VALUE ENGINEERING REPORT

Toccoa Bypass Extension
Project No. STP-114-2(13)
Stephens County
PI No.: 132440

September 12, 2007

OWNER:

Georgia Department of Transportation
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Atlanta, GA 30334
(404.651.7468)

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EXECUTIVE SUMMARY

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Introduction

This report summarizes the results of a value engineering (VE) study conducted on the Toccoa Bypass Extension located in northern Georgia approximately 90 miles northeast of Atlanta. The project consists of a new four lane divided limited access road over the entire 5.2 mile length at an estimated construction cost of $70.65 million. The study occurred August 21-24, 2007 at the GDOT offices in Atlanta using a four person VE team.

This report presents the Team's recommendations and all back-up information, for consideration by the decision-makers. This **Executive Summary** includes a brief description of each recommendation. The **Study Identification** section contains information about the project and the team. The **Recommendations** section presents a more detailed description and support information about each recommendation. Lastly, the **Appendix** includes a complete record of the Team's activities and findings as well as the meeting attendees sign in sheet. The reader is encouraged to review all sections of the report in order to obtain a complete understanding of the VE process.

Considerations

This project contains one historic structure that will not be impacted by the proposed design.

The VE team was not restricted by any constraints on this project. The environment assessment has been approved but the FONSI is being updated and another public hearing will be conducted. There are no significant wetlands in the project area but there are stream crossings.

At the northern terminus of the project the route crosses a two lane bridge into South Carolina and there are no plans to widen the route in SC in the foreseeable future.

Results Obtained

The VE Team generated sixteen ideas and presented nine Recommendations for consideration by GDOT and the design engineer. The recommendations involve changes to the scope of the pavement design, project scope, design speed changes, and bridge modifications. These have the

potential to reduce project costs by as much as $22.7 Million while continuing to provide the required functionality.

A brief presentation of these recommendations was conducted on August 24th, with the following in attendance: GDOT: Tom Cox, Brian Summers, Lisa Myers and Ron Wishon; Design Consultant: Kevin McKeen and Jim Aitken; and the VE Team: Dave Wohlscheid, Lori Kennedy, Alex Wiley and Dipi Chandra.

Recommendation Highlights

A-1 Use superpave design instead of concrete for the main line pavement

This recommendation analyzed the economic benefits of both systems using updated cost information based on current pricing information used by GDOT. The format followed the life cycle analysis format prepared by GDOT and resulted in a substantial life cycle savings.

Proposed initial savings is $8,339,000 with a 30 year life cycle savings of $3,930,000.

A-4 Build a two lane typical section on a four lane right of way

The original concept is to construct a four lane limited access divided highway to serve as a bypass around Toccoa. The proposed change is to purchase right of way for the ultimate four lane program, but only construct a new two lane roadway at this time. The VE team felt the projected design traffic quantities did not warrant a four lane project within the design timeframe.

Potential savings is $14,875,000

B-2 Change alignment to avoid displacements in the area of CR57 / Oak Valley Road

The current design indicates a taking of about seven residences in the area discussed in this example. The proposed change shifts the roadway to the east avoiding the majority of the takes as well as negating the need for the bridge in this area because of improved grade opportunities.

Potential savings amounts to $872,200

B-4 Use Red Rock Road as the alignment

The proposed concept is to change the alignment to the north just southwest of Red Rock Road and Rock Creek. The proposed alignment would follow the existing Red Rock Road and tie back in to the proposed alternative to the west of Hillside Drive. The proposed concept requires additional design evaluation, however it has the potential of avoiding 5-7 residences; would eliminate one at grade intersection; would eliminate the bridge at Red Rock Creek; and would reduce earthwork as Red Rock Road is on fairly flat terrain.

The total potential savings if accepted is on the order of $6.0 million

C-1 Reduce design speed to the posted limit of 55 mph

The current design speed is 65 mph. The proposed concept will allow for a more rolling grade and will therefore have significant impact on the quantity of cut and fill contained in the project resulting in a savings of 350,00 CY.

Total potential savings is $2,665,000

C-4 Lower the profile approximately 5 feet along a portion of the route

This concept allows for an increase in excavation but a reduction in the required fill thus resulting in a reduction in the quantity of borrow needed. It also shortens the lengths of bridges number 1 and 3.

Proposed savings for this concept is $2,872,000

E-2 Remove slope paving and use vertical abutments at the Oak Valley Road bridge

The current design proposes slope paving at the ends of the bridge. The proposal is to use an extended approach and vertical abutments to eliminate the slope paving and to shorten the bridge length.

Proposed cost savings is $354,000

E-4 Build a single bridge on Rock Creek instead of two parallel twin bridges

The current design is to construct two twin bridges with a total width of 81.5 feet. The proposed concept is to use a single bridge with a proposed width of 73.25 feet. The savings results in bridge deck area reduction.

Proposed savings is $210,000

E-5 Build a single bridge on Wards Creek instead of two parallel twin bridges

This is a similar concept as proposed in E-4.

The proposed savings for this option is $260,000

Toccoa Bypass Extension

SUMMARY OF POTENTIAL COST SAVINGS

ITEM No.	CREATIVE IDEA DESCRIPTION	ORIGINAL INITIAL COST	PROPOSED INITIAL COST	INITIAL COST SAVINGS	FUTURE SAVINGS	TOTAL PRESENT WORTH SAVINGS	Maximum Savings in Combination with other VE proposals
A	**Pavement**						
A-1	Use superpave design in lieu of concrete for the mainline pavement	19,814,000	11,475,000	8,339,000	(4,409,000)	3,930,000	1,900,000
A-4	Build a two lane typical section on a four lane right of way	29,651,000	14,826,000	14,825,000	-0-	14,825,000	14,825,000
B	**Right of Way**						
B-2	Change alignment to avoid displacements in the area of CR57 / Oak Valley Road	1,065,000	192,800	872,200	-0-	872,200	-0-
B-4	Use Red Rock Road as the alignment for a portion of the project	8,676,700	2,639,600	6,037,100	-0-	6,037,100	5,000,000
C	**Unclassified Excavation**						

Toccoa Bypass Extension

SUMMARY OF POTENTIAL COST SAVINGS

ITEM No.	CREATIVE IDEA DESCRIPTION	ORIGINAL INITIAL COST	PROPOSED INITIAL COST	INITIAL COST SAVINGS	FUTURE SAVINGS	TOTAL PRESENT WORTH SAVINGS	Maximum Savings in Combination with other VE proposals
C-1	Reduce design speed to posted speed of 55 mph	2,761,400	96,400	2,665,000	-0-	2,665,000	1,000,000
C-4	Lower profile to reduce borrow	2,904,700	32,200	2,872,500	-0-	2,872,500	-0-
E	**Bridges**						
E-2	Use vertical abutments at Oak Valley Road bridge	1,004,200	650,500	353,700	-0-	353,700	-0-
E-4	Build a single bridge over Rock Creek instead of two parallel twin bridges	1,871,100	1,661,300	209,800	-0-	209,800	-0-
E-5	Build a single bridge over Wards Creek instead of two parallel twin bridges	2,316,600	2,056,900	259,700	-0-	259,700	-0-
	TOTAL POTENTIAL SAVINGS			**26,728,000**			**22,725,000**

STUDY IDENTIFICATION

STUDY IDENTIFICATION

Project: Toccoa Bypass Extension	**Dates: August 21-24, 2007**
Location: GDOT HQ - Atlanta	

VE Team Members

Name:	Discipline:	Organization:	Telephone:
David Wohlscheid	VE Team Leader	MACTEC	703-471-8383
Lori Kennedy	Highway Construction	Kennedy Engineering Assoc.	770-813-0882
Alex Wiley	Highway Design	MACTEC	770-421-3486
Dipi Chandra	Structural Engineering	MACTEC	770-421-3526

Project Description

This project is the Toccoa Bypass Extension which is a new road from the eastern terminus of the South Toccoa Bypass at SR 17 northeast on a new location to SR 365/US 123 at CR 311. The proposed project is 5.2 miles long and is located in northern Georgia approximately 90 miles northeast of Atlanta.

The project will begin at SR 17 and will proceed northeasterly on a new location crossing CR 3/Shady Lane and CR 538. At 0.1 mile southwest of CR 56/Red Rock Road, the alignment would continue northeast parallel to a Georgia Power transmission line. Then, the alignment would cross CR 56/Red Rock Road and Rock Creek, turn north and extend across CR 57/Oak Valley Road and Wards Creek. The alignment ties into US 123/SR 365 with a continuous movement near CR 311. The typical section will consist of four, 12 foot lanes divided by a 44 foot grassed median on a variable 210-250 feet of proposed right of way. The major structures will consist of constructing a triple 10 foot x 12 foot culvert over Wards Creek and a double 10 foot x 10 foot culvert over Rock Creek. Bridges include new parallel bridges over Rock Creek and Wards Creek, and a single bridge on Oak Valley Road over the main line. Traffic volumes were projected to be 14,500 ADT in the year 2008 and 24,500 ADT in the year 2028. The proposed posted speed is 55 mph (design speed is 65) and access would be partially limited. Traffic will be maintained on the existing network of roads and streets during construction.

The current project estimate is $70.65 million. Please refer to the Cost Distribution Model included in the appendix for more details.

Kick off Meeting/Design Presentation

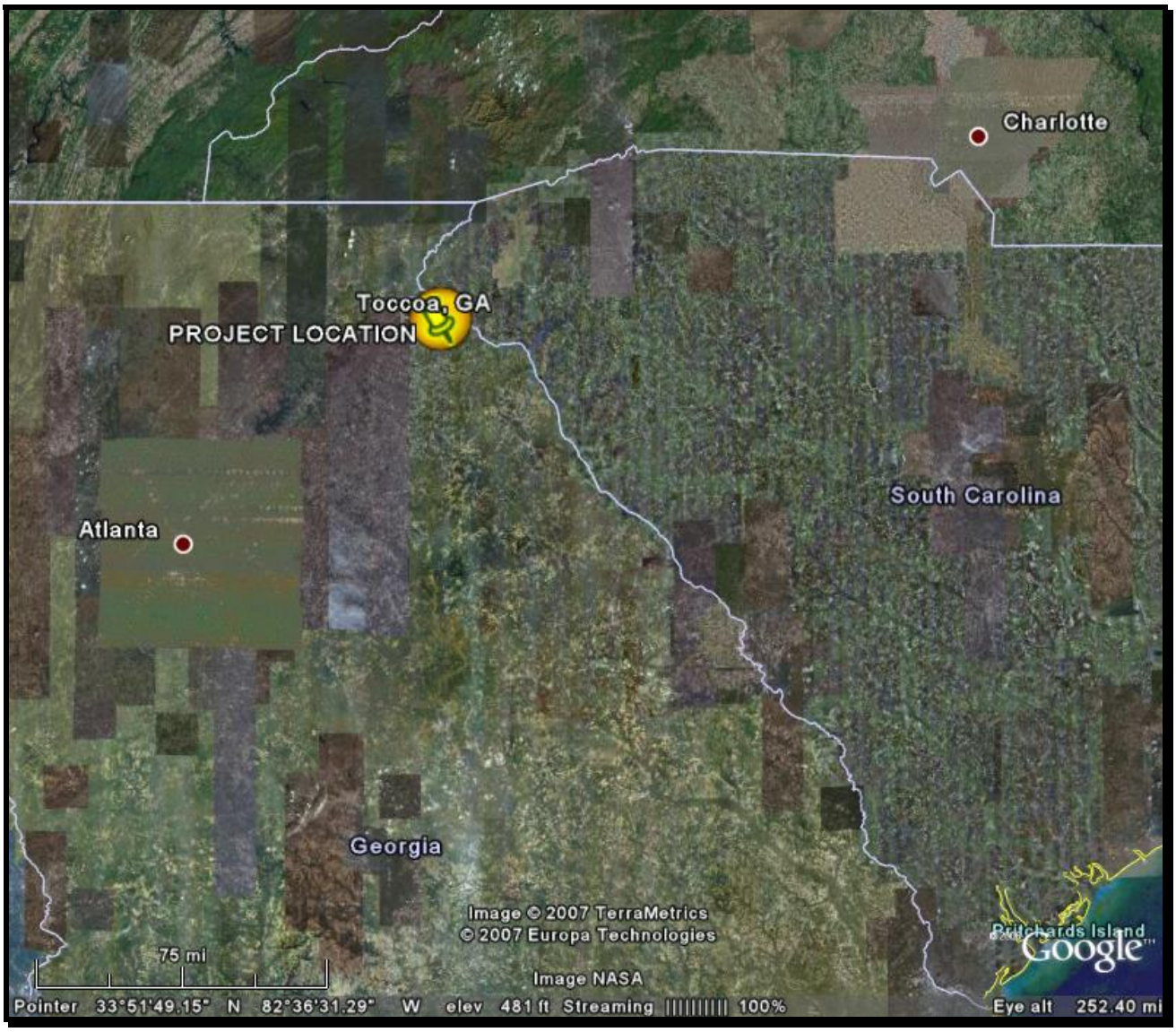
The following personnel attended this meeting which was held at the outset of the VE study:

Brian Summers	GDOT Engineering Services
Lisa Myers	GDOT Engineering Services
Kevin McKeen	Arcadis
Jim Aitken	Arcadis
Thomas Cox	OCD GDOT Project Manager
Michelle Cheves	OEL GDOT Environmental
Larry Bowman	OEL GDOT Environmental
Jerry Milligan	GDOT Right of Way
Steve Gaston	GDOT Bridge
Rob Mabry	GDOT
Dave Wohlscheid	MACTEC
Lori Kennedy	KEA
Alex Wiley	MACTEC
Dipi Chandra	MACTEC

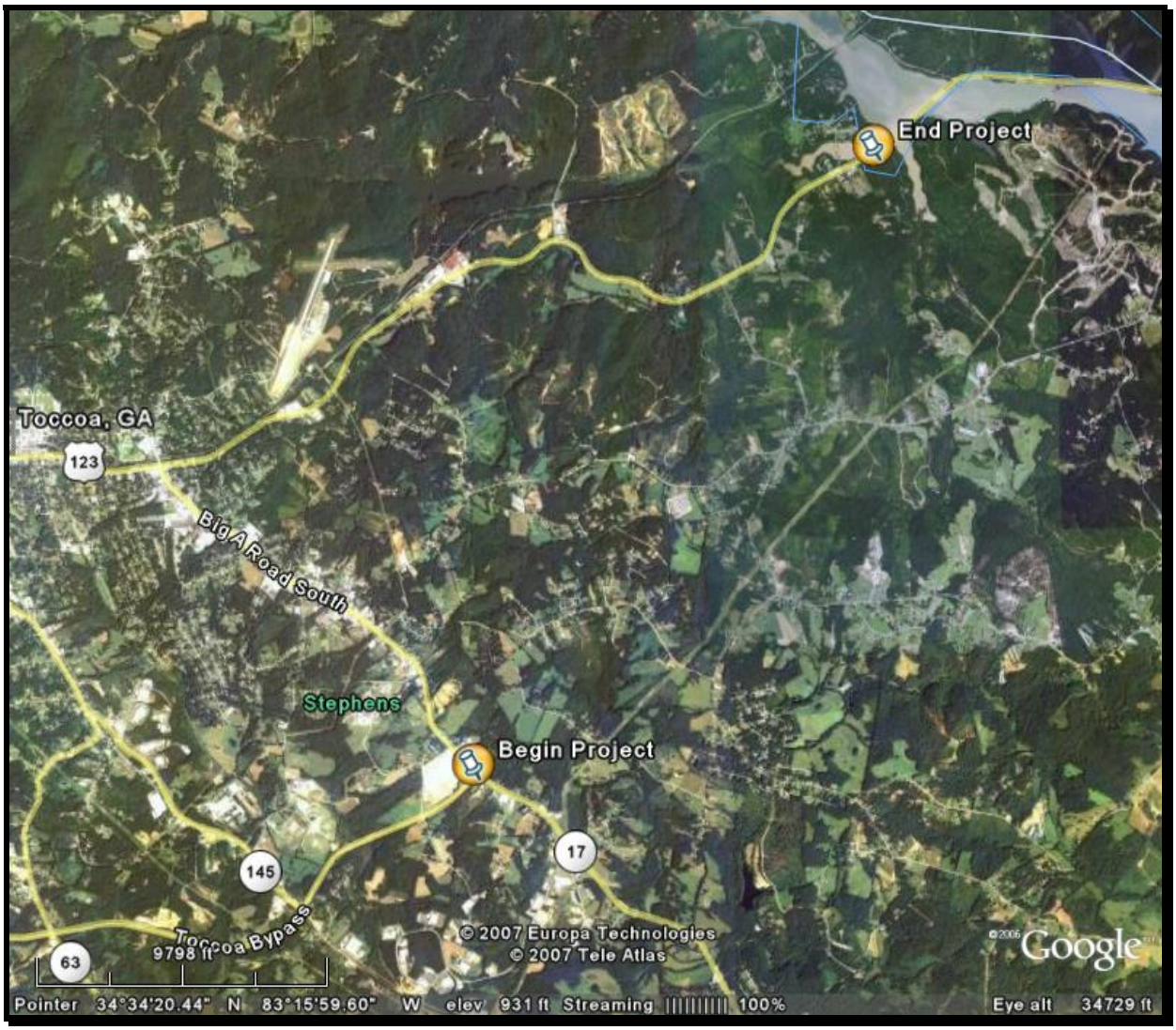
The VE Team appreciated the project overview given by Tom Cox, Kevin McKeen and Jim Aitken. Highlights included:

- The mainline is being designed with concrete pavement and, according to the consultant, this was per direction from GDOT.
- No firm constraints were placed on the VE team including project location.
- The Environmental Assessment has been approved but the FONSI is being revised.
- A new public hearing will be conducted.

Project Location



Project Limits



VE RECOMMENDATIONS

DEVELOPMENT AND RECOMMENDATION PHASE

Toccoa Bypass Extension

IDEA No.:	PAGE No.:	CREATIVE IDEA:
A-1	1 of 7	Use Superpave design in lieu of concrete pavement

Comp By: DW Date:8/22/07 Checked By: LK Date: 8/22/07

Original Concept:

A pavement life cycle analysis was presented to the VE team which indicated AC was the most cost effective choice for this application. The design team indicated in the presentation concrete was to be used.

Proposed Change:

Evaluate the life cycle evaluation based on the current pricing for asphalt materials to determine which alternate would be more cost effective in today's market.

Justification:

The evaluation indicates that AC is still a more cost effective material on a life cycle basis. The evaluation mirrored the GDOT format and design assumptions and compared the project on the 30 year and 40 year basis. Cost savings shown below are based on the 30 year evaluation and are shown on a per mile basis.

Total cost savings based on 5.1 miles of new pavement = $8,339,000 capital, and $3,930,000 on a 30 year life cycle basis and $2,050,000 on a 40 year basis.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	PRESENT WORTH
INITIAL COST - Original	3,885,000	324,400	
- Proposed	2,250,000	1,188,900	
- Savings	1,635,000		1,635,000
FUTURE COST - Savings		(864,500)	(864,500)
TOTAL PRESENT WORTH SAVINGS			**770,500**

COST WORKSHEET

PROJECT: **Toccoa Bypass Extension**

ALTERNATE 1 ----Concrete Pavement cost per mile

ITEM No: A-1

CLIENT: GADOT

Sheet 2 of 7

CONSTRUCTION ELEMENT		ORIGINAL ESTIMATE			NEW ESTIMATE		
ITEM	UNITS	No. UNITS	COST/ UNIT	TOTAL COST	No. UNITS	COST/ UNIT	TOTAL COST
Travel Lane - 10 inch PCC	SY	28,160	90	2,534,400			
- 19 mm Superpave	TN	4,646	104.50	485,507			
- Graded Agg. Base	SY	28,160	12.41	349,466			
Inside Shoulder - 10 in PCC	SY	2,347	90	211,230			
19mm Superpave	TN	387	104.50	40,462			
Graded Agg Base	SY	2,347	12.41	29,126			
Outside Shoulder - 6 in RCC	CY	1,271	110	139,810			
Graded Agg Base	SY	7,627	12.41	94,651			
TOTAL				3,884,652			0
TOTAL ROUNDED				3,885,000			0

COST WORKSHEET							
PROJECT: **Toccoa Bypass Extension**					ITEM No: A-1		
					CLIENT: GADOT		
Alternate 2- AC Pavement cost per mile					Sheet 3 of 7		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	UNITS	No. UNITS	COST/ UNIT	TOTAL COST	No. UNITS	COST/ UNIT	TOTAL COST
Travel Lane -							
12.5mm superpave	TN	2,323	90	209,088			
19mm superpave	TN	3,098	104.5	323,741			
25mm superpave	TN	9,293	104.5	971,119			
Graded Agg Base	SY	28,160	12.41	349,466			
Inside Shoulder							
12.5mm superpave	TN	194	90	17,424			
19mm superpave	TN	258	104.5	26,975			
25mm superpave	TN	774	104.5	80,925			
Graded Agg Base	SY	2,347	12.41	29,126			
Outside Shoulder							
12.5mm superpave	TN	629	90	56,610			
19mm superpave	TN	1,258	104.5	131,461			
Graded Agg Base	SY	7,627	6.25	47,669			
Bituman Tack Coat	GL	3,098	2	6,196			
TOTAL				2,249,799			0
TOTAL ROUNDED				2,250,000			0

COST WORKSHEET							
PROJECT: **Toccoa Bypass Extension**					ITEM No: A-1		
					CLIENT: GADOT		
ALTERNATE 1 - 20 Year Rehabilitation Cost					Sheet 4 of 7		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	UNITS	No. UNITS	COST/ UNIT	TOTAL COST	No. UNITS	COST/ UNIT	TOTAL COST
Travel Lane							
Grind Concrete	SY	28,160	3.5	98,560			
Reseal joints and cracks	LF	38,016	1.8	68,429			
Full depth slab replacement	CY	391	742.0	290,122			
Inside Shoulder-Full Depth							
Concrete							
Grind Concrete	SY	2,347	3.5	8,215			
Reseal joints and cracks	LF	11,264	1.8	20,275			
Full depth slab replacement	CY	33	742.0	24,182			
Outside Shoulder - RCC							
Grind Concrete	SY	7,627	3.5	26,695			
Full depth slab replacement	CY	64	742.0	47,162			
Traffic Control	DAY	6		2,260			
TOTAL				585,898			0
TOTAL ROUNDED				585,900			0

COST WORKSHEET							
PROJECT: **Toccoa Bypass Extension**					ITEM No: A-1		
					CLIENT: GADOT		
ALTERNATE 2 - 10 year rehab cost					Sheet 5 of 7		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	UNITS	No. UNITS	COST/ UNIT	TOTAL COST	No. UNITS	COST/ UNIT	TOTAL COST
Travel Lane							
Mill Asphalt	SY	28,160	0.90	25,344			
Overlay Design							
12.5mm Superpave	TN	2,323	90	209,088			
19mm Superpave	TN	3,098	104.5	323,699			
Full Depth Asph. Patch							
12.5mm Superpave	TN	116	90	10,454			
19mm Superpave	TN	155	104.5	16,185			
25mm Superpave	TN	465	104.5	48,555			
Inside Shoulder-							
Full Depth Asphalt							
Mill Asphalt	SY	2,347	0.90	2,112			
Overlay Design							
12.5mm Superpave	TN	194	90	17,424			
19mm Superpave	TN	258	104.5	26,975			
Full Depth Asph. Patch							
12.5mm Superpave	TN	10	90	871			
19mm Superpave	TN	13	104.5	1,349			
25mm Superpave	TN	39	104.5	4,046			
Outside Shoulder - Typ. Asphalt							
Mill Asphalt	SY	7,627.0	0.90	6,864			
Overlay Design							
12.5mm Superpave	TN	629.2	90	56,628			
19mm Superpave	TN	1,258.4	104.5	131,503			
Full Depth Asph. Patch							
12.5mm Superpave	TN	31.46	90	2,831			
19mm Superpave	TN	62.92	104.5	6,575			
Traffic Control	Day	6	2000	4,520			
TOTAL				895,024			0
TOTAL ROUNDED				895,000			0

Life Cycle Cost Analysis – Present Worth Method
Future Cost Calculation

Toccoa Bypass Extension

Creative Idea No. A-1 Sheet 6 of 7

Discount Rate: 3.0% Economic Life: 30 Years

	Alternate 1 Conc. **Original Design**		Alternate 2 AC **Alternate Design**	
	Cost	PW	Cost	PW
1. Single Expenditures: (i.e., stage Construction, Major Maintenance)				
a. Year 10 PWF .7747			895,000	693,356
b. Year 20 PWF .5537	585,900	324,413		495,562
c. Year PWF _____				
d. Year PWF _____				
1. Total Future Single Costs:		324,413		1,188,918
2. Annual Costs:				
a. General Maintenance PWF' 19.600				
b. Other Annual Costs PWF' 19.600				
2. Total Future Annual Costs				
3. Total Future Costs: (1 + 2)		324,413		1,188,918
4. Total Future Cost Savings on a Present Worth Basis (3B-3D)		(864,500)		
4. Total Future Cost Savings on an Annual Basis (4B X crf_ 0.0510)		(44,090)		

Life Cycle Cost Analysis – Present Worth Method
Future Cost Calculation

Toccoa Bypass Extension

Creative Idea No. A-1 Sheet 7 of 7

Discount Rate: 3.0% Economic Life: 40 Years

	Alternate 1 Conc. **Original Design**		Alternate 2 AC **Alternate Design**	
	Cost	PW	Cost	PW
1. Single Expenditures: (i.e., stage Construction, Major Maintenance)				
a. Year 10 PWF .7747			895,000	693,356
b. Year 20 PWF .5537	585,900	324,413	895,000	495,562
c. Year 30 PWF .4120			895,000	368,740
d. Year PWF _____				
1. Total Future Single Costs:		324,413		1,557,658
2. Annual Costs:				
a. General Maintenance PWF' 23.115				
b. Other Annual Costs PWF' 23.115				
2. Total Future Annual Costs				
3. Total Future Costs: (1 + 2)		324,413		1,557,658
4. Total Future Cost Savings on a Present Worth Basis (3B-3D)		(1,233,200)		
4. Total Future Cost Savings on an Annual Basis (4B X crf_ 0.0510)		(62,900)		

DEVELOPMENT AND RECOMMENDATION PHASE

Toccoa Bypass Extension

IDEA No.:	PAGE No.:	CREATIVE IDEA:
A-4	1 of 3	Build a 2 lane typical section on 4 lanes of ROW

Comp By: LGK Date: 8-22-07 Checked By: DCW Date: 8-22-07

Original Concept:

GDOT's proposed project would construct four 12-foot lanes separated by a 44 foot depressed grass median on approximately 210 feet to 250 feet.

Proposed Change:

Build two 12-foot lanes on four lanes of right of way (210 feet to 250 feet).

Justification:

The Proposed Open Year (2008) Design Traffic is 14,780 ADT. The Proposed Design Year (2028) Traffic is 24,480 ADT. The proposed design entails four 12-foot lanes.

According to the *Highway Capacity Manual*, a rate of flow of 2,200 vehicles per lane for freeways with two or more lanes is used as the basic capacity under ideal conditions. The proposed design year (2028) design hour volume per lane is 1,225 vehicles per lane. Therefore a two 12-foot lane facility is more than adequate for the proposed design.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	PRESENT WORTH
INITIAL COST - Original	$29,651,000		
- Proposed	$14,826,000	N/A	
- Savings	$14,825,000		14,825,000
FUTURE COST - Savings		-0-	-0-
TOTAL PRESENT WORTH SAVINGS			**14,825,000**

COST WORKSHEET

PROJECT: **Toccoa Bypass Extension (SR 365)**

ITEM No: A-4
CLIENT: GADOT
Sheet 2 of 3

CONSTRUCTION ELEMENT		ORIGINAL ESTIMATE			NEW ESTIMATE		
ITEM	UNITS	No. UNITS	COST/ UNIT	TOTAL COST	No. UNITS	COST/ UNIT	TOTAL COST
Br at CR 57/Oak Valley Rd	Sq. Ft.	10,279	90	925,110	5,139.50	90	462,555
Br at Rock Creek	Sq. Ft.	19,152	90	1,723,680	9,576	90	861,840
Br at Wards Creek	Sq. Ft.	23,712	90	2,134,080	11,856	90	1,067,040
Unclassified Excavation	CY	2,800,000	5.21	14,588,000	1,400,000	5.21	7,294,000
Clearing and Grubbing	AC	200	6,000	1,200,000	100	6,000	600,000
Base	TN	200,500	18.89	3,787,445	100,250	18.89	1,893,723
Recycled Conc Leveling	TN	250	90	22,500	125	90	11,250
Recycled Asp Conc 9.5 MM	TN	54,200	90	4,878,000	27,100	90	2,439,000
Recycled Asp Conc. 12.5 MM	TN	750	90	67,500	375	90	33,750
Recycled Asp Conc. 19 MM	TN	2,250	104.5	235,125	1,125	104.5	117,563
Bitum Tack Coat	GL	44,800	2	89,600	22,400	2	44,800
TOTAL				29,651,040			14,825,520
TOTAL ROUNDED				29,651,000			14,826,000

Proposed Bridge at CR 57/Oak Valley Road -

Begin Bridge – 18+59.25

End Bridge – 21+29.75

270.50 feet x 38 feet (wide) = 10,279 sq. feet

10,279 sq. feet x $90/sq. foot = **$925,110.00/2 = $462,555**

Proposed Bridge at Rock Creek (twin bridges) -

Begin Bridge – 256+45.00

End Bridge – 258.97.00

252.00 feet x 38 feet (wide) = 9,576 sq. feet x 2 = 19,152 sq. feet

19,152 sq. feet x $90/sq. foot = **$1,723,680.00/2 = $861,840**

Proposed Bridge at Wards Creek (twin bridges) –

Begin Bridge – 346+64.00

End Bridge – 349+76.00

312 feet x 38 feet (wide) = 11,856 sq. feet x 2 = 23,712 sq. feet

23,712 sq. feet x $90/sq. foot = **$2,134,080/2 = $1,067,040**

Unclassified Excavation for the entire project:

$14,588,000/2 = $7,294,000.00

Clearing and Grubbing for the entire project:

$1,200,000/2 = $600,000.00

Base and Paving for the entire project:

$9,080,170/2 = $4,540,085.00

Roadway Cost for two lanes versus four lanes:

$7,294,000 + $600,000 + $4,540,085.00 = **$12,434,085**

Cost Savings:

$462,555.00 + $861,840.00 + $1,067,040.00 + $12,434,085.00 = **$14,825,520**

DEVELOPMENT AND RECOMMENDATION PHASE

Toccoa Bypass Extension

IDEA No.:	**PAGE No.:**	**CREATIVE IDEA:**
B-2	1 of 5	Change Alignment to Avoid Displacements in the area of CR 57/Oak Valley Road

Comp By: LGK Date: 8-21-07 Checked By: DCW Date: 8-21-07

Original Concept:

GDOT's proposed alternative would begin at SR 17, where the existing South Toccoa Bypass ends with 4 - 12-foot lanes divided by a 44-foot grassed median and proceed northeasterly on new location crossing CR 3/Shady Lane and CR 538. Approximately 440 feet southwest of CR 56/Red Rock Road and Rock Creek, the alignment would continue northeast parallel to a Georgia Power Company transmission line. Then, the alternative would cross CR 56/Red Rock Road and Rock Creek, turns north and extend across CR 57/Oak Valley Road and Wards Creek, then tie into US 123/SR 365 at CR 146. This proposed alternative would displace approximately 12 residences and 1 commercial property.

Proposed Change:

From where the proposed alternative alignment crosses CR 56/Red Rock Road and Rock Creek it is proposed that the alignment then continue in a northeasterly direction continuing to parallel the Georgia Power Company Transmission line and crossing CR 57/Oak Valley Road approximately ¼ mile south of GDOT's proposed CR 57/Oak Valley Road bridge crossing. And then turn north and tie back into GDOT's proposed alternative.

Justification:

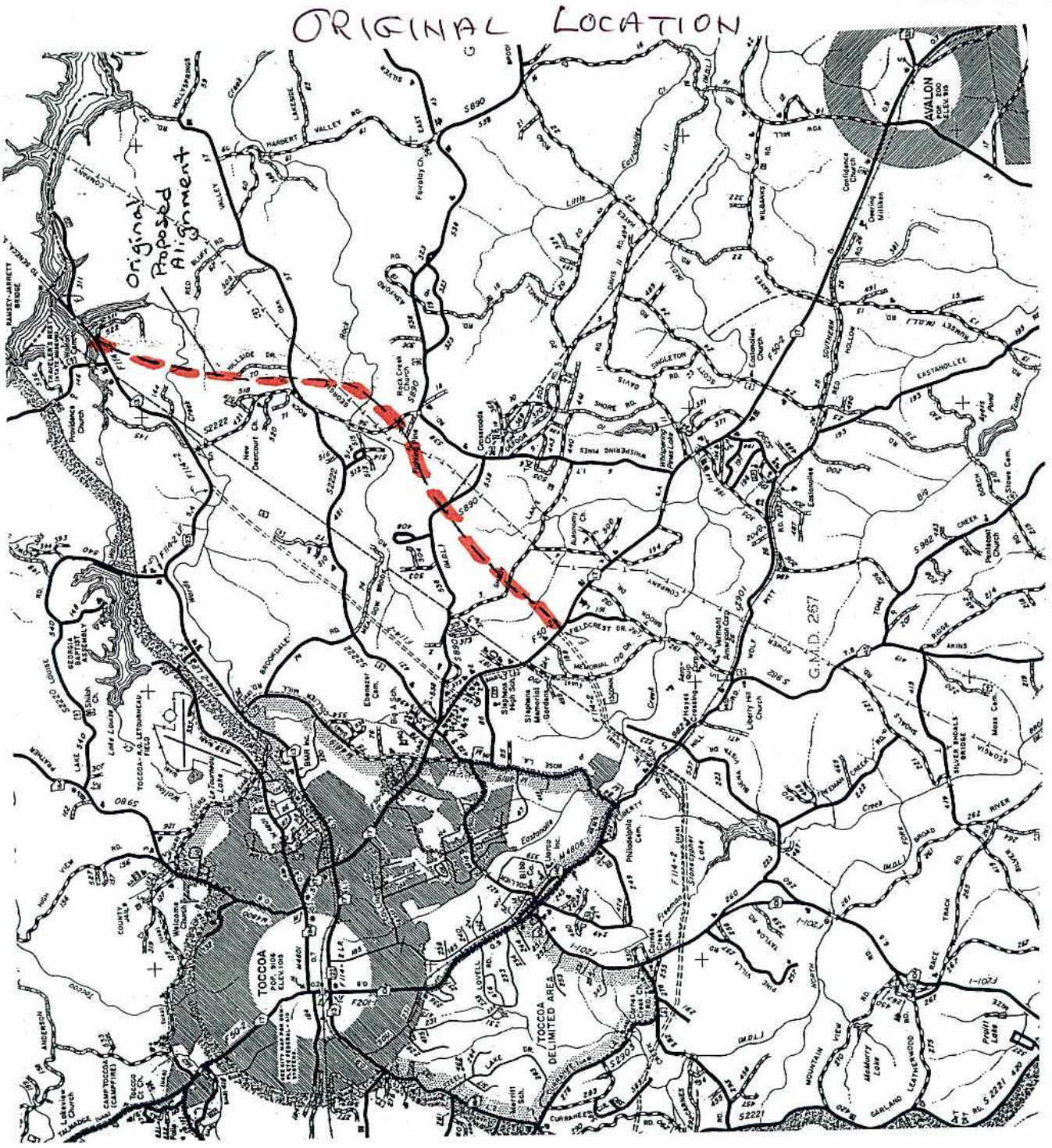
Avoid 7 displacements (assume residential displacements); and the need for an at-grade crossing would be eliminated. However, this suggested alternative would be approximately 200 feet longer than the GDOT proposed alignment.

LIFE CYCLE COST SUMMARY	**CAPITAL COST**	**FUTURE COST**	**PRESENT WORTH**
INITIAL COST - Original	$1,065,000		
- Proposed	$192,800	N/A	
- Savings	$872,200		872,200
FUTURE COST - Savings		-0-	-0-
TOTAL PRESENT WORTH SAVINGS			**872,200**

SKETCH

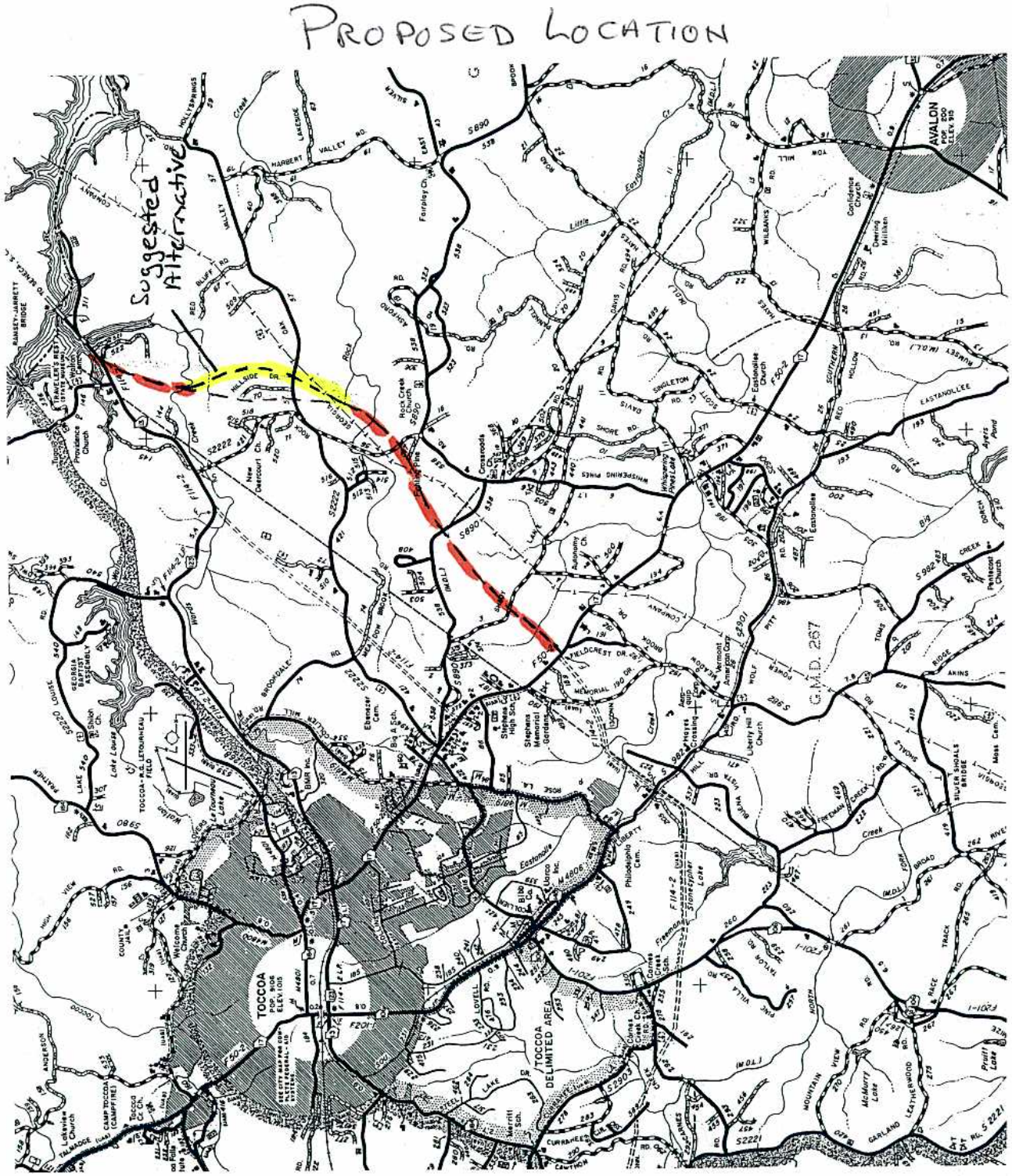
Toccoa Bypass Extension

ITEM NO: B-2
CLIENT: GA DOT
Sheet 2 of 5



SKETCH

Toccoa Bypass Extension	ITEM N^{O} : B-2 CLIENT: GA DOT Sheet 3 of 5



COST WORKSHEET							
PROJECT: **Toccoa Bypass Extension**					ITEM N B-2 CLIENT GADOT Sheet 4 of 5		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	UNITS	No. UNITS	COST/ UNIT	TOTAL COST	No. UNITS	COST/ UNIT	TOTAL COST
7 Residential Relocations	Parcel	7	20,000	140,000	0.00	20,000	
Proposed Br at CR 57/Oak Valley	Sq. Ft.	10,279	90	925,110	0	90	
Road							
Additional cost of roadway for 200 feet (see calculation sheet)	Mile				0.04	4,819,413	192,777
TOTAL				1,065,110			192,777
TOTAL ROUNDED				1,065,000			192,800

7 residential relocations – 7 x $20,000/parcel = $140,000.

Proposed Bridge at CR 57/Oak Valley Road

10,279 sq. ft. x $90/sq. ft. = $925,110

Additional cost for 200 ft. of Roadway

0.04 mile x $4,819,413/mile = $192,777

Cost Savings -

$140,000 + $925,110 - $192,777 = **$872,333**

DEVELOPMENT AND RECOMMENDATION PHASE

Toccoa Bypass Extension

IDEA No.:	PAGE No.:	CREATIVE IDEA:
B-4	1 of 5	Use Red Rock Road as the alignment

Comp By: LGK Date: 8-22-07 Checked By: DCW Date: 8-22-07

Original Concept:

GDOT's proposed alternative would begin at SR 17, where the existing South Toccoa Bypass ends with 4 12-foot lanes divided by a 44-foot grassed median and proceed northeasterly on new location crossing CR 3/Shady Lane and CR 538. Approximately 440 feet southwest of CR 56/Red Rock Road and Rock Creek, the alignment would continue northeast parallel to a Georgia Power Company transmission line. Then, the alternative would cross CR 56/Red Rock Road and Rock Creek, turns north and extend across CR 57/Oak Valley Road and Wards Creek, then tie into US 123/SR 365 at CR 146.

Proposed Change:

Approximately 440 feet southwest of CR 56/Red Rock Road and Rock Creek, consider turning the alignment to the north and utilizing existing CR 56/Red Rock Road. Then tie back into the proposed alternative to the west of Hillside Drive.

Justification:

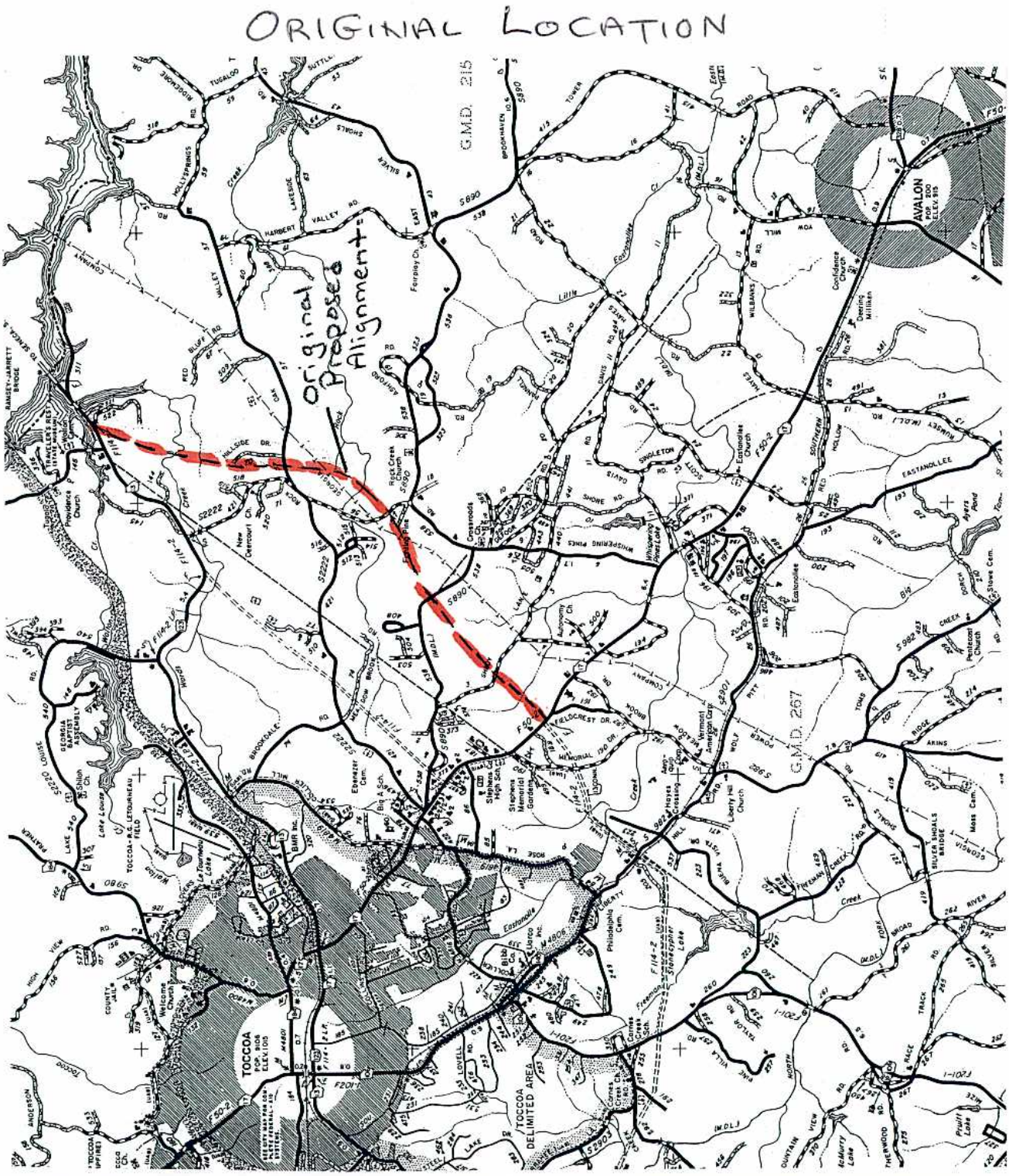
There is a potential to avoid 5 - 7 displacements (assume residential displacements); the need for an at-grade crossing would be eliminated; the need for the bridge at Red Rock Creek would be eliminated; the cost of new location (for approximately 1 mile) would be reduced as the existing CR 56/Red Rock Road is on relatively flat terrain (see USGS Topography Map). Additional cost for MOT along CR 56/Red Rock Road would need to be considered along with Limited Access being maintained.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	PRESENT WORTH
INITIAL COST - Original	$8,676,700		
- Proposed	$2,639,600	N/A	
- Savings	$6,037,100		6,037,100
FUTURE COST - Savings		-0-	-0-
TOTAL PRESENT WORTH SAVINGS			**6,037,100**

SKETCH

Toccoa Bypass Extension

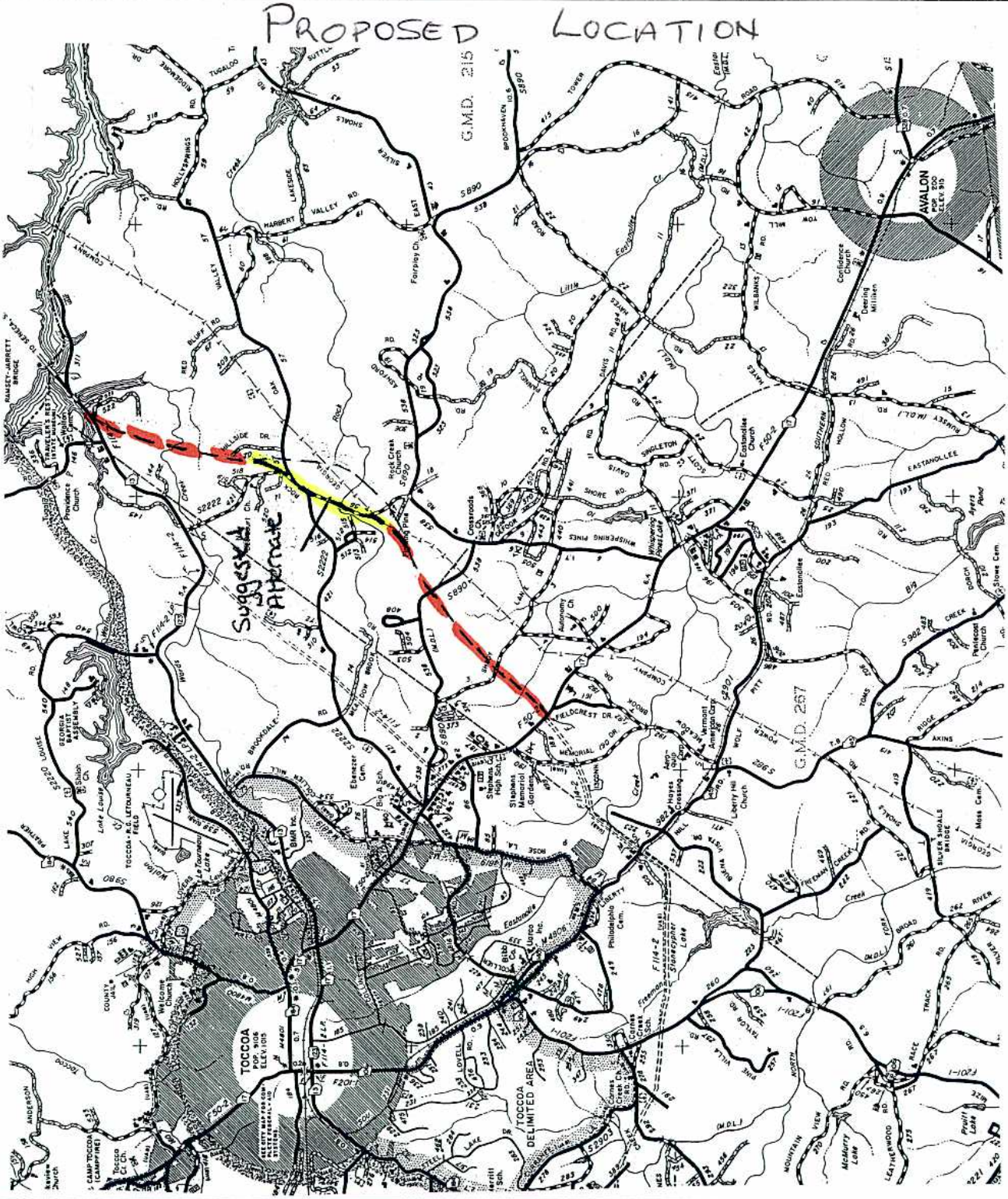
ITEM N^{O} : B-4
CLIENT: GA DOT
Sheet 2 of 5



SKETCH

Toccoa Bypass Extension

ITEM N^{O} : B-4
CLIENT: GA DOT
Sheet 3 of 5



COST WORKSHEET							
PROJECT: **Toccoa Bypass Extension (SR 365)**					ITEM N B-4 CLIENT GADOT Sheet 4 of 5		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	UNITS	No. UNITS	COST/ UNIT	TOTAL COST	No. UNITS	COST/ UNIT	TOTAL COST
5 Residential Relocations	Ea	5	20,000	100,000	0.00	20,000	
Proposed Br at CR 57/Oak Valley	SF	10,279	90	925,110	0	90	
Proposed Br at Rock Creek	SF	19,152	90	1,723,680	0	90	
Location of Proposed Alternative where cost savings could occur if CR 56/Red Rock Road were used as part of the alignment (see calculation sheet)	Mile	1.23	4,819,413	5,927,878			
Base and Paving cost for CR 56/Red Rock Road (see calculation sheet)	Mile				1.5	1,759,722	2,639,583
TOTAL				8,676,668			2,639,583
TOTAL ROUNDED				8,676,700			2,639,600

COST WORKSHEET							
PROJECT: **Toccoa Bypass Extension (SR 365)**					ITEM N B-4 CLIENT GADOT Sheet 4 of 5		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	UNITS	No. UNITS	COST/ UNIT	TOTAL COST	No. UNITS	COST/ UNIT	TOTAL COST
5 Residential Relocations	Ea	5	20,000	100,000	0.00	20,000	
Proposed Br at CR 57/Oak Valley	SF	10,279	90	925,110	0	90	
Proposed Br at Rock Creek	SF	19,152	90	1,723,680	0	90	
Location of Proposed Alternative where cost savings could occur if CR 56/Red Rock Road were used as part of the alignment (see calculation sheet)	Mile	1.23	4,819,413	5,927,878			
Base and Paving cost for CR 56/Red Rock Road (see calculation sheet)	Mile				1.5	1,759,722	2,639,583
TOTAL				8,676,668			2,639,583
TOTAL ROUNDED				8,676,700			2,639,600

5 residential relocations – 5 x $20,000/parcel = **$100,000**.

Proposed Bridge at CR 57/Oak Valley Road -

Begin Bridge – 18+59.25

End Bridge – 21+29.75

270.50 feet x 38 feet (wide) = 10,279 sq. feet

10,279 sq. feet x $90/sq. foot = **$925,110.00**

Proposed Bridge at Rock Creek (twin bridges)

Begin Bridge – 256+45.00

End Bridge – 258.97.00

252.00 feet x 38 feet (wide) = 9,576 sq. feet x 2 = 19,152 sq. feet

19,152 sq. feet x $90/sq. foot = **$1,723,680.00**

Unclassified Excavation for the entire project:

$14,588,000/5.16 miles = $2,827,131.78/mile

Clearing and Grubbing for the entire project:

$1,200,000/5.16 miles = $232,558.14/mile

Base and Paving for the entire project:

$9,080,170/5.16 miles = $1,759,722.87/mile

Roadway Cost/mile:

$2,827,131.78 + $232,558.14 + $1,759,722.87 = $4,819,413/mile

Location of Proposed Alternative that cost savings could occur if CR 56/Red Rock Road were used as part of the alignment:

Station 245+00 to 310+00 = 6,500 feet = 1.23 miles x $4,819,413 = **$5,927,878**

Base and Paving Cost for CR 56/Red Rock Road:

Approximately 1.5 miles x $1,759,722.87/mile = **$2,639,584**

Cost Savings:

$100,000 + $925,110 + $1,723,680 + $5,927,878 - $2,639,584 = **$6,037,084**

DEVELOPMENT AND RECOMMENDATION PHASE

Toccoa Bypass Extension

IDEA No.:	PAGE No.:	CREATIVE IDEA:
C-1	1 of 6	Reduce design speed to 55 mph

Comp By: AW Date: 8/23/07 Checked By: DCW Date: 8/23/07

Original Concept:

The design speed used was 65 mph. The roadway is to be signed at 55 mph.

Proposed Change:

Reduce the design speed to the posted speed of 55 mph.

Justification:

Reducing the design speed to 55 mph will match the speed for which the roadway will be signed. The proposed change has significant impact on the quantity of cut and fill associated with this project. Revising the grade to the maximum allowable of 5% and adjusting several PI locations results in savings of 350,000 CY of cut and fill.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	PRESENT WORTH
INITIAL COST - Original	2,761,000		
- Proposed	96,400	N/A	
- Savings	2,664,600		2,664,600
FUTURE COST - Savings		-0-	-0-
TOTAL PRESENT WORTH SAVINGS			**2,664,600**

COST WORKSHEET							
PROJECT: **Toccoa Bypass Extension**					ITEM No: C-1 CLIENT: GADOT Sheet 2 of 6		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	UNITS	No. UNITS	COST/ UNIT	TOTAL COST	No. UNITS	COST/ UNIT	TOTAL COST
ITEMS SAVED:							
Reduced Fill	CY	279,000	5.21	1,453,590			
Decreased Cut	CY	80,000	5.21	416,800			
Reduced Bridge	SY	9,900	90	891,000			
ITEMS ADDED:							
10 inch PCC	SY				693	90	62,370
3 inch 19 mm superpave	Tons				125	104.5	13,063
12 inch GAB	Tons				478	18.89	9,029
6 inch RCC	SY				173	54	9,342
6 inch GAB	Tons				138	18.89	2,607
TOTAL				2,761,390			96,411
TOTAL ROUNDED				2,761,000			96,400

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JOB NO. C-1 SHEET 3 OF 6

PHASE _____ TASK _____

JOB NAME _____

BY _____ DATE _____

CHECKED BY _____ DATE _____

IDEA No. C-1

REVISE THE GRADES AND P.I. LOCATIONS BY CHANGING THE MAXIMUM GRADE 5% AND ADJUSTING SOME P.I. LOCATIONS AS NOTED BELOW:

KEEP STA 132+50, EL. 928.21

REVISE
- STA. 148+00, EL. 985.00
- STA. 162+00, EL. 915.00
- STA. 199+50, EL. 970.00
- STA. 218+00, EL. 905.00

KEEP STA. 240+00, EL. 932.11

REVISE
- STA. 270+00, EL. 807.50
- STA. 292+50, EL. 915.00
- STA. 322+50, EL. 850.00
- STA. 347+50, EL. 725.00
- STA. 364+50, EL. 810.00
- STA. 390+50, EL. 680.00

KEEP STA 398+65, EL. 668.00

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IDEA No. C-1

JOB NO. C-1 SHEET 4 OF 6
PHASE _____ TASK _____
JOB NAME _____
BY _____ DATE _____
CHECKED BY _____ DATE _____

EARTHWORK

APPROX. STA. RANGE	DECREASE FILL HT. (FT.)	DECREASE FILL VOL. (C.Y.)	INCREASE FILL HT. (FT.)	INCREASE FILL VOL. (C.Y.)
152+00 TO 163+00	10'	56,630		
254+00 TO 261+00	5'	16,722		
266+00 TO 290+00	10'	123,556		
320+00 TO 329+00			10'	46,333
335+00 TO 353+00	15'	149,000		
366+00 TO 370+00			10'	20,593
TOTAL FILL		345,908 C.Y.	-	66,926 C.Y. = 278,982 C.Y. REDUCED FILL

	INCREASE CUT HT. (FT.)	INCREASE CUT VOL. (C.Y.)	DECREASE CUT HT. (FT.)	DECREASE CUT VOL. (C.Y.)
245+00 TO 254+00	5'	27,000		
261+00 TO 266+00	10'	31,852		
310+00 TO 320+00			10'	63,704
360+00 TO 366+00			10'	38,222
372+00 TO 384+00			5'	36,000
TOTAL CUT		58,852 C.Y.	-	137,926 C.Y. = 79,074 C.Y. DECREASED CUT

278,982 C.Y. + 79,074 C.Y. = C.Y. x $5.21 =

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IDEA No. C-1

JOB NO. C-1 SHEET 5 OF 6

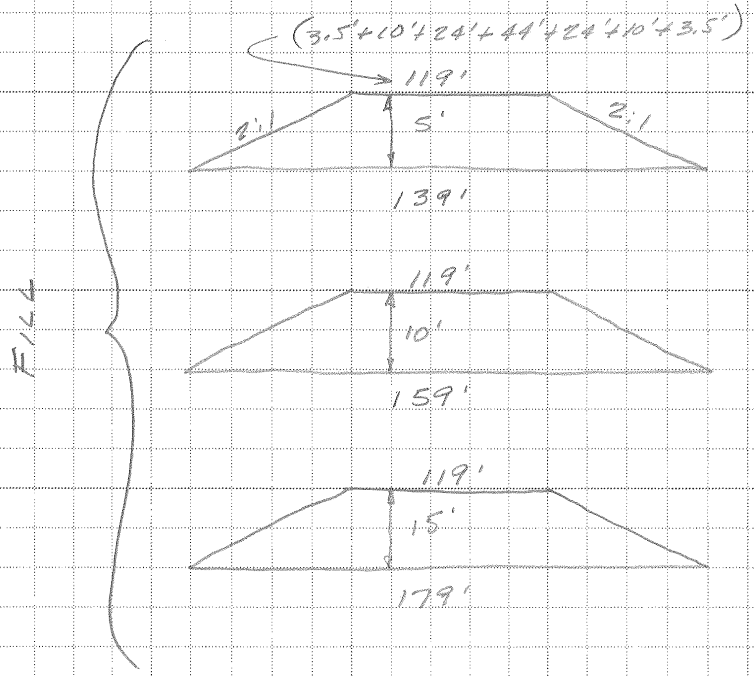
PHASE _____ TASK _____

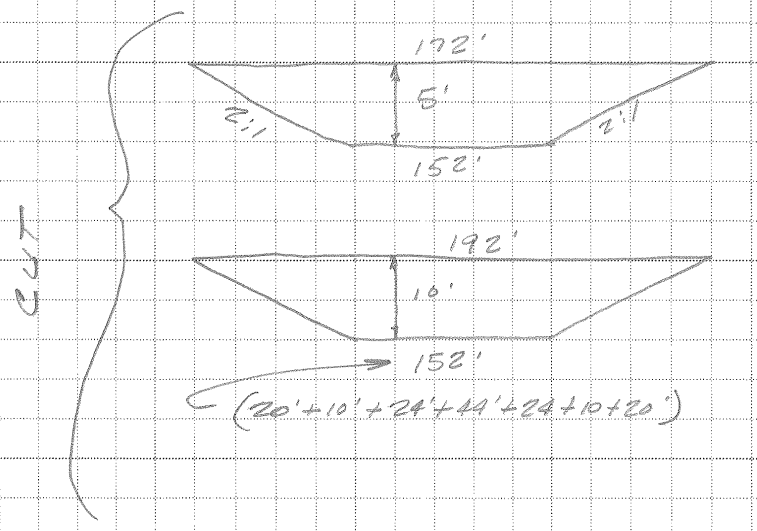
JOB NAME _____

BY _____ DATE _____

CHECKED BY _____ DATE _____

EARTHWORK





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JOB NO. C-1 SHEET 6 OF 6
PHASE _____ TASK _____
JOB NAME _____
BY _____ DATE _____
CHECKED BY _____ DATE _____

IDEA No. C-1

BRIDGE REDUCTION:

LOWERING THE GRADES AT BRIDGES 1 AND 3 WILL REDUCE THE LENGTH OF THE TWIN BRIDGES

BRIDGE NO. 1:
THE HEIGHT OF THE BRIDGE REDUCED BY 10'±
(10'×2) × 2 ENDS = 40 L.F.
BRIDGE WIDTH = 41.25' × 2 BRIDGES = 82.5'
AREA = 40' × 82.5' = 3300 S.F.

BRIDGE NO. 3:
THE HEIGHT OF THE BRIDGE REDUCED BY 20'±
(20'×2) × 2 ENDS = 80 L.F.
BRIDGE WIDTH = 41.25' × 2 BRIDGES = 82.5'
AREA = 80' × 82.5' = 6600 S.F.

TOTAL: (3300 + 6600) × $90/S.F. = $891,000

ADDITIONAL PAVING FOR BRIDGE REDUCTION:

ROADWAY:

10" PCC [(40'+80')×(48'+4')]/9 = 693 S.Y.
693 S.Y. × $90/S.Y. = $62,370

3"-19 mm (693 S.Y. × 9) × 3" × 0.00665 TONS/S.F.-IN = 125 TONS
125 TONS × $104.50/TN. = $13,063

12" GAB (693 S.Y. × 9) × 1'/27 × 2.07 TONS/C.Y. = 478 TONS
478 TNS. × $18.89/TON = $9030

SHOULDERS

6" RCC [(40'+80')×(6.5'×2)]/9 = 173 S.Y.
173 S.Y. × $54/S.Y. = $9342
← 54"/10" × $90/S.Y. (FOR 10" PAV.) = $54/S.Y.

6" GAB [(40'+80')×(7.5'×2)] × 1'/27 × 2.07 TONS/C.Y. = 138 TONS
138 TN. × $18.89/TON = $2607

TOTAL = $94,412

DEVELOPMENT AND RECOMMENDATION PHASE

Toccoa Bypass Extension

IDEA No.:	PAGE No.:	CREATIVE IDEA:
C-4	1 of 6	Lower Profile Approximately 5 feet along a portion of the route

Comp By: AW Date: 8-23-07 Checked By: DCW Date: 8-23-07

Original Concept:

Proposed profile as shown on the plans.

Proposed Change:

Lower the profile from approximately station 135+00 to station 390+00. Keep the grade approximately where it is around the Oak Valley Road grade separation, approximately station 280+00 to station 310+00.

Justification:

The designer stated this project was in borrow. This will increase the excavation and reduce the required fill. It will also shorten the lengths of bridges (no. 1 and no. 3).

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	PRESENT WORTH
INITIAL COST - Original	2,904,700		
- Proposed	32,200	N/A	
- Savings	2,872,500		2,872,500
FUTURE COST - Savings		-0-	-0-
TOTAL PRESENT WORTH SAVINGS			**2,872,500**

COST WORKSHEET

PROJECT: **Toccoa Bypass Extension (SR 365)**

ITEM No: C-4
CLIENT: GADOT
Sheet 2 of 6

CONSTRUCTION ELEMENT		ORIGINAL ESTIMATE			NEW ESTIMATE		
ITEM	UNITS	No. UNITS	COST/ UNIT	TOTAL COST	No. UNITS	COST/ UNIT	TOTAL COST
Reduced Borrow	CY	500,520	5	2,607,709			
Reduce Bridge Cost	SY	3300	90	297,000			
Additional Pavement Cost:							
10" PCC	SY				231	90	20,790
3" - 19 mm superpave	TN				42	104.5	4,389
12" GAB	TN				160	18.89	3,022
6" RCC	SY				58	54	3,132
6" GAB	TN				46	19	869
TOTAL				2,904,709			32,202
TOTAL ROUNDED				2,904,700			32,200

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IDEA NO. C-4

JOB NO. C-4 SHEET 3 OF 6

PHASE _____ TASK _____

JOB NAME _____

BY _____ DATE _____

CHECKED BY _____ DATE _____

EARTHWORK

APPROX. STA. RANGE	FILL HT. (FT.)	FILL VOL. (C.Y.)	CUT HT. (FT.)	CUT VOL. (C.Y.)
135+00 TO 146+00	20'	38,500		
146+00 TO 151+00			10'	18,704
151+00 TO 168+00	10'	46,907		
168+00 TO 178+00			20'	44,815
178+00 TO 197+00	60'	94,648		
197+00 TO 203+00			10'	22,444
203+00 TO 222+00	20'	66,500		
222+00 TO 229+00			20'	31,370
229+00 TO 240+00	30'	46,648		
240+00 TO 243+00			10'	11,222
243+00 TO 245+00	10'	5,519		
245+00 TO 254+00			40'	53,669
254+00 TO 261+00	20'	24,500		
261+00 TO 267+00			20'	26,889
267+00 TO 280+00	20'	45,500		
(OMIT 280+00 TO 310+00)				
310+00 TO 324+00			30'	73,111
324+00 TO 329+00	30'	21,204		
329+00 TO 335+00			20'	26,889
335+00 TO 356+00	30'	89,056		

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IDEA No. C-4

JOB NO. C-4 SHEET 4 OF 6

PHASE _____ TASK _____

JOB NAME _____

BY _____ DATE _____

CHECKED BY _____ DATE _____

EARTHWORK (CONT.)

APPROX. STA. RANGE	FILL		CUT	
	HT. (FT.)	VOL. (C.Y.)	HT. (FT.)	VOL. (C.Y.)
356+00 TO 366+00			40'	59,630
366+00 TO 369+00	20'	10,500		
369+00 TO 386+00			30'	88,778
386+00 TO 390+00	10'	11,037		
TOTAL		500,519 C.Y. - REDUCED FILL		457,519 C.Y. - INCREASED CUT

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IDEA NO. C-4

JOB NO. C-4 SHEET 5 OF 6

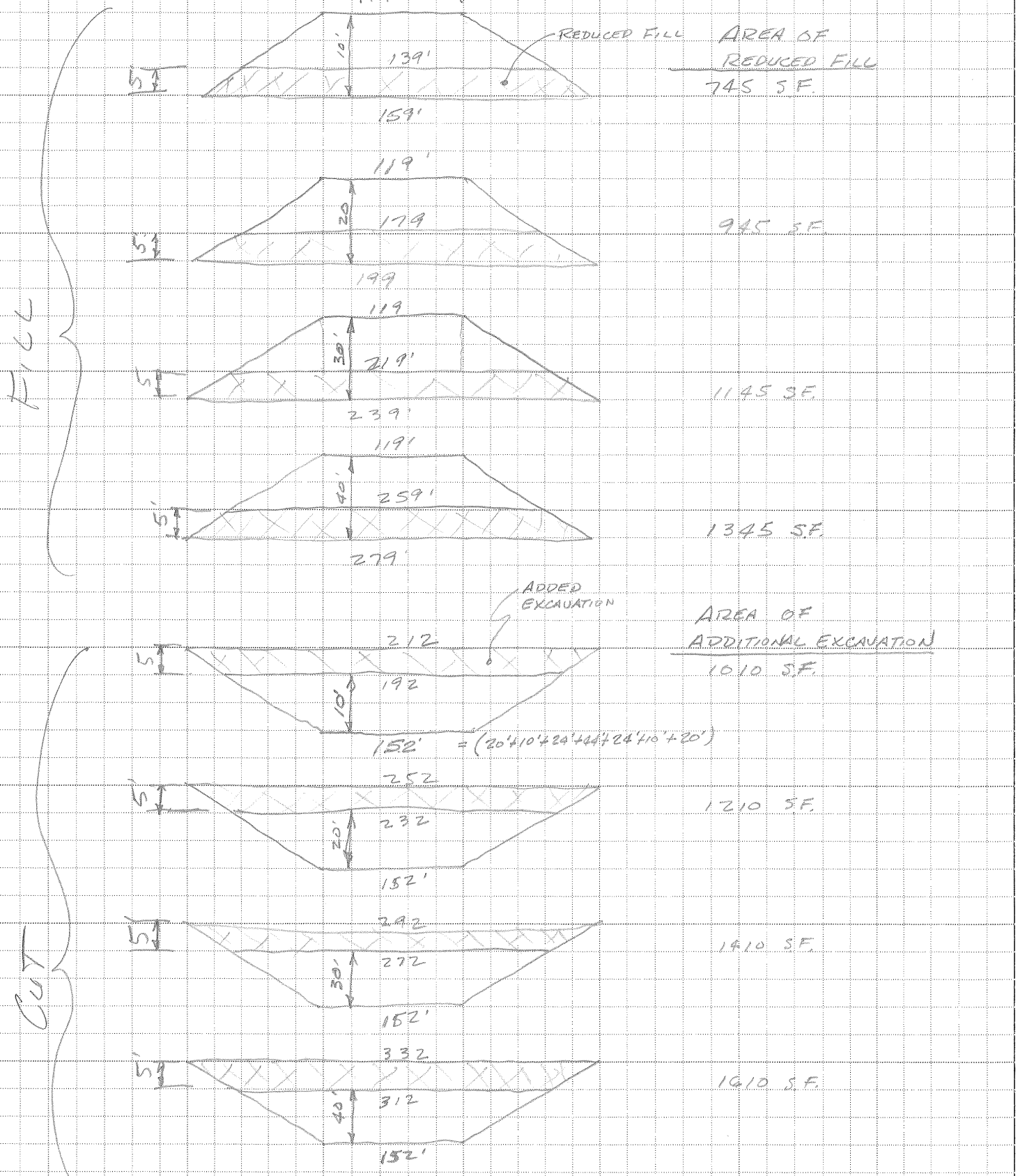
PHASE _____ TASK _____

JOB NAME _____

BY _____ DATE _____

CHECKED BY _____ DATE _____

EARTHWORK



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IDEA NO. C-4

JOB NO. C-4 SHEET 6 OF 6
PHASE _____ TASK _____
JOB NAME _____
BY _____ DATE _____
CHECKED BY _____ DATE _____

BRIDGE REDUCTION:

LOWERING THE PROFILE BY 5' WILL SHORTEN THE LENGTHS OF THE TWIN BRIDGES, NO. 1 AND NO. 3. BASED ON A 2:1 SLOPE ON EACH END OF THE BRIDGE, THE BRIDGES WILL BE SHORTENED BY 20'

BRIDGE WIDTH: 41.25' x 2 BRIDGES = 82.5'

BRIDGE NO. 1: 82.5' x 20' = 1650 S.F.

BRIDGE NO. 2: 82.5' x 20' = 1650 S.F.

TOTAL 3300 S.F.

3300 S.F. x $90/S.F. = $297,000

ADDITIONAL PAVING FOR BRIDGE REDUCTION:

ROADWAY:

10" PCC: [(20' x 2) x (48' + 4')] / 9 = 231 S.Y.
231 S.Y. x $90/S.Y. = $20,790

3" - 19 MM: (231 S.Y. x 9) x 3" x 0.00665 TONS/S.F.-IN = 42 TONS
42 TONS x $104.50 = $4,389

12" GAB: (231 S.Y. x 9) x 1' / 27 x 2.07 TONS/C.Y. = 160 TONS
160 TONS x $18.89/TON $3,023

SHOULDERS

6" RCC: [(20' x 2) x (6.5' x 2)] / 9 = 58 S.Y.
58 S.Y. x $54/S.Y. = {6"/10" x $90/S.Y. (FOR 10" PCC) = $54/S.Y.} $3,132

6" GAB: [(20' x 2) x (7.5' x 2)] x 1' / 27 x 2.07 TONS/C.Y. = 46 TONS
46 TONS x $18.89/TON $869

TOTAL = $32,203

DEVELOPMENT AND RECOMMENDATION PHASE

Toccoa Bypass Extension

IDEA No.:	**PAGE No.:**	**CREATIVE IDEA:**
E-2	1 of 3	Remove slope paving and use vertical abutments at the two ends of Oak Valley Road bridge

Comp By: DC Date: 8/21/07 Checked By: DW Date: 8/22/07

Original Concept:

Build the bridge on Oak Valley Road with slope paving near two ends.

Proposed Change:

Remove slope paving and use vertical abutments at the two ends of Oak Valley Road bridge

Justification:

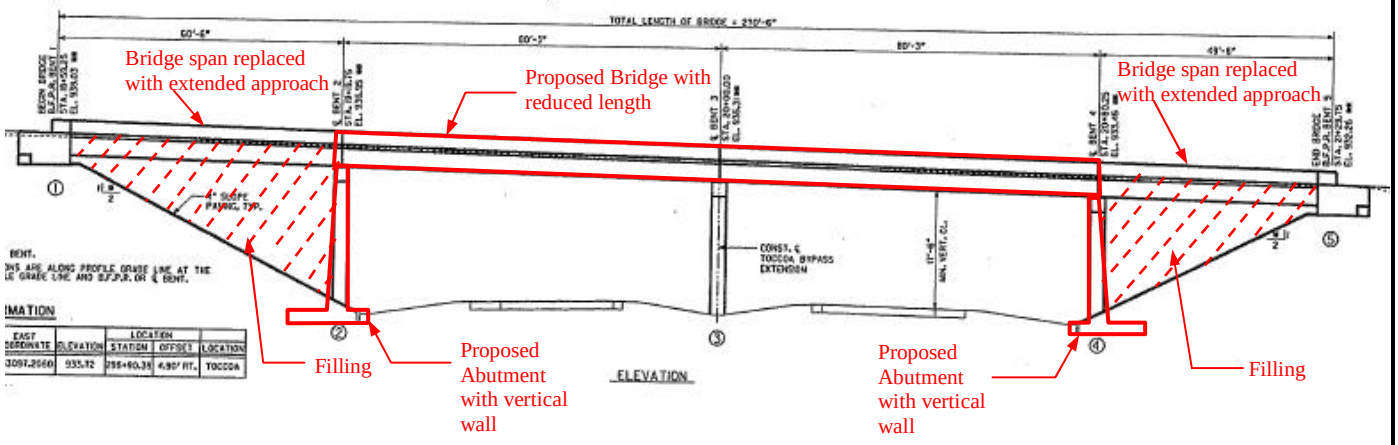
1. Removal of slope paving will eliminate associated cost.
2. By removing the slope paving and constructing vertical abutment walls, the total bridge length can be shortened. That would lead to reduction in associated cost.

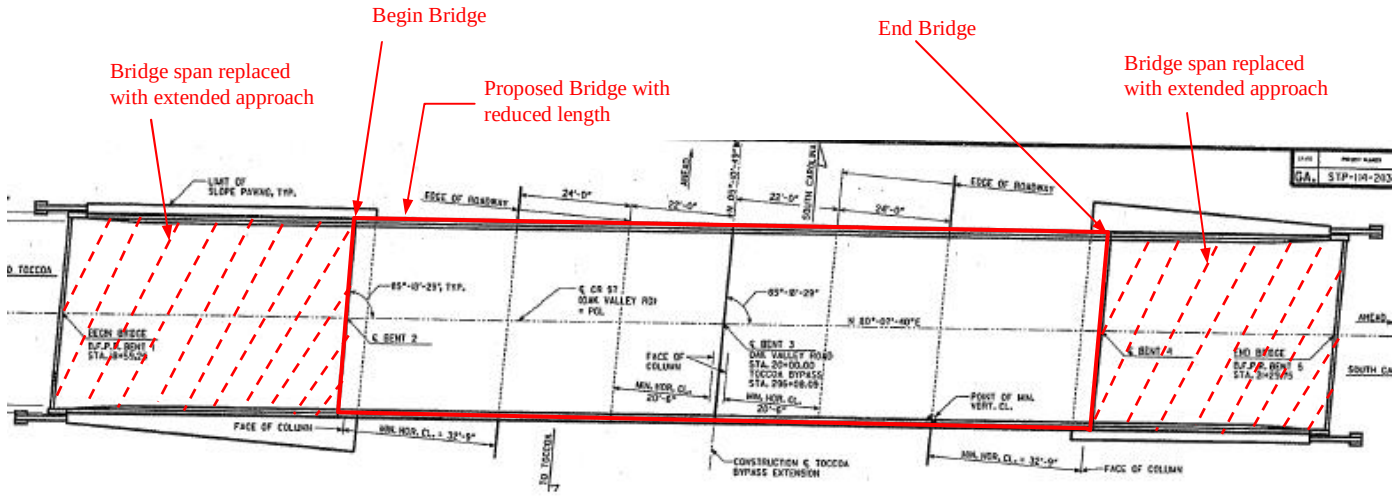
LIFE CYCLE COST SUMMARY	**CAPITAL COST**	**FUTURE COST**	**PRESENT WORTH**
INITIAL COST - Original	1,004,200		
- Proposed	650,500	N/A	
- Savings	353,700		353,700
FUTURE COST - Savings		-0-	-0-
TOTAL PRESENT WORTH SAVINGS			**353,700**

SKETCH

Toccoa Bypass Extension

ITEM N^{O} : E-2
CLIENT: GA DOT
Sheet 2 of 3





COST WORKSHEET

PROJECT: **SR365 Improvements in Stephens County** (Toccoa Bypass Extension)

ITEM No E-2

CLIENT: GADOT

Sheet 3 of 3

CONSTRUCTION ELEMENT		ORIGINAL ESTIMATE			NEW ESTIMATE		
ITEM	UNITS	No. UNITS	COST/ UNIT	TOTAL COST	No. UNITS	COST/ UNIT	TOTAL COST
Oak Valley Road Bridge	SF	11158.1	90	1,004,231	6620.63	90	595,856
4" Slope Paving	SY	0	53		564	-53	-29,875
Additional Roadway pavement	SY	0	113		504	113	56,971
Additional Fill	CY	0	5		2334	10	23,339
Additional Guard-rail	LF	0	19		220	19	4,180
TOTAL				1,004,231			650,471
TOTAL ROUNDED				1,004,200			650,500

DEVELOPMENT AND RECOMMENDATION PHASE

Toccoa Bypass Extension

IDEA No.:	**PAGE No.:**	**CREATIVE IDEA:**
E-4	1 of 3	Build a single bridge on Rock Creek instead of two parallel twin bridges

Comp By: DC Date: 8/21/07 Checked By: DCW Date: 8/23/07

Original Concept:

Build two parallel twin bridges over Rock Creek with one bridge carrying traffic in one direction only.

Proposed Change:

Build a single bridge over Rock Creek with a median barrier in the middle of the deck.

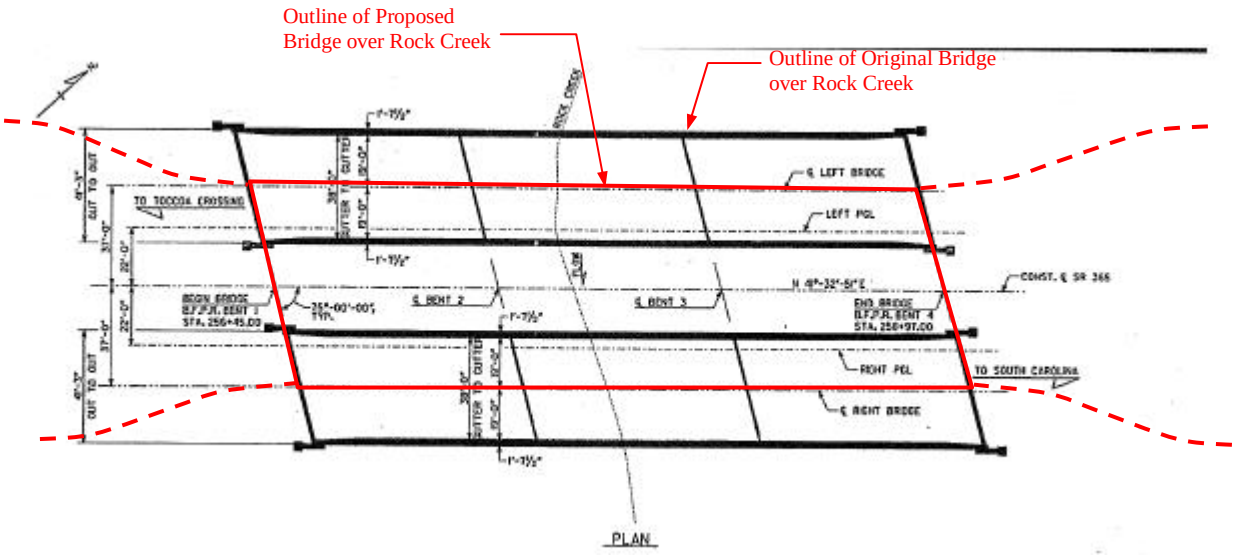
Justification:

1. The single bridge can be constructed with a deck area smaller than the total deck area of two twin bridges. This would lead to a reduction in construction and maintenance cost. However, this would introduce horizontal curves and additional guard-rails in the bridge approaches since the original design calls for a separation of 32.75' between approaches. The original design involves two twin bridge units with each unit having an out-to-out width of 41.25' (two lanes [24'], two 7' shoulders on two sides [14'] and two barriers on two sides [3.25']). Whereas, the proposed design involves one single bridge unit having an out-to-out width of 73.25' (four lanes [48'], two 7' outside shoulders on two sides [14'], two 3' inside shoulders on two sides [6'], a median [2'] and two outside barriers on two sides [3.25']).

LIFE CYCLE COST SUMMARY	**CAPITAL COST**	**FUTURE COST**	**PRESENT WORTH**
INITIAL COST - Original	1,871,100		
- Proposed	1,661,300	N/A	
- Savings	209,800		209,800
FUTURE COST - Savings		-0-	-0-
TOTAL PRESENT WORTH SAVINGS			**209,800**

SKETCH

Toccoa Bypass Extension	ITEM NO : E-4 CLIENT: GA DOT Sheet 2 of 3



COST WORKSHEET

PROJECT:	**SR365 Improvements in Stephens County** (Toccoa Bypass Extension)	ITEM N E-4
		CLIENT GA DOT
		Sheet 3 of 3

CONSTRUCTION ELEMENT		ORIGINAL ESTIMATE			NEW ESTIMATE		
ITEM	UNITS	No. UNITS	COST/ UNIT	TOTAL COST	No. UNITS	COST/ UNIT	TOTAL COST
Rock Creek Bridge with twin deck	SF	20790	90	1,871,100	0	90	
Rock Creek Bridge with single deck	SF	0	90		18,459	90	1,661,310
TOTAL				1,871,100			1,661,310
TOTAL ROUNDED				1,871,100			1,661,300

DEVELOPMENT AND RECOMMENDATION PHASE

Toccoa Bypass Extension

IDEA No.:	**PAGE No.:**	**CREATIVE IDEA:**
E-5	1 of 3	Build a single bridge on Wards Creek instead of two parallel twin bridges

Comp By: DC Date: 8/21/07 Checked By: DCW Date: 8/23/07

Original Concept:

Build two parallel twin bridges over Wards Creek with one bridge carrying traffic in one direction only.

Proposed Change:

Build a single bridge over Wards Creek with a median barrier in the middle of the deck.

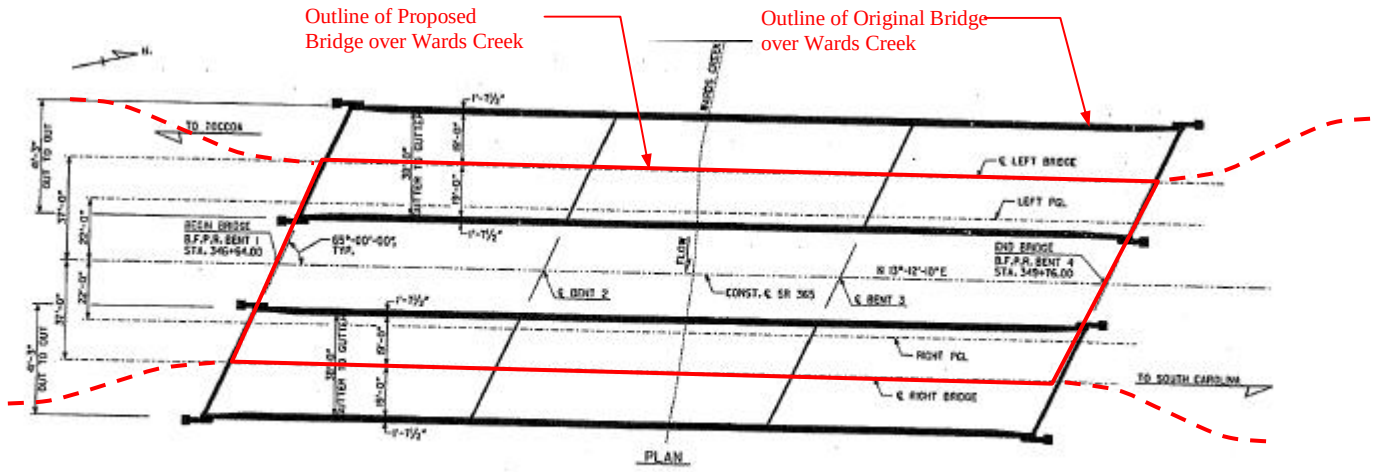
Justification:

The single bridge can be constructed with a deck area smaller than the total deck area of two twin bridges. This would lead to a reduction in construction and maintenance cost. However, this would introduce horizontal curves and additional guard-rails in the bridge approaches since the original design calls for a separation of 32.75' between approaches. The original design involves two twin bridge units with each unit having an out-to-out width of 41.25' (two lanes [24'], two 7' shoulders on two sides [14'] and two barriers on two sides [3.25']). Whereas, the proposed design involves one single bridge unit having an out-to-out width of 73.25' (four lanes [48'], two 7' outside shoulders on two sides [14'], two 3' inside shoulders on two sides [6'], a median [2'] and two outside barriers on two sides [3.25']).

LIFE CYCLE COST SUMMARY	**CAPITAL COST**	**FUTURE COST**	**PRESENT WORTH**
INITIAL COST - Original	2,316,600		
- Proposed	2,056,900	N/A	
- Savings	259,700		259,700
FUTURE COST - Savings		-0-	-0-
TOTAL PRESENT WORTH SAVINGS			**259,700**

SKETCH

Toccoa Bypass Extension	ITEM NO : E-5 CLIENT: GA DOT Sheet 2 of 3



COST WORKSHEET

PROJECT: **SR365 Improvements in Stephens County** (Toccoa Bypass Extension)

ITEM No E-5
CLIENT: GA DOT
Sheet 3 of 3

CONSTRUCTION ELEMENT		ORIGINAL ESTIMATE			NEW ESTIMATE		
ITEM	UNITS	No. UNITS	COST/ UNIT	TOTAL COST	No. UNITS	COST/ UNIT	TOTAL COST
Ward Creek Bridge with twin deck	SF	25,740	90	2,316,600	0	90	
Ward Creek Bridge with single deck	SF	0	90		22,854	90	2,056,860
TOTAL				2,316,600			2,056,860
TOTAL ROUNDED				2,316,600			2,056,900

APPENDIX

COST MODEL

COST DISTRIBUTION

By

Decreasing Item Number

Toccoa Bypass Extension

Element ID.	Item Description	Cost x $1,000	%
A	Concrete Pavement	18,607	26.3
B	Right of Way	15,681	22.2
C	Unclassified Excavation	14,588	20.6
D	AC Pavement	5,293	7.5
E	Bridges	5,220	7.4
80% Cost Line			
F	Base Material	3,787	5.4
G	Temporary Erosion Control	2,490	3.5
H	Clearing, Grubbing, Field Office	1,250	1.8
I	Drainage	1,005	1.4
J	Concrete Box Culvert Barrel	900	1.3
K	Permanent Erosion Control	846	1.2
L	Signing and Marking	464	0.7
M	Traffic Control	250	0.4
N	Rip Rap	141	0.2
O	Rumble Strips	104	0.1
P	ROW Markers	24	0.0
	TOTAL	**$70,650**	**100.0%**

INFORMATION PHASE FUNCTION ANALYSIS

Toccoa Bypass Extension

System: Road Development
Function: Bypass Town

ITEM		FUNCTION			INITIAL DOLLARS (x 1,000)		
No.	**DESCRIPTION**	**Verb**	**Noun**	**Kind***	**Cost**	**% of Total**	**Worth**
A	Concrete Pavement	Supports	Load	B	18,607	26	17,607
		Drains	Runoff				
		Facilitates	Movement				
B	Right of Way	Accommodate	Project	B	15,681	22	15,000
C	Unclassified Excavation	Meet	Grade	B	14,588	21	13,500
		Support	Load				
D	Asphalt Cement Pavement	Supports	Load	S	5,293	7.5	5,293
E	Bridges	Span	Gap	S	5,220	7.4	4,500
F	Base Material	Supports	Load	S	3,787	5.4	3,787
G	Temporary Erosion Control	Capture	Sediment	S	2,490	3.5	2,490
H	Clearing, Grubbing, Field Office	Prepare	Project	S	1,250	1.8	1,250
I	Drainage	Transport	Runoff	S	1,005	1.4	1,005
J	Conc. Box Culvert Barrels	Transport	Stormwater	S	900	1.3	900
	TOTAL				68,821	97.3	65,332

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
Toccoa Bypass Extension			
NO.	**CREATIVE IDEA**	**COMMENTS**	**IDEA RATING**
A	**Concrete Pavement**		
A-1	Use AC Pavement in lieu of concrete		✓
A-2	Evaluate concrete pavement design	Not cost effective	**X**
A-3	Use asphalt shoulders	Not as durable	**X**
A-4	Build two lanes now, buy right of way for four lanes		✓
B	**Right of Way**		
B-1	Tighten up Right of Way limits	Plans indicate tight limits	**X**
B-2	Evaluate alignment versus displacements		✓
B-3	Use County layout alternative – shift alignment to the east		See B-2
B-4	Use Red Rock Road as the alignment		✓
C	**Unclassified Excavation**		
C-1	Reduce design speed to 55 mph		✓
C-2	Raise grade at Oak Valley, delete bridge		**See E-3**
C-3	Shift alignment at Oak Valley to the North	Interferes with historic site	**X**

NO.	CREATIVE IDEA	COMMENTS	IDEA RATING
D	**AC Pavement**		
D-1	Evaluate need for 3 inch base course	Minimal savings does not offset savings in reduced construction time	**X**
E	**Bridges**		
E-1	Evaluate bridge versus culvert	Not cost effective using quantities in GA Special Design Box Culverts	✓
E-2	Use vertical abutment in lieu of slope paving		✓
E-3	Delete Oak Valley bridge, revise grades	Not cost effective	**X**
E-4	Use one bridge for twin bridges over Rock Creek		✓

VE STUDY SIGN-IN SHEET

Project No.: STP-114-2(13) County: Stephens PI No.: 132440 Date: August 21-24, 2007

NAME	EMPLOYEE ID NO.	DOT OFFICE OR COMPANY	PHONE NUMBER	EMAIL ADDRESS
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Kevin McKeon		ARCADIS	770-431-8666	kmckeon@arcadis-us.com
LORI Kennedy		KEA Group	678 904-8591	lkennedy@keagroup.com
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Steve Gaston	00352939	GDOT Bridge	404-656-5197	steve.gaston@dot.state.ga.us
ROB MABRY	00326589	GDOT DIAZ Coast	706 754 9559	rob.mabry...
Nabil Raad		OTS&D/TO	4-635-8126	m.nabil.Raad@dot.w