$ 1,244,062		
8458 Inflation Based on 8.00% per annum for 4.17 Years* 37.81%	\$ 5,173,523	Construction	
Construction Total	\$ 18,858,205	Mark-Up: 51.59%	
Right-of-Way Costs; 00008458	\$ 1,208,425		
Scheduling Contingency 55.00%	\$ 664,634		
Administration / Court Costs 60.00%	\$ 1,123,835		
Inflation Factor 40.00%	\$ 1,198,758	ROW	
Right-of-Way Total	\$ 4,195,652	Mark-Up: 247.20%	
Reimbursable Utilities; 00008458	\$ 332,800		
Reimbursable Utilities Total	\$ 332,800	Overall	
GRAND TOTAL 8458	\$ 23,386,657	Mark-Up: 87.99%	



Costs in graph are not marked-up.

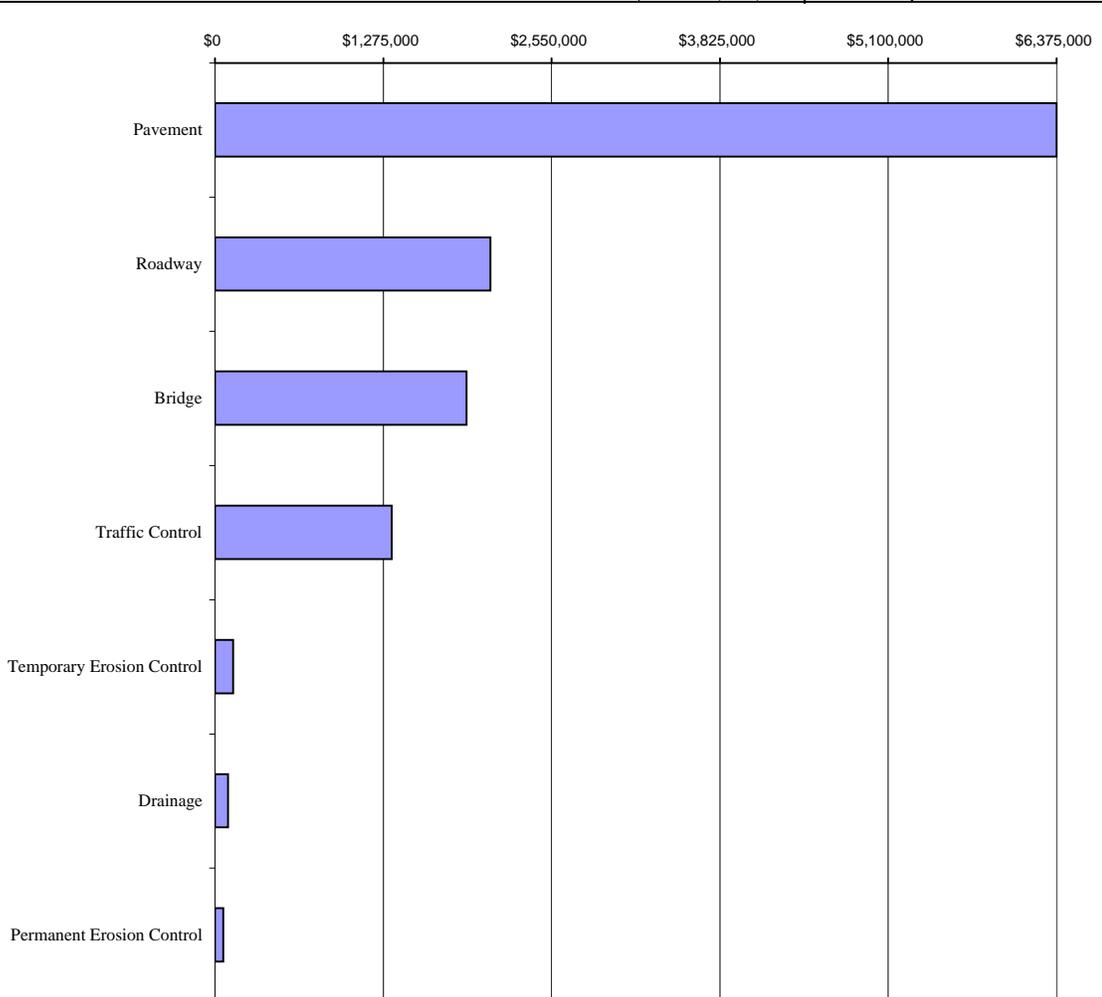
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COST HISTOGRAM



Project: NHS-0000-00(764, 765, 803, 804 and 805); P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805
I-75 INTERCHANGE IMPROVEMENTS
 Cook, Crisp, Tift, and Turner Counties, GDOT, District 4
Preliminary Design Stage

P.I. No. 0000765: I-75 IMPROVEMENTS	COST	PERCENT	CUM. PERCENT
Pavement	6,374,437	53.09%	53.09%
Roadway	2,087,558	17.39%	70.48%
Bridge	1,905,016	15.87%	86.35%
Traffic Control	1,338,251	11.15%	97.49%
Temporary Erosion Control	137,730	1.15%	98.64%
Drainage	99,909	0.83%	99.47%
Permanent Erosion Control	63,585	0.53%	100.00%
Construction Subtotal	\$ 12,006,486	100.00%	
765 Engineering and Construction at 10.00%	\$ 1,200,649		
765 Inflation Based on 8.00% per annum for 1.08 Years*	\$ 1,148,344	Construction	
Construction Total	\$ 14,355,478	Mark-Up:	19.56%
Right-of-Way Costs; 0000765	\$ 1,170,651		
Scheduling Contingency 55.00%	\$ 643,858		
Administration / Court Costs 60.00%	\$ 1,088,705		
Inflation Factor 40.00%	\$ 1,161,286	ROW	
Right-of-Way Total	\$ 4,064,500	Mark-Up:	247.20%
Reimbursable Utilities; 0000765	\$ 299,788		
Reimbursable Utilities Total	\$ 299,788	Overall	
GRAND TOTAL 765	\$ 18,719,767	Mark-Up:	55.91%



Costs in graph are not marked-up.

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FUNCTION ANALYSIS

Function Analysis was performed to: (1) define the requirements for each project element, and (2) ensure a complete and thorough understanding by the VE team of the basic function(s) needed to attain a given requirement. Random Function Analysis worksheets for the project are 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.

CREATIVE IDEA LISTING AND JUDGMENT OF IDEAS

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

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: NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4 <i>Preliminary Design Stage</i>	SHEET NO.: 1 of 6
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NO.	IDEA DESCRIPTION	RATING
I-75 INTERCHANGE IMPROVEMENTS FROM SR 300 TO SR 159 (805xx)		
805-1	Leave the Alberson Road (CR 159) overpass as is	4
805-2	Shorten overpass as is bridge at Alberson Road	4
805-3	Eliminate Alberson Road overpass	3
805-4	Only protect the face of the columns – Alberson Road	1
805-5	Use mechanically stabilized earth (MSE) walls to eliminate end spans – Alberson Road	5
805-6	Eliminate the skew on the Alberson Road overpass	2
805-7	Leave the Wardlow Road (CR 251) overpass	4
805-8	Shorten overpass bridge at Wardlow Road	4
805-9	Eliminate Wardlow Road overpass as is	3
805-10	Only protect the face of the columns – Wardlow Road	1
805-11	Use MSE walls to eliminate end spans – Wardlow Road	5
805-12	Eliminate the skew on the Wardlow Road overpass	2
805-13	Leave the Musselwhite Road (CR-117) overpass as is	4
805-14	Shorten overpass bridge at Musselwhite Road	4
805-15	Eliminate Musselwhite Road overpass	3
805-16	Only protect the face of the columns – Musselwhite Road	1
805-17	Use MSE walls to eliminate end spans – Musselwhite Road	5
805-18	Eliminate the skew on the Musselwhite Road overpass	2
805-19	At the Musselwhite Road overpass reduce the realignment of the frontage road	4
805-20	Eliminate the frontage road work at the Musselwhite Road overpass	2
805-21	Leave the Bedgood Road (CR-116) overpass as is	4
805-22	Shorten overpass bridge at Bedgood Road	4
805-23	Eliminate Bedgood Road overpass	3
805-24	Only protect the face of the columns – Bedgood Road	1
805-25	Use MSE walls to eliminate end spans – Bedgood Road	5
805-26	At the Bedgood Road overpass do nothing on the frontage road	4

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CREATIVE IDEA LISTING



PROJECT: NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4 Preliminary Design Stage

SHEET NO.:
2 of 6

NO.	IDEA DESCRIPTION	RATING
I-75 INTERCHANGE IMPROVEMENTS FROM SR 300 TO SR 159 (805xx) (Continued)		
805-27	Compress the diamond at Hawpond Road (CR 357)	4
805-28	At Hawpond Road - minimize Olivia Drive improvement/realignment	3
805-28A	Use MSE walls to eliminate end spans – Hawpond Road	5
805-29	At Hawpond Road – eliminate the Amboy Road improvements	4
805-29A	Reduce the width of the Hawpond Road Bridge	4
805-30	Leave the Old Hatley Road overpass as is (CR 355)	4
805-31	Shorten overpass bridge at Old Hatley Road	4
805-32	Only protect the face of the columns – Old Hatley Road	1
805-33	Use MSE walls to eliminate end spans – Old Hatley Road	5
805-34	Eliminate the skew on the Old Hatley Road overpass	2
805-35	Reduce the width of the Rockhouse Road (SR 33) Bridge	4
805-36	Eliminate the Floyd Road realignment	4
805-37	Place the northbound (NB) off ramp at 90° to Rockhouse Road	2
805-38	Use a NB loop ramp in the northeast quadrant	4
805-39	Use MSE walls to eliminate end spans – Rockhouse Road	5
I-75 INTERCHANGE IMPROVEMENTS FROM TIFT COUNTY LINE TO SR 159 (804xx)		
804-1	Compress the diamond at Inaha Road (CR 252)	4
804-2	Use MSE walls to eliminate end spans – Inaha Road	5
804-3	Eliminate the realignment of Sumner Road (CR 182)	4
804-4	Cul-de-sac Sumner Road	2
804-5	Realign Goose Creek Road (CR 184) to avoid the pond	DS
804-6	Realign Goose Creek Road closer to the southbound (SB) on ramp	4
804-7	Reduce the width of the Hat Creek Bridge at Jefferson Davis Highway (SR 32)	4
804-8	Use MSE walls to eliminate end spans – Jefferson Davis Highway	5

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CREATIVE IDEA LISTING



PROJECT: NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4 Preliminary Design Stage

SHEET NO.:
3 of 6

NO.	IDEA DESCRIPTION	RATING
I-75 INTERCHANGE IMPROVEMENTS FROM TIFT COUNTY LINE TO SR 159 (804xx) (Continued)		
804-9	Reduce the taper length on both sides of the Interchange at Jefferson Davis Highway	3
804-10	Eliminate the Russell Smith Road relocation at Jefferson Davis Highway	3
804-11	Compress the diamond at Jefferson Davis Highway	4
804-12	Adjust the skew of all ramps at Jefferson Davis Highway	See 804-11
804-13	Eliminate the access drive at Jefferson Davis Highway	4
804-14	Shift ramp termini to minimize wetlands impacts Jefferson Davis Highway	3
804-14A	Eliminate the bicycle shoulders	4
804-15	Compress the diamond at the Bussey Road (CR 33) Interchange	4
804-16	Leave the Bussey Road overpass as is	5
804-17	Leave the Washington Avenue (SR 112) Interchange as is	5
804-18	Compress the diamond on the east side at Washington Avenue	4
804-19	Reduce the relocation of Peacock Road	4
804-20	Eliminate the new Park and Ride at the Peacock Road relocation at Washington Avenue	3
804-21	At North Street (SR 159), shorten Ewing Farm Road realignment	4
804-22	Cul-de-sac Ewing Farm Road at North Street	5
804-23	At the at Washington Avenue Interchange, tighten the loop ramp (Ramp R)	3
804-24	Do not take the properties within the new loop ramp (Ramp R)	4
804-25	Use MSE walls to eliminate end spans – North Street	5
804-26	Use a NB slip off ramp to SR 159 at North Street Interchange	2
804-27	Use a NB slip on ramp from SR 159 at North Street Interchange	2
I-75 INTERCHANGE IMPROVEMENTS FROM NORTH OF TIFT CITY LIMITS TO TURNER COUNTY LINE (803xx)		
803-1	Eliminate the noise walls at the Brighton Road (CR 410) Interchange	5
803-2	Compress the diamond on the east side of the Brighton Road Interchange	4
Rating: 1 → 2 = Not to be Developed; 3 – 4 = Varying Degree of Development Potential; 5 = Most Likely to be Developed; ABD = Already Being Done; N/A = Not Applicable		

CREATIVE IDEA LISTING



PROJECT: NHS-0000-00(764, 765, 803, 804 and 805) P. I. Nos. 0000764, 0008458, 0000765, 0000803, 0000804, and 0000805; I-75 INTERCHANGE IMPROVEMENTS Cook, Tift, and Turner Counties, Georgia Department of Transportation, Dist. 4 Preliminary Design Stage

SHEET NO.:
4 of 6

NO.	IDEA DESCRIPTION	RATING
I-75 INTERCHANGE IMPROVEMENTS FROM NORTH OF TIFT CITY LIMITS TO TURNER COUNTY LINE (803xx) (Continued)		
803-3	Cul-de-sac Carrington Drexler Road at the Brighton Road Interchange	4
803-4	Use MSE walls to eliminate end spans – Brighton Road	5
803-5	Use reinforced slopes to minimize the use of MSE walls along Brighton Road	DS
803-6	Eliminate the loop ramps on the southwest quadrant of the Brighton Road Interchange and extend the east side	4
803-7	Leave the Wesley Rigdon Road (CR 107) overpass as is	5
803-8	Minimize new paving at Wesley Rigdon Road	4
803-9	Use MSE walls to eliminate end spans – Wesley Rigdon Road	5
803-10	Eliminate Wesley Rigdon Road overpass	5
803-11	Only protect the face of the columns – Wesley Rigdon	1
803-12	Compress the diamond at Chula Brookfield Road (CR 421) Interchange	4
803-13	Widen to the east side of I-75 at the Chula Brookfield Road Interchange	4
803-14	Provide access to the M. Patel property (southeast quadrant)	3
803-15	Shorten the limits of the project on the west side (short of Glenwood Road) at the Chula Brookfield Road Interchange	4
803-16	Use MSE walls to eliminate end spans – Chula Brookfield Road Interchange	5
803-17	At the Willis Still Road (CR 11), cul-de-sac Academy Drive	4
803-18	Use MSE walls to eliminate end spans – Willis Still Road Interchange	5
803-19	Compress the diamond at the Willis Still Road Interchange	4
803-20	Use a 4-way intersection for the east side frontage road at the Willis Still Road Interchange	3
803-21	Do not purchase right-of-way for private drive; provide a driveway only at the southeast quadrant of the Willis Still Road Interchange	4
803-22	Cul-de-sac South Access Road (CR 114) in the northeast quadrant of the Willis Still Road Interchange	4
803-23	Reconfigure the NB on ramp to minimize property takes	3
803-24	Reduce the width of the Willis Still Road Bridge	4

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CREATIVE IDEA LISTING



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SHEET NO.:
5 of 6

NO.	IDEA DESCRIPTION	RATING
I-75 FROM CR 246/COOK TO CR 204 IN TIFT COUNTY (765xx)		
765-1	Compress the width of the diamond at the Omega-Eldorado Road (CR 418) Interchange	4
765-2	Eliminate the Interchange work associated with the HOV [High Occupancy Vehicle]/TOL [Truck Only Lane] concept	4
765-3	Use MSE walls to eliminate end spans – Omega-Eldorado Road Interchange	5
765-4	Reduce the width of the new bridge at the Omega-Eldorado Road Interchange	4
765-5	Compress the length of the diamond at the Omega-Eldorado Road Interchange	4
I-75/SR 401/CR 251 – ROUNTREE BRIDGE ROAD (EXIT 41) CR 253 – BARNEYVILLE ROAD (EXIST 45) INTERCHANGE RECONSTRUCTION (764xx)		
764-1	Compress the diamond at the Barneyville Road Interchange	4
764-2	Minimize ramp doglegs at the Barneyville Road Interchange	4
764-3	Use MSE walls to eliminate end spans – Barneyville Road Interchange	5
764-4	Do not take the property where the telecommunication pole is currently located and allow access at the Barneyville Road Interchange	DS
764-5	Reduce the length of the turn lanes	2
764-6	Reduce the width of the new bridge at the Barneyville Road Interchange	4
764-7	Relocate the temporary barriers at the Rountree Bridge Road Interchange	DS
764-8	Compress the diamond at the Rountree Bridge Road Interchange	4
764-9	Use MSE walls to eliminate end spans – Rountree Bridge Road Interchange	5
764-10	Reduce the width of the new bridge at the Rountree Bridge Road Interchange	4
764-11	Reduce the approach/departure tangents on the ramps of the Rountree Bridge Interchange	4
I-75/SR 401/CR 246 – KINARD BRIDGE ROAD (EXIT 49) INTERCHANGE RECONSTRUCTION (8458xx)		
8458-1	Reduce the bridge skew at the Kinard Bridge Road Intersection	2
8458-2	Use MSE walls to eliminate end spans – Kinard Bridge Road Intersection	5
8458-3	Reduce bridge width at the Kinard Bridge Road Intersection	4

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