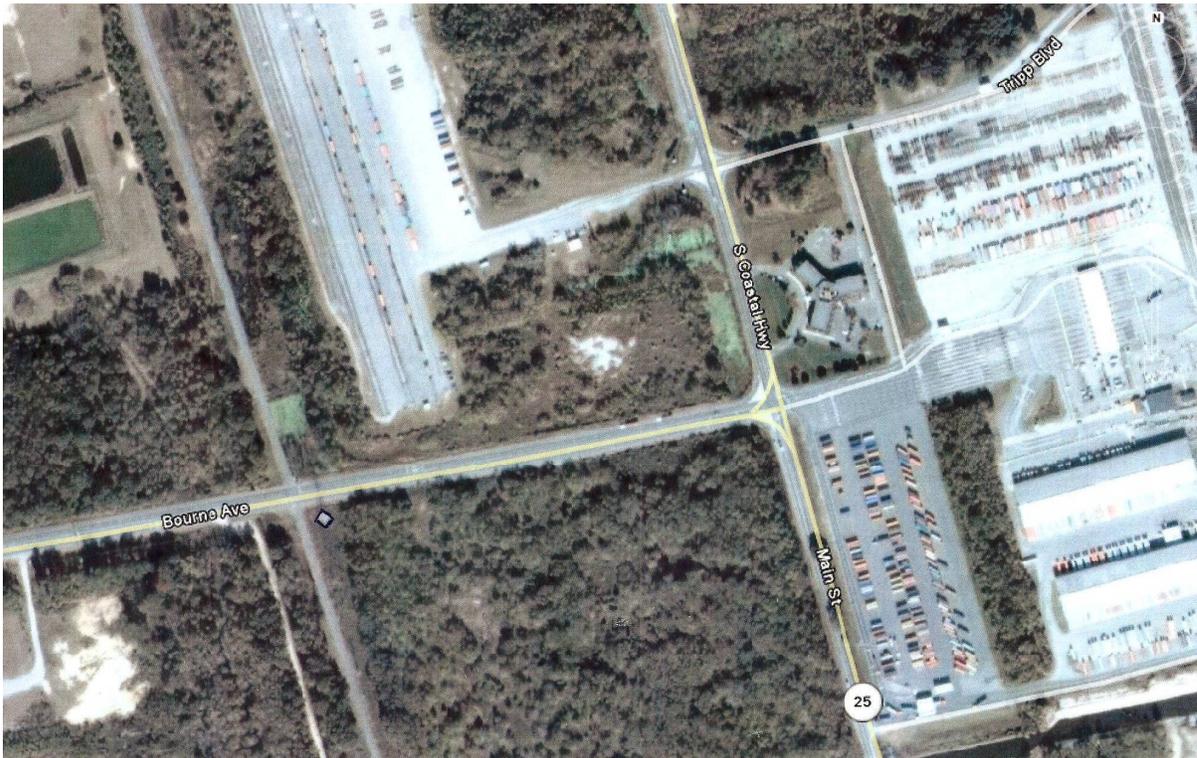


Value Engineering Study Report

Project No. HPP00-0000-00(345)

P.I. No. 0000345

*SR 307 – New Overpass over Port Authority Rail Line
Chatham County*



Value Management Team



Design Team



January 2009



January 24, 2009

Ms. Lisa Myers
Design Review Engineer Manager/VE Coordinator
Georgia Department of Transportation-Engineering Services
One Georgia Center
600 W. Peachtree Street NW
Atlanta, GA 30308

RE: Submittal of the final Value Engineering Report
Project No.: HPP00-0000-00(345)
P.I. No.: 0000345
SR 307 – New Overpass Over Port Authority Rail Line
Chatham County

Dear Ms. Myers:

Please find enclosed two (2) hard copies and one (1) CD of our final Value Engineering Report for the SR 307 construction of an overpass over the Port Authority Rail Line in Chatham County.

This Value Engineering Study, which was performed during the period January 6 through January 9, 2009, identified **22 Alternative Ideas** of which **8 are recommended for implementation**. We believe that the **Alternative Ideas** recommended may have a significant positive affect on the project.

We trust that you will find this report to be in proper order. It should be noted that the results of this workshop are volatile in that they can be overcome by the events that accompany the expeditious continuance of the design process. Accordingly, we encourage an equally expeditious implementation meeting to design the disposition of the contents of this report.

On behalf of our VE Team, we thank you very much for this opportunity to work with you and the hard working staff of the Georgia Department of Transportation.

Yours truly,

PBS&J

A handwritten signature in black ink that reads "Les M. Thomas".

Les M. Thomas, P.E., CVS-Life
VE Team Leader

A handwritten signature in black ink that reads "Randy S. Thomas".

Randy S. Thomas, CVS
Assistant Team Leader

Value Engineering Study Report

Project No. HPP00-0000-00(345)

P.I. No. 0000345

*SR 307 – New Overpass Over Port Authority Rail Line
Chatham County*

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Executive Summary

EXECUTIVE SUMMARY

INTRODUCTION

This report summarizes the analysis and conclusions by the PBS&J Value Engineering workshop team as they performed a VE study during the period of January 6 – January 9, 2009 in Atlanta, at the office of the Georgia Department of Transportation. The subject of the Value Engineering study was Project HPP00-0000-00(345) - P.I. No. 0000345, the construction of an overpass of the Port Authority Rail Line, Chatham County. The concept design for the project has been prepared by Kimley-Horn and Associates, Inc. At the time of the workshop the plans had advanced to the final design level.

PROJECT DESCRIPTION

This project is needed to provide a grade separation between rail and vehicular traffic. SR 307 currently has an at grade crossing with the Norfolk Southern Foundation Lead Track. The Port Authority plans to install a total of 14 tracks that will cross SR 307 in the future. The grade separation will provide a much safer and more efficient movement of vehicles. The functional classification for this project is urban principal arterial. The design calls for four 12' travel lanes (two in each direction) with a 20' raised median and 10' shoulders (6.5' paved and 3.5' grassed). The proposed bridge would have four 12' lanes with an 8' raised median and 10' shoulders. Total width would be 79.25' and total length 1038'. A proposed SR 307 detour during construction would have four 12' lanes with a 10' (2' paved and 8' grassed) rural shoulders.

The estimated construction cost, reimbursable utilities and right-of-way cost for this project are: \$17,484,598, \$3,000,000 and \$300,000 respectively, for a total project cost of \$20,784,598.

This project is rather fully described in the documentation that is located in Tabbed section of this report, entitled *Project Description*.

PROJECT CONCERNS AND OBJECTIVES

Some of the information from the concept report and the designer's presentation indicated the following important points about the project:

- The project has been through final design and is ready to let.
- A major change to the alignment would result in going back through environmental studies which could result in delaying this project.
- Alignment needs to respect the existing heavy power lines.
- Design must maintain uninterrupted traffic to the port.
- The design must accommodate the forthcoming construction of additional Port Authority rail lines.

VALUE ENGINEERING PROCESS

The Value Engineering team followed the seven step Value Engineering job plan as promulgated by SAVE International. This seven step job plan includes the following:

- Investigative
- Analysis
- Speculation
- Evaluation
- Development
- Recommendation
- Presentation

This report is a component of the Presentation Phase. As part of the VE workshop in Atlanta, the team made an informal presentation of their results on the last morning of the workshop. This report is intended to formalize the workshop results and set the stage for a formal implementation meeting in which alternatives and design suggestions will typically be accepted, accepted with modifications, or rejected for cause. The worksheet that follows, along with the formally developed alternatives and design suggestions can be used as a “score sheet” for the implementation meeting. It is also included in this report to identify, on a summary basis, the results of the workshop. The reader is encouraged to visit the third tabbed section of this report entitled *Study Results* for a review of the details of the developed alternatives. The tabbed section *Project Description* includes information about the project itself and the tabbed section *Value Engineering Process* presents the detail process of the Value Engineering Study.

CONCLUSIONS AND RECOMMENDATIONS

During the speculation phase the VE Team identified **22 Alternative Ideas** that appeared to hold potential for reducing the construction cost, improving the end product, and/or reducing the difficulty and time of project construction.

After the evaluation phase was completed, **8 Alternative Ideas** remained for further consideration. These Alternative Ideas may be found, in their documented form, in the section of this report entitled *Study Results*.

The following *Summary of Alternatives and Design Suggestions* coupled with the documentation of the developed alternatives should provide the reader with the information required to fully evaluate the merits of each of the alternatives.

Study Results

STUDY RESULTS

INTRODUCTION

This section includes the study results presented in the form of fully developed value engineering alternatives that include descriptions of the original design, description of the alternative design configurations, comments on the technical justifications, opportunities and risks associated with the alternatives, sketches, calculations and technical justification for these alternatives. For the most part, these fully developed alternatives represent an array of choices that clearly could have an impact on the eventual cost and performance of the finished project.

This introductory sheet is followed by a *Summary of Alternatives and Design Suggestions*. It should be noted that the alternatives that are included, which have cost estimates attached are not necessarily representative of the final cost outcome for each alternative. Some of these alternatives have components that are mutually exclusive so they may not be added together.

The users of this report are asked to consider these alternatives and design suggestions as a smorgasbord of choices for selection and use as the project moves forward. The enclosed *Summary of Alternatives & Design Suggestions* may also be used as a “score sheet” within the bounds of an implementation meeting.

COST CALCULATIONS

The cost calculations are intended only as a guide to the approximate results that might be expected from implementation of the alternatives. They should be helpful in making clear choices as to the pursuit of individual alternatives.

The composite mark-up of 10% for the construction cost comparisons was derived from the cost estimate for the project. This estimate can be found in the section of this report entitled *Project Description*.

Value Analysis Design Alternative



PROJECT:	Georgia Department of Transportation HPP00-0000-00(345) – P.I. No. 0000345 SR 307 - New Overpass over Port Authority Rail Line Chatham County	ALTERNATIVE NO.:	RD-3
DESCRIPTION:	Reduce outside shoulder width in areas bound by MSE wall.	SHEET NO.:	1 of 4

Original Design:

The original design calls for a 10' outside shoulder on bridge approach areas contained by the MSE walls from STA 103+25 to STA 109+29 and from STA 118+78 to STA 122+40.

Alternative:

The alternative proposes narrowing the 10' paved shoulder to an 8' paved shoulder in the areas described above.

Opportunities:

- Reduction in PCC and flexible pavement costs
- Reduction of construction footprint

Risks:

- Reduces usable shoulder

Technical Discussion:

The intent of the alternative is to narrow the outside shoulders on both approaches to the bridge which are bound by an MSE wall. This alternative may be used in conjunction with Alternative BR-2, which proposes narrowing the outside shoulders on the bridge to an 8' width. The project as designed has 8' shoulders, of which only 6'-6" is paved from STA 93+85 to STA 103+25. The result of narrowing the 10' full depth paved shoulder to 8" would result in flexible and PCC pavement savings, GAB savings, and would narrow the footprint required to construct the bridge approaches. This would also save on earthwork costs by narrowing the area bound by the MSE wall.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 3,550,035	\$ 0	\$ 3,550,035
ALTERNATIVE	\$ 3,508,519	\$ 0	\$ 3,508,519
SAVINGS	\$ 41,515	\$ 0	\$ 41,515

Illustration

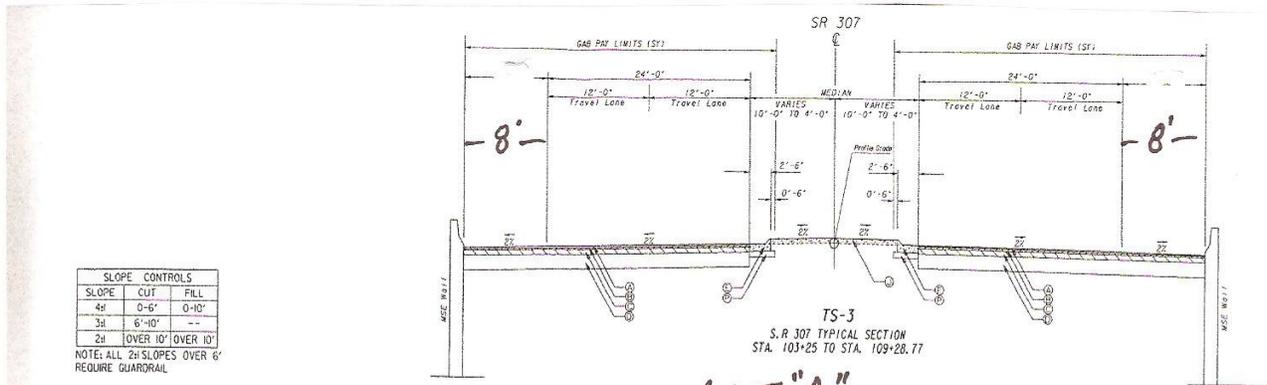


PROJECT: Georgia Department of Transportation
 HPP00-0000-00(345) – P.I. No. 0000345
 SR 307 - New Overpass over Port Authority Rail Line
 Chatham County

DESCRIPTION: Reduce outside shoulder width in areas bound by MSE wall

ALTERNATIVE NO.:
RD-3

SHEET NO.: 2 of 4

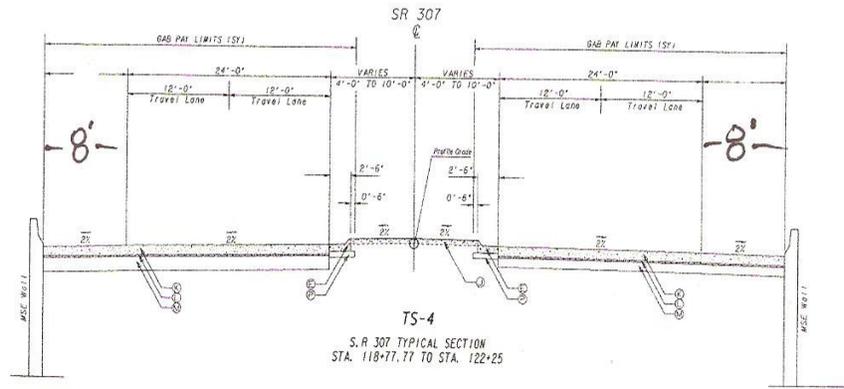


SLOPE CONTROLS		
SLOPE	CUT	FILL
4:1	0'-6"	0'-10"
3:1	6'-10"	--
2:1	OVER 10' OVER 10'	--

NOTE: ALL 2:1 SLOPES OVER 10' REQUIRE GUARDRAIL

ALT. "A"
 REDUCE WIDTH OF OUTSIDE SHOULDERS TO 8'
 WEST OF BRIDGE APPROACH IN PROPOSED ASPHALT SECTION.

- REQUIRED PAVEMENT**
- ① RECYCLED ASPHALTIC CONCRETE 12.5 mm SUPERPAVE (1165 LB/SY)
 - ② RECYCLED ASPHALTIC CONCRETE 19 mm SUPERPAVE (660 LB/SY)
 - ③ RECYCLED ASPHALTIC CONCRETE 25 mm SUPERPAVE (890 LB/SY)
 - ④ GRADED AGGREGATE BASE, 16"
 - ⑤ 8" X 30" TYPE 7 CURB & GUTTER
 - ⑥ 6" CONCRETE MEDIAN TYPE 7
 - ⑦ EXISTING PAVEMENT-RETAIN
 - ⑧ ASPHALTIC CONCRETE LEVELING
 - ⑨ 4" CONCRETE MEDIAN PAVING
 - ⑩ PORTLAND CEMENT CONCRETE, 12"
 - ⑪ RECYCLED ASPHALT CONCRETE, 19 mm SUPERPAVE (1330 LB/SY)
 - ⑫ GRADED AGGREGATE BASE, 12"
 - ⑬ MILLING, VARIABLE DEPTH
 - ⑭ GRADED AGGREGATE BASE, 6"
 - ⑮ RECYCLED ASPHALTIC CONCRETE 19 mm SUPERPAVE (1220 LB/SY)
 - ⑯ RECYCLED ASPHALTIC CONCRETE 25 mm SUPERPAVE (1550 LB/SY)
 - ⑰ GRADED AGGREGATE BASE, 10"



ALT. "B"
 REDUCE WIDTH OF OUTSIDE SHOULDERS TO 8' EAST
 OF BRIDGE APPROACH IN PROPOSED P.C.C. SECTION.

Calculations



PROJECT: **Georgia Department of Transportation
HPP00-0000-00(345) – P.I. No. 0000345
SR 307 - New Overpass over Port Authority Rail Line
Chatham County**

DESCRIPTION: **Reduce outside shoulder width in areas bound by
MSE wall**

ALTERNATIVE NO.:
RD-3

SHEET NO.: **3** of **4**

Assumptions:

-Narrow proposed shoulders from 10' paved width to 8' paved width in bridge approach areas bound by MSE wall from STA 103+25 to STA 109+29 and from STA 118+78 to STA 122+40.

-Outside shoulders from STA 103+25 to STA 109+29 are proposed to be constructed of flexible pavement(asphalt).

-Outside shoulders from STA 118+78 to STA 122+40 are proposed to be constructed of PCC (concrete).

Calculations:

Asphalt Pavement Section

-STA 103+25 to STA 109+29= $604\text{LF} \times 4/9 = 268.44\text{SY}$.

- 25mm Superpave- $268.44\text{SY} \times 880\text{LB}/\text{SY}/2000 = \mathbf{118 \text{ tons saved.}}$

-19.0mm Superpave- $268.44\text{SY} \times 660\text{LB}/\text{SY}/2000 = \mathbf{89 \text{ tons saved.}}$

-12.5mm Superpave- $268.44\text{SY} \times 165\text{LB}/\text{SY}/2000 = \mathbf{22 \text{ tons saved.}}$

- $268.44\text{SY} @ 1600\text{LB}/\text{SY}/2000 = \mathbf{215 \text{ tons GAB saved.}}$

Concrete Pavement Section

-STA 122+40-STA 118+78= $362\text{LF} \times 4/9 = 161\text{SY}$.

-Concrete Pavement saved= **161 SY saved.**

-19.0mm Superpave- $161\text{SY} \times 330\text{LB}/\text{SY}/2000 = \mathbf{27 \text{ tons saved.}}$

-GAB= $161\text{SY} \times 1600\text{LB}/\text{SY}/2000 = \mathbf{129 \text{ tons GAB saved.}}$

Cost Worksheet



PROJECT:	Georgia Department of Transportation HPP00-0000-00(345) - P.I. No. 0000345 SR 307 - New Overpass over Port Authority Rail Line - Chatham County	ALTERNATIVE NO.:
		RD-3
DESCRIPTION:	Reduce outside shoulder width in areas bound by MSE wall	SHEET NO.: 4 of 4

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE			
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL	
430-0220 Plain PC Conc Pavt 12"	SY	5,225	\$ 57.00	\$ 297,825	5,064	\$ 57.00	\$ 288,648	
402-3190 19.0mm Superpave	TN	2,724	\$ 85.00	\$ 231,540	2,608	\$ 85.00	\$ 221,680	
310-1101 GAB	TN	22,640	\$ 19.78	\$ 447,819	22,296	\$ 19.78	\$ 441,015	
402-3121 25mm Superpave	TN	24,099	\$ 85.00	\$ 2,048,415	23,981	\$ 85.00	\$ 2,038,385	
402-3113 12.5mm Superpave	TN	2,373	\$ 85.00	\$ 201,705	2,351	\$ 85.00	\$ 199,835	
Sub-total				\$ 3,227,304				\$ 3,189,563
Mark-up at 10.00%				\$ 322,730				\$ 318,956
TOTAL				\$ 3,550,035				\$ 3,508,519
Estimated Savings:							\$41,515	

Value Analysis Design Alternative



PROJECT:	Georgia Department of Transportation HPP00-0000-00(345) – P.I. No. 0000345 SR 307 - New Overpass over Port Authority Rail Line Chatham County	ALTERNATIVE NO.:	RD-4
DESCRIPTION:	Use P.C.C. from STA 100+00 to STA 109+00.	SHEET NO.:	1 of 5

Original Design:

The original design calls for constructing the western portion of the project from the west approach slab at STA 109+00 to the beginning of the full build-up section at STA 101+75 of flexible pavement with a 16" GAB base.

Alternative:

The alternative proposes to use PCC to construct the western portion of the project from STA 109+00 to STA 101+75.

Opportunities:

- Lower life cycle costs
- More desirable and durable pavement designed to withstand high concentration of truck traffic

Risks:

- None identified

Technical Discussion:

The alternative proposes constructing the western portion of the project with PCC instead of the asphalt build-up proposed in the original design. The limits for the alternative proposal range from the west end of the bridge end slab at STA 109+00+/- to STA 101+75. The alternative separates the proposed PCC pavement into two sections, Section I from STA 109+00+/- to STA 103+25 contains 10' outside shoulders, and is in the approach area to the bridge bound by the MSE wall to the north and south. Section II begins at STA 103+25 and goes to STA 101+75. Section II is outside of the bridge approach areas and has 6'-6" paved shoulders. STA 101+75 to the western end of the project at STA 93+85 were excluded from this alternative, as that section is an overlay only. The construction of all full build-up areas on the project with PCC would be desirable considering the volume and concentration of truck traffic. Construction with PCC on this project will reduce staging issues with future planned projects to the west of the existing project limits. A cost estimate is attached with this alternative, as well as a life cycle cost analysis. The life cycle cost analysis shows significant savings over the material life span.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS AND SINGLE EXPENDITURES	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 388,450	\$ 86,726	\$ 475,176
ALTERNATIVE	\$ 380,802	\$ 43,846	\$ 424,648
SAVINGS	\$ 7,648	\$ 42,880	\$ 50,528

Illustration

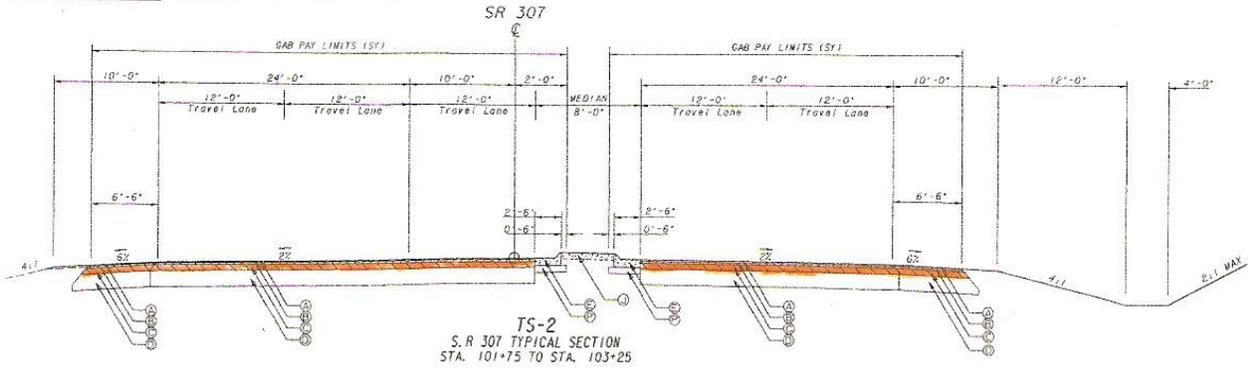


PROJECT: Georgia Department of Transportation
HPP00-0000-00(345) – P.I. No. 0000345
SR 307 - New Overpass over Port Authority Rail Line
Chatham County

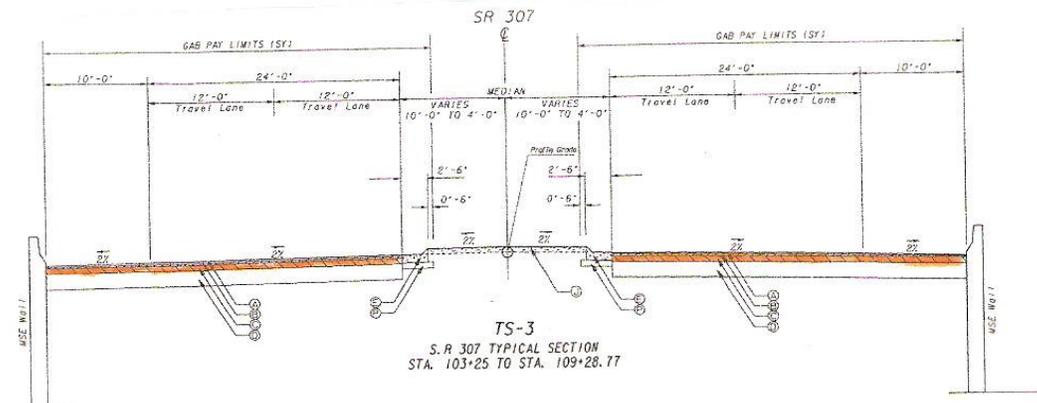
ALTERNATIVE NO.:
RD-4

DESCRIPTION: Use P.C.C. from STA 100+00 to STA 109+00.

SHEET NO.: 2 of 5



SECTION II



SECTION I

-DELETE FLEXIBLE PAVEMENTS IN SECTIONS I+II;
G.A.B. QUANTITIES REMAIN THE SAME. REPLACE
PROPOSED FLEXIBLE PAVEMENTS WITH P.C.C.

Calculations



PROJECT: **Georgia Department of Transportation
HPP00-0000-00(345) – P.I. No. 0000345
SR 307 - New Overpass over Port Authority Rail Line
Chatham County**

ALTERNATIVE NO.:
RD-4

DESCRIPTION: **Use P.C.C. from STA 100+00 to STA 109+00.**

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

Assumptions:

- Construct the western portion of the project from STA 109+00 to STA 101+75 with PCC instead of asphalt.
- Proposed design has 10' outside shoulders from STA 109+00 to STA 103+25, 6'6" outside shoulders from STA 103+25 to STA 101+75. STA 101+75 to western project terminus is a proposed overlay.

Removal of proposed asphalt quantities:

Section I-STA 109+00 to STA 103+25= 68' w(10'-12'-12', 12'-12'-10')

68'w x 575'L/9= 4344SY

-25mm Superpave-880LB/SY x 4344SY/2000=1911 tons

-19mm Superpave-660LB/SY x 4344SY/2000=1434 tons

-12.5mm Superpave-165LB/SY x 4344SY/2000=358 tons

Section II-STA 103+25 to STA 101+75= 61'w(6.5'-12'-12', 12'-12'-6.5')

61'w x 150'L/9=1,017SY

-25mm Superpave-880LB/SY x 1017SY/2000=447 tons

-19mm Superpave-660LB/SY x 1017SY/2000=336 tons

-12.5mm Superpave- 165LB/SY x 1017/2000=84 tons

Addition of PCC Quantities:

Section I + Section II SY totals- 5361 SY

19.0mm Superpave@ 330LB/SY=5361 x 330/2000=884.57 tons

LIFE CYCLE COST WORKSHEET

PROJECT: **HPP00-0000-00(345) - P.I. No. 0000345** ALTERNATIVE NO. **RD-4**
SR 307-New Overpass over Port Authority Rail Line
Chatham County

Comparison of Concrete vs Asphalt Paving SHEET NO. **5 of 5**

LIFE CYCLE PERIOD:		20 years		Asphalt		Concrete	
INTEREST RATE:		3.00%		ESCALATION RATE:		0.00%	
A. INITIAL COST				\$388,450		\$380,802	
Useful Life (Years)				20		40	
INITIAL COST SAVINGS						\$7,648	
B. RECURRENT COSTS (Annual Expenditures)							
	1.	Maintenance	% of First Cost during each year	Asphalt	0.50%	\$ 1,942	
	2.	Maintenance	% of First Cost during each year	Concrete	0.25%		\$ 952
	3.	Energy					
	4.						
	5.						
	6.						
Total Annual Costs						1,942	952
Present Worth Factor						14.8775	14.8775
Present Worth of RECURRENT COSTS						28,896	14,163
C. SINGLE EXPENDITURES							
			Year	Amount	PW factor	Present Worth	Present Worth
ORIG	PROP	< Put "x" in appropriate box (original design or proposed design)					
	x	1. Concrete Pavement	10	\$0	0.7441	\$ -	\$ -
x		2. Asphalt Resurfacing	10	\$28,681	0.7441	\$ 21,342	\$ -
x		3. Asphalt Resurfacing	20	\$28,681	0.5537	\$ 15,880	\$ -
	x	4. Concrete Repairs	20	\$53,610	0.5537	\$ -	\$ 29,683
x		4. Asphalt Resurfacing	30	\$28,681	0.4120	\$ 11,816	\$ -
x		5. Asphalt Resurfacing	40	\$28,681	0.3066	\$ 8,792	\$ -
		6.			1.0000	\$ -	\$ -
		7.			1.0000	\$ -	\$ -
		8.			1.0000	\$ -	\$ -
D. SALVAGE VALUE							
	x	1.			1.0000	-	-
		2.			1.0000	-	-
Present Worth of SINGLE EXPENDITURES						\$57,830	\$29,683
E. Total Recurrent Costs & Single Expenditures (B + C + D)						\$86,726	\$43,846
RECURRENT COSTS & SINGLE EXPENDITURES SAVINGS							\$42,880
TOTAL PRESENT WORTH COST (A + E)						\$475,176	\$424,648
TOTAL LIFE CYCLE SAVINGS							\$50,528

Note - escalation shown as 0.0% since using constant dollar LCC analysis

Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation
HPP00-0000-00(345) – P.I. No. 0000345
SR 307 - New Overpass over Port Authority Rail Line
Chatham County**

ALTERNATIVE NO.:
D-2

DESCRIPTION: **Eliminate temporary concrete barrier**

SHEET NO.: 1 of 4

Original Design:

The original design provided a concrete safety barrier at the edge of a 10' graded shoulder with an additional offset behind the barrier (varies 25' to 60') for the contractor to construct the project.

Alternative:

The alternative would provide a 14' clear zone at a minimum 6:1 side slope (Design Speed \leq 40 mph & ADT > 6000 vpd) in accordance with the requirements of the AASHTO 2006 Roadside Design Guide, eliminate the use of temporary concrete barrier and the corresponding impact attenuators and utilize construction drums to delineate the work zone.

Opportunities:

- Eliminate barrier and attenuator costs
- Improve contractor access to the project and speed construction
- Improve roadway drainage for the detour
- Eliminate a restriction in the floodplain

Risks:

- Additional costs for traffic drums
- Slight reduction in worker safety during retaining wall construction
- Negligible impact to the designer

Technical Discussion:

Temporary barrier located on a graded shoulder will pond water on the shoulder resulting in damage and creating a maintenance problem. Flood waters frequently overtop this section of roadway and the barrier will serve as a "dam" causing an increase in negative flooding impacts in the designated floodplain. While providing a positive barrier can increase worker safety, since the posted speed of the detour will be 35 mph any benefits would be minimal. Removing the barrier will improve the contractor's access to the work and should speed construction. The original design already requires a graded area of 14' at a 6% grade from the edge of the through lane so no additional grading will be required.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 144,838	\$ 0	\$ 144,838
ALTERNATIVE	\$ 13,200	\$ 0	\$ 13,200
SAVINGS	\$ 131,638	\$ 0	\$ 131,638

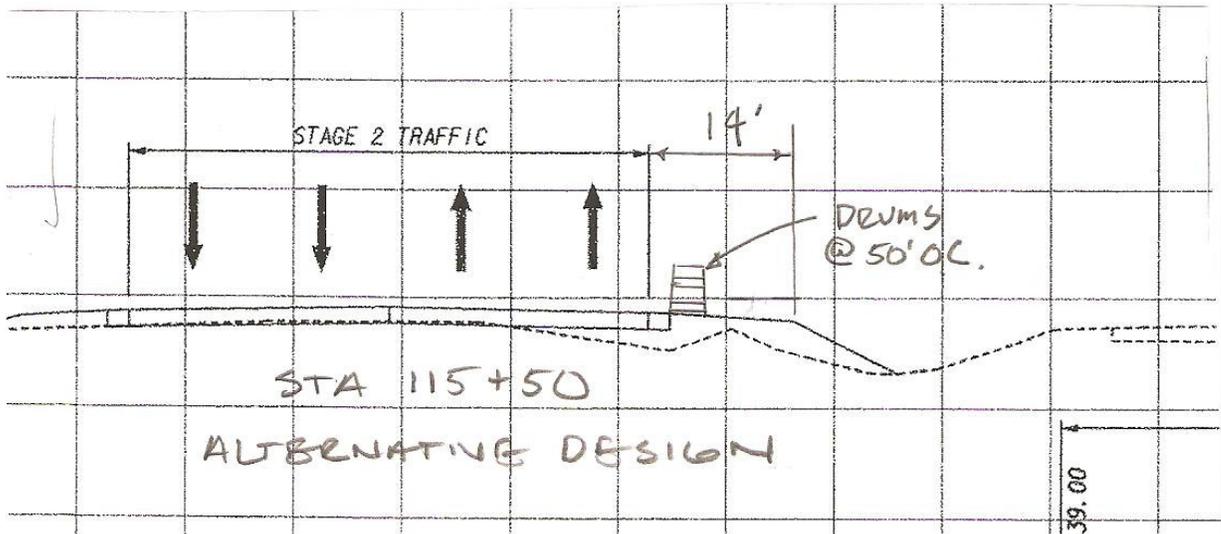
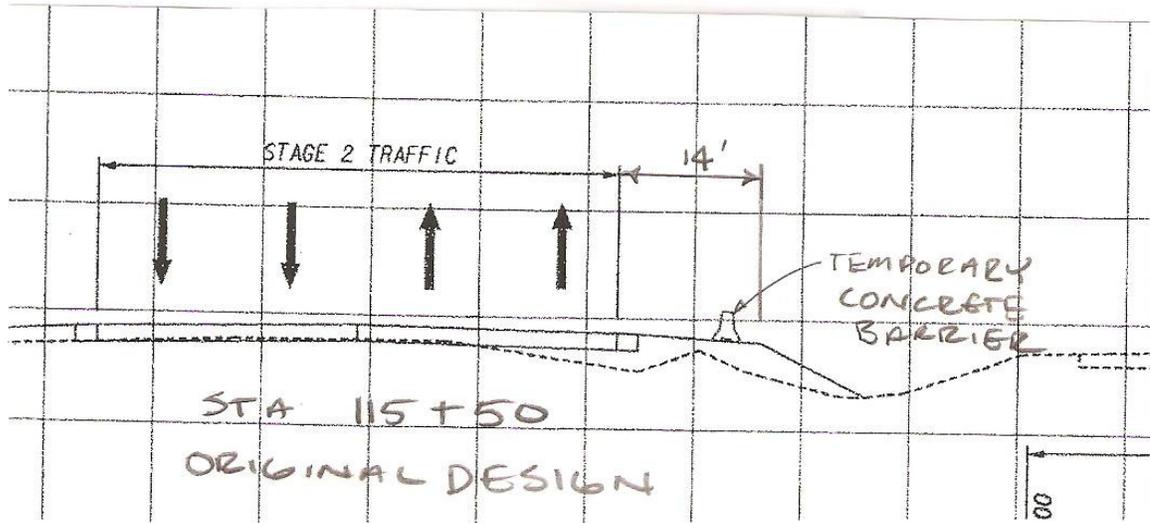
Illustration

PROJECT: Georgia Department of Transportation
HPP00-0000-00(345) – P.I. No. 0000345
SR 307 - New Overpass over Port Authority Rail Line
Chatham County

ALTERNATIVE NO.:
D-2

DESCRIPTION: **Eliminate temporary concrete barrier**

SHEET NO.: 2 of 4



Calculations



PROJECT: **Georgia Department of Transportation
HPP00-0000-00(345) – P.I. No. 0000345
SR 307 - New Overpass over Port Authority Rail Line
Chatham County**

ALTERNATIVE NO.:
D-2

DESCRIPTION: **Eliminate temporary concrete barrier**

SHEET NO.: **3** of **4**

Drums:

Station 100+00 to Station 125+00 = 2500LF (2-250' tapers and a 2000' tangent)

25' O.C. in tapers = $500' / (25' / \text{drum}) = 20$ each

50' O.C. in tangents = $2000' / (50' / \text{drum}) = \underline{40}$ each

TOTAL = 60 each

Value Analysis Design Alternative



PROJECT:	Georgia Department of Transportation HPP00-0000-00(345) – P.I. No. 0000345 SR 307 - New Overpass over Port Authority Rail Line Chatham County	ALTERNATIVE NO.:	D-3
DESCRIPTION:	Construct the permanent roadway to the north of the existing roadway and phase the construction	SHEET NO.:	1 of 4

Original Design:

The original design proposes utilizing a temporary detour to the north of the existing roadway. This detour will be built on a temporary construction easement and removed after use.

Alternative:

Construct the permanent roadway to the north of the existing roadway and phase the construction half at a time in order to reduce the required permanent right of way and reduce the curvature introduced into the final alignment.

Opportunities:

- Eliminate temporary paving costs
- Reduce earthwork
- Eliminate the temporary railroad crossing
- Reduce temporary drainage costs
- Reduce wetland impacts
- Reduce total Right of Way costs
- Reduce exposure to railroad traffic

Risks:

- Increase right of way costs
- Significant design effort
- “median construction” in final construction phase
- Increase Temporary Barrier cost (method 1 versus method 2)

Technical Discussion:

By constructing the permanent roadway slightly offset to the north of the existing roadway and constructing it in phases it will eliminate the need for constructing an offsite detour. This will not only eliminate the need for the temporary paving but also the temporary drainage and the temporary railroad crossing. This will also reduce the exposure to rail traffic by putting half the traffic on the grade separation earlier.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 3,007,153	\$ 0	\$ 3,007,153
ALTERNATIVE	\$ 1,273,267	\$ 0	\$ 1,273,267
SAVINGS	\$ 1,733,886	\$ 0	\$ 1,733,886

Illustration

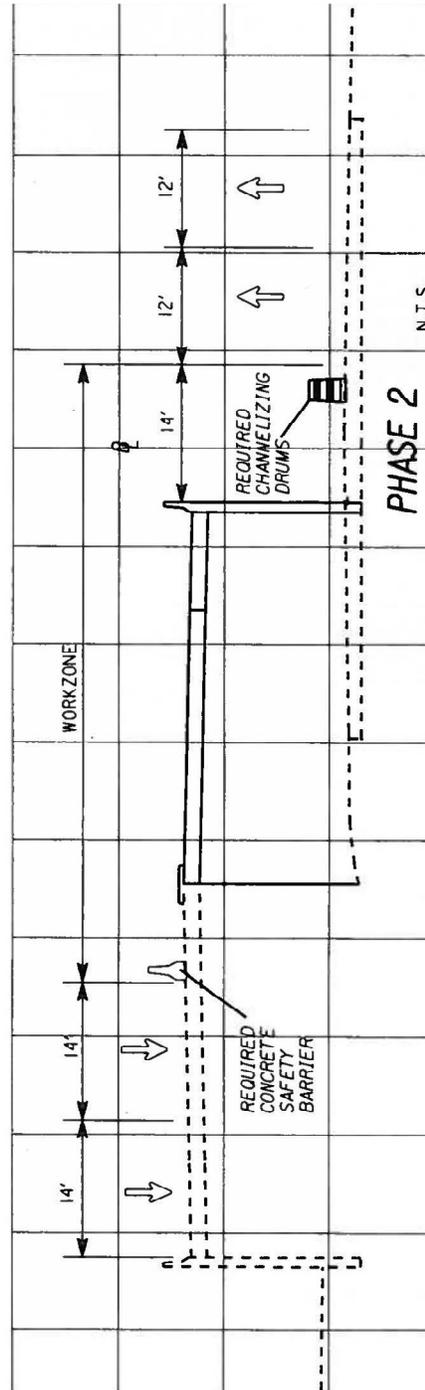
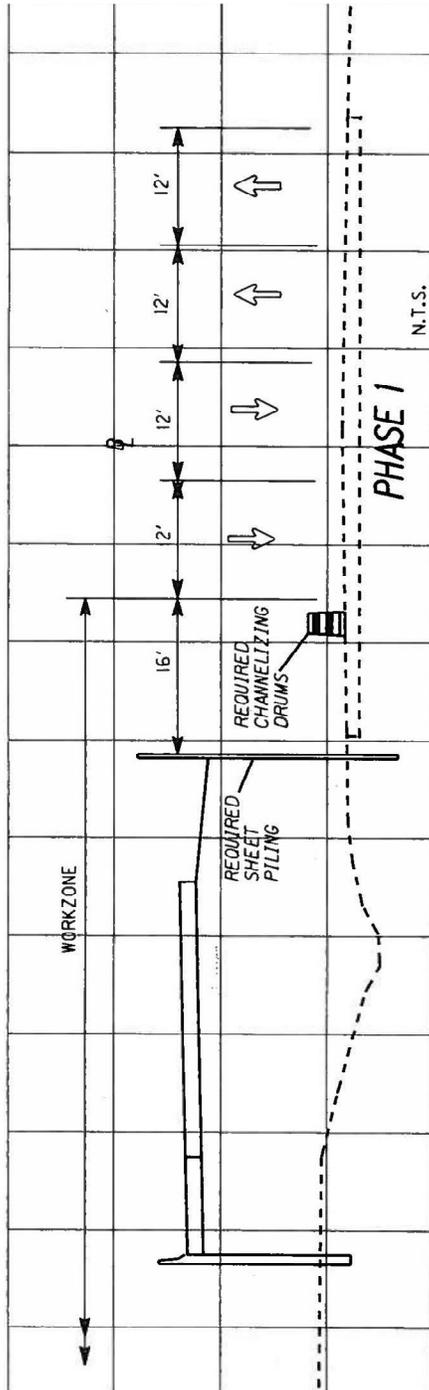


PROJECT: Georgia Department of Transportation
 HPP00-0000-00(345) – P.I. No. 0000345
 SR 307 - New Overpass over Port Authority Rail Line
 Chatham County

ALTERNATIVE NO.:
D-3

DESCRIPTION: Construct the permanent roadway to the north of the existing roadway and phase the construction

SHEET NO.: 2 of 4



Calculations



PROJECT: **Georgia Department of Transportation
HPP00-0000-00(345) – P.I. No. 0000345
SR 307 - New Overpass over Port Authority Rail Line
Chatham County**

ALTERNATIVE NO.:
D-3

DESCRIPTION: **Construct the permanent roadway in the location of
the proposed detour.**

SHEET NO.: **3** of **4**

Sheet Piles:

Station 103+25 to 109+25 = 600 lf x (25'+0)/2 = 7500 sf

Station 118+75 to 122+25 = 600 lf x (20'+0)/2 = 3500 sf

Total = 11,000 sf

Detour Paving Area:

Station 194+00 to 199+15 = 515 lf x (66'+0)/2 = 16,995 sf

Station 199+15 to 206+45 = 730 lf x (66'+52')/2 = 43,070 sf

Station 206+45 to 223+24 = 1679 lf x 52' = 87,308 sf

Station 223+24 to 226+00 = 276 lf x (76'+42')/2 = 16,284sf

Station 226+00 to 227+87= 287 lf x (13'+42')/2 = 16,503 sf

Total = 180,160 sf / (9sf/sy) => 20,000 sy

GAB 20000sy x (1000#/sy) x (2000#/tn) = 10,000 tons

12.5 mm Superpave 20000sy x (165#/sy) x (2000#/tn) = 1,650 tons

19.0 mm Superpave 20000sy x (220#/sy) x (2000#/tn) = 2,200 tons

25.0 mm Superpave 20000sy x (550#/sy) x (2000#/tn) = 5,500 tons

Right of Way:

From the original estimate ~\$116,447/90,000sf => \$1.30/sf

New ROW assume 50' x 3000' = 150,000sf x \$1.30 = \$195,000

Legal @ 50% = \$ 97,500

Appraisal = \$ 50,000

Condemnation = \$ 6,750

Incidentals = \$ 12,000

= \$166,250

Appreciation 10% = \$16,625

TOTAL COST = \$377,875

Drums:

Station 100+00 to Station 125+00 = 2500LF (2-250' tapers and a 2000' tangent)

25' O.C. in tapers = 500'/(25'/drum) = 20 each

50' O.C. in tangents = 2000'/(50'/drum) = 40 each

TOTAL = 60 each

Borrow:

Original Detour- Assume (3' avg. depth x 90' width x 2500 ft)/(27 cf /cy) = 25,000cy

Reqd. Fill for Alternative- Assume (3' avg. depth x 20' width x 2500 ft)/(27 cf /cy) = 5,555cy

Cost Worksheet



PROJECT:	Georgia Department of Transportation HPP00-0000-00(345) - P.I. No. 0000345 SR 307 - New Overpass over Port Authority Rail Line - Chatham County	ALTERNATIVE NO.:	D-3
DESCRIPTION:	Construct the permanent roadway to the north of the existing roadway and phase the construction	SHEET NO.:	4 of 4

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Temporary Barrier (Method 1)	lf	2,750	\$ 34.58	\$ 95,095	0	\$ 34.58	\$ -
Temporary Barrier (Method 2)	lf	0	\$ 70.73	\$ -	2,750	\$ 70.73	\$ 194,508
Temporary Attenuators	ea	3	\$ 12,191.82	\$ 36,575	1	\$ 12,191.82	\$ 12,192
Sheet Piling	sf	0	\$ 25.00	\$ -	11,000	\$ 25.00	\$ 275,000
Traffic Drums	ea	0	\$ 200.00	\$ -	60	\$ 200.00	\$ 12,000
GAB	tn	10,000	\$ 85.00	\$ 850,000	0	\$ 85.00	\$ -
12.5 mm Superpave	tn	5,500	\$ 85.00	\$ 467,500	0	\$ 85.00	\$ -
19.0 mm Superpave	tn	2,200	\$ 85.00	\$ 187,000	0	\$ 85.00	\$ -
25.0 mm Superpave	tn	1,650	\$ 85.00	\$ 140,250	0	\$ 85.00	\$ -
Borrow Excavation	cy	25,000	\$ 6.47	\$ 161,750	5555	\$ 6.47	\$ 35,941
Traffic Control	ls	1	\$ 150,000	\$ 150,000	1	\$ 250,000	\$ 250,000
Right of Way	ls	1	\$ 402,010	\$ 402,010	1	\$ 377,875	\$ 377,875
Temporary Railroad Crossing	ls	1	\$ 200,000	\$ 200,000	0	\$ -	\$ -
Temporary Pipe 18"	lf	100	\$ 45.00	\$ 4,500	0	\$ -	\$ -
Temporary Pipe 30"	lf	100	\$ 70.00	\$ 7,000	0	\$ -	\$ -
Temporary Pipe 60"	lf	100	\$ 280.00	\$ 28,000	0	\$ -	\$ -
Temporary FES 18"	ea	1	\$ 645.00	\$ 645	0	\$ -	\$ -
Temporary FES 30"	ea	1	\$ 950.00	\$ 950	0	\$ -	\$ -
Temporary FES 60"	ea	1	\$ 2,500.00	\$ 2,500	0	\$ -	\$ -
Sub-total				\$ 2,733,775			
Mark-up at 10.00%				\$ 273,378			
TOTAL				\$ 3,007,153			
Estimated Savings:							\$ 1,733,886

Value Analysis Design Alternative



PROJECT:	Georgia Department of Transportation HPP00-0000-00(345) – P.I. No. 0000345 SR 307 - New Overpass over Port Authority Rail Line Chatham County	ALTERNATIVE NO.:	BR-1
DESCRIPTION:	Optimize Span Arrangement	SHEET NO.:	1 of 5

Original Design:

The original design calls for a 949' long, 9 span bridge with wrap-around MSE walled abutments. The spans are of lengths 94' & 105' with BT 54 PPC girders and 118' with BT 63 girders. The out-to-out width of the bridge is 79'-3" to accommodate 10' foot shoulders on each side, an 8' median (4' raised) and two 12' travel lanes in each direction. The intermediate bents are made up of concrete caps and columns and founded on PPC piles supporting a pile cap. Span 1 crosses a canal while spans 2, 5, 6, 7, 8 & 9 cross railroad tracks and a Georgia Port Authority access drive.

Alternative:

The alternative suggests optimization of the span arrangement. Five intermediate spans, 2, 3, 4, 5 & 6 can be rearranged to accommodate four 132'-3" spans and elimination of one intermediate bent. All other geometry remains the same as in the original design.

Opportunities:

- Potential savings in construction costs and construction time due to larger number of similar sized beams
- Reduction in one intermediate bent
- Reduced wetlands mitigation, if any
- Larger horizontal clearances to tracks

Risks:

- Minimal redesign effort

Technical Discussion:

The rearrangement of spans offers the opportunity to eliminate one intermediate bent. BT 63 girders can be used on the 132'-3" spans with no effect on the existing vertical clearance. Higher strength concrete may be used if required. Larger number of similar sized girders could result in potential savings in fabrication and mobilization costs while at the same time speeding up installation and construction.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,380,040	\$ 0	\$ 1,380,040
ALTERNATIVE	\$ 1,268,216	\$ 0	\$ 1,268,216
SAVINGS	\$ 111,824	\$ 0	\$ 111,824

Illustration

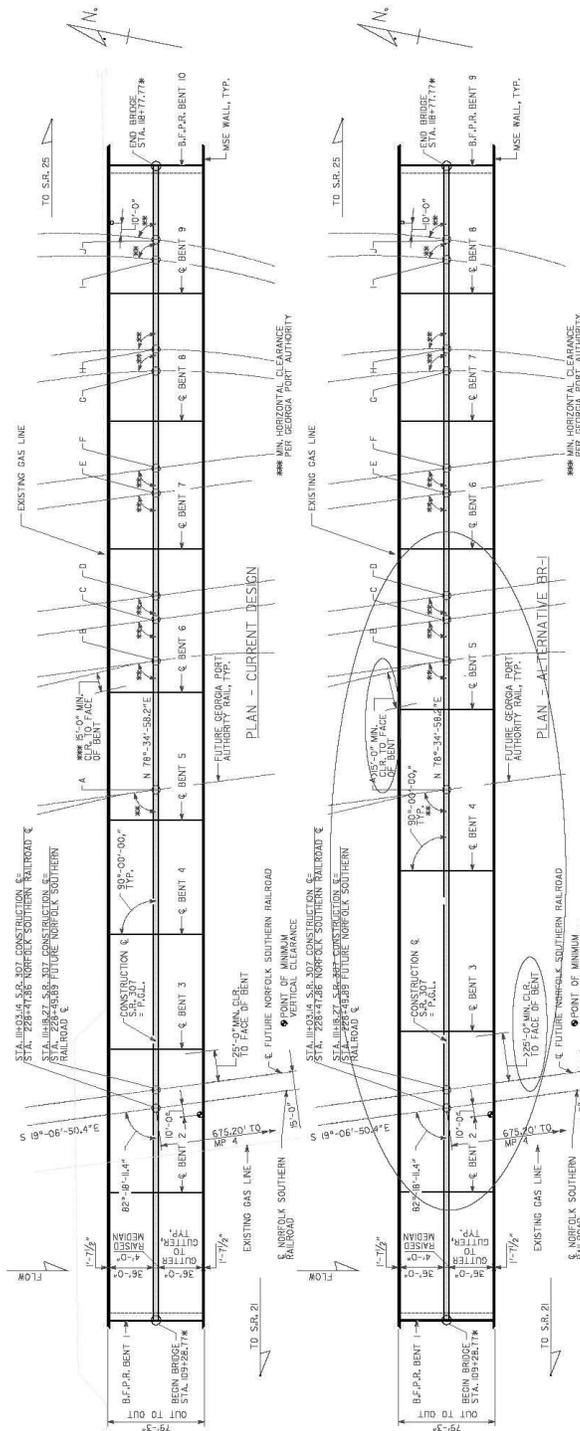


PROJECT: **Georgia Department of Transportation
HPP00-0000-00(345) – P.I. No. 0000345
SR 307 - New Overpass over Port Authority Rail Line
Chatham County**

ALTERNATIVE NO.:
BR-1

DESCRIPTION: **Optimize Span Arrangement**

SHEET NO.: **2 of 5**



Illustration

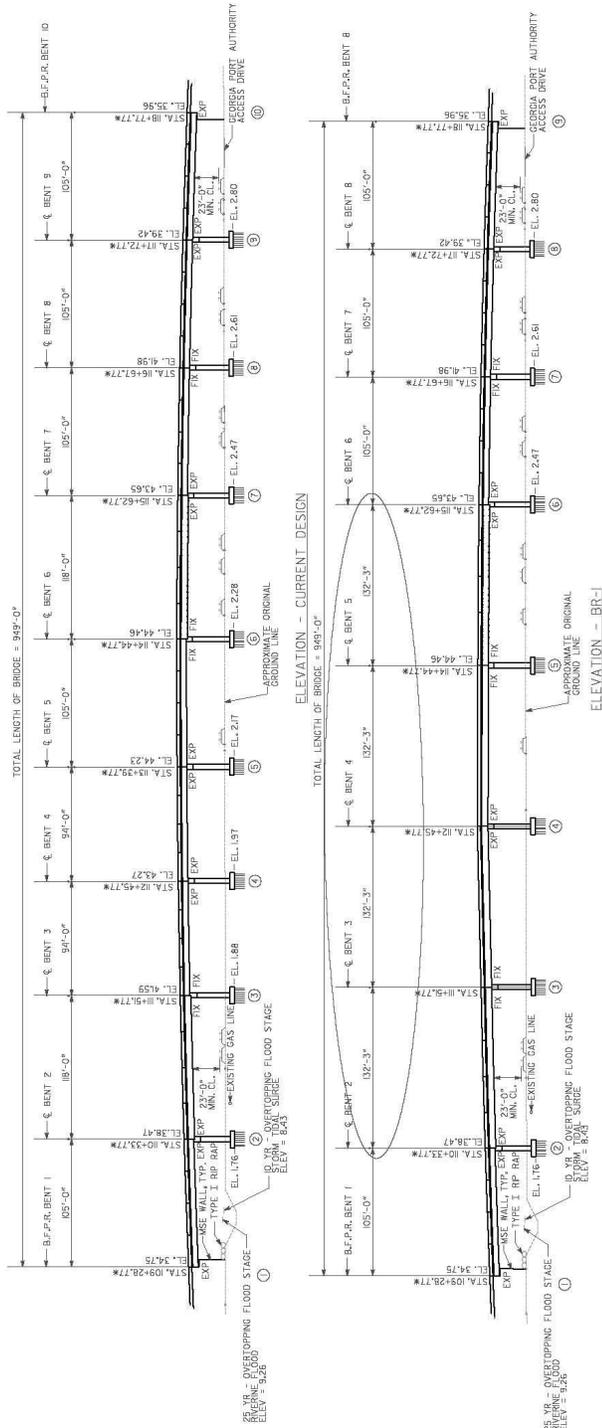


PROJECT: **Georgia Department of Transportation
HPP00-0000-00(345) – P.I. No. 0000345
SR 307 - New Overpass over Port Authority Rail Line
Chatham County**

ALTERNATIVE NO.:
BR-1

DESCRIPTION: **Optimize Span Arrangement**

SHEET NO.: **3 of 5**



Calculations



PROJECT: **Georgia Department of Transportation
HPP00-0000-00(345) – P.I. No. 0000345
SR 307 - New Overpass over Port Authority Rail Line
Chatham County**

ALTERNATIVE NO.:
BR-1

DESCRIPTION: **Optimize Span Arrangement**

SHEET NO.: **4 of 5**

Note:

- 1) Reduction from current design = savings for alternative
- 2) All Class AA concrete assumed

Current Design (9 Span – 949' Long, 79'-3" Out-to-Out Bridge)

Reductions:

Approximate length of Type BT 63 Girders = $12 * (2 * 118') = 2832$ LF

Approximate length of Type BT 54 Girders = $11 * (2 * 94') + 12 * 105' = 3328$ LF

Approximate Class AA concrete for cap, columns and pile caps (say, by eliminating Bent 4) = 178.6 CY

{Note: Above quantity obtained from Bridge Sheet 16 of 25 made available to the VE Team}

Approximate 18" PPC piles (say by eliminating Bent 4) = $3 * 10 * 19.97' = 599.1$ LF

**{Note: Above quantity obtained from Bridge Sheets 2 and 16 of 25 made available to the VE Team.
Pile tip = El. -17', Pile cut-off = El. 2.97, assuming 12" embedment in pile cap}**

Excavation / other treatments (assumed same for current design & alternative, therefore, not considered - conservative)

Alternative Design (8 Span – 949' Long, 79'-3" Out-to-Out Bridge)

Additions (replacement):

Approximate length of Type BT 63 Girders = $4 * (132.25' * 12) = 6348$ LF

NOTE:

A more detailed cost analysis may be performed on sufficiently developed alternative bridge plans to be able to itemize major components and realize greater cost savings than that shown in this study.

Cost Worksheet



PROJECT:	Georgia Department of Transportation HPP00-0000-00(345) - P.I. No. 0000345 SR 307 - New Overpass over Port Authority Rail Line - Chatham County	ALTERNATIVE NO.:	BR-1
DESCRIPTION:	Optimize Span Arrangement	SHEET NO.:	5 of 5

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE			
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL	
Class AA Concrete (Incl. Reinf.)	CY	179	\$ 848.10	\$ 151,471	0	\$ 848.10	\$ -	
BT 63 Girder	LF	2,832	\$ 181.62	\$ 514,348	6348	\$ 181.62	\$ 1,152,924	
BT 54 Girder	LF	3,328	\$ 167.13	\$ 556,209	0	\$ 167.13	\$ -	
18" SQ. PPC Piles	LF	599	\$ 54.34	\$ 32,555	0	\$ 54.34	\$ -	
Note: Reduction from current design = savings for alternative								
Sub-total				\$ 1,254,582			\$ 1,152,924	
Mark-up at	10.00%				\$ 125,458			\$ 115,292
TOTAL				\$ 1,380,040			\$ 1,268,216	
Estimated Savings:							\$111,824	

Value Analysis Design Alternative



PROJECT:	Georgia Department of Transportation HPP00-0000-00(345) – P.I. No. 0000345 SR 307 - New Overpass over Port Authority Rail Line Chatham County	ALTERNATIVE NO.:	BR-2
DESCRIPTION:	Use 8' shoulders on bridge and provide an intermediate concrete barrier	SHEET NO.:	1 of 4

Original Design:

The original design calls for a 949' long, 9 span bridge with wrap-around MSE walled abutments. The spans are of lengths 94' & 105' with BT 54 PPC Girders and 118' with BT 63 Girders. The out-to-out width of the bridge is 79'-3" to accommodate 10' foot shoulders on each side, an 8' median (4' raised) and two 12' travel lanes in each direction. The intermediate bents are made up of concrete caps and columns and founded on PPC piles supporting a pile cap. Span 1 crosses a canal while Spans 2, 5, 6, 7, 8 & 9 cross railroad tracks and a Georgia Port Authority access drive.

Alternative:

The alternative suggests reducing the shoulders on both sides to 8'. Additionally, an intermediate barrier in the median in-lieu of a raised median is suggested for positive traffic separation. All other geometry remains the same as in the original design.

Opportunities:

- Potential savings in construction costs and construction time
- Reduction in one beam line
- Additional construction staging area made available
- Reduced bent cap width

Risks:

- Minimal redesign effort

Technical Discussion:

An 8' outside shoulder will be adequate per AASHTO Geometric Design of Highways and Streets (pgs. 224, 315, 412, 455 & etc.). The 8' shoulder may also be sufficient to temporarily accommodate heavily laden stalled trucks. Additionally, the shoulder and buffer widths will closely match the typical roadway cross section.

An intermediate concrete barrier, 3' wide at the bottom with 2' buffers on either side, in-lieu of the 4' raised median, will provide positive traffic separation.

The out-to-out bridge width in the Alternative will measure 74'-3".

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 307,006	\$ 0	\$ 307,006
ALTERNATIVE	\$ 52,978	\$ 0	\$ 52,978
SAVINGS	\$ 254,028	\$ 0	254,028

Illustration

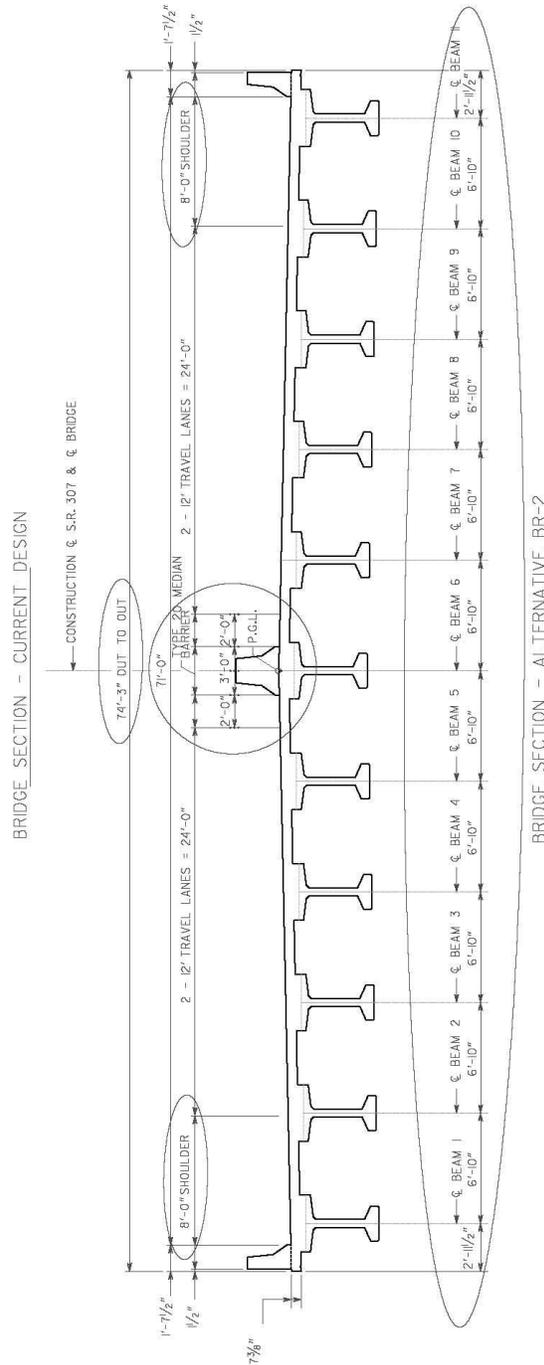
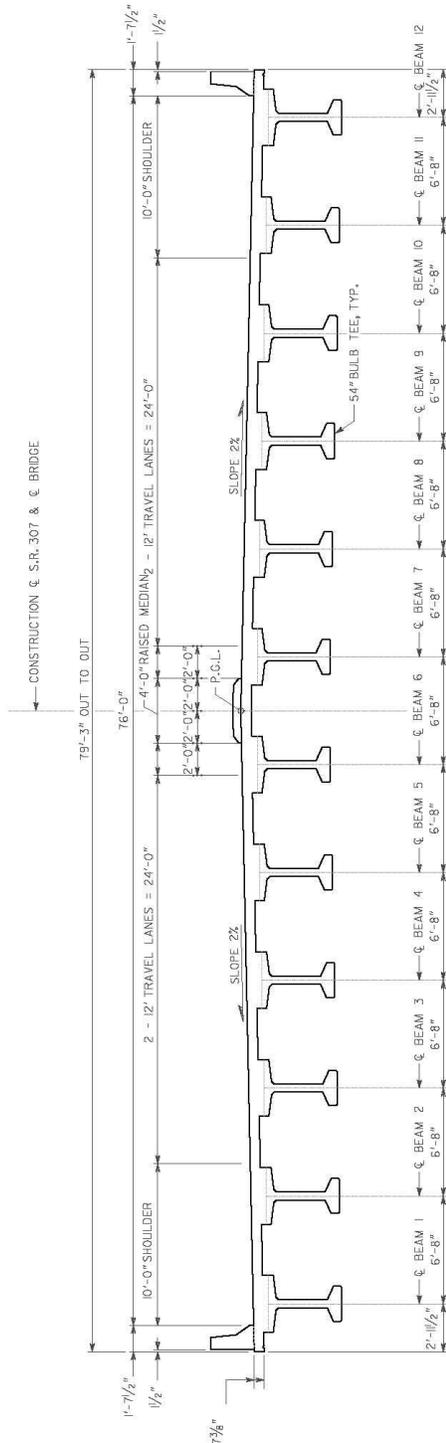


PROJECT: **Georgia Department of Transportation
HPP00-0000-00(345) – P.I. No. 0000345
SR 307 - New Overpass over Port Authority Rail Line
Chatham County**

ALTERNATIVE NO.:
BR-2

DESCRIPTION: **Use 8' shoulders on bridge and provide an
intermediate concrete barrier**

SHEET NO.: **2 of 4**



Calculations



PROJECT: **Georgia Department of Transportation
HPP00-0000-00(345) – P.I. No. 0000345
SR 307 - New Overpass over Port Authority Rail Line
Chatham County**

ALTERNATIVE NO.:
BR-2

DESCRIPTION: **Use 8' shoulders on bridge and provide an
intermediate concrete barrier**

SHEET NO.: **3** of **4**

Note:

- 1) Reduction from current design = savings for alternative
- 2) All Class AA concrete assumed
- 3) Savings based on 5' reduction in width of bridge (2' per shoulder and 1' due to reduced median width)
- 4) Savings based on possible reduction in one beam each from spans of lengths 105' and 118'

Current Design (9 Span – 949' Long, 79'-3" Out-to-Out Bridge)

Reductions:

Vol. of 7.375" thick (average) Class AA Superstructure Deck concrete = $(5' * 7.375" * 949') / (27 * 12) = 108$ CY

Approximate Class AA concrete cap (all bents, min dimensions used) = $5 * \{8 * [(4.5' * 5')] + 2 * [(3' * 2')]\} / 27$
= 35.56 CY

Total reduction in Class AA concrete = 143.56 CY

Class AA concrete for 4' wide 6" raised median = $(949' * 4') / 9 = 421.78$ SY

Approximate length of BT 63 Girders (1 Beam per spans 2 & 6) = $(2 * 118') = 236$ LF

Approximate length of BT 54 Girders (1 Beam per spans 1, 5, 7, 8, & 9) = $(5 * 105') = 525$ LF

Area of Grooved concrete (approx.) = $5' * 949' / 9 = 527.22$ SY

Area of other components / treatments / fill (assumed same for current design & alternative, therefore, not considered - conservative)

Alternative Design (9 Span – 949' Long, 74'-3" Out-to-Out Bridge)

Additions:

Type 20 Median Barrier = 949 LF

NOTE:

A more detailed cost analysis may be performed on sufficiently developed alternative bridge plans to be able to itemize major components and realize greater cost savings than that shown in this study.

Cost Worksheet



PROJECT:	Georgia Department of Transportation HPP00-0000-00(345) - P.I. No. 0000345 SR 307 - New Overpass over Port Authority Rail Line - Chatham County	ALTERNATIVE NO.:	BR-2
DESCRIPTION:	Use 8' shoulders on bridge and provide an intermediate concrete barrier	SHEET NO.:	4 of 4

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE			
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL	
Class AA Concrete (Incl. Reinf.)	CY	144	\$ 848.10	\$ 121,753	0	\$ 848.10	\$ -	
BT 63 Girder	LF	236	\$ 181.62	\$ 42,862	0	\$ 181.62	\$ -	
BT 54 Girder	LF	525	\$ 167.13	\$ 87,743	0	\$ 167.13	\$ -	
Deck Grooving	SY	527	\$ 4.05	\$ 2,135	0	\$ 4.05	\$ -	
4' Wide, 6" Raised Median	SY	422	\$ 58.33	\$ 24,602	0	\$ 58.33	\$ -	
Type 20 Median Barrier	LF	0	\$ 50.75	\$ -	949	\$ 50.75	\$ 48,162	
Note: Reduction from current design = savings for alternative								
Sub-total				\$ 279,096				\$ 48,162
Mark-up at 10.00%				\$ 27,910				\$ 4,816
TOTAL				\$ 307,006				\$ 52,978

Estimated Savings: \$254,028

Value Analysis Design Alternative



PROJECT:	Georgia Department of Transportation HPP00-0000-00(345) – P.I. No. 0000345 SR 307 - New Overpass over Port Authority Rail Line Chatham County	ALTERNATIVE NO.:	BR-3
DESCRIPTION:	Use 6' shoulder for inbound and 10' shoulder for outbound and provide an int. concrete barrier	SHEET NO.:	1 of 4

Original Design:

The original design calls for a 949' long, 9 span bridge with wrap-around MSE walled abutments. The spans are of lengths 94' & 105' with BT 54 PPC girders and 118' with BT 63 girders. The out-to-out width of the bridge is 79'-3" to accommodate 10' foot shoulders on each side, an 8' median (4' raised) and two 12' travel lanes in each direction. The intermediate bents are made up of concrete caps and columns and founded on PPC piles supporting a pile cap. Span 1 crosses a canal while spans 2, 5, 6, 7, 8 & 9 cross railroad tracks and a Georgia Port Authority access drive.

Alternative:

The alternative suggests reducing the shoulder for the inbound traffic to 6'. Additionally, an intermediate barrier in the median in-lieu of a raised median is suggested for positive traffic separation.

All other geometry remains the same as in the original design.

Opportunities:

- Potential savings in construction costs and construction time
- Reduction in one beam line
- Additional construction staging area made available
- Reduced bent cap width

Risks:

- Minimal redesign effort

Technical Discussion:

A 6' outside shoulder will be adequate per AASHTO Geometric Design of Highways and Streets (pgs. 224, 315, 412, 455 & etc.). Since inbound traffic typically comprises of lighter (unladen) trucks with less likelihood of stalls reported, the 6' shoulder should be sufficient.

An intermediate concrete barrier, 3' wide at the bottom with 2' buffers on either side, in-lieu of the 4' raised median, will provide positive traffic separation.

The out-to-out bridge width in the Alternative will measure 74'-3".

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 307,006	\$ 0	\$ 307,006
ALTERNATIVE	\$ 52,978	\$ 0	\$ 52,978
SAVINGS	\$ 254,028	\$ 0	\$ 254,028

Calculations



PROJECT: **Georgia Department of Transportation
HPP00-0000-00(345) – P.I. No. 0000345
SR 307 - New Overpass over Port Authority Rail Line
Chatham County**

ALTERNATIVE NO.:
BR-3

DESCRIPTION: **Use 6' shoulder for inbound and 10' shoulder for
outbound and provide an int. concrete barrier**

SHEET NO.: **3** of **4**

Note:

- 1) Reduction from current design = savings for alternative
- 2) All Class AA concrete assumed
- 3) Savings based on 5' reduction in width of bridge (2' per shoulder and 1' due to reduced median width)
- 4) Savings based on possible reduction in one beam each from spans of lengths 105' and 118'

Current Design (9 Span – 949' Long, 79'-3" Out-to-Out Bridge)

Reductions:

Vol. of 7.375" thick (average) Class AA Superstructure Deck concrete = $(5' * 7.375" * 949') / (27 * 12) = 108$ CY

Approximate Class AA concrete cap (all bents, min dimensions used) = $5 * \{8 * [(4.5' * 5')] + 2 * [(3' * 2')]\} / 27$
= 35.56 CY

Total reduction in Class AA concrete = 143.56 CY

Class AA concrete for 4' wide 6" raised median = $(949' * 4') / 9 = 421.78$ SY

Approximate length of BT 63 Girders (1 Beam per spans 2 & 6) = $(2 * 118') = 236$ LF

Approximate length of BT 54 Girders (1 Beam per spans 1, 5, 7, 8, & 9) = $(5 * 105') = 525$ LF

Area of Grooved concrete (approx.) = $5' * 949' / 9 = 527.22$ SY

Area of other components / treatments / fill (assumed same for current design & alternative, therefore, not considered - conservative)

Alternative Design (9 Span – 949' Long, 74'-3" Out-to-Out Bridge)

Additions:

Type 20 Median Barrier = 949 LF

NOTE:

A more detailed cost analysis may be performed on sufficiently developed alternative bridge plans to be able to itemize major components and realize greater cost savings than that shown in this study.

Cost Worksheet



PROJECT:	Georgia Department of Transportation HPP00-0000-00(345) - P.I. No. 0000345 SR 307 - New Overpass over Port Authority Rail Line - Chatham County	ALTERNATIVE NO.:
		BR-3
DESCRIPTION:	Use 6' shoulder for inbound and 10' shoulder for outbound and provide an int. concrete barrier	SHEET NO.: 4 of 4

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Class AA Concrete (Incl. Reinf.)	CY	144	\$ 848.10	\$ 121,753	0	\$ 848.10	\$ -
BT 63 Girder	LF	236	\$ 181.62	\$ 42,862	0	\$ 181.62	\$ -
BT 54 Girder	LF	525	\$ 167.13	\$ 87,743	0	\$ 167.13	\$ -
Deck Grooving	SY	527	\$ 4.05	\$ 2,135	0	\$ 4.05	\$ -
4' Wide, 6" Raised Median	SY	422	\$ 58.33	\$ 24,602	0	\$ 58.33	\$ -
Type 20 Median Barrier	LF	0	\$ 50.75	\$ -	949	\$ 50.75	\$ 48,162
Note: Reduction from current design = savings for alternative							
Sub-total				\$ 279,096			\$ 48,162
Mark-up at 10.00%				\$ 27,910			\$ 4,816
TOTAL				\$ 307,006			\$ 52,978

Estimated Savings: \$254,028

Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation
HPP00-0000-00(345) – P.I. No. 0000345
SR 307 - New Overpass over Port Authority Rail Line
Chatham County**

ALTERNATIVE NO.:
BR-8

DESCRIPTION: **Replace spans 3 & 4 with fill**

SHEET NO.: **1 of 4**

Original Design:

The original design calls for a 949' long, 9 span bridge with wrap-around MSE walled abutments. The spans are of lengths 94' & 105' with BT 54 PPC girders and 118' with BT 63 girders. The out-to-out width of the bridge is 79'-3" to accommodate 10' foot shoulders on each side, an 8' median (4' raised) and two 12' travel lanes in each direction. The intermediate bents are made up of concrete caps and columns and founded on PPC piles supporting a pile cap. Span 1 crosses a canal while spans 2, 5, 6, 7, 8 & 9 cross railroad tracks and a Georgia Port Authority access drive.

Alternative:

The alternative suggests replacing spans 3 & 4 with fill, thereby providing two structures to cross the canal and tracks.

The vertical profile remains the same as in the original design.

Opportunities:

- Potential savings in construction costs and construction time
- Reduction in one substructure
- Additional construction staging area made available
- Lesser maintenance requirements

Risks:

- Redesign effort
- Additional MSE Wall and fill requirements

Technical Discussion:

Spans 3 & 4 can be replaced with soil fill encased in a MSE Wall system. The fill could support a normal full depth PCC pavement as at the approaches.

The calculations of quantities and savings are provided in the following pages.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,304,316	\$ 0	\$ 1,304,316
ALTERNATIVE	\$ 1,234,230	\$ 0	\$ 1,234,230
SAVINGS	\$ 70,086	\$ 0	\$ 70,086

Illustration

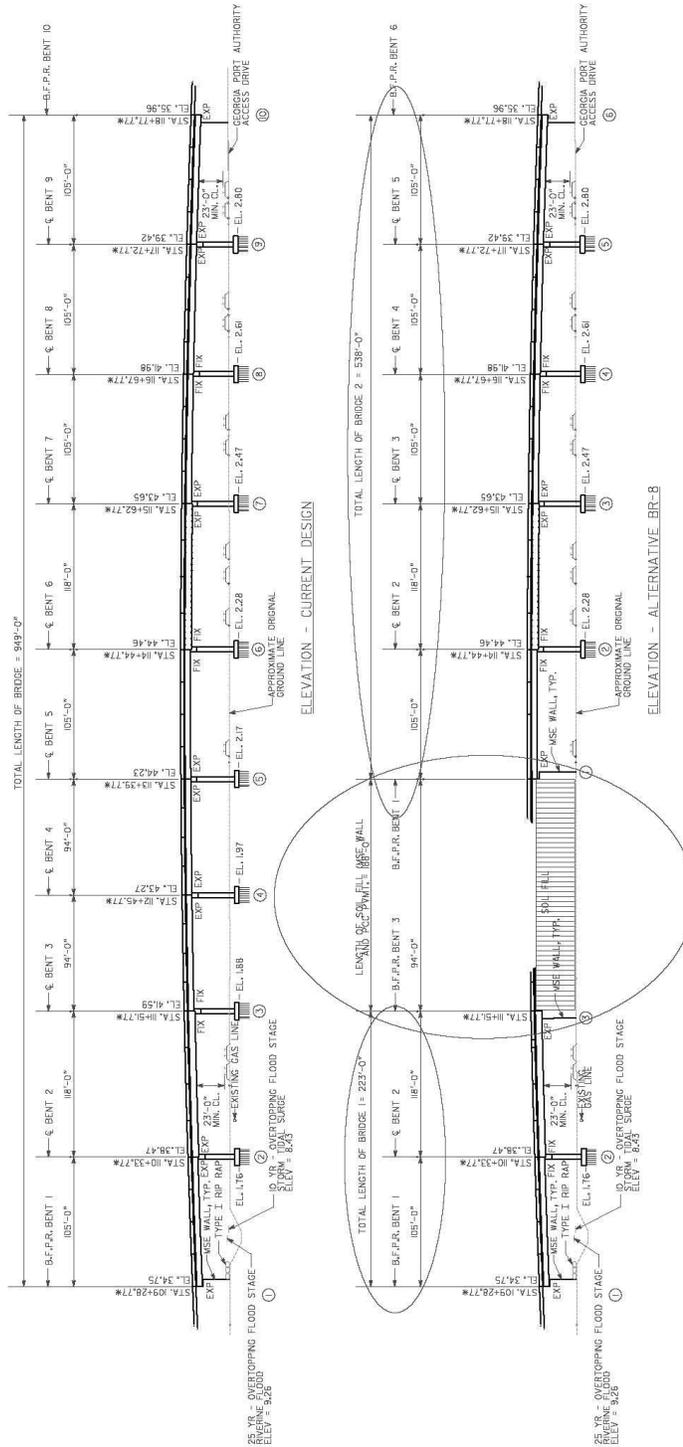


PROJECT: **Georgia Department of Transportation
HPP00-0000-00(345) – P.I. No. 0000345
SR 307 - New Overpass over Port Authority Rail Line
Chatham County**

ALTERNATIVE NO.:
BR-8

DESCRIPTION: **Replace spans 3 & 4 With fill**

SHEET NO.: **2 of 4**



Calculations



PROJECT: **Georgia Department of Transportation
HPP00-0000-00(345) – P.I. No. 0000345
SR 307 - New Overpass over Port Authority Rail Line
Chatham County**

ALTERNATIVE NO.:
BR-8

DESCRIPTION: **Replace spans 3 & 4 with fill**

SHEET NO.: **3 of 4**

Note:

- 1) Reduction from current design = savings for alternative
- 2) All Class AA concrete assumed
- 3) Savings based on elimination of spans 3 & 4 and replacing with fill wrapped in MSE Walls
- 4) Assume roadway section across fill to be similar to bridge section
- 5) Current Barrier requirement = New Barrier requirement over MSE Wall (offset in cost)
- 6) Quantities are approximate

Current Design (9 Span – 949' Long, 79'-3" Out-to-Out Bridge)

Reductions:

Vol. of 7.375" thick (average) Class AA Super. Deck conc. = $(2*94*7.375*79.25)/(27*12) = 339.14$ CY

Approx. Class AA conc. cap, columns, pile cap (removal of Bents 3, 4, & 5) = $179.2 + 178.6 + 180.2 = 538$ CY

Total reduction in Class AA concrete = 877.14 CY

{Note: Above quantities obtained from Bridge Sheets 15, 16 & 17 of 25 made available to the VE Team}

{Note: Class AA concrete for 4' wide 6" raised median is offset by raised median on pavement section}

Approximate length of BT 54 Girders (removal of spans 3 & 4) = $(2*11*94) = 2068$ LF

{Note: Area of Grooved concrete is offset by grooved concrete on pavement section}

18" SQ. PPC Piles = $3*10*(18.88' + 19.97' + 20.17') = 1770.6$ LF

(Any minor missing components or treatments assumed same for current and alternative design)

Alternative Design (Two Bridges, 223' and 538', 79'-3" Out-to-Out Bridge, MSE Walls)

Additions: (Note: Existing Bents 3 & 5 substituted by End Bents similar to Bent 1)

Class AA Concrete for new End Bents = $2*(21.5) = 43$ CY

18" PPC Piles at new End Bents (assume 57.5' pile lengths) = $2*12*57.5 = 1380$ LF

MSE Walls (assume 30' high throughout) = $2*[78.33' + 2*(94' + 6')]*30' = 16699.8$ SF

Concrete Coping = $2*[78.33' + 2*(94' + 6')] = 556.66$ LF

Borrow Excavation = $78.33'*200'*30'/27 = 17406.67$ CY

12" Thk. PCC Paving = $79.25'*2*94'/9 = 1655.44$ SF

NOTE: A more detailed cost analysis may be performed on sufficiently developed alternative bridge plans to be able to itemize major components and realize greater cost savings than that shown in this study.

Cost Worksheet



PROJECT:	Georgia Department of Transportation HPP00-0000-00(345) - P.I. No. 0000345 SR 307 - New Overpass over Port Authority Rail Line - Chatham County	ALTERNATIVE NO.:	BR-8
DESCRIPTION:	Replace spans 3 & 4 with fill	SHEET NO.:	4 of 4

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Class AA Concrete (Incl. Reinf.)	CY	877	\$ 848.10	\$ 743,902	43	\$ 848.10	\$ 36,468
BT 54 Girder	LF	2,068	\$ 167.13	\$ 345,625	0	\$ 167.13	-
18" SQ. PPC Piles	LF	1,771	\$ 54.34	\$ 96,214	1,380	\$ 54.34	\$ 74,989
MSE Walls, 30' High	SF	0	\$ 45.76	-	16,700	\$ 45.76	\$ 764,183
Coping A	LF	0	\$ 70.79	-	557	\$ 70.79	\$ 39,406
Borrow Excavation	CY	0	\$ 6.47	-	17,407	\$ 6.47	\$ 112,621
12" Thk. PCC Paving	SY	0	\$ 57.00	-	1,655	\$ 57.00	\$ 94,360
Note: Reduction from current design = savings for alternative							
Sub-total				\$ 1,185,742			\$ 1,122,028
Mark-up at 10.00%				\$ 118,574			\$ 112,203
TOTAL				\$ 1,304,316			\$ 1,234,230

Estimated Savings: \$70,086

Project Description

PROJECT DESCRIPTION

PROJECT INTRODUCTION

This project begins in Chatham County at mile post 7.93 on SR 307 west of the Norfolk Southern Foundation Lead Track crossing and continues east to the intersection of SR 25 at mile post 8.47. The project length is 0.54 miles.

This project is needed to provide a grade separation between rail and vehicular traffic. SR 307 currently has an at grade crossing with the Norfolk Southern Foundation Lead Track. The Port Authority plans to install a total of 14 tracks that will cross SR 307 in the future. The grade separation will provide a much safer and more efficient movement of vehicles. The functional classification for this project is urban principal arterial. The design calls for four 12' travel lanes (two in each direction) with a 20' raised median and 10' shoulders (6.5' paved and 3.5' grassed). The proposed bridge would have four 12' lanes with an 8' raised median and 10' shoulders. Total width would be 79.25' and total length 1038'.

A proposed SR 307 detour during construction would have four 12' lanes with a 10' (2' paved and 8' grassed) rural shoulders.

The estimated construction costs for this project are \$17,484,599 plus a reimbursable utilities cost of \$3,000,000 and a right-of-way acquisition cost of \$300,000. Total project costs are estimated to be \$20,784,598.

REPRESENTATIVE DOCUMENTS

- Georgia Department of Transportation
- Kimley-Horn and Associates, Inc.
 - Half size plan set
 - Construction Cost Estimates
 - Preliminary Right-of-Way Cost Estimate
 - Concept Report/Revised Concept Report

The VE Team utilized the supplied project materials noted above and the current standard drawings, details and specifications provided by Kimley-Horn and Associates, Inc.

REVISED PROJECT CONCEPT REPORT

HPP-0000-00(345)

P.I. No. 0000345

Chatham County

SR 307 CONSTRUCT OVERPASS OVER PORT AUTHORITY NEW RAIL LINE

Need and Purpose: Project HPP-0000-00(345) is needed to provide a grade separation between rail and vehicular traffic. This project proposes the construction of a bridge and approaches to carry SR 307 traffic over both existing (Norfolk Southern) and proposed (Intermodal Facility) railroad tracks. SR 307 presently has an at-grade crossing with the Norfolk Southern Foundation Lead track. The Georgia Ports Authority has long range plans to install up to twelve working tracks and eight storage tracks at the James D. Mason Intermodal Container Transfer Facility. Additionally, a connection from the working tracks and storage tracks on the south end of the ICTF is necessary for train movements into and out of the facility. These connecting tracks will eventually lead to 14 total tracks that will lie across the present location of SR 307. The grade separation will provide a much safer and more efficient movement of vehicles. The grade separation of SR 307 from the rail traffic was identified in the Chatham County Intermodal Freight Study.

Project location: Project HPP-0000-00(345) begins in Chatham County at Mile Post 7.93 on SR 307 west of the Norfolk Southern Foundation Lead Track crossing and continues east to the intersection of SR 25 at Mile Post 8.47. The total project length is 0.54 miles.

Description of the approved concept: The proposed project would provide grade separation between vehicular traffic and existing Norfolk Southern Foundation Lead as well as numerous rails that are being installed as part of the GPA intermodal facility. The existing 4-lane rural roadway with 14-foot flush median would be reconstructed along existing alignment. The proposed bridge would be a 4-lane section with a 14-foot raised median. An on-site 2-lane detour would be required to maintain traffic during construction.

PDP Classification: Major (X) Minor ()

Federal Oversight: Full Oversight (), Exempt (X), State Funded (), Other ()

Functional Classification: Urban Principal Arterial

U. S. Route Number(s): None **State Route Number(s):** 307

Traffic (AADT) as shown in the approved concept:

Current Year: 7000 (1999) ^{44 of 66} Design Year: 9500 (2023)

Proposed features to be revised:

Typical Section: The typical sections described in the original concept for SR 307 and detour are to be revised to meet current GDOT policy. The original typical section for SR 307 consists of two 12-foot travel lanes in each direction divided by a 14-foot flush median with 10-foot rural shoulders (8-foot paved on the north side). The detour typical section described in the original concept consists of one 12-foot travel lane in each direction with 10 foot rural shoulders (4-foot paved).

SR 307 @ SR 25 Intersection Configuration: The original concept calls for this intersection laneage to remain the same. The eastbound approach laneage would remain a single left, thru, and right.

Describe the revised feature(s) to be approved:

Proposed SR 307 Typical Section: Four 12-foot travel lanes (two in each direction) with a 20-foot raised median and 10-foot (6.5-foot paved, 3.5-foot grassed) rural shoulders.

Proposed SR 307 Bridge Typical Section: Four 12-foot travel lanes (two in each direction) with an 8-foot raised median and 10-foot shoulders. This allows for a total width of 79.25-feet, including side barriers, along a length of approximately 1038-feet.

Proposed SR 307 Detour Typical Section: Four 12-foot travel lanes (two in each direction) with 10-foot (2-foot paved, 8-foot grassed) rural shoulders.

SR 307 @ SR 25 Intersection Configuration: The east bound approach laneage will consist of a single left, two through, and a single right.

Updated traffic data (AADT):

Current Year: 5900 (2007)

Design Year: 26500 (2030)

Programmed/Schedule:

P.E. Authorized

R/W: 2008

Construction: 2009

VE Study Required: Yes (X)

No ()

Revised cost estimates:

1. Construction cost including inflation and E&C = \$20,834,338

Is the project located in a Non-attainment area? Yes..... X No

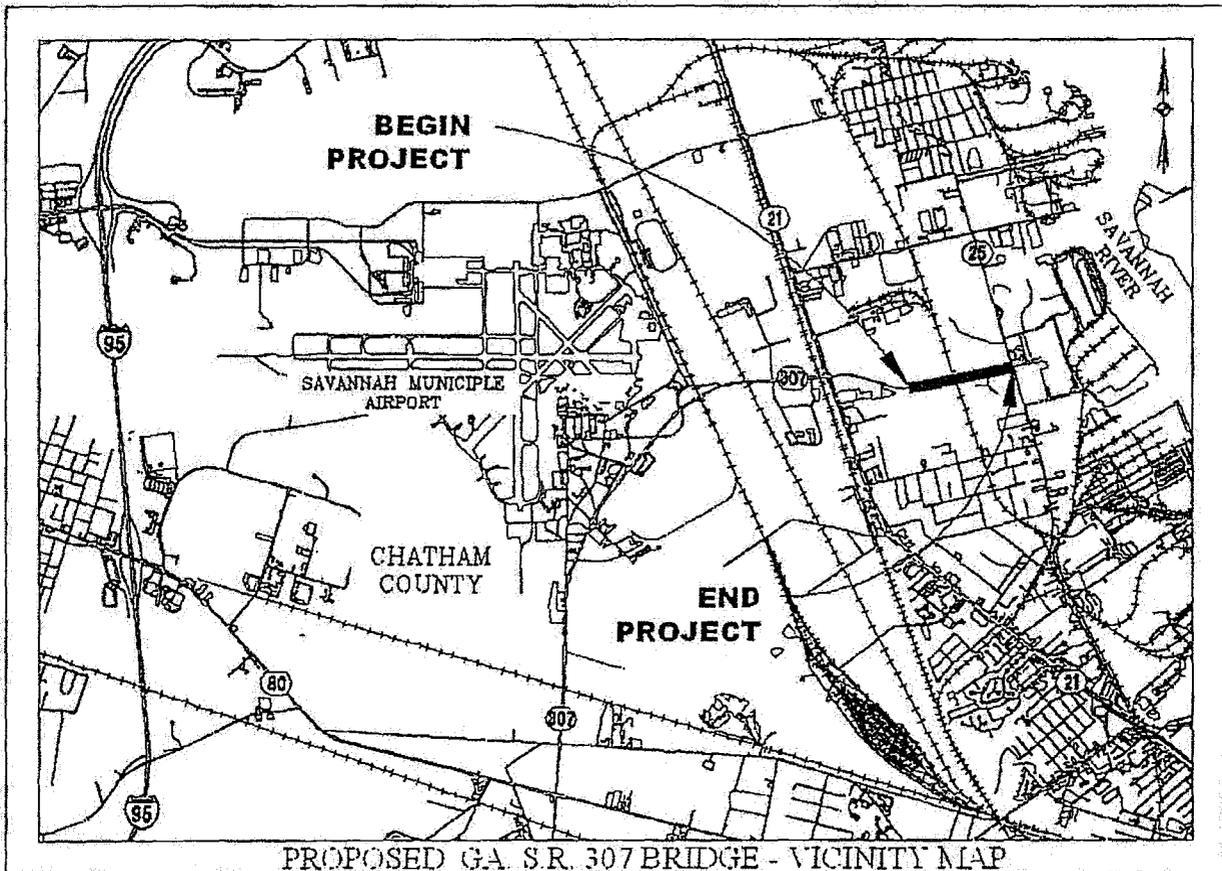
Recommendation: Recommend that the proposed revision to the concept be approved for implementation.

Attachments:

1. Sketch Map
2. Cost Estimate
3. Typical Sections (letter size)
4. Traffic Study

Concur: _____
Director of Preconstruction

Approve: _____
Chief Engineer



Location Map

HPP-0000-00(345) Chatham County PI No. 0000345

SR 307 CONSTRUCT OVERPASS OVER PORT AUTHORITY NEW RAIL LINE

Estimate Report for file "HPP00-0000-00(345)"

Section ROADWAY ITEMS					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
150-1000	1	LS	150000.00	TRAFFIC CONTROL - HPP-0000-00(345)	150000.00
153-1300	1	EA	75763.76	FIELD ENGINEERS OFFICE TP 3	75763.76
210-0100	1	LS	600000.00	GRADING COMPLETE -	600000.00
310-1101	22640	TN	19.78	GR AGGR BASE CRS, INCL MATL	447819.20
402-1812	500	TN	85.00	RECYCLED ASPH CONC LEVELING, INCL BITUM MATL & H LIME	42500.00
402-3113	2373	TN	85.00	RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME	201705.00
402-3121	24099	TN	85.00	RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME	2048415.00
402-3190	2724	TN	85.00	RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME	231540.00
413-1000	4792	GL	2.00	BITUM TACK COAT	9584.00
430-0220	5225	SY	57.00	PLAIN PC CONC PVMT, CL 1 CONC, 12 INCH THK	297825.00
433-1000	533	SY	126.22	REINF CONC APPROACH SLAB	67275.26
441-0740	1835	SY	34.63	CONCRETE MEDIAN, 4 IN	63546.05
441-0748	427	SY	54.78	CONCRETE MEDIAN, 6 IN	23391.06
441-6720	3720	LF	15.91	CONC CURB & GUTTER, 6 IN X 30 IN, TP 7	59185.20
453-1000	470	CY	643.63	PORTLAND CEMENT CONCRETE WHITETOPPING	302506.10
610-9999	1	Lump Sum	100000.00	REMOVE DETOUR PAVING	100000.00
620-0100	2750	LF	34.58	TEMPORARY BARRIER, METHOD NO. 1	95095.00
627-1020	44900	SF	58.90	MSE WALL FACE, 20 - 30 FT HT, WALL NO -	2644610.00
641-1100	40	LF	50.01	GUARDRAIL, TP T	2000.40
641-1200	600	LF	17.12	GUARDRAIL, TP W	10272.00
641-5012	2	EA	1835.14	GUARDRAIL ANCHORAGE, TP 12	3670.28
999-9999	83133	SF	100.00	BRIDGE (1049FT X 79.25 FT)	8313300.00
Section Sub Total:					\$15,790,003.31

Section DRAINAGE ITEMS					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
550-1180	100	LF	44.54	STORM DRAIN PIPE, 18 IN, H 1-10	4454.00
550-1300	100	LF	70.20	STORM DRAIN PIPE, 30 IN, H 1-10	7020.00
550-2240	60	LF	38.48	SIDE DRAIN PIPE, 24 IN, H 1-10	2308.80
550-3424	2	EA	727.52	SAFETY END SECTION 24 IN, SIDE DRAIN, 4:1 SLOPE	1455.04
550-4218	2	EA	664.32	FLARED END SECTION 18 IN, STORM DRAIN	1328.64
550-4230	2	EA	942.53	FLARED END SECTION 30 IN, STORM DRAIN	1885.06
Section Sub Total:					\$18,451.54

Section SIGNING AND MARKING					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
636-1033	100	SF	19.60	HIGHWAY SIGNS, TP 1 MATL, REFL SHEETING, TP 9	1960.00
636-2070	80	LF	8.27	GALV STEEL POSTS, TP 7	661.60
652-5451	5600	LF	0.23	SOLID TRAFFIC STRIPE, 5 IN, WHITE	1288.00
652-6501	5600	GLF	0.16	SKIP TRAFFIC STRIPE, 5 IN, WHITE	896.00
654-1001	100	EA	3.13	RAISED PVMT MARKERS TP 1	313.00
Section Sub Total:					\$5,118.60

Section EROSION CONTROL - PERMANENT					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
700-6910	13	AC	1050.40	PERMANENT GRASSING	13655.20
716-2000	10000	SY	1.23	EROSION CONTROL MATS, SLOPES	12300.00
Section Sub Total:					\$25,955.20

Section EROSION CONTROL - TEMPORARY					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
163-0300	2	EA	1620.67	CONSTRUCTION EXIT	3241.34
163-0503	4	EA	530.48	CONSTRUCT AND REMOVE SILT CONTROL GATE, TP 3	2121.92
163-0530	1000	LF	4.29	CONSTRUCT AND REMOVE BALED STRAW EROSION CHECK	4290.00
165-0101	4	EA	584.83	MAINTENANCE OF CONSTRUCTION EXIT	2339.32
171-0030	11200	LF	3.89	TEMPORARY SILT FENCE, TYPE C	43568.00
Section Sub Total:					\$55,560.58

Subtotal Construction Cost	\$15,895,089.23
E&C Rate 10.0 %	\$1,589,508.92
Inflation Rate 0 % @ 0 Years	\$0.00
<hr/>	
Total Construction Cost	\$17,484,598.15
Right Of Way	\$300,000.00
ReImb. Utilities	\$3,000,000.00
<hr/>	
Grand Total Project Cost	\$20,784,598.15

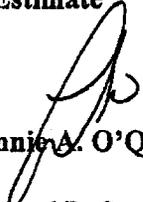
DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

INTERDEPARTMENTAL CORRESPONDENCE

FILE: R/W Cost Estimate

OFFICE: Right of Way

DATE: 4/11/08

FROM:  Lonnie A. O'Quinn, District Right of Way Team Manager

TO: Howard P. Copeland, State Right of Way Administrator
ATTENTION: Katrina Anderson

SUBJECT: RIGHT OF WAY COST ESTIMATE
NEGOTIATION FROM COST ESTIMATE
PROJECT NO. : HPP00-0000-00(345)
P.I. NUMBER: 000345 *Chatham*

Attached is the project Right of Way Cost Estimate on the above referenced project, along with the verified Comparable Sales Data supporting the \$10,000 or less value estimations. (See verification sources on Comparable Sales Data Sheet.)

It is estimated that the total cost of right of way plus all related expenses will be \$402,010.00.
Parcels exceeding the \$10,000 limit will be appraised.

By this submission, I am requesting that funds be authorized as identified above.

This Cost Estimate and the information contained herein shall be used to negotiate the parcels that have been estimated to have a value of \$10,000 or less on subject project.

Please contact Bryan Wingate/ Tony Griffis at 912-427-1983/ 912-427-1987 should you have any questions regarding this request.

Approved: _____

Review Appraiser/Date

ATTACHMENTS: R/W Cost Breakdown Sheet; Parcel Value Documentation; Comparable Sales Data (With Sales Verification Information); Subject and Sales Analysis; Comparable Sale Sheet Photographs

DETAIL COST ESTIMATE SUMMARY SHEET

DATE: 4-11-08

P.I. #: 000345

PROJECT: HPP00-0000-00(345)

COUNTY: Chatham

PARCELS: 6

PROJECT DESCRIPTION: S.R. 307 Overpass over Port Authority New Rail Line.

1. LAND: (Total area and cost by category)

Right of Way:	\$ 116,446.78	
Permanent and Temporary Easement:	\$97,671.99	
Total		<u>\$214,118.77</u>

2. IMPROVEMENTS:

Main Structures	\$ 0.00	
Site Improvements	\$ 0.00	
Total		<u>\$ 0.00</u>

3. Damages:

Damages to Land and Structures	\$ 0.00	
Specialty Costs (Cost to Cures, Trade Fixtures, etc.)	\$ 0.00	
Total		<u>\$ 0.00</u>

4. RELOCATION: (Including Consequential Displacements)

Businesses (# Displaced x \$15,000):	\$ 0.00	
Residential Tenant: (# Displaced x \$20,000):	\$ 0.00	
Residential Owner (# Displaced x \$40,000):	\$ 0.00	
Total		<u>\$ 0.00</u>

5. Property Management (Asbestos Removal and Demolition)

Number of Structures _____ x \$25,000/structure	\$ 0.00	
Number of sites with UST's _____ x \$50,000	\$ 0.00	
Number of signs (not billboards) _____ x \$1,500	\$ 0.00	
Total		<u>\$ 0.00</u>

Estimated Cost of Right of Way	<u>\$214,118.77</u>
---------------------------------------	----------------------------

C/O, Condemnation Increase & Legal Cost (50% of R/W)	\$ 107,059.38
Service Fees and Appraisal Cost(# Par x \$7,500)	\$ 45,000.00
Condemnation Cost (# Par x 15% x \$7,500)	\$ 6,750.00
Incidentals (# Par x \$2,000)	<u>\$ 12,000.00</u>

Net Cost	<u>\$ 170,809.38</u>
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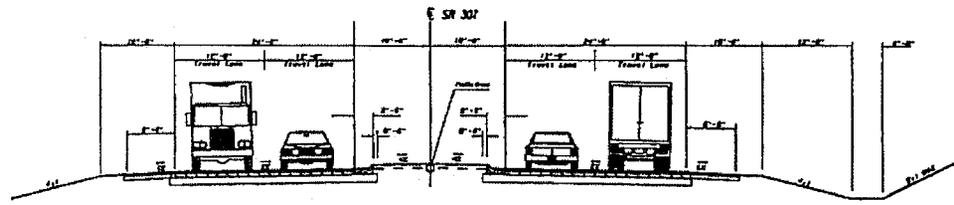
Market Appreciation (5% rural, 10% urban)	<u>\$17,080.93</u>
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TOTAL COST	<u>\$ 402,009.08</u>
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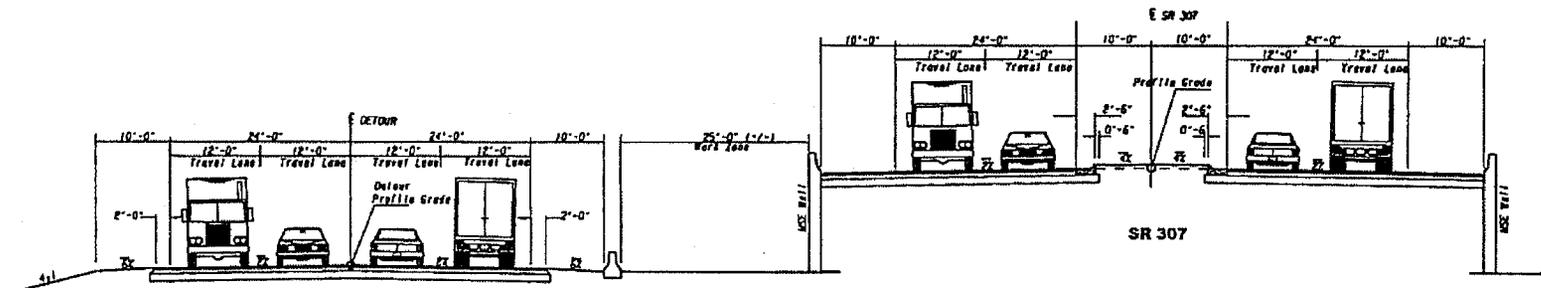
TOTAL COST (ROUNDED)	<u>\$ 402,010.00</u>
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<u>Credits:</u>	<u># Hours</u>
H. Bryan Wingate	40
Tony L. Griffis	40

Cc:
Attachment(s): Project Location Map; Comparable Sales Data

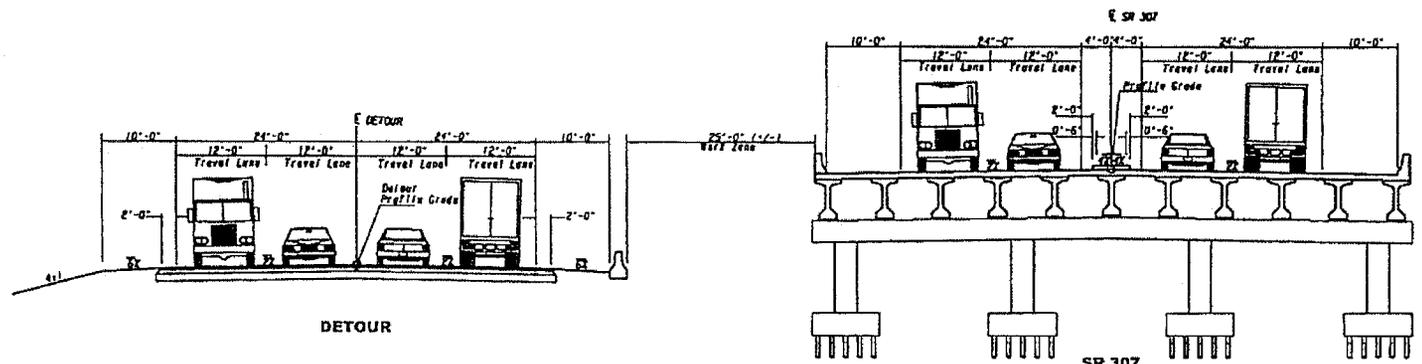


SR 307 AT GRADE



DETOUR

SR 307



DETOUR

SR 307 BRIDGE


Kimley-Horn and Associates, Inc.
 Engineers, Planners, and Environmental Consultants
 Suite 600, 3769 Holcomb Bridge Road
 Norcross, Georgia 30071

REVISION DATES

STATE OF GEORGIA
 DEPARTMENT OF TRANSPORTATION
 OFFICE: **TYPICAL SECTIONS**

Value Engineering Process

VALUE ENGINEERING PROCESS

This report summarizes the analysis and conclusions by the PBS&J Value Engineering team as they performed a VE Study during the period of January 6 through January 9, 2009 in Atlanta, Georgia, for the Georgia Department of Transportation.

INTRODUCTION

The Value Engineering Study team and its leadership were provided by PBS&J. This VE Team consisted of the following:

Les M. Thomas, P.E., CVS-Life	Certified Value Specialist
Luke Clarke., P.E., AVS	Highway and Transportation PE
Kevin Martin, Esq. AVS	Highway Construction Specialist
Ramesh Kalvakaalva, PE, AVS	Senior Bridge Structural Engineer
Randy S. Thomas, CVS	Assistant Team Leader

The Value Engineering Team followed the Seven Step Value Engineering job plan as promulgated by SAVE International. This Seven Step job plan includes the following:

- **Investigation/Information Phase** – during this phase of the VE Team’s work, the team received a briefing from the Kimley-Horn design team and the Georgia Department of Transportation (GDOT) staff. This briefing included discussions of the design intent behind the project, the cost concerns, and the physical project limitations. In the working session that followed, the VE Team developed cost models from the cost data provided by the designers and familiarized themselves with the construction drawings and other data that was available to the team. Some of the representative project information (concept report, cost estimate, and special provisions) may be found in the tabbed section of this report entitled ***Project Description***. Following this current narrative the reader will also find a cost model done in the Pareto fashion, i.e., identifying the highest costs down to the lowest costs for the larger construction cost elements. This cost model, developed by the VE Team, was used by the VE Team to help focus their week of work. The headings on the Pareto Chart also were used as headings for creative phase activities.
- **Analysis Phase** – during this phase the VE Team determined the “**Functions**” of the project. This was accomplished by reviewing the project from the simplest format in asking the questions of “What is the project supposed to do?”, and “How is it supposed to accomplish this purpose? In the Value Engineering vernacular, the answers to these questions are cast in the form of active verbs and measurable nouns. These verb/noun pairs form the basis of the function analysis which distinguishes a Value Engineering effort from a potentially damaging cost cutting exercise.

- The important functions of the project were identified as follows:
 - **Project Objective/Goals**
 - **Improve operations**
 - **Improve safety**
 - **Reduce conflicts**
 - **Reduce delays**
 - **Maintain schedule**
 - **Project Basic Functions**
 - **Separate vehicular and train traffic**
 - **Accommodate yard expansion**
 - **Accommodate existing utilities**
- **Speculation Phase** - The VE team performed a brainstorming session to identify ideas that might help meet the project objectives:
 - **Improve safety**
 - **Increase capacity**
 - **Reduce construction and life cycle costs**
 - **Reduce the time of construction**

This brainstorming session initially identified numerous ideas that were then evaluated in the Judgment phase. The reader will find the creative worksheets enclosed. These same work sheets were also used to record the results of the Judgment/Evaluation Phase.

- **Evaluation Phase** – Once the VE Team identified the creative ideas, it was necessary to decide which alternatives should be carried forward. This is the work of the Evaluation or Judgment Phase. The VE Team reflected back on the project constraints and objectives shared with the team by the owner’s representatives, in the kick-off meeting on the first day of the workshop. From that guidance, the team selected ideas that they believed would improve the project by a vote process.

- Following that selection process, the VE Team used the following values as measures of whether or not an alternative had enough merit to be carried forward in the VE process:
 - Construction cost savings
 - Improve value
 - Maintainability
 - Ability to implement the idea
 - General acceptability of the alternatives
 - Constructability
 - Scheduling delays

Based on these criteria, the VE Team evaluated the alternatives and graded them from 5 (Excellent) down to 1 (Poor). Other notes about the alternatives are annotated at the bottom of the enclosed creative and evaluation sheets.

- **Development Phase** – During this phase, the VE Team developed each of the selected design alternatives whose rating was “4” or “5” because of time constraints. If time permitted, the team will develop additional recommendations. This effort included a detailed explanation of the idea with sketches as appropriate to clarify the idea from the original concept, advantages and disadvantages, a technical explanation and an estimation of the cost and resultant savings if implemented. (see the tabbed section – Study Results)
- **Recommendation Phase** – During this phase the VE Team reviews the alternative ideas to confirm which ones are appropriate for the project, have an opportunity for success and which will improve the value of the project if implemented.
- **Presentation Phase** – As noted earlier, the team made an informal “out-briefing” on the last day of the workshop, designed to inform the Owners and the Designers of the initial findings of the VE Study. This written report is intended to formalize those findings.

The following **Function – Worth - Cost** Analysis, was utilized to focus the team and stimulate brainstorming; a copy of the **Attendance Sheets** is also attached so that the reader can be informed about who participated in the Study proceedings.

VALUE ENGINEERING STUDY AGENDA

for
Georgia Department of Transportation

Project No. HPP00-0000-00(345)

P.I. No. 0000345

SR 307 – New Overpass over Port Authority Rail Line
Chatham County

January 6-9, 2009

Pre-Workshop Activities

VE Team Leader organizes study, coordinates with the Owner and Designer the project objectives and materials necessary. The VE Team receives and reviews all project documents. The team develops a Pareto Chart and/or Cost Model for the project.

Day One

9:00-10:30 Design Team Presentation (Information Phase)

- Introduction of participants, owner, designer, and VE team members
- Presentation of the project by the design engineer including:
 - History and background
 - Design criteria and constraints
 - Special “U” turn requirements
 - Special needs (port, businesses, etc.)
 - Sidewalks, bicycle lanes, and or multi-use trails
 - Historical property protection
 - Current construction completion schedule
 - Project cost estimate and budget constraints
- Owner presentation – special requirements, definition of life cycle period and interest rate for life cycle costs
- Review VE Pareto Chart/Cost Model
- Discussion, questions and answers
- Overview of the VE Process and agenda – workshop goals & project goals

10:30-12:00 VE Team reviews project (Information Phase)

- Review design team’s presentation
- Review agenda and goals of the study

1:00-2:30 Function Analysis Phase

- Analyze Cost Model – Pareto
- Identify basic and secondary functions
- Complete Function Matrix/FAST Diagram

2:30-5:00 Creative Phase

- Brainstorming of alternative ideas

Day Two

8:00-10:00 Evaluation Phase

- Establish criteria for evaluation
- Rank ideas
- Identify “best” ideas for development
- Identify those ideas that will become Design Suggestions
- Develop a cost/worth analysis
- Identify a “champion” for each idea to be developed

10:00-5:00 Development Phase

- Develop alternative ideas design suggestions with assessment of original design and write up new alternatives including:
 - Opportunities & risks
 - Illustrations
 - Calculations
 - Cost worksheets
 - Life cycle cost analysis

Day Three

8:00-5:00 Development Phase

- Continue developing Alternative Ideas
- Continue developing Design Suggestions
- Prepare for presentation to Owners and Designers

Day Four

8:00-9:00 Prepare Presentation

9:00-10:00 VE Team Presentation

FUNCTION ANALYSIS AND COST-WORTH



Georgia Department of Transportation
 HPP00-0000-00(345) – P.I. No. 0000345
 SR 307 - New Overpass over Port Authority Rail Line – Chatham County

SHEET NO.: 1 of 2

NO.	ELEMENT	FUNCTION			COST (000)	WORTH (000)	COMMENTS
		VERB	NOUN	KIND			
1	OVERALL PROJECT	Increase	Traffic Capacity	B	20,785	18,785	C/W = 1.0
		Reduce	Congestion	B			
		Enhance	Safety	S			
2	BRIDGE	Cross	Creek	B	8,313	7,000	CW=1.18
		Separate	Traffic	B			
3	UTILITIES REIMBURSEMENT	Access	Site	S	3,000	2,000	CW= 1.5
		Reduce	Maintenance	S			
4	MSE WALL	Support	Load	S	2,645	2,645	CW=1.0
		Retain	Fill				
5	ASPHALT PAVING	Create	Lanes	B	2,524	2,524	C/W = 1.0
		Increase	Capacity	B			
		Enhance	Safety	RS			
6	MISCELLANEOUS ROADWAY ITEMS	Improve	Roadway	S	962	940	CW=1.02

Function defined as: Action Verb
 Measurable Noun

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

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

FUNCTION ANALYSIS AND COST-WORTH



Georgia Department of Transportation
HPP00-0000-00(345) – P.I. No. 0000345
SR 307 - New Overpass over Port Authority Rail Line – Chatham County

SHEET NO.: 2 of 2

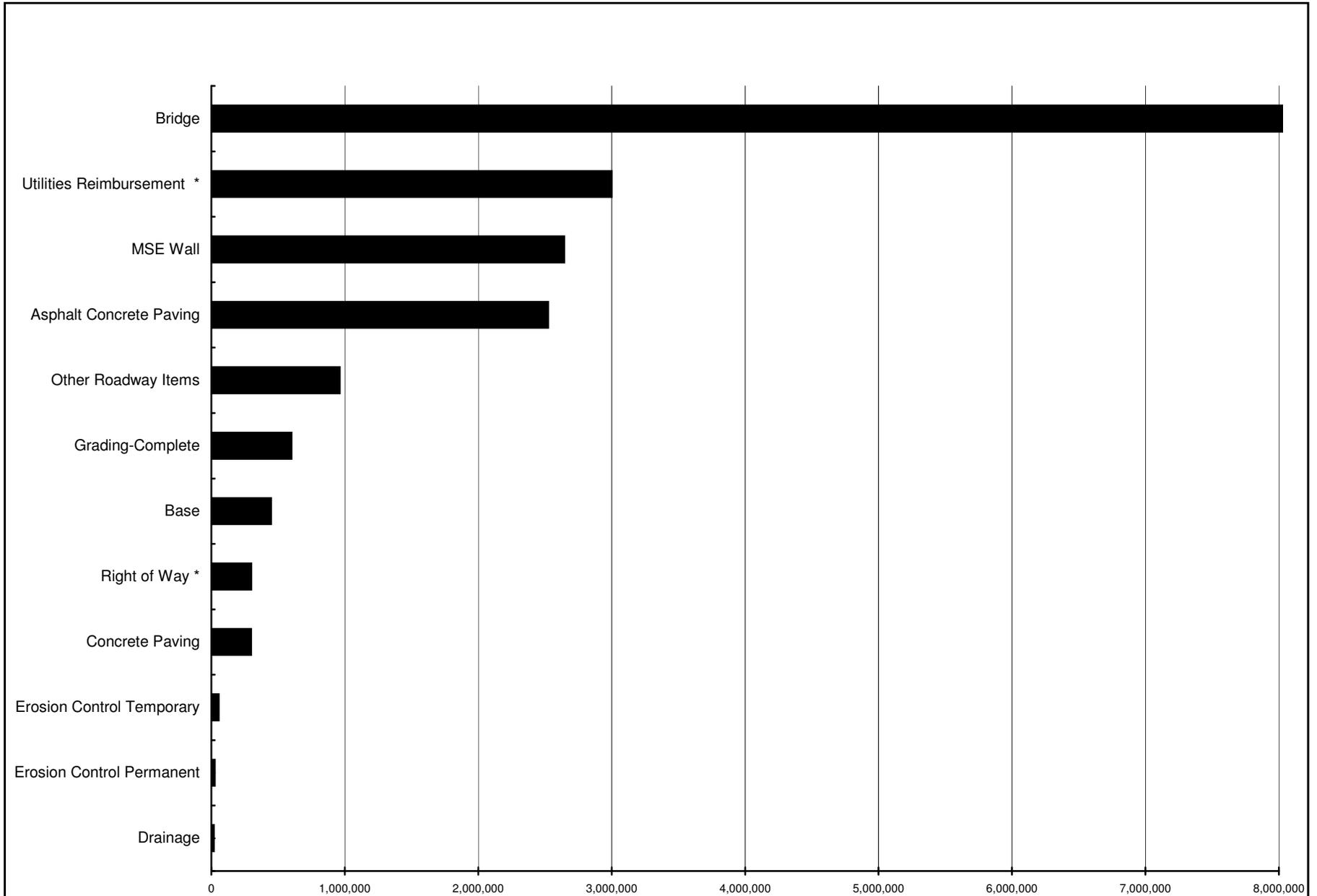
NO.	ELEMENT	FUNCTION			COST (000)	WORTH (000)	COMMENTS
		VERB	NOUN	KIND			
7	GRADING	Prepare	Site	S	600	600	CW=1.0
8	BASE	Support	Load	B	448	448	CW=1.0
9	RIGHT-OF-WAY	Accommodate	Widening	B	300	300	C/W= 1.0
		Facilitate	Utilities	RS			
10	CONCRETE PAVING	Reduce	Maintenance	S	298	298	CW=1.0
		Support	Load	S			
11	EROSION CONTROL	Stabilize	Earthwork	S	82	82	CW=1.0
		Stabilize	Earthwork	S			
12	DRAINAGE	Convey	Storm Water	B	18	18	C/W = 1.0
		Facilitate	Utilities	S			
13	SIGNING, STRIPING & SIGNALS	Enhance	Safety	S	5	5	C/W=1.0

Function defined as: Action Verb
 Measurable Noun

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

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

Project: HPP00-0000-00(345)
P.I. No.:0000345
Chatham County



DESIGNER PRESENTATION



MEETING PARTICIPANTS

Geogia Department of Transportation		January 6, 2009		
HP00-0000-00(345) - P.I. No. 0000345 - Chatham County				
NAME		ORGANIZATION & TITLE	E-MAIL	PHONE
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VE TEAM PRESENTATION

Georgia Department of Transportation		January 9, 2009		
HP00-0000-00(345) - P.I. No. 0000345 - Chatham County				
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CREATIVE IDEA LISTING



**PROJECT: Georgia Department of Transportation
HPP00-0000-00(345) – P.I. No. 0000345
SR 307 - New Overpass over Port Authority Rail Line
Chatham County**

SHEET NO.: 1 of 2

NO.	IDEA DESCRIPTION	RATING
ROADWAY (RD)		
RD-1	Use 11' lanes	2
RD-2	Reduce median width	2
RD-3	Reduce outside shoulder width in areas bound by MSE wall	4
RD-4	Use PCC from Sta 100+00 to Sta 109+00	4
RD-5	Use a poured in place wall on North side in lieu of MSE wall	2
RD-6	Use sheet pile in lieu of MSE	2
RD-7	Use minimum crest vertical curve on bridge	2
RD-8	Route SR 25 to the west under bridge	1
DETOUR ROADWAY (D)		
D-1	Use 11' lanes	2
D-2	Eliminate temporary concrete barrier	4
D-3	Construct "Detour" as permanent to the North – abandon existing alignment after using as a detour	4
D-4	Check horizontal alignment on detour curves	2
D-5	Construct new route to the south – avoid all power impacts	3

**Rating: 1→2 = Not to be Developed; 3 = Varying Degrees of Development Potential;
4→5 = Most likely to be Developed; DS = Design Suggestion; ABD = Already Being Done**

