VALUE ENGINEERING REPORT

Bridge Replacements on Brown Avenue over
Norfolk Southern Railroad
BR000-0004-00(729), PI No. 0004729
Muscogee County

May 14, 2009

OWNER:

Georgia Department of Transportation
600 West Peachtree Street
Atlanta, GA 30308
(404.631.1770)

VALUE ENGINEERING CONSULTANT:

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Introduction

This report presents the results of a value engineering (VE) study conducted on the replacement of the two bridges on Brown Avenue in Columbus, GA. The first is a bridge over six sets of railroad tracks and the second is a small bridge over Bragg Smith Street. Both bridges were constructed in the 1940s and both are classified as structurally inadequate having sufficiency ratings of 26.15 for the RR crossing portion and 47.02 for the Bragg Smith Street segment.

The total estimated project cost for both projects includes an estimated 10% factor for E&C and a fuel adjustment and AC adjustment cost of $89,845. This results in a markup factor of 1.11457 over the estimated base costs. Also included in the estimate is 0% for additional inflation and all right of way and utilities costs. Right of way and utilities have no markup applied to the base costs. The total estimated project cost is $11.084 million. Brown Avenue is functionally classified as an urban minor arterial and is a designated school bus route. Existing AADT (2005) is 11,500 VPD and projected AADT (2033) is 18,000 with 3% trucks.

The project is located in southern Columbus in Muscogee County approximately 110 miles southwest of Atlanta. Because of the historic constraints for the Bragg Smith area, these two

bridges will be replaced with a single continuous two-lane bridge approximately 1040 feet in length.

This effort included a four day study with a four person VE team on the 30% level design for the project. The study was conducted on April 28-May 1, 2009 at the GDOT offices in Atlanta. The design team included in-house District 3 GDOT personnel.

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

During the presentation by the design team on the project overview, the VE Team was alerted to the stakeholder's constraints on this project which include:

- The area east of Brown Avenue along Bragg Smith Street is considered an Historical District and should not be disturbed. This resulted in one continuous bridge in lieu of two separate bridges.
- The existing road bed will only be removed to the extent necessary to construct the proposed bridge to minimize impact on existing slopes and the need to disrupt existing property.

Results Obtained

The VE Team generated 20 ideas in the creative session and presented 13 of these as recommendations for consideration by GDOT. The recommendations involve: reducing the bridge width by eliminating the sidewalk on one side; reducing the bridge length; reducing the

lane widths to 11 feet; using short retaining walls at the bottom of the slopes and extending the guardrail section to minimize right of way; narrowing the shoulder to minimize the right of way; deleting improvements to Bragg Smith Street; and eliminating dual trunk lines in the storm drainage system.

Neglecting the overlapping nature of the recommendations as much as possible, the net total of all the recommendations have the potential to reduce project costs by as much as $4,047,000 capital cost savings while continuing to provide the required functionality. This is shown in the last column of the Summary Table that follows the summary descriptions below.

A brief presentation of these recommendations was delivered on May 1st with the following in attendance: Lisa Myers and Ron Wishon from GDOT Engineering Services; Lyn Clements of GDOT Bridge design; District 3 personnel via video teleconference including Debra Pruitt, Bill Rountree, Jeff Swiderski and Jason Mobley; and the VE Team: Dave Wohlscheid, Stephen Gaines, William Dial and Aruna Sastra.

Recommendation Highlights

A-1.1 Reduce bridge width from 46 feet to 40 feet

This concept includes reducing the width to comply with the current GDOT bridge manual.

Potential savings if implemented is $626,000

A-1.2 Reduce bridge width from 46 feet to 34 feet

This concept includes A-1.1 above plus reducing the width further by eliminating one of the two sidewalks used for pedestrian traffic.

Potential savings is $1,252,000

A-2 Reduce bridge length by using more roadway sections

Converting the bridge section to road section saves 600 feet of bridge. The road section is less costly than the bridge section. The road section is revised from the original concept and includes 11 foot lanes, a sidewalk on one side only, a reduced shoulder on one side and guardrail on both sides. This will fit on the existing embankment and will not disturb the historic district.

Potential Savings is $2,336,500

A-6.2 Begin bridge at station 15+60 instead of at station 14+00 thus saving 160 feet of structure

It does not appear to be necessary to begin the bridge as far back as originally proposed.

Potential savings is $623,000

A-8 Reduce length of bridge to 880 feet from 1,040 feet and reduce the width to 40 feet. Pile bents are proposed for the short span section of bridge

This item also starts the bridge at station 15+60. The pile bent section can be constructed at a lower unit cost than the original assumed at $75 per SF in lieu of the $90 original.

Potential savings $1,554,000

A-10 Reduce lane widths from 12 feet to 11 feet in width

With the level of projected traffic and the proposed design speed of 30 mph, it appears the 11 foot lanes will be adequate.

Potential savings is $111,000

B-1 Use short retaining walls at the bottom of the proposed slopes

The increased cost of the walls reduces the need to take parcels 2 and 4 and results in a cost savings.

Savings potential $1,135,000

B-2.1 Extend guard rail to increase side slopes

Extending the guard rail and widening the shoulder allows a 2:1 slope to be used resulting in reduced impacts on parcels 2 and 4.

Savings estimated at $954,000

B-2.2 Incorporate both items B-1 and B-2.1

The items are not fully additive.

Potential total savings $1,311,000

B-3 Use permanent easements instead of right of way takes past the shoulder breakpoint

The right of way department has advised that easements can be obtained for 60% of right of way costs. Savings would be minimal as buildings would still need to be purchased.

Potential savings $275,000

B-4 **Reduce right of way on Whatley Oil and McLemore parcels by adding guard rail and narrowing the shoulder**

This concept evaluated eliminating the sidewalk on one side (east) and using a 4.5 foot shoulder including an extended post T-beam guardrail at the front face of curb. This resulted in no right of way acquisition being needed for this area.

Savings indicated as $1,353,000

D-1 Delete improvements to Bragg Smith Street

The original design proposes to reconstruct a portion of Bragg Smith Street on both the east and west sides of Brown Avenue. This idea is to provide no improvements to this area and repair only what was disturbed under this contract.

Potential Savings is $53,700

D-3 Eliminate dual trunk lines in the drainage system

Dual trunk lines are proposed on the roadway sections of the project. This idea is to eliminate these lines and provide small cross over pipes as this project will not be constructed under traffic.

Savings Potential is $29,200

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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	**Bridge**						
A-1.1	Reduce bridge width from 46 feet to 40 feet based on GDOT bridge manual	4,799,000	4,173,000	626,000	-0-	626,000	-0-
A-1.2	Reduce bridge with from 46 feet to 34 feet by eliminating one sidewalk	4,799,000	3,547,000	1,252,000	-0-	1,252,000	-0-
A-2	Reduce bridge length by using more roadway sections	2,769,000	432,500	2,336,500	-0-	2,336,500	2,336,500
A-6.2	Begin bridge at 15+60 in lieu of 14+00	4,799,000	4,176,000	623,000	-0-	623,000	-0-
A-8	Reduce length of bridge to 880 feet and width to 40 feet. Revise beams.	4,799,000	3,245,000	1,554,000	-0-	1,554,000	-0-
A-10	Reduce lane widths from 12 feet to 11 feet	4,878,000	4,767,000	216,000	-0-	216,000	-0-

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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
B	**Right of Way**						
B-1	Use short retaining walls at the bottom of the proposed slopes	2,124,000	989,000	1,135,000	-0-	1,135,000	-0-
B-2.1	Extend guardrail to increase side slopes	2,127,000	1,173,000	954,000	-0-	954,000	-0-
B-2.2	Incorporate Items B-1 and B-2.1	2,370,000	1,056,000	1,314,000	-0-	1,314,000	-0-
B-3	Use permanent easement instead of right of way	695,000	420,000	275,000	-0-	275,000	275,000
B-4	Reduce right of way on Whatley Oil and McLemore parcels by narrowing the shoulder.	1,353,000	-0-	1,353,000	-0-	1,353,000	1,353,000
D	**Other**						
D-1	Remove improvements to Bragg Smith Street	53,700	-0-	53,700	-0-	53,700	53,700

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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
D-3	Eliminate dual trunk lines in the drainage system	75,100	45,900	29,200	-0-	29,200	29,200
	TOTAL POTENTIAL SAVINGS						**$4,047,000**

STUDY IDENTIFICATION

STUDY IDENTIFICATION

Bridge Replacements on Brown Avenue	Dates: April 28 – May 1, 2009
Location: GDOT HQ - Atlanta	

VE Team Members

Name:	Discipline:	Organization:	Telephone:
David Wohlscheid	VE Team Leader	MACTEC	703-471-8383
Stephen Gaines	Highway Design	Wolverton & Associates	770-447-8999
Aruna Sastry	Structural	Sastry & Associates	678-366-9375
William Dial	Highway Construction	Street Smarts	404-405-4622

Project Description

This value engineering effort includes a four day study on the concept level design for this bridge replacement project for two bridges. The first is a bridge over six sets of railroad tracks and the second is a small bridge over Bragg Smith Street. Both bridges were constructed in the 1940s and both are classified as structurally inadequate having sufficiency ratings of 26.15 for the RR crossing portion and 47.02 for the Bragg Smith Street segment.

The total estimated project cost for both projects includes an estimated 10% factor for E&C and a fuel adjustment and AC adjustment cost of $89,845. This results in a markup factor of 1.11457 over the estimated base costs. Also included in the estimate is 0% for additional inflation and all right of way and utilities costs. Right of way and utilities have no markup applied to the base costs The total for the project is $11.084 million. Brown Avenue is functionally classified as an urban minor arterial and is a designated school bus route. Existing AADT (2005) is 11,500 VPD and projected AADT (2033) is 18,000 with 3% trucks.

The project is located in southern Columbus in Muscogee County approximately 110 miles southwest of Atlanta. Because of the historic constraints for the Bragg Smith area, these two

bridges will be replaced with a single, continuous, two lane bridge approximately 1040 feet in length.

The proposed construction will replace the existing two lane bridges with a new two lane bridge with 12 foot travel lanes and 5 foot sidewalks in both directions. The existing bridges are 46 feet x 150 feet for the Bragg Smith Street unit and 46 feet x 292 feet for the Norfolk Southern unit. The proposed 1040 feet in length x 46 feet was used so that the existing road bed will only be removed to the point necessary to construct the bridge. This prevents the demolition of six structures within the Bragg Smith Historical District which parallels the current alignment of Brown Avenue to the east of the roadway.

The study was conducted on April 28-May 1, 2009 at the GDOT offices in Atlanta using a four person VE team. The design team included in-house District 3 GDOT staff.

Kick off Meeting/Design Presentation

In addition to the VE Team, the following personnel attended this meeting which was held at the outset of the VE study:

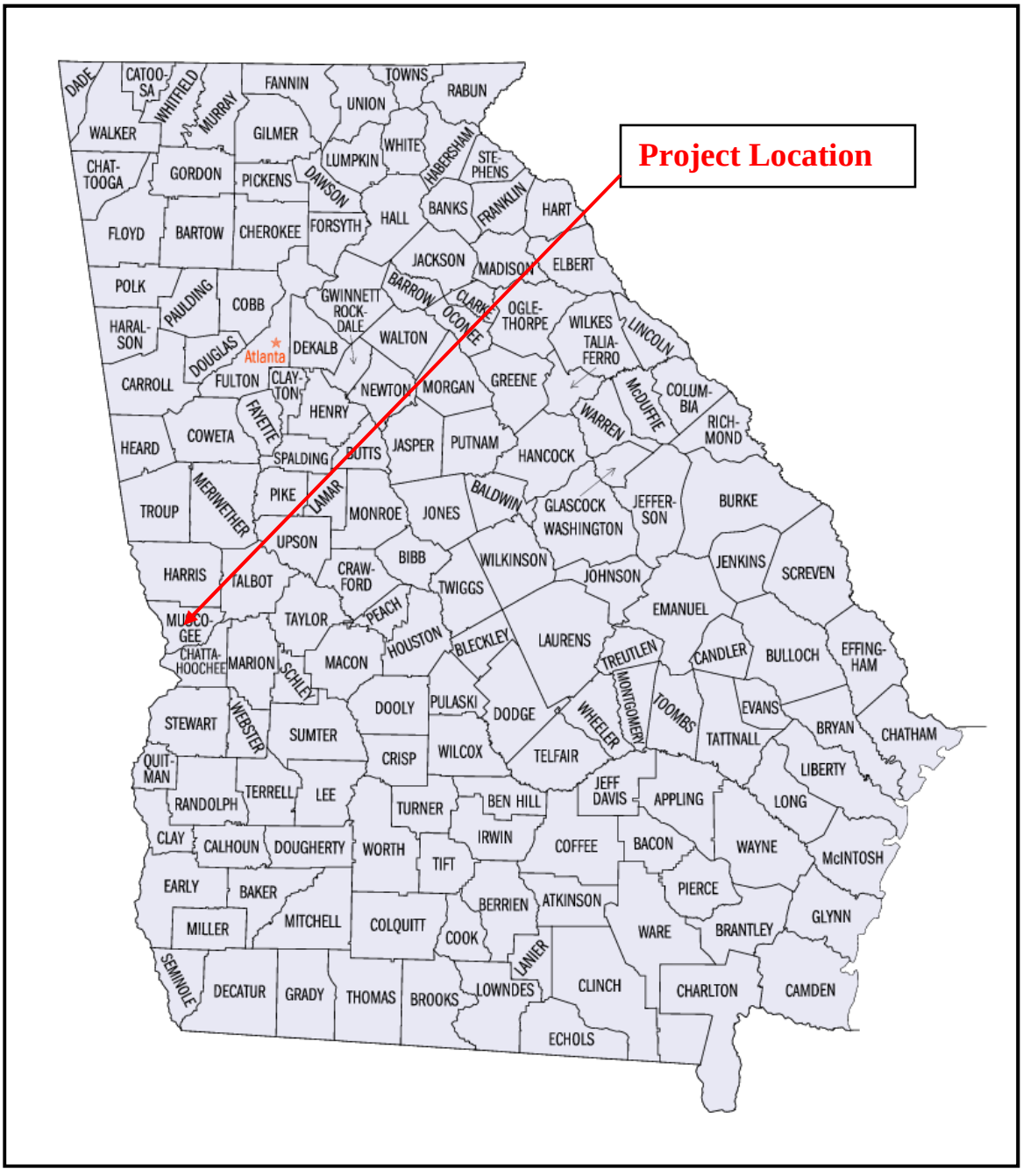
Lisa Myers	GDOT Engineering Services
Doug Fadool	GDOT Engineering Services
Ron Wishon	GDOT Engineering Services
Lyn Clements	GDOT Bridge Design
Via Teleconferencing:	
Bill Rountree	District 3 Project Manager
Jeff Swiderski	District 3 Design Engineer 1
Jason Mobley	District 3 Design Engineer
Debra Pruitt	District 3 Environmental
Randy Bishop	District 3 Intern

The VE Team appreciated the project overview given by Bill Rountree. Highlights included:

- The area to the south of the project is a Historic District that the SHPO has stated should be avoided. No properties can be taken south of the existing bridge over Bragg Smith Street.
- The railroad span includes six (6) tracks with at least three (3) owners/users.
- Heavy commercial property is being acquired at the north end of the project.
- The local folks have requested the road bed remain in place where possible. This would serve as a deterrent to crime which is prevalent on the west side of the bridge.
- The road profile has been raised to provide current clearance requirements for the railroad.
- The road will be closed during construction. An offsite at grade detour will be provided.

The following presents the project vicinity and location maps, plan and elevation views and project cost information used in this VE study to present a more complete project description.

Figure 1
Project Vicinity Map



County Map of Georgia

Figure 3
Project Limits

Bridge Replacements on Brown Avenue over Norfolk Southern Railroad

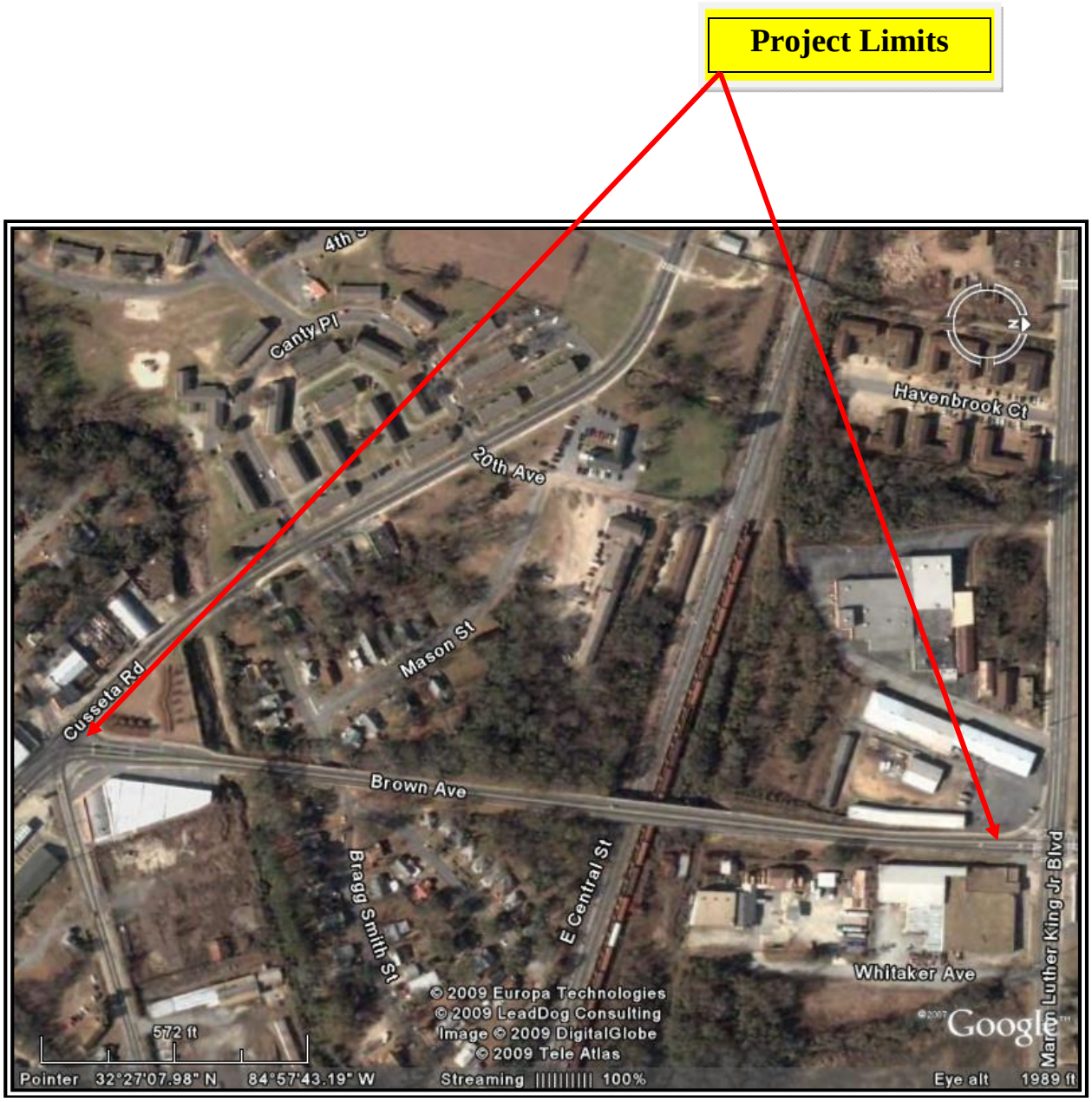
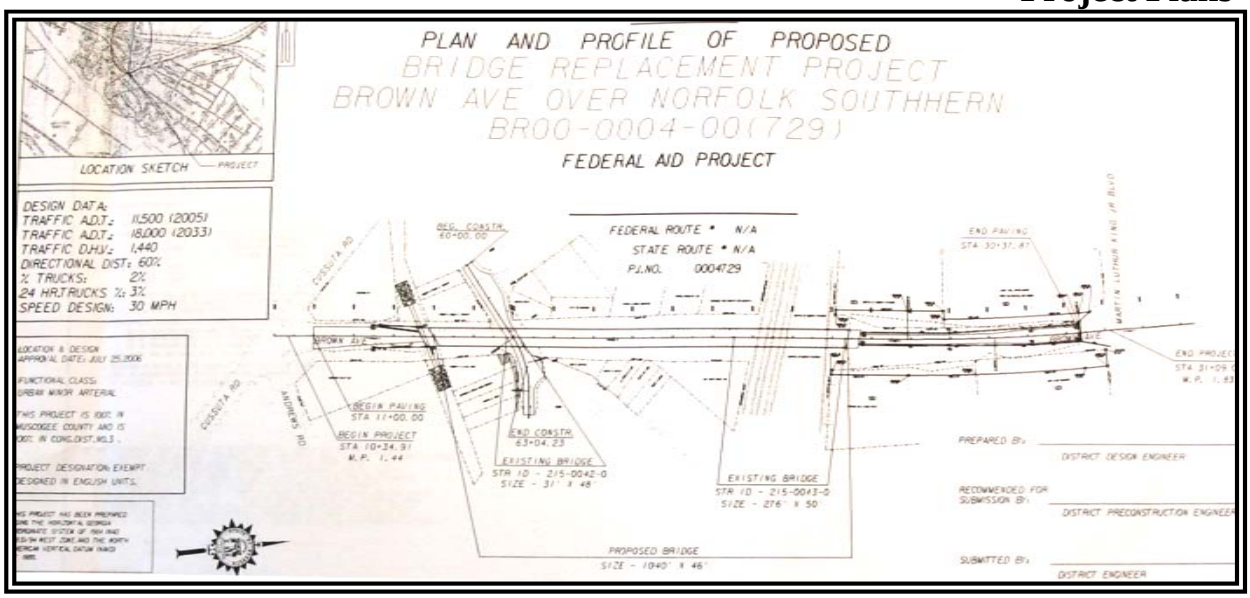
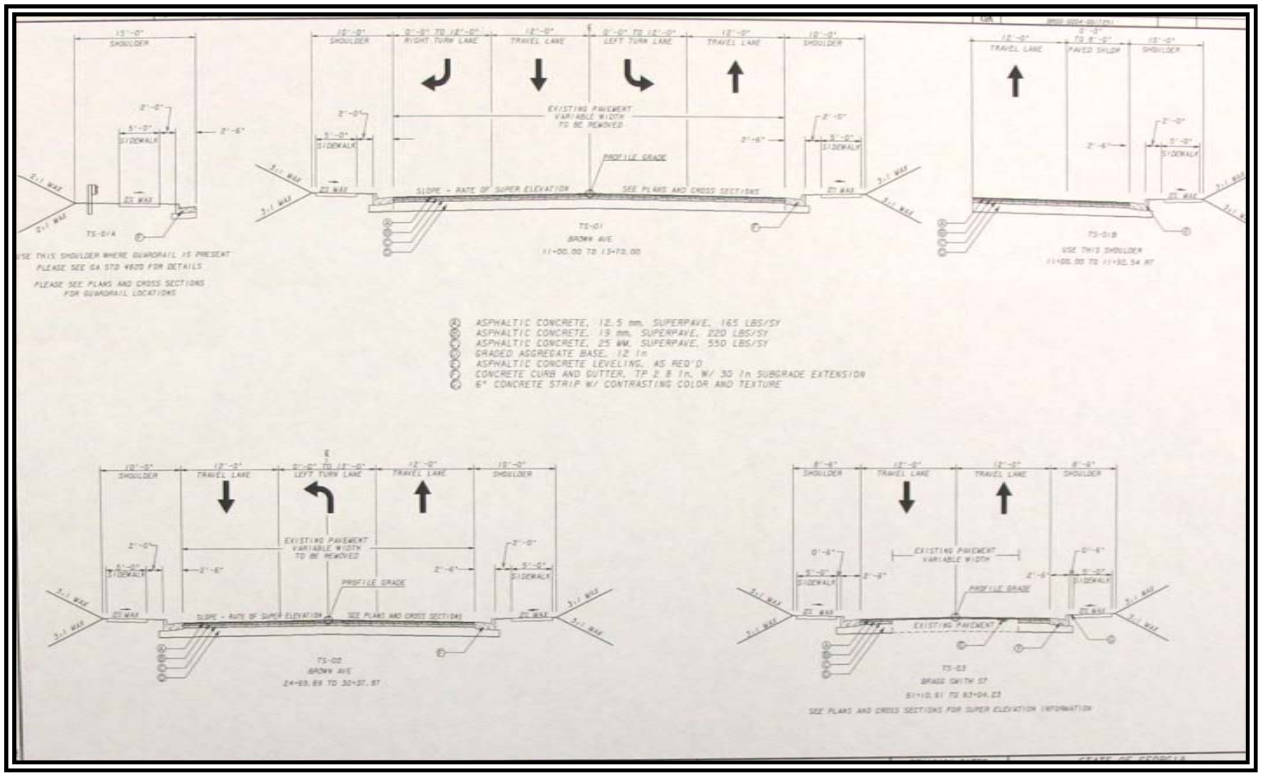


Figure 4
Project Plans



Project Plan



Project Typical Sections

Estimate Report for file "Muscogee - 0004729"

Section ROADWAY

Item Number	Quantity	Units	Unit Price	Item Description	Cost
150-1000	Lump	LS	1000000.00	TRAFFIC CONTROL - BR000-0004-00(729)	1000000.00
210-0100	Lump	LS	40000.00	GRADING COMPLETE - BR000-0004-00(729)	40000.00
310-1101	2100	TN	18.12	GR AGGR BASE CRS, INCL MATL	38052.00
402-3121	1400	TN	100.00	RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME	140000.00
402-3131	210	TN	100.00	RECYCLED ASPH CONC 9.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME	21000.00
402-3190	340	TN	100.00	RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2,INCL BITUM MATL & H LIME	34000.00
413-1000	250	GL	2.14	BITUM TACK COAT	535.00
433-1000	310	SY	158.39	REINF CONC APPROACH SLAB	49100.90
441-0104	940	SY	34.31	CONC SIDEWALK, 4 IN	32251.40
441-6222	1700	LF	15.69	CONC CURB & GUTTER, 8 IN X 30 IN, TP 2	26673.00
634-1200	15	EA	100.03	RIGHT OF WAY MARKERS	1500.45
641-1100	290	LF	50.25	GUARDRAIL, TP T	14572.50
641-1200	320	LF	17.59	GUARDRAIL, TP W	5628.80
641-5001	2	EA	664.48	GUARDRAIL ANCHORAGE, TP 1	1328.96
641-5012	2	EA	1867.46	GUARDRAIL ANCHORAGE, TP 12	3734.92
643-8200	520	LF	2.73	BARRIER FENCE (ORANGE), 4 FT	1419.60
				Section Sub Total:	**$1,409,797.53**

Section BRIDGE

Item Number	Quantity	Units	Unit Price	Item Description	Cost
501-9999	49220	SF	90.00	BRIDGE CONSTRUCTION	4429800.00
				Section Sub Total:	**$4,429,800.00**

Section DRAINAGE

Item Number	Quantity	Units	Unit Price	Item Description	Cost
441-0301	4	EA	2059.65	CONC SPILLWAY, TP 1	8238.60
500-3101	350	CY	246.73	CLASS A CONCRETE	86355.50
511-1000	53700	LB	0.89	BAR REINF STEEL	47793.00
550-1240	600	LF	45.44	STORM DRAIN PIPE, 24 IN, H 1-10	27264.00
668-1100	8	EA	2515.38	CATCH BASIN, GP 1	20123.04
				Section Sub Total:	**$189,774.14**

Section TEMPORARY EROSION CONTROL					
Item Number	**Quantity**	**Units**	**Unit Price**	**Item Description**	**Cost**
163-0232	2	AC	395.22	TEMPORARY GRASSING	790.44
163-0240	45	TN	169.64	MULCH	7633.80
163-0300	2	EA	1171.08	CONSTRUCTION EXIT	2342.16
163-0501	1	EA	929.21	CONSTRUCT AND REMOVE SILT CONTROL GATE, TP 1	929.21
163-0550	8	EA	205.18	CONSTRUCT AND REMOVE INLET SEDIMENT TRAP	1641.44
165-0030	3800	LF	0.80	MAINTENANCE OF TEMPORARY SILT FENCE, TP C	3040.00
165-0085	1	EA	282.81	MAINTENANCE OF SILT CONTROL GATE, TP 1	282.81
165-0101	2	EA	476.92	MAINTENANCE OF CONSTRUCTION EXIT	953.84
165-0105	8	EA	82.18	MAINTENANCE OF INLET SEDIMENT TRAP	657.44
167-1000	2	EA	577.61	WATER QUALITY MONITORING AND SAMPLING	1155.22
167-1500	12	MO	707.94	WATER QUALITY INSPECTIONS	8495.28
171-0030	7600	LF	3.45	TEMPORARY SILT FENCE, TYPE C	26220.00
				Section Sub Total:	**$54,141.64**

Section PERMAMNENT EROSION CONTROL					
Item Number	**Quantity**	**Units**	**Unit Price**	**Item Description**	**Cost**
603-2024	500	SY	48.25	STN DUMPED RIP RAP, TP 1, 24 IN	24125.00
603-7000	500	SY	4.43	PLASTIC FILTER FABRIC	2215.00
700-6910	3	AC	831.65	PERMANENT GRASSING	2494.95
700-7000	9	TN	64.43	AGRICULTURAL LIME	579.87
700-7010	8	GL	21.82	LIQUID LIME	174.56
700-8000	31	TN	425.74	FERTILIZER MIXED GRADE	13197.94
700-8100	150	LB	2.32	FERTILIZER NITROGEN CONTENT	348.00
716-2000	11200	SY	0.96	EROSION CONTROL MATS, SLOPES	10752.00
				Section Sub Total:	**$53,887.32**

Section TRAFFIC CONTROL					
Item Number	**Quantity**	**Units**	**Unit Price**	**Item Description**	**Cost**
652-0120	6	EA	49.00	PAVEMENT MARKING, ARROW, TP 2	294.00
653-0130	2	EA	92.95	THERMOPLASTIC PVMT MARKING, ARROW, TP 3	185.90
653-2501	1	LM	1273.48	THERMOPLASTIC SOLID TRAF STRIPE, 5 IN, WHITE	1273.48
653-2502	1	LM	1262.71	THERMOPLASTIC SOLID TRAF STRIPE, 5 IN, YELLOW	1262.71
653-3501	320	GLF	0.30	THERMOPLASTIC SKIP TRAF STRIPE, 5 IN, WHITE	96.00
653-6004	47	SY	2.78	THERMOPLASTIC TRAF STRIPING, WHITE	130.66
653-6006	150	SY	2.70	THERMOPLASTIC TRAF STRIPING, YELLOW	405.00
654-1001	66	EA	3.09	RAISED PVMT MARKERS TP 1	203.94
654-1003	20	EA	3.19	RAISED PVMT MARKERS TP 3	63.80
657-1085	2800	LF	5.22	PREFORMED PLASTIC SOLID PVMT MKG, 8 IN, CONTRAST (BLACK-WHITE), TP PB	14616.00
657-6085	2800	LF	5.28	PREFORMED PLASTIC SOLID PVMT MKG, 8 IN, CONTRAST (BLACK-YELLOW), TP PB	14784.00
				Section Sub Total:	**$33,315.49**

Total Estimated Cost: $6,170,716.12

Subtotal Construction Cost	**$6,170,716.12**
Engineering & Inspection 5.0 %	$308,535.81
Construction Contingency	$308,535.81
Total Fuel Adjustment	$17,925.56
Total Liquid AC Adjustment	$71,919.43
Total Construction Cost	**$6,877,632.73**
Right Of Way	PFA
ReImb. Utilities	PFA
Utility Contingency	PFA
Grand Total Project Cost	**$6,877,632.73**

VE RECOMMENDATIONS

DEVELOPMENT AND RECOMMENDATION PHASE

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad

IDEA No.:	PAGE No.:	CREATIVE IDEA:
A-1.1	1 of 3	Reduce width of bridge from 46′-0″to 40′-0″

Comp By: AS Date: 4/29/09 Checked By: DCW Date: 4/29/09

Original Concept:

Presently the bridge width is shown as 46′-0″ wide x 1040′-0″ long.

Proposed Change:

Construct a 40′-0″ x 1040′-0″ bridge (based on GDOT bridge design manual bridge widths).

Justification:

Based on GDOT bridge manual, the required width is 40′-0″ for off system road bridges above traffic ADT of 4,000 for all speeds.

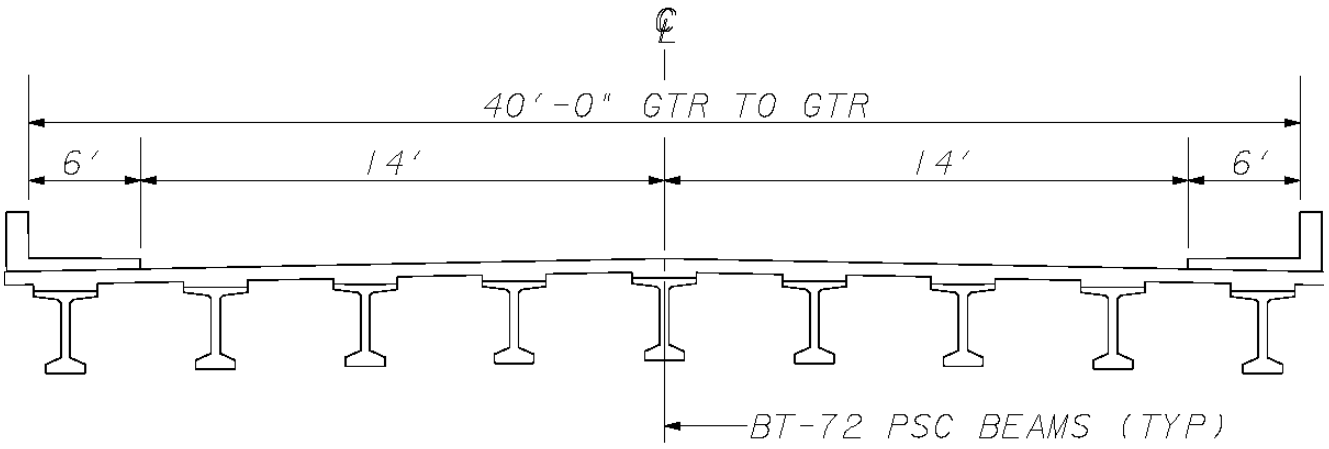
This results in significant savings.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	PRESENT WORTH
INITIAL COST - Original	4,799,000		
- Proposed	4,173,000		
- Savings	626,000		626,000
FUTURE COST - Savings			-0-
TOTAL PRESENT WORTH SAVINGS			**626,000**

SKETCH

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad	ITEM N^{O} : A-1.1 CLIENT: GDOT Sheet 2 of 3

CREATIVE IDEA A-1.1



BRIDGE TYPICAL SECTION

COST WORKSHEET							
PROJECT: **Bridge Replacements on Brown Ave. over Norfolk Southern Railroad**					ITEM No.: A-1.1 CLIENT: GDOT Sheet 3 of 3		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	Units	No. Units	Cost/ Unit	Total Cost	No. Units	Cost/ Unit	Total Cost
ORIGINAL BRIDGE	SF	47840	90	4,305,600			
(1040' X 46')							
PROPOSED BRIDGE	SF				41600	90	3,744,000
SUBTOTAL				4,305,600			3,744,000
Markup @ 11.46%				493,422			429,062
TOTAL				4,799,022			4,173,062
TOTAL ROUNDED				4,799,000			4,173,000

DEVELOPMENT AND RECOMMENDATION PHASE

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad

IDEA No.:	PAGE No.:	CREATIVE IDEA:
A-1.2	1 of 3	Reduce width of bridge to 34′-0″ from 46′-0″

Comp By: AS Date: 4-29-09 Checked By: DCW Date: 04/29/09

Original Concept:

Presently the bridge width is shown as 46′-0″ x 1040′-0″ long.

Proposed Change:

Construct a 34′-0″ x 1040′-0″ bridge (based on GDOT bridge design manual bridge widths) and eliminate the sidewalk on one side of the bridge.

Justification:

Based on GDOT bridge manual, and eliminate one side sidewalk, required width is 34′-0″ for off system road bridges above traffic ADT of 4000 for all speeds.

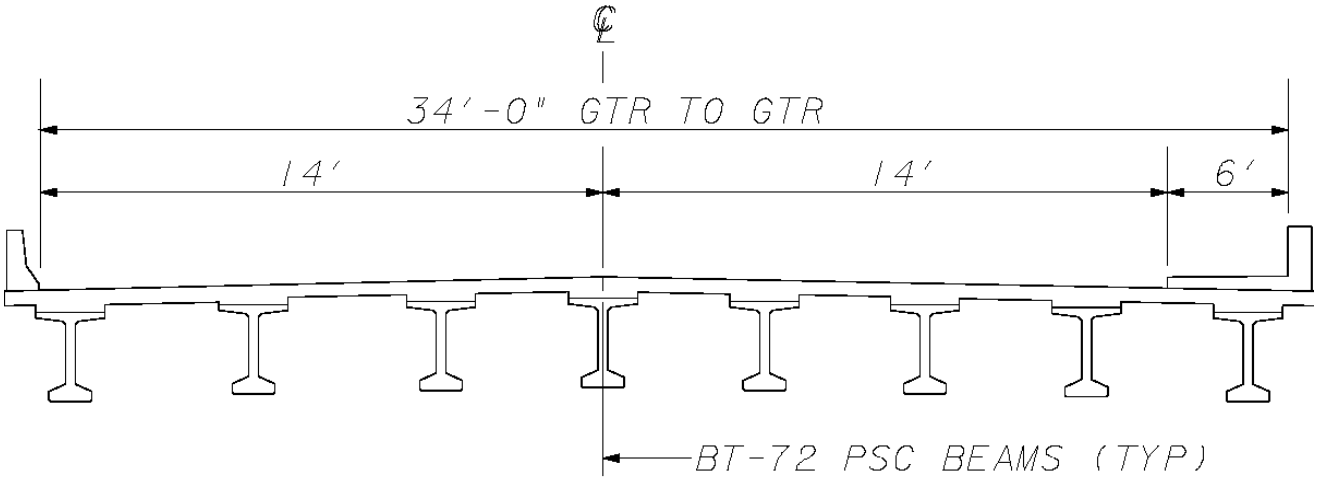
This results in significant savings.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	PRESENT WORTH
INITIAL COST - Original	4,799,000		
- Proposed	3,547,000		
- Savings	1,252,000		1,252,000
FUTURE COST - Savings			-0-
TOTAL PRESENT WORTH SAVINGS			**1,252,000**

SKETCH

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad	ITEM N^{O} : A-1.2 CLIENT: GDOT Sheet 2 of 3

CREATIVE IDEA A-1.2



BRIDGE TYPICAL SECTION

COST WORKSHEET							
PROJECT: **Bridge Replacements on Brown Ave. over Norfolk Southern Railroad**					ITEM No.: A-1.2 CLIENT: GDOT Sheet 3 of 3		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	Units	No. Units	Cost/ Unit	Total Cost	No. Units	Cost/ Unit	Total Cost
ORIGINAL BRIDGE	SF	47840	90	4,305,600			
(1040' X 46')							
PROPOSED BRIDGE	SF				35360	90	3,182,400
(1040' X 34')							
SUBTOTAL				4,305,600			3,182,400
Markup @ 11.46%				493,422			364,703
TOTAL				4,799,022			3,547,103
TOTAL ROUNDED				4,799,000			3,547,000

DEVELOPMENT AND RECOMMENDATION PHASE

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad

IDEA No.:	PAGE No.:	CREATIVE IDEA:
A-2	1 of 4	Reduce bridge length by replacing portions of the bridge with a roadway section on existing embankment

Comp By: SG Date: 5/1/09 Checked By: DW Date: 5/1/09

Original Concept:

The original concept proposes a single 1,040' bridge from Sta. 14+00 to Sta. 24+40. The length of the bridge has been designed to span Bragg Smith Street, avoid impacts to the historic district on the east side of Brown Avenue and span the railroad tracks. The roadway typical section for the project includes 2-12' lanes, 10' shoulders (15.5' with guardrail), 30" curb & gutter and sidewalk on both sides of the road. 2:1 front slopes are utilized behind guardrail.

Proposed Change:

The revised concept proposes to reduce the length of the bridge approximately 600 lf by replacing a portion of the proposed bridge with a roadway section on the existing roadway embankment. Two shorter bridges are proposed to span Bragg Smith Street and the railroad tracks as proposed in the original concept report. The revised roadway section includes 2-11' lanes, an 11' shoulder on the left side (24" curb & gutter, 6' sidewalk at the back of curb, extended T-beam guardrail at the front face of sidewalk) and a 4.5' shoulder on the right side (24" curb & gutter, extended beam T-beam guardrail). The front slopes behind guardrail vary between 1:1 and 2:1 to avoid R/W impacts. Geogrid reinforcement will be utilized to reinforce slopes steeper than 2:1.

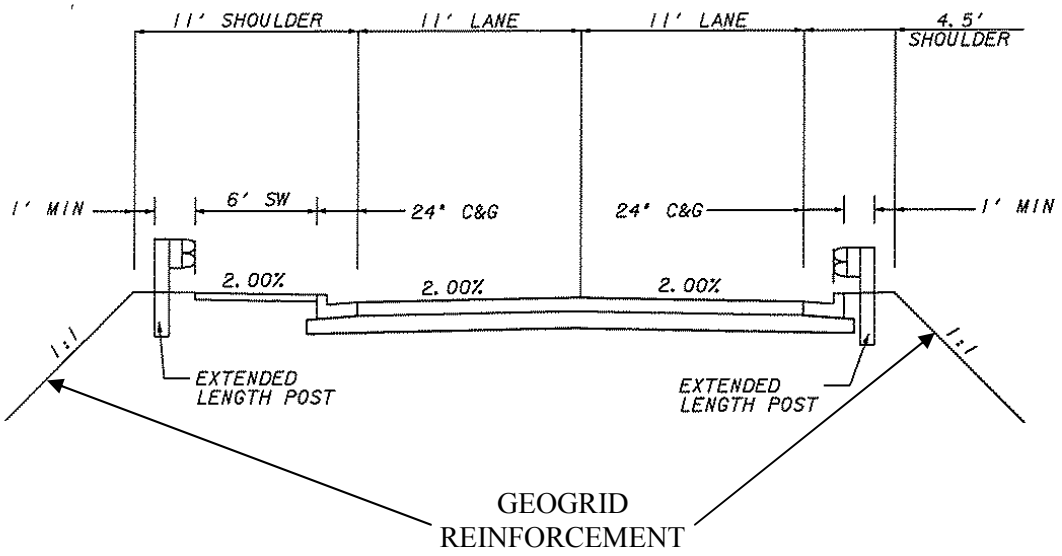
Justification:

The need and purpose of the project is to replace the two functionally obsolete\structurally deficient bridges. The additional length of bridge proposed between Bragg Smith Street and the span over the railroad has been added to avoid the historic district and to avoid environmental justice concerns about properties adjoining Brown Avenue. The revised concept meets the need and purpose of the project by replacing the existing bridges with two short bridges. Concerns about environmental justice and impacts to the historic district are addressed through the revised roadway typical section, which minimizes impacts to the existing roadway embankment.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	PRESENT WORTH
INITIAL COST - Original	2,769,000		
- Proposed	432,500		
- Savings	2,336,500		2,336,500
FUTURE COST - Savings			-0-
TOTAL PRESENT WORTH SAVINGS			**2,336,500**

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad	ITEM N^{O} : A-2 CLIENT: GDOT Sheet 2 of 4

PROPOSED TYPICAL SECTION
STA. 16+90 TO 22+90



COST WORKSHEET							
PROJECT: **Bridge Replacements on Brown Ave. over Norfolk Southern Railroad**					ITEM No: A-2 CLIENT: GDOT Sheet 3 of 4		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	Units	No. Units	Cost/ Unit	Total Cost	No. Units	Cost/ Unit	Total Cost
Bridge	SF	27,600	$90	$2,484,000	0	$90	$0
12.5 mm	TN				121	$100	$12,100
19 mm	TN				158	$100	$15,800
25 mm	TN				409	$100	$40,900
GAB	TN				1,183	$18	$21,436
T-Beam Guardrail	LF				1,200	$50	$60,300
Curb & Gutter	LF				1,200	$16	$18,828
Geogrid Reinforcement	SF				12,000	$16	$192,000
Earthwork	CY				4,444	$3	$13,332
Sidewalk	SY				400	$33	$13,296
SUBTOTAL				$2,484,000			$387,992
Markup @ 11.46%				$284,666			$44,464
TOTAL				$2,768,666			$432,456
TOTAL ROUNDED				$2,769,000			$432,500

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad	ITEM NO: A-2 CLIENT: GDOT Sheet 4 of 4

Original Concept
STA 16+90 to 22+90 (46′ width bridge & no roadway / embankment)

Bridge Area = (2290-1690)(46) = 27,600 sf

Revised Concept
STA 16+90 to 22+90 [2-11' lanes, an 11' shoulder on the left side (24" curb & gutter, 6' sidewalk at the back of curb, T-beam guardrail at the front face of sidewalk) and a 4.5' shoulder on the right side (24" curb & gutter, extended beam T-beam guardrail)]

Pavement Rates:
12.5mm => 0.0092 tons/sf
19mm => 0.012 tons/sf
25mm => 0.031 tons/sf
GAB => 0.073 tons/sf

Pavement
Wt(12.5 mm) = (600 lf)(22 lf)(0.0092 tons/sf) = 121 tons
Wt (19 mm) = (600 lf)(22 lf)(0.012 tons/sf) = 158 tons
Wt (25 mm) = (600 lf)(22 lf)(0.031 tons/sf) = 409 tons
Wt (GAB) = (600 lf)(22 + 5 lf)(0.073 tons/sf) = 1,183 tons

Guardrail
Length (T-Beam Guardrail) = 2 (600 lf) = 1,200 lf

Curb & Gutter
Length = 2 (600 lf) = 1,200 lf

Geogrid Reinforcement (Steepened Slopes)
Assume Average 10' width on both sides of road
Area = 2 (600 lf)(10 lf) = 12,000 sf

Earthwork
Assume 200 sf per template
Volume = (600 lf)(200 sf)/27 = 4,444 cy

Sidewalk
Area = 6(600 lf)/9 = 400 sy

DEVELOPMENT AND RECOMMENDATION PHASE

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad

IDEA No.:	PAGE No.:	CREATIVE IDEA:
A-6.2	1 of 2	Begin bridge at station 15+60 in lieu of 14+00

Comp By: AS Date: 4/29/09 Checked By: DCW Date: 4/29/09

Original Concept:

Build a 8′ x 10′ Concrete Box Culvert at station 13+75 +/- at the beginning of the project and start the bridge at station 14+00

Proposed Change:

Shorten the bridge by beginning at station 15+60.00 for a reduction of 160 ft.

Justification:

It is not necessary to begin the bridge at 14+00. The beginning station can be moved to 15+60. Shortening of the bridge by 160 ft. results in cost savings.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	PRESENT WORTH
INITIAL COST - Original	4,799,000		
- Proposed	4,176,000		
- Savings	623,000		623,000
FUTURE COST - Savings			-0-
TOTAL PRESENT WORTH SAVINGS			**623,000**

COST WORKSHEET							
PROJECT: **Bridge Replacements on Brown Ave. over Norfolk Southern Railroad**					ITEM No.: A-6.2 CLIENT: GDOT Sheet 2 of 2		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	Units	No. Units	Cost/ Unit	Total Cost	No. Units	Cost/ Unit	Total Cost
ORIGINAL BRIDGE	SF	47840	90	4,305,600			
(1040' X 46')							
PROPOSED BRIDGE	SF				40480	90	3,643,200
(880' X 46')							
Proposed Roadway	LF				160	647	103,520
160 ft (see Item A-2 for unit costs)							
SUBTOTAL				4,305,600			3,746,720
Markup @ 11.46%				493,422			429,374
TOTAL				4,799,022			4,176,094
TOTAL ROUNDED				4,799,000			4,176,000

DEVELOPMENT AND RECOMMENDATION PHASE

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad

IDEA No.:	PAGE No.:	CREATIVE IDEA:
A-8	1 of 8	Reduce length of bridge to 885'-0" and width of bridge to 40'. Use shallower Type II PSC beams for 600 ft. and Bulb Tee-72 PSC beams over NS Railroad

Comp By: AS Date: 04/29/09 Checked By: DCW Date: 04/30/09

Original Concept:

Presently the bridge width is shown as 46′-0″ x 1040′-0″ long.

Proposed Change:

Construct a 40′-0″ x 880′-0″ bridge (based on GDOT bridge design manual bridge widths). Use shallower Type II PSC beams (50 ft. spans) over pile bents for 600 ft. and bulb Tee-72 PSC beams over NS Railroad

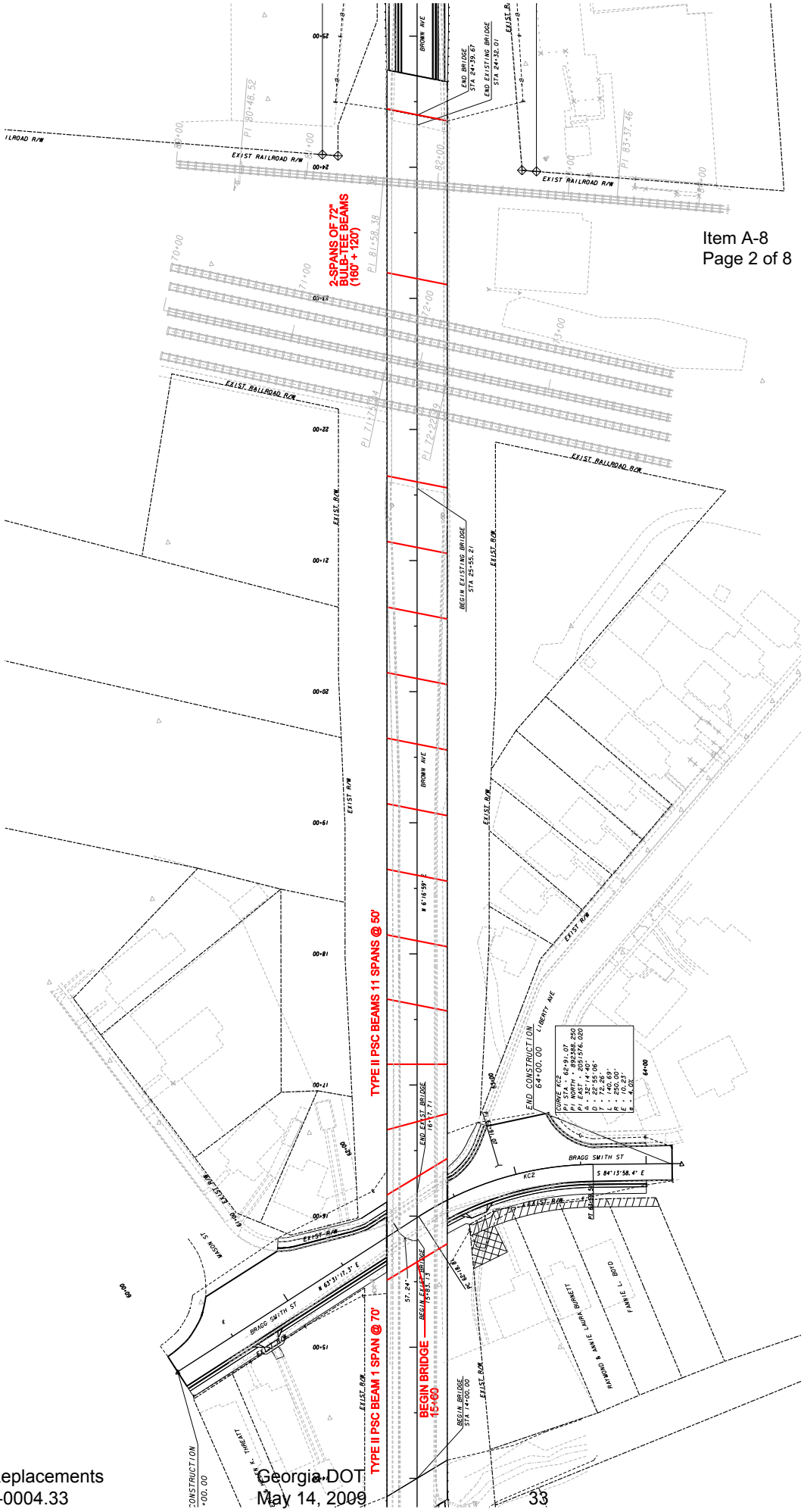
Justification:

Based on GDOT bridge manual, required width is 40'-0" for off system road bridges above Traffic ADT of 4000 for all speeds.

Also, the beginning of the bridge is moved to Sta. 15+60. Use of pile bents reduces the cost of construction compared to use of long spans. Hence use cost of $75/SF for Type II beams and $90/SF for longer spans.

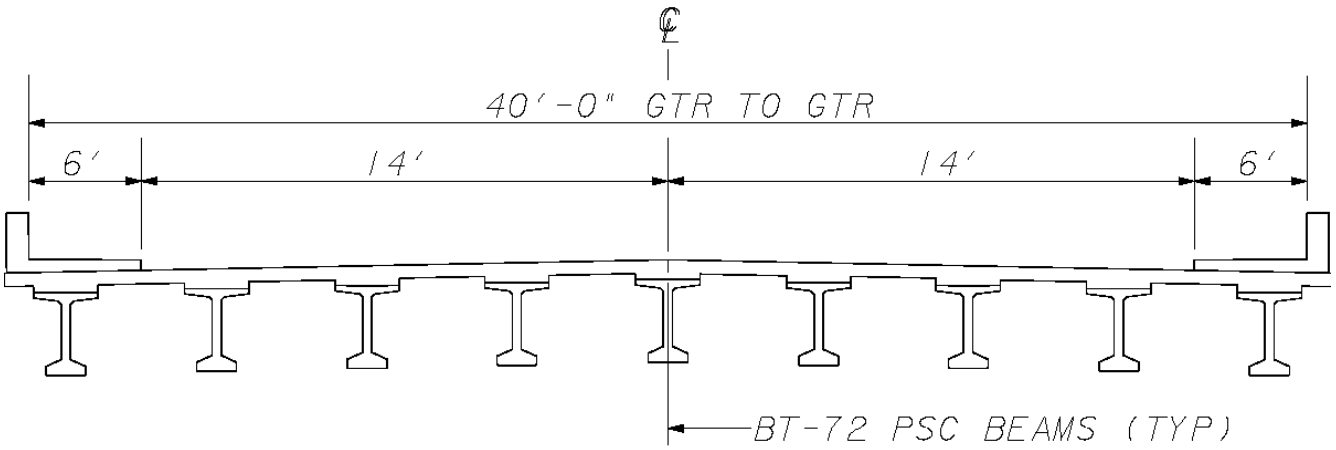
This results in significant savings.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	PRESENT WORTH
INITIAL COST - Original	4,799,000		
- Proposed	3,245,000		
- Savings	1,554,000		1,554,000
FUTURE COST - Savings			-0-
TOTAL PRESENT WORTH SAVINGS			**1,554,000**


2-SPANS OF 72" BULB-TEE BEAMS (160' + 120')
TYPE II PSC BEAMS 11 SPANS @ 50'
TYPE II PSC BEAM 1 SPAN @ 70'
BEGIN BRIDGE 15+00
EXIST RAILROAD R/W
BROWN AVE
BRAGG SMITH ST
LIBERTY AVE
MASON ST
END CONSTRUCTION 64+00.00
EXIST R/W

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad	ITEM NO: A-8 CLIENT: GDOT Sheet 3 of 8

CREATIVE IDEA A-8

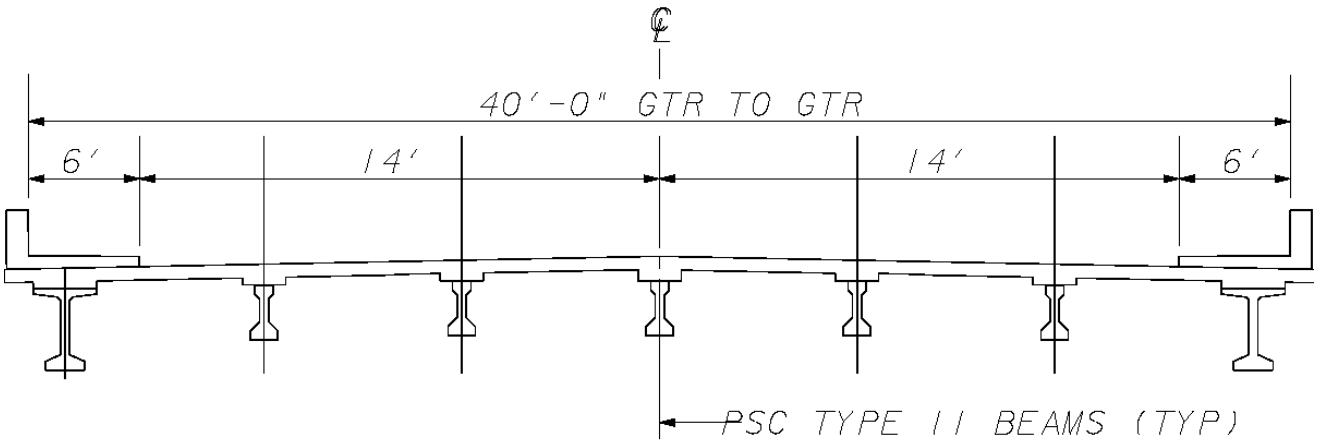


BRIDGE SECTION

SKETCH

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad	ITEM NO: A-8 CLIENT: GDOT Sheet 4 of 8

CREATIVE IDEA A-8



BRIDGE SECTION

COST WORKSHEET							
PROJECT: **Bridge Replacements on Brown Ave. over Norfolk Southern Railroad**					IDEA No.: A-8 CLIENT: GDOT Sheet 5 of 8		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	Units	No. Units	Cost/ Unit	Total Cost	No. Units	Cost/ Unit	Total Cost
ORIGINAL BRIDGE	SF	47840	90	4,305,600			
(1040' X 46')							
PROPOSED BRIDGE 600 FT. LONG	SF				24000	75	1,800,000
(TYPE II BEAMS 12 SPANS @ 50')							
PROPOSED BRIDGE 280FT. LONG					11200	90	1,008,000
(PSC BT-72 BEAMS 2 SPANS 160' AND 120')							
Proposed Roadway							
160 feet see Item A-2 for unit costs	LF				160	647	103,520
SUBTOTAL				4,305,600			2,911,520
Markup @ 11.46%				493,422			333,660
TOTAL				4,799,022			3,245,180
TOTAL ROUNDED				4,799,000			3,245,000

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad	ITEM NO: A-8 CLIENT: GDOT Sheet 6 of 8

Reduce length of bridge to 880′-0″ and width of bridge to 40′.
Use shallower Type II PSC beams for 600 ft. and Bulb Tee-72 PSC beams over NS Railroad

Begin Bridge at Sta. 15+60.00 and 880′-0″ long.

Use 12 spans of TYPE II beams = 600′-0″

600′ X 40″ = 24000 SF @ $75/SF = $1,800,000.00

Use 2 spans (160′-0″ and 120′-0″) over NS Railroad
280′ X 40′ = 11,200 SF @ $ 90/SF = $1,008,000.00

CREATIVE IDEA A-8
PAGE 7 OF 8

72" Bulb Tee Beam

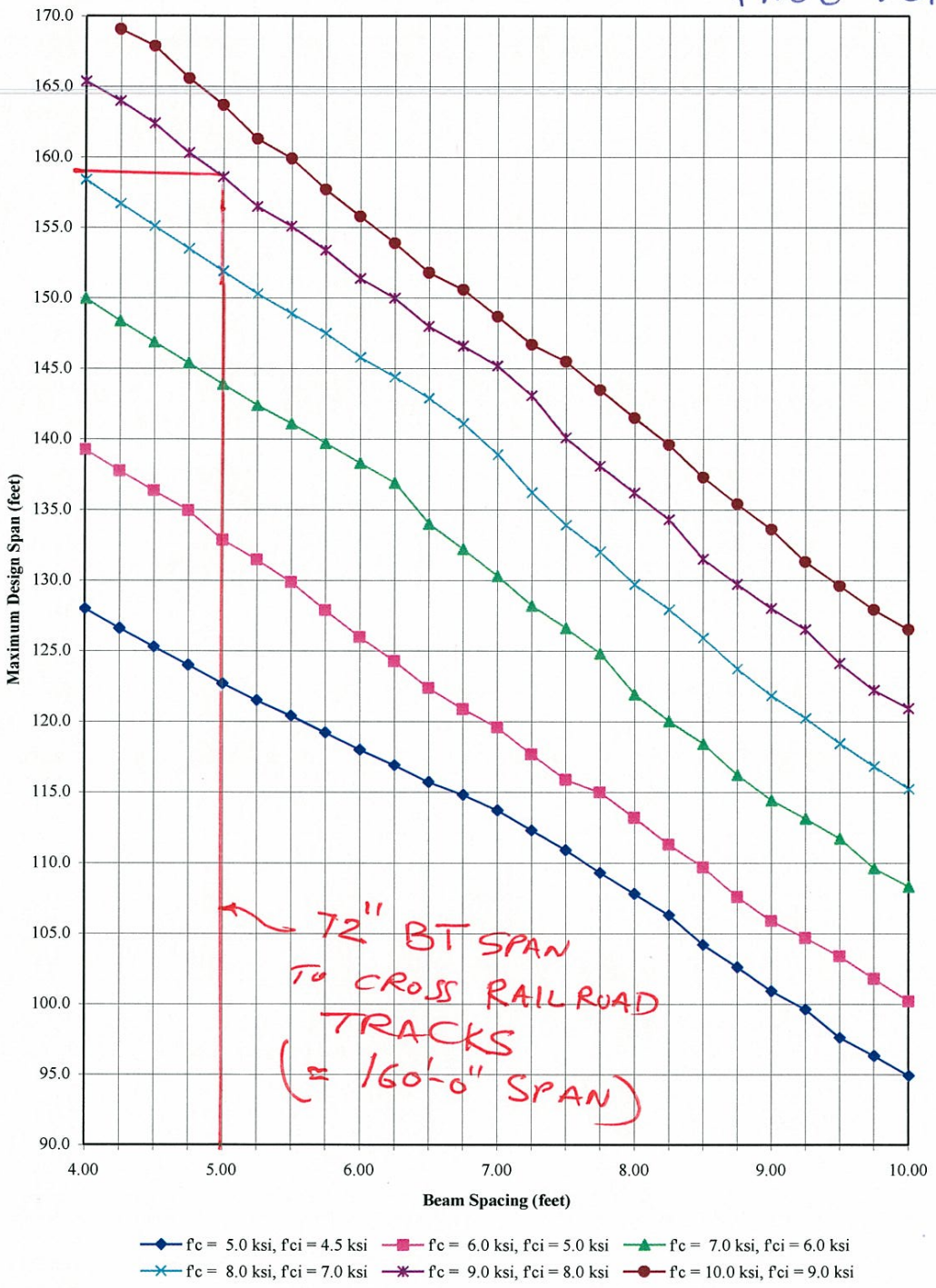
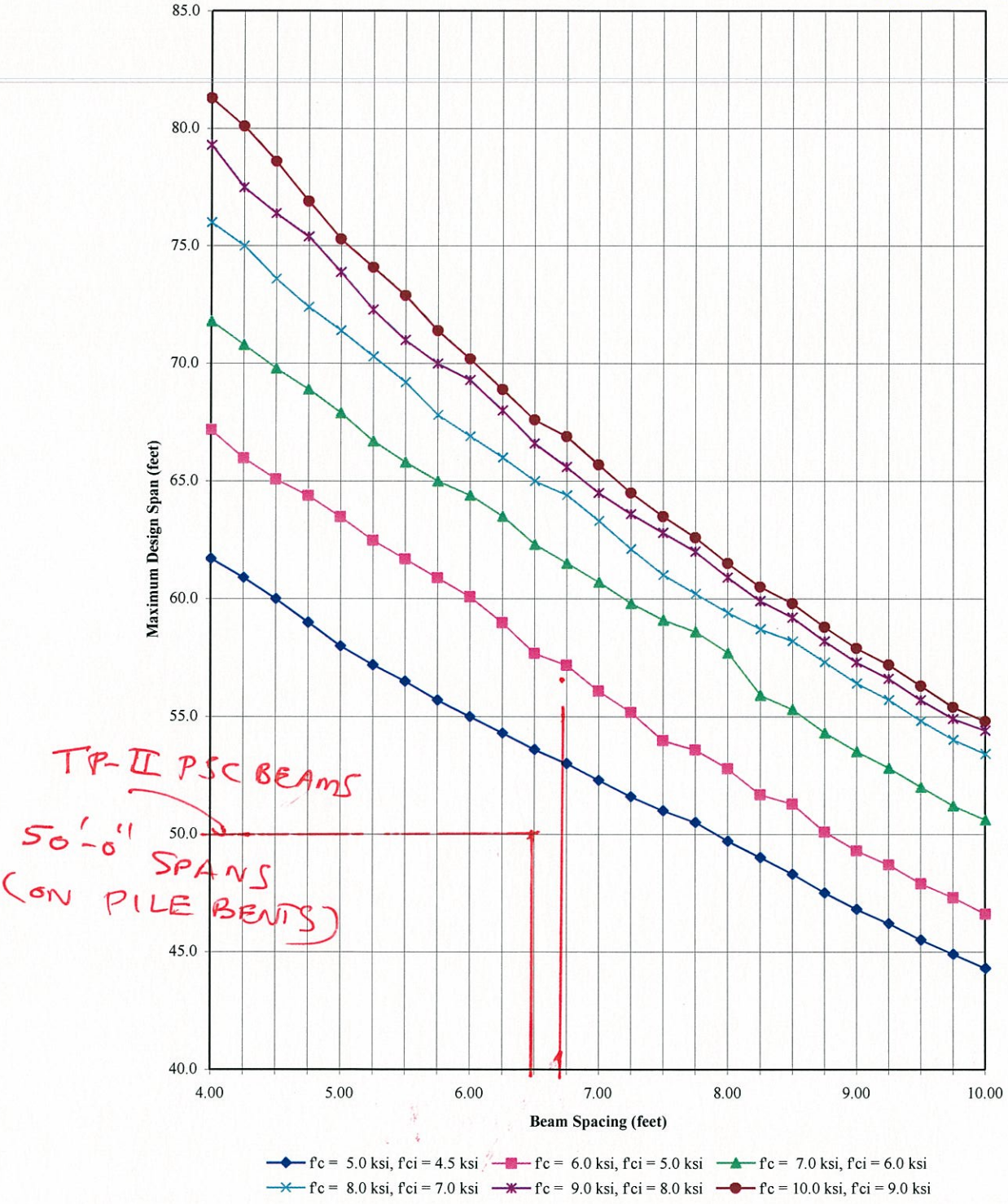


Figure 3-10

All strands are .6" diameter low relaxation strands. The 4 top flange strands are stressed to 10,000 pounds each and all remaining strands are stressed to 43,943 pounds each.

CREATIVE IDEA A-8
PAGE 8 OF 8



TP-II PSC BEAMS
50'-0" SPANS
(ON PILE BENTS)

Figure 3-5

All strands are ½" diameter low relaxation strands each stressed to 33,818 pounds.

DEVELOPMENT AND RECOMMENDATION PHASE

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad

IDEA No.:	PAGE No.:	CREATIVE IDEA:
A-10	1 of 3	Reduce Lane Widths from 12′ to 11′

Comp By: SG Date: 5-1-09 Checked By: DW Date: 5-1-09

Original Concept:

The original concept proposes 12′ lane widths.

Proposed Change:

The revised concept proposes to reduce the lane widths to 11′

Justification:

The need and purpose of the project can be accomplished with reduced lane widths.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	PRESENT WORTH
INITIAL COST - Original	4,878,000		
- Proposed	4,662,000		
- Savings	216,000		111,000
FUTURE COST - Savings			-0-
TOTAL PRESENT WORTH SAVINGS			**216,000**

COST WORKSHEET

PROJECT: **Bridge Replacements on Brown Ave. over Norfolk Southern Railroad**

ITEM No: A-10
CLIENT: GDOT
Sheet 2 of 3

CONSTRUCTION ELEMENT		ORIGINAL ESTIMATE			NEW ESTIMATE		
ITEM	Units	No. Units	Cost/ Unit	Total Cost	No. Units	Cost/ Unit	Total Cost
Bridge	SF	47,840	90	4,305,600	45,760	90	4,118,400
12.5 mm	TN	99	100	9,900	91	100	9,100
19 mm	TN	129	100	12,900	118	100	11,800
25 mm	TN	334	100	33,400	306	100	30,600
GAB	TN	786	$18.12	14,242	720	$18.12	13,046
SUBTOTAL				4,376,042			4,182,946
Markup @ 11.46%				501,494			479,366
TOTAL				4,877,537			4,662,312
TOTAL ROUNDED				4,878,000			4,662,000

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad	ITEM N^{O} : A-10 CLIENT: GDOT Sheet 3 of 3

Original Concept

Bridge

Area = (46 lf)(1040 lf) = 47,840 sf

Roadway
Length = (1400-1100) + (3037-2440) = 897 lf
Pavement Area = (12 lf)(897 lf) = 10,764 sf

Pavement Rates:
12.5mm => 0.0092 tons/sf
19mm => 0.012 tons/sf
25mm => 0.031 tons/sf
GAB => 0.073 tons/sf

Pavement
Wt(12.5 mm) = (10,764 sf)(0.0092 tons/sf) = 99 tons
Wt (19 mm) = (10,764 sf)(0.012 tons/sf) = 129 tons
Wt (25 mm) = (10,764 sf)(0.031 tons/sf) =334 tons
Wt (GAB) = (10,764 sf)(0.073 tons/sf) = 786 tons

Revised Concept

Bridge
Area = (44 lf)(1040 lf) = 45,760 sf

Roadway
Length = (1400-1100) + (3037-2440) = 897 lf
Pavement Area = (11 lf)(897 lf) = 9,867 sf

Pavement
Wt(12.5 mm) = (9,867 sf)(0.0092 tons/sf) =91 tons
Wt (19 mm) = (9,867 sf)(0.012 tons/sf) = 118 tons
Wt (25 mm) = (9,867 sf)(0.031 tons/sf) = 306 tons
Wt (GAB) = (9,867 sf)(0.073 tons/sf) = 720 tons

DEVELOPMENT AND RECOMMENDATION PHASE

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad

IDEA No.:	PAGE No.:	CREATIVE IDEA:
B-1	1 of 3	Use short retaining walls at the bottom of the proposed slopes

Comp By: WED Date: 4/29/09 Checked By: DCW Date: 4/30/09

Original Concept:

2:1 or 3:1 slopes are used to tie into existing ground.

Proposed Change:

Use short retaining walls from 24+50 right to 29+00 right, 10′ inside the existing right of way line.

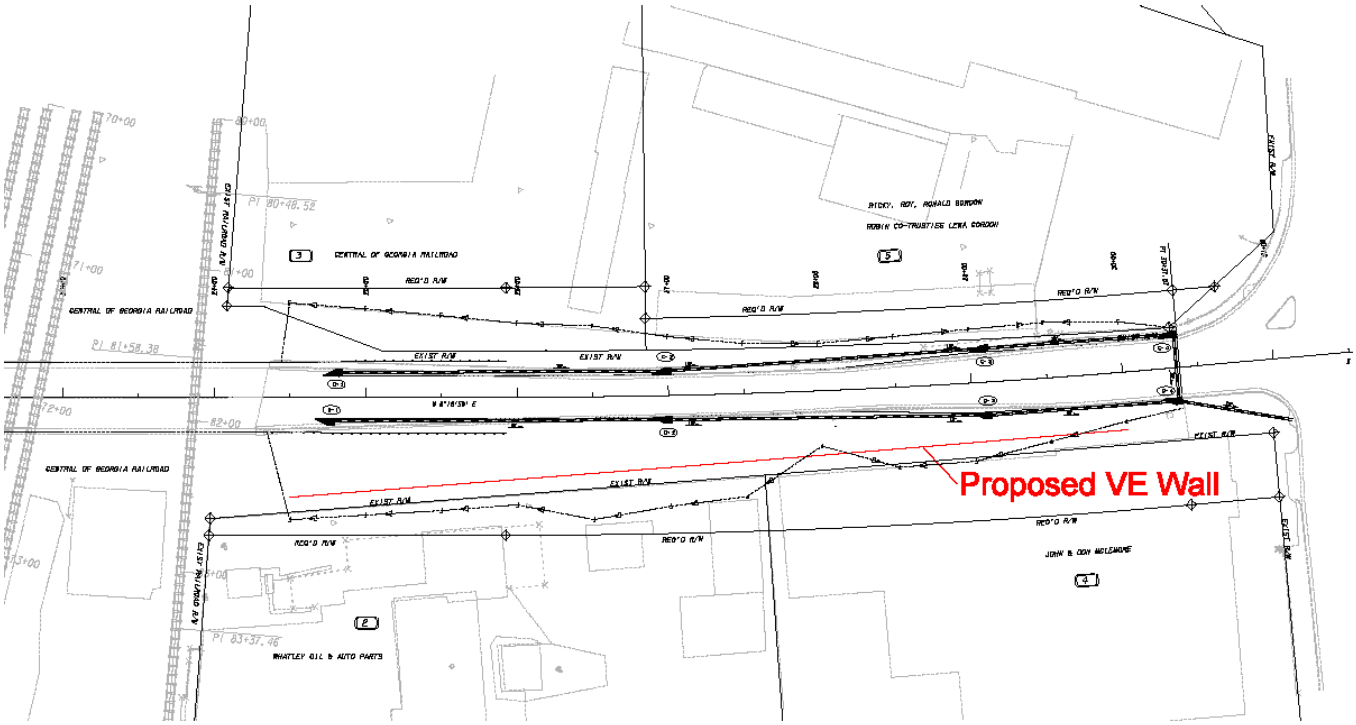
Justification:

This will eliminate the right of way acquisition on parcels 2 and 4.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	PRESENT WORTH
INITIAL COST - Original	2,124,000		
- Proposed	989,000		
- Savings	1,135,000		1,135,000
FUTURE COST - Savings			-0-
TOTAL PRESENT WORTH SAVINGS			**1,135,000**

SKETCH

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad	ITEM N^{O} : B-1 CLIENT: GDOT Sheet 2 of 3



COST WORKSHEET							
PROJECT: **Bridge Replacements on Brown Ave. over Norfolk Southern Railroad**					ITEM No: B-3 CLIENT: GDOT Sheet 3 of 3		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	Units	No. Units	Cost/ Unit	Total Cost	No. Units	Cost/ Unit	Total Cost
Right of Way Parcel 2	sf	9,125	15	139,613	0	15	
Right of Way Parcel 3	sf	9,593	15	146,773	9,593	15	146,773
Right of Way Parcel 4	sf	13,945	15	213,359	0	15	
Right of Way Parcel 5	sf	8,103	15	123,976	8,103	15	123,976
Class B Concrete (Wall)	cy	0	610	0	321	610	195,858
Commercial Displacements	EA	6	250,000	1,500,000	2	250,000	500,000
SUBTOTAL				2,123,720			966,607
Markup @ 11.46%				0			22,445
TOTAL				2,123,720			989,052
TOTAL ROUNDED				2,124,000			989,000

DEVELOPMENT AND RECOMMENDATION PHASE

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad

IDEA No.:	PAGE No.:	CREATIVE IDEA:
B-2.1	1 of 4	Extend guardrail to increase side slopes

Comp By: WED Date: 4/29/09 Checked By: DCW Date: 4/29/09

Original Concept:

2:1 or 3:1 slopes are used to tie into existing ground. Guardrail ends at STA 25+93 right.

Proposed Change:

Extend guardrail to station 28+50. Extend shoulder to 15 feet and use a 2:1 side slope.

Justification:

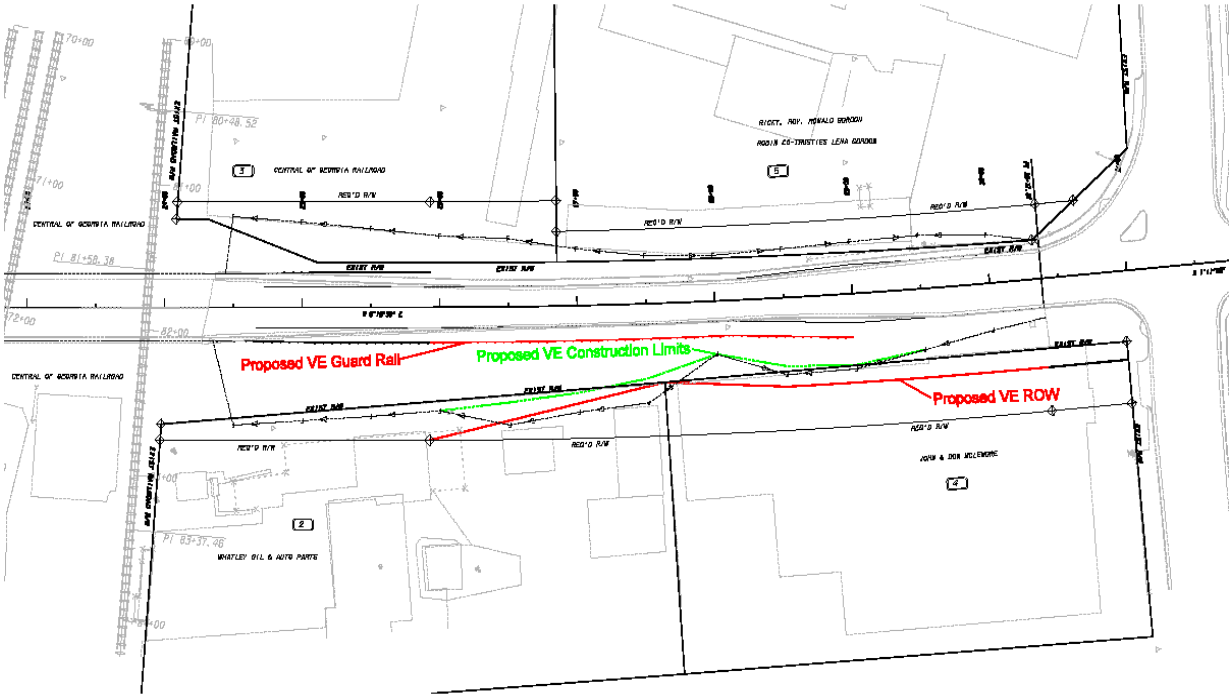
This will limit the right of way acquisition on parcels 2 and 4.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	PRESENT WORTH
INITIAL COST - Original	2,127,000		
- Proposed	1,173,000		
- Savings	954,000		954,000
FUTURE COST - Savings			-0-
TOTAL PRESENT WORTH SAVINGS			**954,000**

SKETCH

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad	ITEM NO: B-2.1 CLIENT: GDOT Sheet 2 of 4

Proposed VE Change



COST WORKSHEET							
PROJECT: **Bridge Replacements on Brown Ave. over Norfolk Southern Railroad**					ITEM No: B-2.1 CLIENT: GDOT Sheet 3 of 4		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	Units	No. Units	Cost/ Unit	Total Cost	No. Units	Cost/ Unit	Total Cost
Right of Way Parcel 2	sf	9,125	15	139,613	5,868	15	89,780
Right of Way Parcel 3	sf	9,593	15	146,773	9,593	15	146,773
Right of Way Parcel 4	sf	13,945	15	213,359	3,522	15	53,887
Right of Way Parcel 5	sf	8,103	15	123,976	8,103	15	123,976
W Beam Guardrail	lf	163	18	2,867	420	18	7,388
Commercial Displacements	EA	6	250,000	1,500,000	3	250,000	750,000
SUBTOTAL				2,126,587			1,171,804
Markup @ 11.46%				329			847
(Applied to guardrail only)							
TOTAL				2,126,916			1,172,650
TOTAL ROUNDED				2,127,000			1,173,000

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad	ITEM NO : B-2.1 CLIENT: GDOT Sheet 4 of 4

Right of way areas were measured from the microstation files supplied by the district.

Right of way costs were determined from the examples supplied in the right of way cost estimate and the stated cost escalations.

Commercial Property Cost

Dollars Per Acre	$261,360
Schedule Contingency (55%)	$143,748
Adm/Court Cost (60%)	$156,816
Inflation Factor (40%)	$104,544
Total ($/acre)	$666,468
Total ($/sf)	$15.30

Commercial Relocation costs include cost of structures, business relocations, and cost to cure.

DEVELOPMENT AND RECOMMENDATION PHASE

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad

IDEA No.:	PAGE No.:	CREATIVE IDEA:
B-2.2	1 of 4	Use short retaining walls at the bottom of the proposed slopes. Extend the guardrail to station 28+50

Comp By: WED Date: 4/29/09 Checked By: DCW Date: 04/30/09

Original Concept:

2:1 or 3:1 slopes are used to tie into existing ground.

Proposed Change:

Use short retaining walls from 24+50 right to 29+00 right, 10′ inside the existing right of way line. Extend guardrail to station 28+50. Extend shoulder to 15 feet and use a 2:1 side slope.

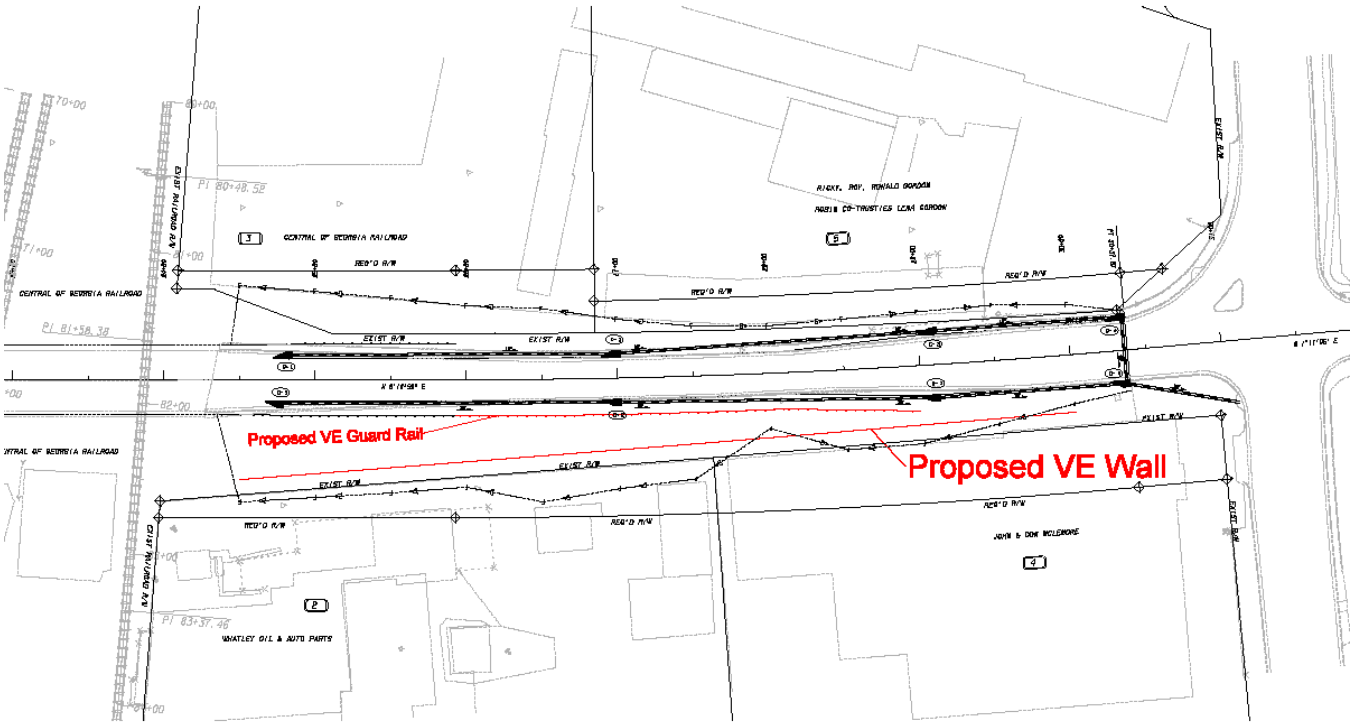
Justification:

This will eliminate the right of way acquisition on parcels 2 and 4.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	PRESENT WORTH
INITIAL COST - Original	2,370,000		
- Proposed	1,056,000		
- Savings	1,314,000		1,314,000
FUTURE COST - Savings			-0-
TOTAL PRESENT WORTH SAVINGS			**1,314,000**

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad

ITEM N^{O} : B-2.2
CLIENT: GDOT
Sheet 2 of 4



COST WORKSHEET							
PROJECT: **Bridge Replacements on Brown Ave. over Norfolk Southern Railroad**					ITEM No: B-2.2 CLIENT: GDOT Sheet 3 of 4		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	Units	No. Units	Cost/ Unit	Total Cost	No. Units	Cost/ Unit	Total Cost
Right of Way Parcel 2	sf	9,125	15.30	139,613	0	15.30	
Right of Way Parcel 3	sf	9,593	15.30	146,773	9,593	15.30	146,773
Right of Way Parcel 4	sf	13,945	15.30	213,359	0	15.30	
Right of Way Parcel 5	sf	8,103	15.30	123,976	8,103	15.30	123,976
Class B Concrete (Wall)	cy	0	610.15		277	610.15	169,012
Commercial Displacements	EA	6	250,000	1,500,000	2	250,000.00	500,000
W Beam Guardrail	lf	163	17.59	2,867	420	17.59	7,388
SUBTOTAL				2,126,587			947,148
Markup @ 11.46%				243,707			108,543
TOTAL				2,370,294			1,055,691
TOTAL ROUNDED				2,370,000			1,056,000

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad

ITEM N^{O} : B-2.2
CLIENT: GDOT
Sheet 4 of 4

Wall heights were determined by placing the wall 10′ from the property line and grading the area wall and the property line to the existing elevation at the property line.

Maximum wall height is 8.4 feet. GDOT Standard 9031L Gravity retaining wall was used to calculate the cost for this wall.

Wall Volume Calculations

Station	Wall Height	Area (sf)	Inc Vol (sf)	Cum Vol (sf)	Cum Vol(cy)
2450	7.4	19.99	0.00	0.00	0.00
2500	7.9	22.2775	1056.69	1056.69	39.14
2550	8.4	24.69	1174.19	2230.88	82.63
2600	8.2	23.71	1210.00	3440.88	127.44
2650	6.9	17.8275	1038.44	4479.31	165.90
2700	6.1	14.6275	811.38	5290.69	195.95
2750	5.9	13.8775	712.63	6003.31	222.34
2800	3.8	7.21	527.19	6530.50	241.87
2850	4.6	9.49	417.50	6948.00	257.33
2900	2.7	4.5975	352.19	7300.19	270.38
2950	1.4	2.29	172.19	7472.38	276.75

DEVELOPMENT AND RECOMMENDATION PHASE

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad

IDEA No.:	PAGE No.:	CREATIVE IDEA:
B-3	1 of 3	Use permanent easement instead of right of way

Comp By: WED Date: 4/29/09 Checked By: DCW Date: 4/29/09

Original Concept:

Right of way acquisition is shown beyond the construction limits.

Proposed Change:

Limit right of way acquisition to the shoulder breakpoint of the roadway. Change the remaining area to permanent easements.

Justification:

This will limit or eliminate the right of way acquisition on several parcels. Permanent easements can be acquired at 60% of the cost of right of way.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	PRESENT WORTH
INITIAL COST - Original	695,000		
- Proposed	420,000		
- Savings	275,000		275,000
FUTURE COST - Savings		-0-	-0-
TOTAL PRESENT WORTH SAVINGS			**275,000**

COST WORKSHEET							
PROJECT: **Bridge Replacements on Brown Ave. over Norfolk Southern Railroad**					ITEM No: B-3 CLIENT: GDOT Sheet 2 of 3		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	Units	No. Units	Cost/ Unit	Total Cost	No. Units	Cost/ Unit	Total Cost
Right of Way Parcel 2	sf	9,125	15.30	139,613	0	15.30	
Right of Way Parcel 3	sf	9,593	15.30	146,773	0	15.30	
Right of Way Parcel 4	sf	13,945	15.30	213,359	0	15.30	
Right of Way Parcel 5	sf	8,103	15.30	123,976	337	15.30	5,156
Permanent Easement Parcel 2	sf	0	9.18		9125	9.18	83,768
Permanent Easement Parcel 3	sf	0	9.18		9593	9.18	88,064
Permanent Easement Parcel 4	sf	0	9.18		13945	9.18	128,015
Permanent Easement Parcel 5	sf	0	9.18		7766	9.18	71,292
SUBTOTAL				623,720			376,294
Markup @ 11.46%				71,478			43,123
TOTAL				695,198			419,418
TOTAL ROUNDED				695,000			420,000

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad	ITEM N^{O} : B-3 CLIENT: GDOT Sheet 3 of 3

Right of way areas were measured from the microstation files supplied by the district.

Right of way costs were determined from the examples supplied in the right of way cost estimate and the stated cost escalations.

Per the Right of Way Department, Permanent Easement can be acquired for 60% of the cost of Right of Way.

DEVELOPMENT AND RECOMMENDATION PHASE

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad

IDEA No.:	PAGE No.:	CREATIVE IDEA:
B-4	1 of 4	Reduce R/W on Whatley Oil and McLemore parcels by using a narrow shoulder

Comp By: SG Date: 5/1/09 Checked By: DCW Date: 5/1/09

Original Concept:

The original concept proposes a 10' shoulder (widened to 15.5' with guardrail), 5' sidewalk and 2:1 / 3:1 slopes for STA 24+70 to 30+37 on the right side. Three commercial displacements are required for the Whatley Oil & Auto Parts parcel and 1 commercial displacement is required for the John & Don McLemore parcel.

Proposed Change:

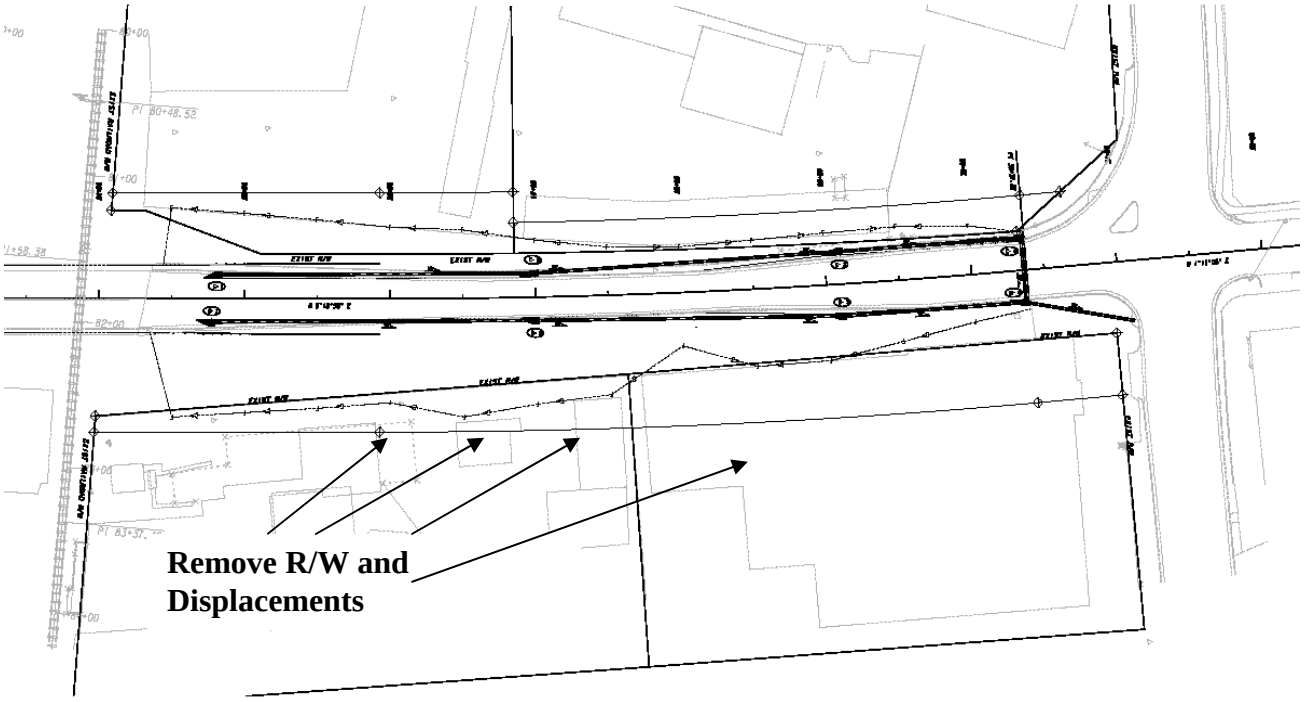
The revised concept proposes a 4.5' shoulder (extended post T-beam guardrail at front face of curb and no sidewalk) and 2:1 slopes. No right-of-way or displacements are required for the Whatley or McLemore parcels.

Justification:

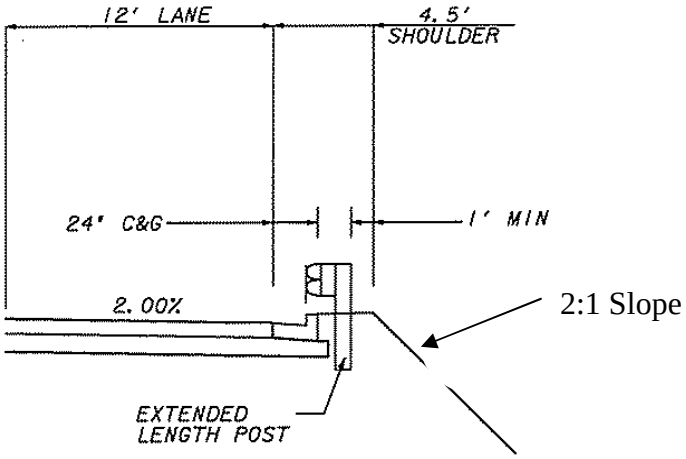
The need and purpose of the project is to replace the structurally deficient/functionally obsolete bridges. Pedestrian traffic between Cussetta Road and Martin Luther King Jr. Boulevard may be maintained on the sidewalk on the west side of Brown Avenue. A significant savings in right-of-way costs is realized by utilizing a more narrow shoulder on the east side of Brown Avenue.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	PRESENT WORTH
INITIAL COST - Original	1,353,000		
- Proposed	0		
- Savings	1,353,000		1,353,000
FUTURE COST - Savings			-0-
TOTAL PRESENT WORTH SAVINGS			**1,353,000**

Revised Concept – Sta. 24+70 to 30+37



Revised Typical Section (Rt)
Sta. 24+70 to 30+37



COST WORKSHEET							
PROJECT: **Bridge Replacements on Brown Ave. over Norfolk Southern Railroad**					ITEM No: B-4 CLIENT: GDOT Sheet 3 of 4		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	Units	No. Units	Cost/ Unit	Total Cost	No. Units	Cost/ Unit	Total Cost
Right of Way Parcel 2	sf	9,125	15	139,613	0	15	0
Right of Way Parcel 4	sf	13,945	15	213,359	0	15	0
Commercial Displacements	ea	4	250,000	1,000,000	0	250,000	0
SUBTOTAL				1,352,971			0
Markup @ 0.00%				-			0
TOTAL				1,352,971			0
TOTAL ROUNDED				1,353,000			0

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad	ITEM NO: B-4 CLIENT: GDOT Sheet 4 of 4

Assume that additional cost for extension of guardrail from Sta. 25+93 to 30+37 is offset by removal of sidewalk and reduction in earthwork.

Original Concept

Parcel 2 (Whatley)
Right-of-Way – 9,125 sf
Commercial Displacements – 3

Parcel 4 (McLemore)
Right-of-Way – 13,945 sf
Commercial Displacements - 1

Revised Concept

Parcel 2 (Whatley)
Right-of-Way – 0 sf
Commercial Displacements – 0

Parcel 4 (McLemore)
Right-of-Way – 0 sf
Commercial Displacements - 0

DEVELOPMENT AND RECOMMENDATION PHASE

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad

IDEA No.:	PAGE No.:	CREATIVE IDEA:
D-1	1 of 4	Remove Improvements to Bragg Smith Street

Comp By: SG Date: 5-1-09 Checked By: DW Date: 5-1-09

Original Concept:

The original concept proposes to reconstruct a portion of Bragg Smith Street on both the east and west sides of Brown Avenue.

Proposed Change:

The revised concept proposes to remove all improvements to Bragg Smith Street from the project.

Justification:

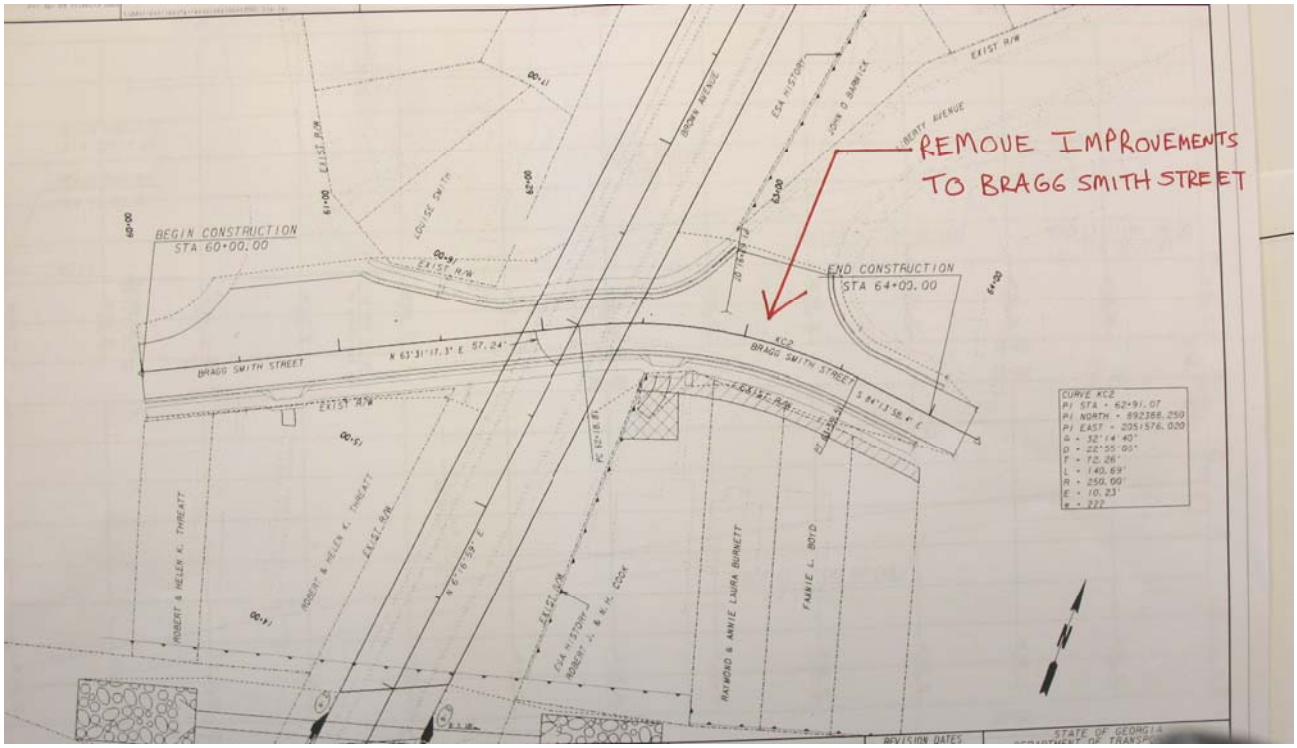
The need and purpose of the project is to replace the structurally deficient/functionally obsolete bridges over Bragg Smith Street and the railroad tracks. The improvements to Bragg Smith Street are unnecessary to satisfy the need and purpose. The removal of these improvements will results in significant cost savings.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	PRESENT WORTH
INITIAL COST - Original	53,700		
- Proposed	0		
- Savings	53,700		53,700
FUTURE COST - Savings			-0-
TOTAL PRESENT WORTH SAVINGS			**53,700**

SKETCH

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad	ITEM N^{O} : D-1 CLIENT: GDOT Sheet 2 of 4

Proposed Work Deleted



COST WORKSHEET

PROJECT:	**Bridge Replacements on Brown Ave. over Norfolk Southern Railroad**	ITEM No: D-1 CLIENT: GDOT Sheet 3 of 4

CONSTRUCTION ELEMENT		ORIGINAL ESTIMATE			NEW ESTIMATE		
ITEM	Units	No. Units	Cost/ Unit	Total Cost	No. Units	Cost/ Unit	Total Cost
12.5 mm	TN	93	100	9,300	0	100	0
19 mm	TN	25	100	2,500	0	100	-
25 mm	TN	65	100	6,500	0	100	-
GAB	TN	306	18.12	5,545	0	18.12	-
Curb & Gutter	LF	820	15.69	12,866	0	15.69	-
Sidewalk	SY	333	34.31	11,425	0	34.31	-
SUBTOTAL				48,136			0
Markup @ 11.46%				5,516			0
TOTAL				53,652			0
TOTAL ROUNDED				53,700			0

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad	ITEM NO: D-1 CLIENT: GDOT Sheet 4 of 4

Original Concept

Assume average full depth pavement widening width of 5' over entire length of street

Pavement
Wt(12.5 mm) = (420 lf)(24 lf)(0.0092 tons/sf) = 93 tons
Wt (19 mm) = (420 lf)(5 lf)(0.012 tons/sf) = 25 tons
Wt (25 mm) = (420 lf)(5 lf)(0.031 tons/sf) = 65 tons
Wt (GAB) = (420 lf)(5+5 lf)(0.073 tons/sf) = 306 tons

Curb & Gutter
Length = 2 (420 lf) = 840 lf

5' Sidewalk
Area = (5 lf)(420 + 180 lf)/9 = 333 sy

Revised Concept
No Improvements on Bragg Smith Street

Pavement
Wt(12.5 mm) = 0 tons
Wt (19 mm) = 0 tons
Wt (25 mm) = 0 tons
Wt (GAB) = 0 tons

Curb & Gutter
Length = 0 lf

5' Sidewalk
Area = 0 sy

DEVELOPMENT AND RECOMMENDATION PHASE

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad

IDEA No.:	PAGE No.:	CREATIVE IDEA:
D-3	1 of 2	Eliminate dual trunk lines in the drainage system

Comp By: WED Date: 4/29/09 Checked By: DCW Date: 4/29/09

Original Concept:

Dual trunk lines are used on the roadway sections of the project.

Proposed Change:

Eliminate the dual trunk lines and use small cross over pipes.
Eliminate pipe from A-1 to A-2 and install pipe from A-1 to B-1.
Eliminate pipe from C-1 to C-2 and install pipe from C1 to D-1.
Eliminate pipe from C-2 to C-3 and install pipe from C-2 to D-2.
Eliminate pipe from C-3 to C-4 and install pipe from C-3 to D-3.

Justification:

This project will not be built under traffic. The dual trunk lines are not needed.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	PRESENT WORTH
INITIAL COST - Original	75,100		
- Proposed	45,900		
- Savings	29,200		29,200
FUTURE COST - Savings			-0-
TOTAL PRESENT WORTH SAVINGS			**29,200**

COST WORKSHEET							
PROJECT: **Bridge Replacements on Brown Ave. over Norfolk Southern Railroad**					ITEM No: D-3 CLIENT: GDOT Sheet 2 of 2		
CONSTRUCTION ELEMENT		**ORIGINAL ESTIMATE**			**NEW ESTIMATE**		
ITEM	Units	No. Units	Cost/ Unit	Total Cost	No. Units	Cost/ Unit	Total Cost
18 inch Storm Pipe	lf	560	45	25,446	43	45	1,954
18 inch Storm Pipe	lf	596	45	27,082	596	45	27,082
18 inch Storm Pipe	lf	76	45	3,453	76	45	3,453
18 inch Storm Pipe	lf	250	45	11,360	191	45	8,679
SUBTOTAL		1482		67,342	906		41,169
Markup @ 11.46%				7,717			4,718
TOTAL				75,059			45,887
TOTAL ROUNDED				75,100			45,900

APPENDIX

Figure A-1
Cost Model

COST MODEL

VALUE ENGINEERING

COST MODEL / DISTRIBUTION

By
Decreasing Item Number

Project No. BR000-0004-00(729)
Bridge Replacement on Brown Avenue over Norfolk Southern Railroad
PI No. 0004729
Muscogee County

May 14, 2009

Element ID.	Item Description	Cost x $1,000	%
A	Bridge	4,936	45
B	Right of Way	3,767	34
C	Traffic Control	1,115	10
89% Cost Line			
D	Reimbursable Utilities	338	3
E	AC Pavement	218	2
F	Drainage	212	2
G	Erosion Control	120	1
H	Utility Contingences	101	1
I	Reinforced Concrete Slab	55	1
J	Grading	45	1
K	Aggregate Base Course	43	-
L	Traffic Control	37	-
M	Concrete Sidewalk	36	-
N	Guardrail	31	-
	TOTAL	**$11,084**	**100%**

INFORMATION PHASE ------- FUNCTION ANALYSIS

Bridge Replacement on Brown Avenue over Norfolk Southern Railroad

System: Replace Bridges
Function: Improve Structures

ITEM No.	DESCRIPTION	FUNCTION			INITIAL DOLLARS (x 1,000)		
		Verb	Noun	Kind*	Cost	% of Total	Worth
A	Bridge	Span	Obstacle	B	4,936	45	4,000
		Deter	Crime				
		Preserve	History				
B	Right of Way	Store	Project	S	3,767	34	3,500
C	Traffic Control	Maintain	Flow	S	1,115	10	1,115
TOTALS					**9,818**	**89**	**8,615**

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
Bridge Replacement on Brown Avenue over Norfolk Southern Railroad			
NO.	**CREATIVE IDEA**	**COMMENTS**	**IDEA RATING ****
A	**Bridge**		
A-1.1	Reduce width of bridge to 40 feet		√
A-1.2	Reduce width of bridge to 34 feet by eliminating sidewalk on one side		√
A-2	Reduce bridge length to two separate structures and roadway		√
A-3	Use a tunnel	Not economically feasible	**X**
A-4	Close road permanently	Traffic count are too high	**X**
A-5	Replace portion of bridge with roadway section		**See A-2**
A-6.1	Extent bridge and reduce culvert	Bridge more expensive than culvert	**X**
A-6.2	Reduce bridge length and leave culvert as designed		√
A-7	Evaluate MSE walls		√
A-8	Use a slab bridge and increase RR bridge grade		√
A-9	Reduce depth of beams, lower profile	Cannot be done structurally	**X**
A-10	Reduce lane width		√
B	**Right of Way**		
B-1	Use short retaining walls at bottom of slope		√

** √ = Idea will be evaluated; X= idea will be dropped; DC = Design Consideration – presented for consideration by the design team

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
Bridge Replacement on Brown Avenue over Norfolk Southern Railroad			
NO.	**CREATIVE IDEA**	**COMMENTS**	**IDEA RATING ****
A	**Bridge**		
A-1.1	Reduce width of bridge to 40 feet		√
A-1.2	Reduce width of bridge to 34 feet by eliminating sidewalk on one side		√
A-2	Reduce bridge length to two separate structures and roadway		√
A-3	Use a tunnel	Not economically feasible	**X**
A-4	Close road permanently	Traffic count are too high	**X**
A-5	Replace portion of bridge with roadway section		**See A-2**
A-6.1	Extent bridge and reduce culvert	Bridge more expensive than culvert	**X**
A-6.2	Reduce bridge length and leave culvert as designed		√
A-7	Evaluate MSE walls		√
A-8	Use a slab bridge and increase RR bridge grade		√
A-9	Reduce depth of beams, lower profile	Cannot be done structurally	**X**
A-10	Reduce lane width		√
B	**Right of Way**		
B-1	Use short retaining walls at bottom of slope		√

** √ = Idea will be evaluated; X= idea will be dropped; DC = Design Consideration – presented for consideration by the design team

NO.	CREATIVE IDEA	COMMENTS	IDEA RATING **
B-2.1	Extend guardrail to increase side slopes		√
B-2.2	Combine Items B-1 + B-2		√
B-3	Convert ROW to permanent easements		√
B-4	Shift road west to avoid historic properties	Causes increased EJ issues	X
C	**Traffic Control**		
	No ideas generated		
D	**Other**		
D-1	Reduce paving on Bragg Smith Street		√
D-2	Modify pavement design	Appears to be OK after evaluation	X
D-3	Reduce drainage at ends		√

** √ = Idea will be evaluated; X= idea will be dropped; DC= Design Consideration – presented for consideration by the design team

VE STUDY SIGN-IN SHEET

Project No.: BR000-0004-00(729) County: Muscogee PI No.: 0004729 Date: April 28-May 1, 2009

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Jason Mobley	00848279	" "	6661	
Randy Bishop		intern		