



September 30, 2008

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.: NH-051-1(25)  
County: Clarke  
P.I. No.: 122850  
SR 10 Loop  
PBS&J Project Task Order No. 30

Dear Ms. Myers:

Please find enclosed two (2) hard copies and one (1) CD of our final Value Engineering Report for the Interchange of SR 10 Loop and Peters Street/Olympic Drive in Clarke County, as referenced above.

This Value Engineering Study, which was performed during the period September 16 through September 19, 2008, identified **10 Alternative Ideas** which **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 – NH-051-1(25)***

***P.I. No. 122850***

***SR 10 Loop***

***Clarke 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 September 16 – September 19, 2008 in Atlanta, at the office of the Georgia Department of Transportation. The subject of the Value Engineering study was Project: NH-051-1(25) P.I. No.: 122850, SR 10 Loop and Peters Street/ Olympic Drive, Clarke County. The concept design for the project has been prepared by MACTEC, Inc. At the time of the workshop the plans had advanced to the concept design level.

## **PROJECT DESCRIPTION**

This project consists of providing grade separation between the existing SR 10 Loop and the Peters Street/ Olympic Drive. The existing at grade intersection is the last at grade intersection on the SR 10 Loop around Athens. The project has been designed to provide unimpeded movement on SR 10 during construction. A partial clover leaf intersection is also proposed. The project extends to the north to regrade the existing SR 10 Loop to be in accordance with a design speed of 65 mph. The current posted speed limit of the loop is 55 mph. A new park is currently under construction in the northwest corner of the existing intersection. The land use to the east is primarily commercial while the property to the west is residential. The estimated construction cost and right of way is \$18,095,662.

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:

- Maintaining smooth traffic flow on SR 10 Loop
- Improving trucking access to Olympic Drive
- Improving Safety
- Providing access to the new park.
- Avoiding rock excavation
- Avoiding unnecessary land "taking"
- Reducing the project scope
- Avoiding environmental concerns/ permitting
- Avoiding the existing power poles

## VALUE ENGINEERING PROCESS

The Value Engineering team followed the seven step Value Engineering job plan as promulgated by the Georgia Department of Transportation. 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 44 *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, *10 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.

# Summary of Alternatives & Design Suggestions



PROJECT: **Georgia Department of Transportation**  
**NH-051-1(25) – P.I. 122850**  
**SR 10 Loop - Clarke County**

SHEET NO.: **1 of 1**

ALTERNATIVE NUMBER	DESCRIPTION OF ALTERNATIVE	INITIAL COST SAVINGS
<b>ASPHALT PAVING (AP)</b>		
<b>AP-2</b>	Remove 2' space inside shoulder on Peter Street/Olympic Drive	\$ <b>33,241</b>
<b>AP-6</b>	Use 2 lane undivided roadway on Peter Street/Olympic Drive with left turn and right turn bays to accommodate traffic turning from Peter and Olympic to SR Loop 10	\$ <b>263,378</b>
<b>AP-15</b>	Move the logical terminus of the eastern portion of Peter Street/Olympic Drive westerly	\$ <b>757,868</b>
<b>AP-17</b>	Move ramp B intersection with Peter Street/ Olympic Drive to the east and re-align ramp A and move the park entrance to line up with the new intersection	\$ <b>441,343</b>
<b>AP-21</b>	Construct compressed diamond interchange	\$ <b>176,238</b>
<b>AP-22</b>	Delete sidewalks and bike lanes on Peter Street/Olympic Drive; build one 10' multi-use trail on one side of the road	\$ <b>76,039</b>
<b>EARTHWORK (EW)</b>		
<b>EW-7</b>	Eliminate SR 10 Loop grade correction on northern section	\$ <b>340,241</b>
<b>BRIDGE (BR)</b>		
<b>BR-5</b>	Use MSE Walled Abutments to accommodate single span bridges	\$ <b>526,875</b>
<b>BR-8</b>	Construct two-12' lanes with 4' and 6'-6" shoulders on both bridges	\$ <b>133,165</b>
<b>BR-9</b>	Construct two-12' lanes width 4' and 6'-6" shoulders on East bridge	\$ <b>43,763</b>

## *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*.

# Summary of Alternatives & Design Suggestions



PROJECT: **Georgia Department of Transportation**  
**NH-051-1(25) – P.I. 122850**  
**SR 10 Loop - Clarke County**

SHEET NO.: **1 of 1**

ALTERNATIVE NUMBER	DESCRIPTION OF ALTERNATIVE	INITIAL COST SAVINGS
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<b>BR-9</b>	Construct two-12' lanes width 4' and 6'-6" shoulders on East bridge	\$ <b>43,763</b>

# Value Analysis Design Alternative



PROJECT:	<b>Georgia Department of Transportation NH-051-1(25) – P.I. 122850 SR 10 Loop - Clarke County</b>	ALTERNATIVE NO.:	<b>AP-2</b>
DESCRIPTION:	<b>Remove 2' space inside shoulder on Peter Street and Olympic Drive.</b>	SHEET NO.:	<b>1 of 4</b>

**Original Design:**

The original design calls for the construction of a 2' inside shoulder between the gutter joint and inside travel lane.

**Alternative:**

The alternative would remove the 2' inside shoulder in its entirety.

**Opportunities:**

- Reduction in pavement and G.A.B. costs

**Risks:**

- Minimal design impacts

**Technical Discussion:**

The section of Peters Street/Olympic Drive from STA.87+71.66 to STA. 114+56 is currently proposed to have a 2' paved inside shoulder between the inside travel lane and the gutter joint line. The alternative proposes removal of the 2' inside paved shoulder in its entirety to reduce pavement costs.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 3,588,748	\$ 0	\$ 3,588,748
ALTERNATIVE	\$ 3,558,528	\$ 0	\$ 3,558,528
SAVINGS	\$ 33,241	\$ 0	\$ 33,241

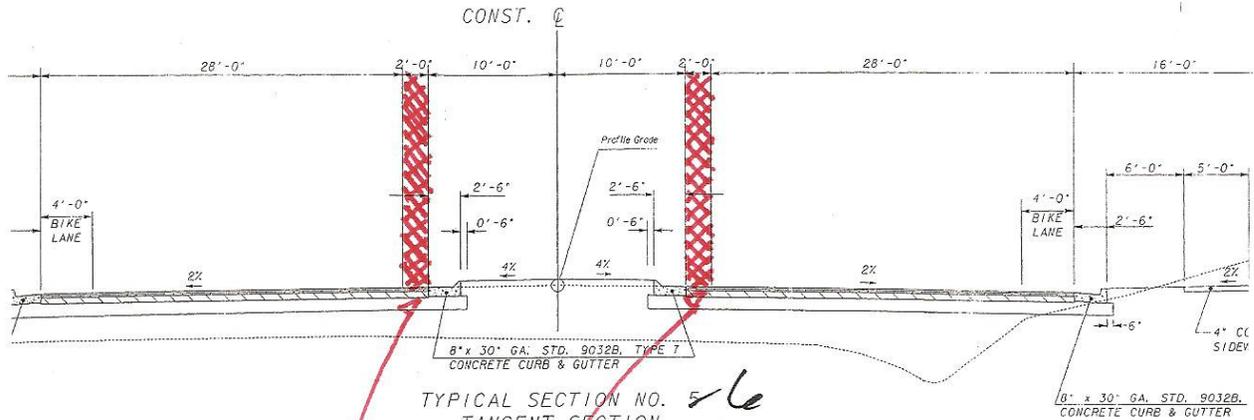
# Illustration

PROJECT: **Georgia Department of Transportation  
NH-051-1(25) – P.I. 122850  
SR 10 Loop - Clarke County**

ALTERNATIVE NO.:  
**AP-2**

DESCRIPTION: **Remove 2' space inside shoulder on Peter Street and  
Olympic Drive.**

SHEET NO.: **2** of **4**



TYPICAL SECTION NO. 56  
TANGENT SECTION  
APPLICABLE TO PETER ST./OLYMPIC DR.  
FROM STA.92-48.24 TO STA.99-15.00 &  
FROM STA.100-75.00 TO STA.114-56

ELIMINATE 2' INSIDE SHOULDER ON BOTH LANES  
OF PETER STREET/OLYMPIC DRIVE WHERE  
APPLICABLE.

# Calculations



PROJECT: **Georgia Department of Transportation  
NH-051-1(25) – P.I. 122850  
SR 10 Loop - Clarke County**

ALTERNATIVE NO.:  
**AP-2**

DESCRIPTION: **Remove 2' space inside shoulder on Peter Street and  
Olympic Drive.**

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

## Assumptions:

-Removal of 2' inside shoulder in its entirety from STA.87+71.66 to STA. 114+56 on Peter Street/Olympic Drive. (2,684.34LF) Calculated per typical section.

-Shoulder build-up= 12" GAB, 400LB/SY Base, 200LB/SY Binder, 150LB/SY Seal as outlined in the preliminary cost estimate quantities.

-Unit costs based on updated Estimate Report dated 9/2/2008.

**-GAB= 2,684.34LF x 2'W/9= 596.52SY x 100LB/SY=59652LB/2000= 29.83 tons per side x 2 sides=  
59.66 tons saved. 59.66 tons @ \$18.73/ton= \$1,117.43**

**-Base Asphalt= 596.52 SY x 400LB/SY=238,608LB/2000=119.3 tons per side x 2 sides=238.60 tons saved.  
238.60 tons @ \$62.07/ton= \$14,809.90**

**-Binder Asphalt= 596.52 SY x 200LB/SY=119,304LB/2000=59.65 tons per side x 2 sides=119.30 tons saved  
119.30 tons @ \$65.42/ton= \$7,804.61**

**-Seal Asphalt= 596.52 SY x 150LB/SY=89,478LB/2000=44.74 tons per side x 2 sides=89.48 tons saved  
89.48 tons @ \$72.16/ton= \$6,456.88**

**\$30,188.82 Design Alternative savings total exclusive of markup.**



# Value Analysis Design Alternative



PROJECT:	<b>Georgia Department of Transportation NH-051-1(25) – P.I. 122850 SR 10 Loop - Clarke County</b>	ALTERNATIVE NO.:	<b>AP-6</b>
DESCRIPTION:	<b>Use two-lane undivided on Peter Street/Olympic Drive with left turn and right turn bays to accommodate traffic turning from Peter Street/Olympic Drive onto SR 10 Loop</b>	SHEET NO.:	<b>1 of 5</b>

### Original Design:

The original design calls for a four-lane divided roadway with a 20-ft median and left turn and right turn bays on the section of Peter & Olympic between the two ramp terminal intersections of the SR 10 Loop interchange.

### Alternative:

The alternative reduces the cross-section of this section of Peter & Olympic from a four-lane divided to a two-lane undivided.

### Opportunities:

- Reduce construction costs
- Reduce right-of-way acquisition

### Risks:

- Require change of design criteria

### Technical Discussion:

The original design follows the proposed design criteria to construct a divided roadway on Peter and Olympic. As divided roadways require a minimum of two lanes in each direction, the original design calls for a four-lane divided roadway. However from traffic operations prospective, a two-lane roadway (one-lane in each direction) would be sufficient to accommodate the design year traffic. Therefore, this VE alternative is to delete the median and construct a two-lane undivided roadway instead.

Based on a Synchro analysis, a two-lane roadway as illustrated in the following sheet would operate at LOS B for both ramp terminal intersections in the AM and PM peak hours under the design year of 2032 traffic conditions.

It is noted that the original design includes a 4-ft bike lane and a 2-ft left side buffer between the inside travel lane and the median. The 4-ft bike lane and 2-ft buffer were kept in this VE alternative in order to have an orange to orange comparison. Removals of the 4-ft bike lane and 2-ft buffer are recommended under separate VE alternatives.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
<b>ORIGINAL DESIGN</b>	\$ 4,087,806	\$ 0	\$ 4,087,806
<b>ALTERNATIVE</b>	\$ 3,824,429	\$ 0	\$ 3,824,429
<b>SAVINGS</b>	\$ 263,378	\$ 0	\$ 263,378

# Illustration

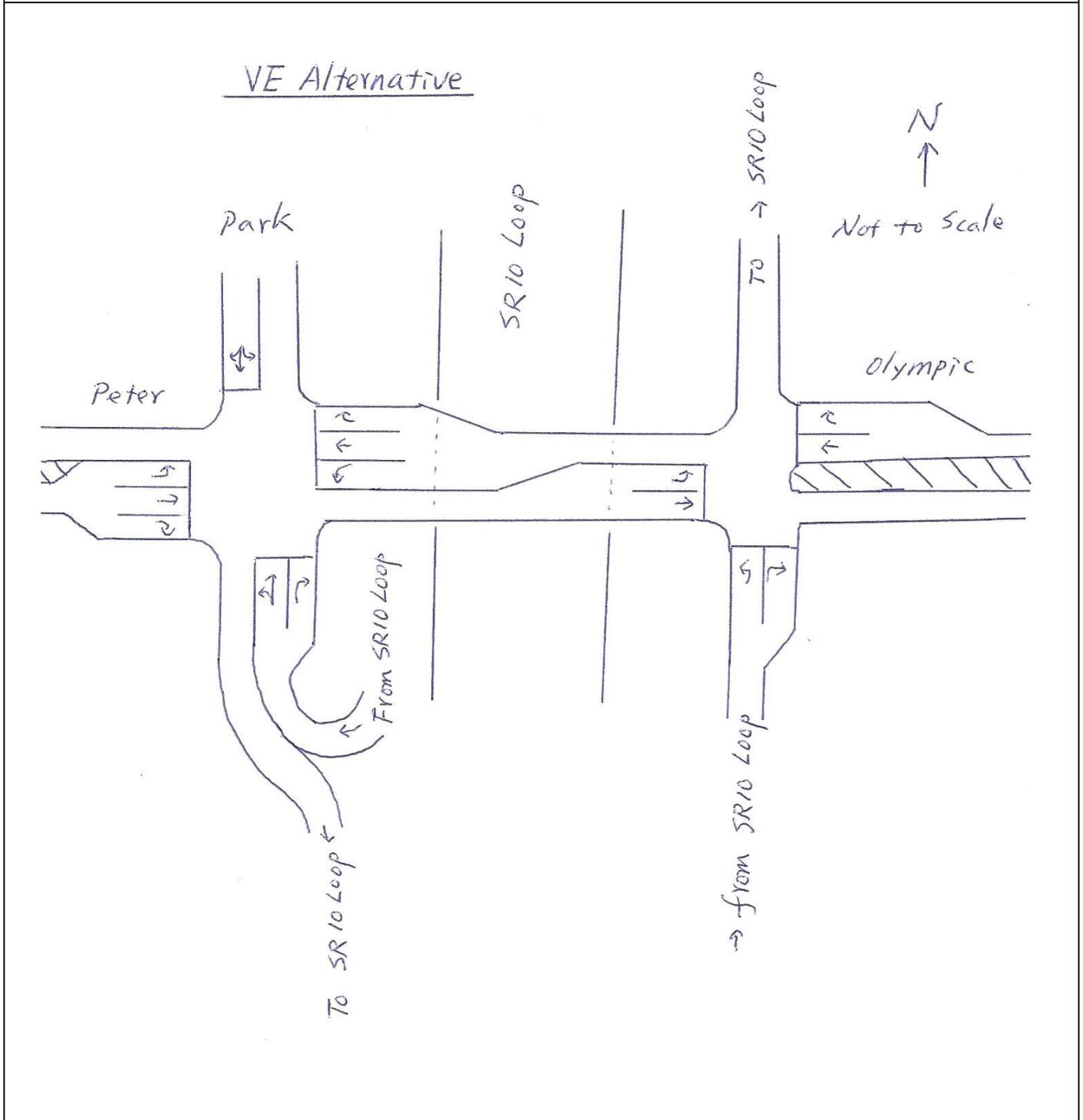


PROJECT: **Georgia Department of Transportation  
NH-051-1(25) – P.I. 122850  
SR 10 Loop - Clarke County**

ALTERNATIVE NO.:  
**A-6**

DESCRIPTION: **Use two-lane undivided on Peter Street/Olympic Drive  
with left turn and right turn bays to accommodate traffic  
turning from Peter Street/Olympic Drive onto SR 10 Loop**

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



# Illustration

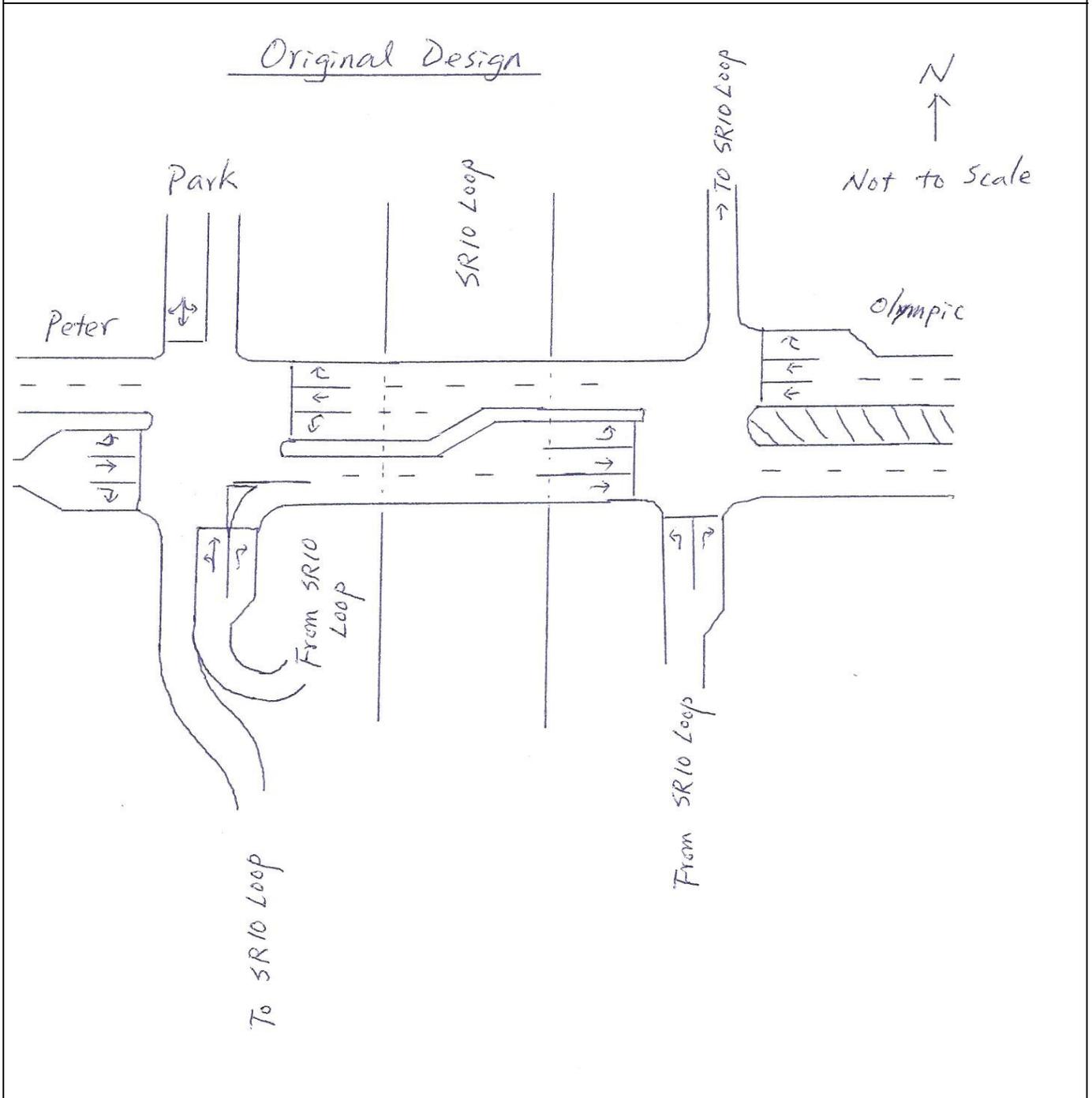


PROJECT: Georgia Department of Transportation  
NH-051-1(25) – P.I. 122850  
SR 10 Loop - Clarke County

ALTERNATIVE NO.:  
**A-6**

DESCRIPTION: Use two-lane undivided on Peter Street/Olympic Drive  
with left turn and right turn bays to accommodate traffic  
turning from Peter Street/Olympic Drive onto SR 10 Loop

SHEET NO.: 3 of 5



# Calculations

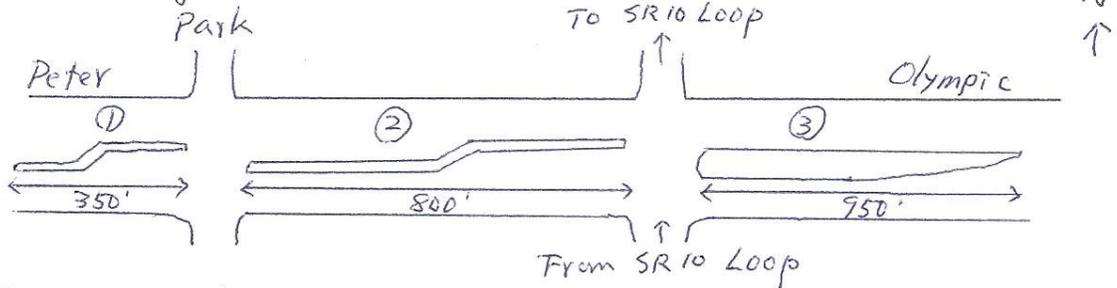
PROJECT: **Georgia Department of Transportation  
NH-051-1(25) – P.I. 122850  
SR 10 Loop - Clarke County**

ALTERNATIVE NO.:  
**AP-6**

DESCRIPTION: **Use two-lane undivided on Peter Street/Olympic Drive  
with left turn and right turn bays to accommodate traffic  
turning from Peter Street/Olympic Drive onto SR 10 Loop**

SHEET NO.: 4 of 5

## A. Reduction of concrete median



① Removed:  $8' \times 350' = 2800 \text{ SF}$

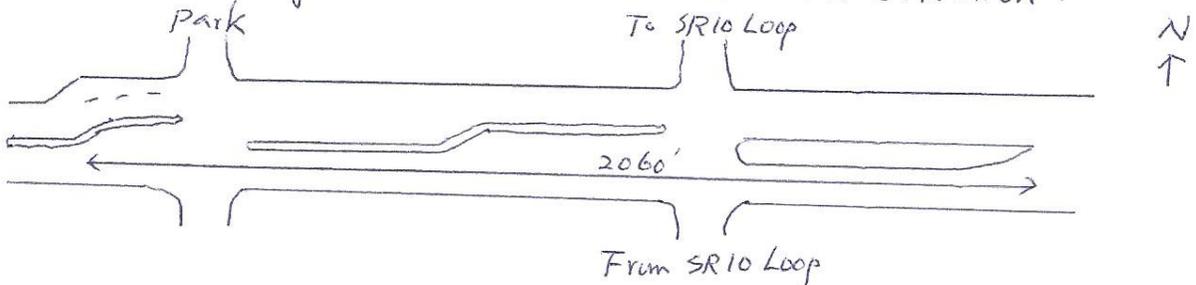
② Removed:  $8' \times 800' = 6400 \text{ SF}$

③ Reduced from 20' to 12':  $8' \times 950' = 7600 \text{ SF}$

Total  $16800 \text{ SF} = 1860 \text{ SY}$

Pay item 441-0748 (6" concrete median): 1860 SY

## B. Reduction of one travel lane in each direction:



Total area =  $12' \times 2060' \times (2 \text{ lanes}) = 49440 \text{ SF} = 5490 \text{ SY}$

① 310-1101 (GR AGGR BASE):  $5490 \times 100/2000 = 275 \text{ TN}$

② 402-3113 (ASPH CONC 12.5 MM):  $5490 \times 150/2000 = 410 \text{ TN}$

③ 402-3121 (ASPH CONC 25 MM):  $5490 \times 400/2000 = 1100 \text{ TN}$

④ 402-3190 (ASPH CONC 19 MM):  $5490 \times 200/2000 = 550 \text{ TN}$

# Cost Worksheet



PROJECT:	<b>Georgia Department of Transportation</b> <b>NH-051-1(25) P.I. 122850</b> <b>SR 10 Loop - Clarke County</b>	ALTERNATIVE NO.:	<b>AP-6</b>
DESCRIPTION:	<b>Use two-lane undivided on Peter Street/Olympic Drive with left turn and right turn bays to accommodate traffic turning from Peter Street/Olympic Drive onto SR 10 Loop</b>	SHEET NO.:	<b>5 of 5</b>

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
310-1101 (GR AGGR BASE)	TN	58,600	\$ 19	\$ 1,097,578	58,325	\$ 19	\$ 1,092,427
402-3113 (ASPH 12.5MM)	TN	10,210	\$ 72	\$ 736,754	9,800	\$ 72	\$ 707,168
402-3121 (ASPH 25 MM)	TN	14,300	\$ 62	\$ 887,601	13,200	\$ 62	\$ 819,324
402-3190 (ASPH 19 MM)	TN	13,250	\$ 65	\$ 866,815	12,700	\$ 65	\$ 830,834
441-0748 (6" CONCRETE MED)	SY	2,360	\$ 54	\$ 127,440	500	\$ 54	\$ 27,000
<b>Sub-total</b>				<b>\$ 3,716,188</b>			<b>\$ 3,476,753</b>
<b>Mark-up at 10.00%</b>				<b>\$ 371,619</b>			<b>\$ 347,675</b>
<b>TOTAL</b>				<b>\$ 4,087,806</b>			<b>\$ 3,824,429</b>

Estimated Savings: \$263,378

Note: The original estimate showed 500 SY of 6"-concrete median that appeared to be incorrect. The saving of the VE alternative is already 1860 SY on this item. So we added 1860 SY to the original 500 SY and used it as the quantity for the original estimate and kept 500 SY for the proposed estimate. The purpose of this adjustment is to show a 1860 SY reduction on this item.

# Value Analysis Design Alternative



PROJECT:	<b>Georgia Department of Transportation NH-051-1(25) – P.I. 122850 SR 10 Loop - Clarke County</b>	ALTERNATIVE NO.:	<b>AP-15</b>
DESCRIPTION:	<b>Move logical terminus of the eastern portion of Peter Street/ Olympic Drive westerly</b>	SHEET NO.:	<b>1 of 4</b>

### Original Design:

The original design calls for the logical terminus of the eastern section of Olympic Drive at STA. 116+14 with a raised concrete median and lane tapers.

### Alternative:

The alternative would move the logical terminus of the eastern section of Olympic Drive east to approximate STA. 106+00, thereby minimizing lane tapers and reduce/eliminate required ROW acquisition on the southern side of Olympic Drive.

### Opportunities:

- Reduction in pavement costs
- Reduced construction time
- Reduction in ROW acquisition/cost

### Risks:

- Moderate design impacts
- Possible access restriction/traffic volume issues due to emerging commercial development in the vicinity

### Technical Discussion:

The intent of this alternative is to shift the logical terminus of Olympic Drive to reduce, or potentially eliminate ROW acquisition on the southern side of Olympic Drive. It is noted that Olympic Drive east of SR 10 Loop is zoned as commercial property, and the ROW costs are much more costly in this area. A shift in the logical terminus would also result in cost savings related to roadway quantities, as well.

Design alternative AP-6 would reduce the footprint width of the designed improvements for Olympic Drive, making it useful to consider this design alternative in conjunction along with it, as the narrower footprint would require less taper length on the roadway to tie to existing.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,832,243	\$ 0	\$ 1,832,243
ALTERNATIVE	\$ 1,074,375	\$ 0	\$ 1,074,375
SAVINGS	\$ 757,868	\$ 0	\$ 757,868

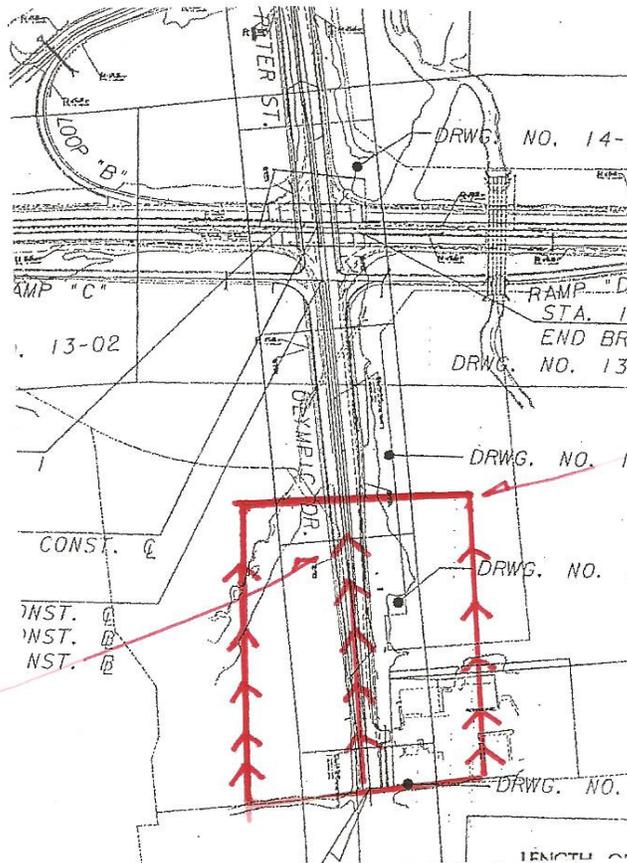
# Illustration

PROJECT: **Georgia Department of Transportation  
NH-051-1(25) – P.I. 122850  
SR 10 Loop - Clarke County**

ALTERNATIVE NO.:  
**A-15**

DESCRIPTION: **Move logical terminus of the eastern portion of Peter Street/Olympic Drive westerly**

SHEET NO.: **2 of 4**



- REDUCE  
R.O.W.  
taking on  
southern side  
of OLYMPIC  
Drive.

- Move logical  
terminus  
westward to  
STA. +/-  
106+00.

This design alternative may be used as a supplement to design alternative AP-6. The as-designed taper lengths may be shortened due to a narrower proposed foot print on Olympic Drive, thus allowing the logical terminus to be shifted eastward.

# Calculations



PROJECT: **Georgia Department of Transportation  
NH-051-1(25) – P.I. 122850  
SR 10 Loop - Clarke County**

ALTERNATIVE NO.:  
**AP-15**

DESCRIPTION: **Move logical terminus of eastern portion of Peter  
Street/Olympic Drive westerly**

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

## Assumptions:

-ROW costs are based on Preliminary ROW Cost Estimate dated April 11, 2008.

-Commercial ROW costs will include raw SF price and adjust for improvements, scheduling contingency, and admin/court costs to reflect a proportion of total estimated preliminary ROW costs.

-Areas eliminated have been calculated from scaled measurements from proposed project limits at STA. 116+14 to alternative project limits at STA. 106+00.

### R.O.W.-

Area left of centerline (Upstation)- 116+14-106+00= 1014 LF x 37' avg. width= 37,518 SF

**37,518 SF x \$7.25/SF=\$272,005.50 Raw cost**

**Scheduling Contingency @ 55%=\$149,603**

**Admin./Court cost @ 60%=\$252,965.10**

**Total=\$674,573.60**

### Asphalt-

Seal overlay only. Costs from preliminary estimate report dated 9/2/2008.

L- 1014'

Average width-24'

1014' x 24'/9=2,704SY x 150/LB/SY=405,600LB/2000=202.80 tons seal overlay saved.

**202.80 tons x \$72.16/ton= \$14,634.05**

# Cost Worksheet



PROJECT:	<b>Georgia Department of Transportation</b> <b>NH-051-1(25) P.I. 122850</b> <b>SR 10 Loop - Clarke County</b>	ALTERNATIVE NO.:	<b>AP-15</b>
DESCRIPTION:	<b>Move logical terminus of eastern portion of Peter Street/Olympic Drive.</b>	SHEET NO.:	<b>4 of 4</b>

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
Commercial ROW	SF	72,675	\$ 7.25	\$ 526,894	35,157	\$ 7.25	\$ 254,888
ROW Scheduling Contingency @ 55%	EA	1	\$ 149,063	\$149,063	1	\$0.00	\$ -
ROW Admin./Court Costs @ 60%	EA	1	\$ 252,965	\$ 252,965	1	\$ -	\$ -
12.5 MM Superpave	TN	10,210	\$ 72.16	\$ 736,754	10,003	\$ 72.16	\$ 721,816
<b>Sub-total</b>				<b>\$ 1,665,675</b>			<b>\$ 976,705</b>
<b>Mark-up at 10.00%</b>				<b>\$ 166,568</b>			<b>\$ 97,670</b>
<b>TOTAL</b>				<b>\$ 1,832,243</b>			<b>\$ 1,074,375</b>
Estimated Savings:							\$ 757,868

# Value Analysis Design Alternative



PROJECT:	<b>Georgia Department of Transportation NH-051-1(25) – P.I. 122850 SR 10 Loop - Clarke County</b>	ALTERNATIVE NO.:	<b>AP-17</b>
DESCRIPTION:	<b>Move ramp B intersection with Peter Street/Olympic Drive to the east and re-align ramp A and move the park entrance to line up with the new intersection.</b>	SHEET NO.:	<b>1 of 4</b>

**Original Design:**

Ramp B in the original design starts from a tangent section departing the intersection with Peter Street/Olympic Drive and then connects to a circular curve (Curve KC213) at station 105+44.35 (PC). The original design requires right-of-way acquisition of the properties in the southwest quadrant of the intersection with Peter Street/ Olympic Drive.

**Alternative:**

The alternative is to start curve KC213 approximately 80-ft in advance of the current PC, which will move ramp B to the east approximately 100-ft and avoid the need to acquire the right-of-way in the southwest quadrant of the intersection.

**Opportunities:**

- Reduce R/W acquisition cost
- Improve intersection operations

**Risks:**

- Require relocation of the park entrance to align with the new intersection
- Require relocation of two concrete box culverts, one under Peter Street/Olympic Drive and one under ramps A and B

**Technical Discussion:**

The primary benefit of this VE alternative is to avoid acquiring the R/W in the SW quadrant of the intersection.

An added benefit of this alternative is to enhance safety of the intersection operations. The original design creates a 75-degree skewed intersection where Ramp B enters Peter Street/Olympic Drive. The alternative intersection would improve the intersection to a near 90-degree angle. A right angle intersection generally would provide safer operations than a skewed intersection.

A disadvantage of this alternative is that the park driveway would need to be shifted approximately 180-ft to the east to line up with the new ramp terminal intersection.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 3,318,370	\$ 0	\$ 3,318,370
ALTERNATIVE	\$ 2,877,027	\$ 0	\$ 2,877,027
SAVINGS	\$ 441,343	\$ 0	\$ 441,343



# Calculations



PROJECT: **Georgia Department of Transportation  
NH-051-1(25) – P.I. 122850  
SR 10 Loop - Clarke County**

ALTERNATIVE NO.:  
**AP-17**

DESCRIPTION: **Move ramp B intersection with Peter Street/Olympic Drive to the east and re-align ramp A and move the park entrance to line up with the new intersection**

SHEET NO.: 3 of 4

ROW Cost Savings:

① relocation of 4 residential  $\$160,000$

② one residential land  $1721 \text{ SF} @ \$0.70/\text{SF} = \$1,205$

total  $\$161,205$

③ scheduling contingency  $\$161,205 \times 0.55 = \$88,663$

④ administration/court cost

$(\$161,205 + \$88,663) \times 0.60 = \$149,920$

total of ①, ②, ③, ④  $\$399,788$



# Value Analysis Design Alternative



PROJECT: **Georgia Department of Transportation  
NH-051-1(25) – P.I. 122850  
SR 10 Loop - Clarke County**

ALTERNATIVE NO.:  
**AP-21**

DESCRIPTION: **Construct a compressed diamond interchange**

SHEET NO.: **1 of 5**

## Original Design:

The original design calls for a southbound quarter-cloverleaf exit loop and a southbound entrance ramp outside the loop, while the two remaining ramps will be in a compressed diamond configuration on the east side of the SR 10 Loop.

## Alternative:

The alternative is to construct a compressed diamond interchange and delete the southbound quarter-cloverleaf exit loop and a southbound entrance ramp outside the loop from the original design.

## Opportunities:

- Reduce construction costs
- Reduce right-of-way acquisition

## Risks:

- Require walls on the west side of SR 10 Loop in the NW quadrant to prevent the SB off-ramp from getting into the County park area.

## Technical Discussion:

Page 9 of the Project Concept Report, dated June 12, 2000, included a table showing the 6 interchange forms the project examined, and compressed diamond (#4) was one of them. The report stated that a compressed diamond provided for adequate operation and safety improvements, and the cost would be in an acceptable range, however, projected turning volumes would be more efficiently handled with a clover leaf configuration. Based on a Synchro analysis conducted by the VE team, a compressed diamond interchange with the laneage illustrated in the following sheet would operate at LOS B for both ramp terminal intersections in the AM and PM peak hours under the design year of 2032 traffic conditions. This analysis confirmed the conclusion stated in the Project Concept Report that a compressed diamond interchange would provide for adequate operation. A few concerns were raised in the Project Concept Report regarding a compressed diamond interchange. One concern was that the short left turn storage under the SR 10 Loop bridge could cause traffic to queue thru the adjacent intersection. Mr. Marwan Abboud from Arcadis who prepared the Project Concept Report responded that the proposed diamond phasing would prevent this from being a problem. Although Mr. Abboud didn't elaborate why, a possible explanation is that the two signalized intersections of a compressed diamond interchange would functionally operate as one signalized intersection, and the signal would operate in a split phase allowing each direction to move in sequence hereby preventing vehicles from queuing between the two intersections. A second concern was that a compressed diamond would result in three signals on this section of Peter and Olympic as opposed to two signals under the original design, because the park entrance will need a traffic signal. Under the original design, the park entrance and the western ramp terminal intersection will share one traffic signal, while each location will need a traffic signal under the compressed diamond interchange configuration. It should be noted that the Park would have different peak hours than the subject interchange. Parks normally generate most traffic on weekends while this project uses weekday peak hours as the design hours. This is evidenced by the design hour traffic volumes provided in the Project Concept Report. The Report used a minimum number of 5 vehicles per hour (vph) to indicate the traffic entering and exiting the Park during the weekday peak hours. This indicates that the traffic signal at the Park entrance would show a green phase to Peter Street most of the time during the weekday peak hours, and thus would have minimum impact on the traffic operations along Peter and Olympic at this interchange. It is also noted that the original design includes a 4-ft bike lane and a 2-ft left side buffer between the inside travel lane and the median. The 4-ft bike lane and 2-ft buffer were kept in this VE alternative in order to have an orange to orange comparison. Removals of the 4-ft bike lane and 2-ft buffer are recommended under separate VE alternatives.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 3,947,622	\$ 0	\$ 3,947,622
ALTERNATIVE	\$ 3,771,384	\$ 0	\$ 3,771,384
SAVINGS	\$ 27 176,238	\$ 0	\$ 176,238

# Illustration

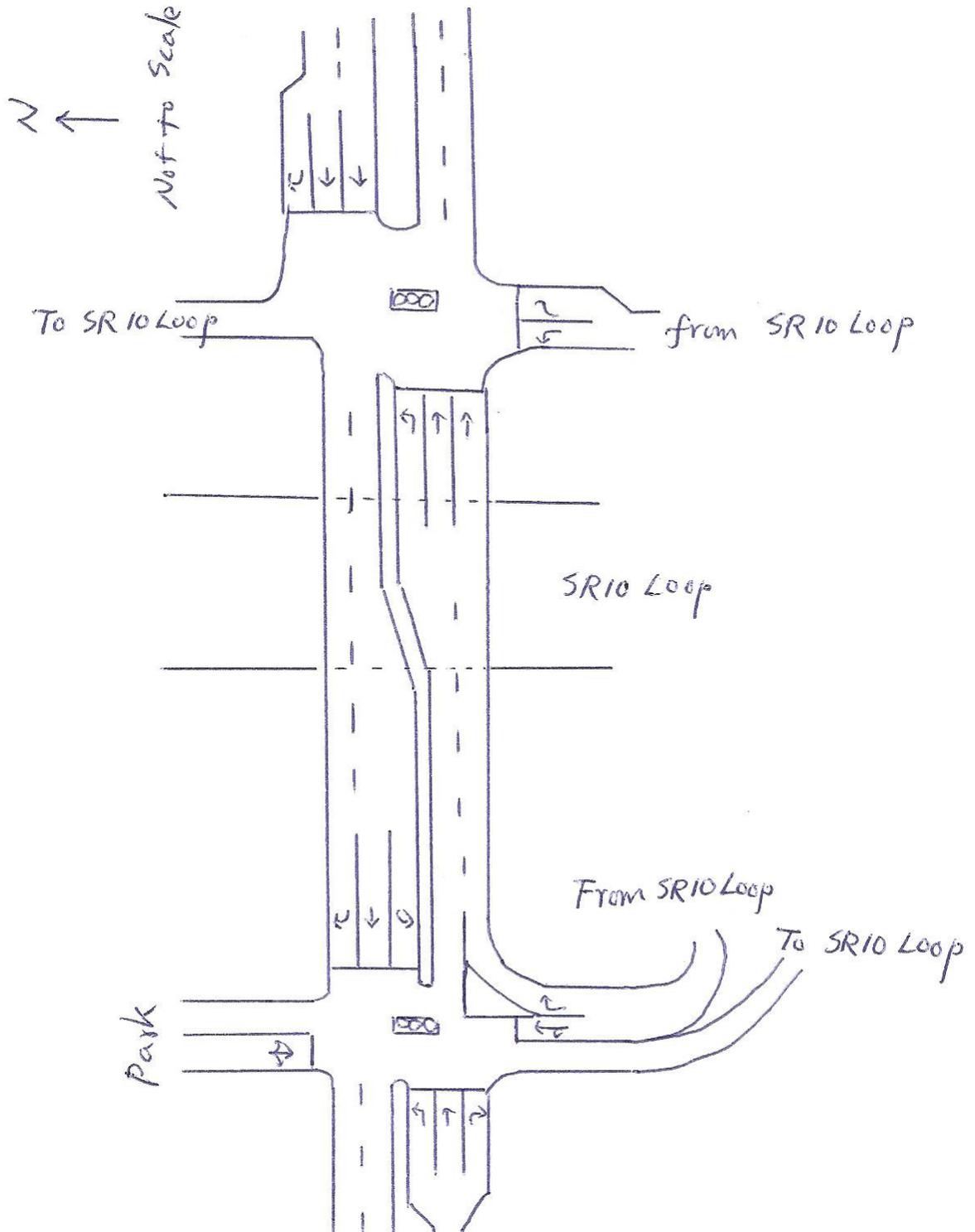
PROJECT: Georgia Department of Transportation  
NH-051-1(25) – P.I. 122850  
SR 10 Loop - Clarke County

ALTERNATIVE NO.:  
**AP-21**

DESCRIPTION: Construct a compressed diamond interchange

SHEET NO.: 2 of 5

Original Design



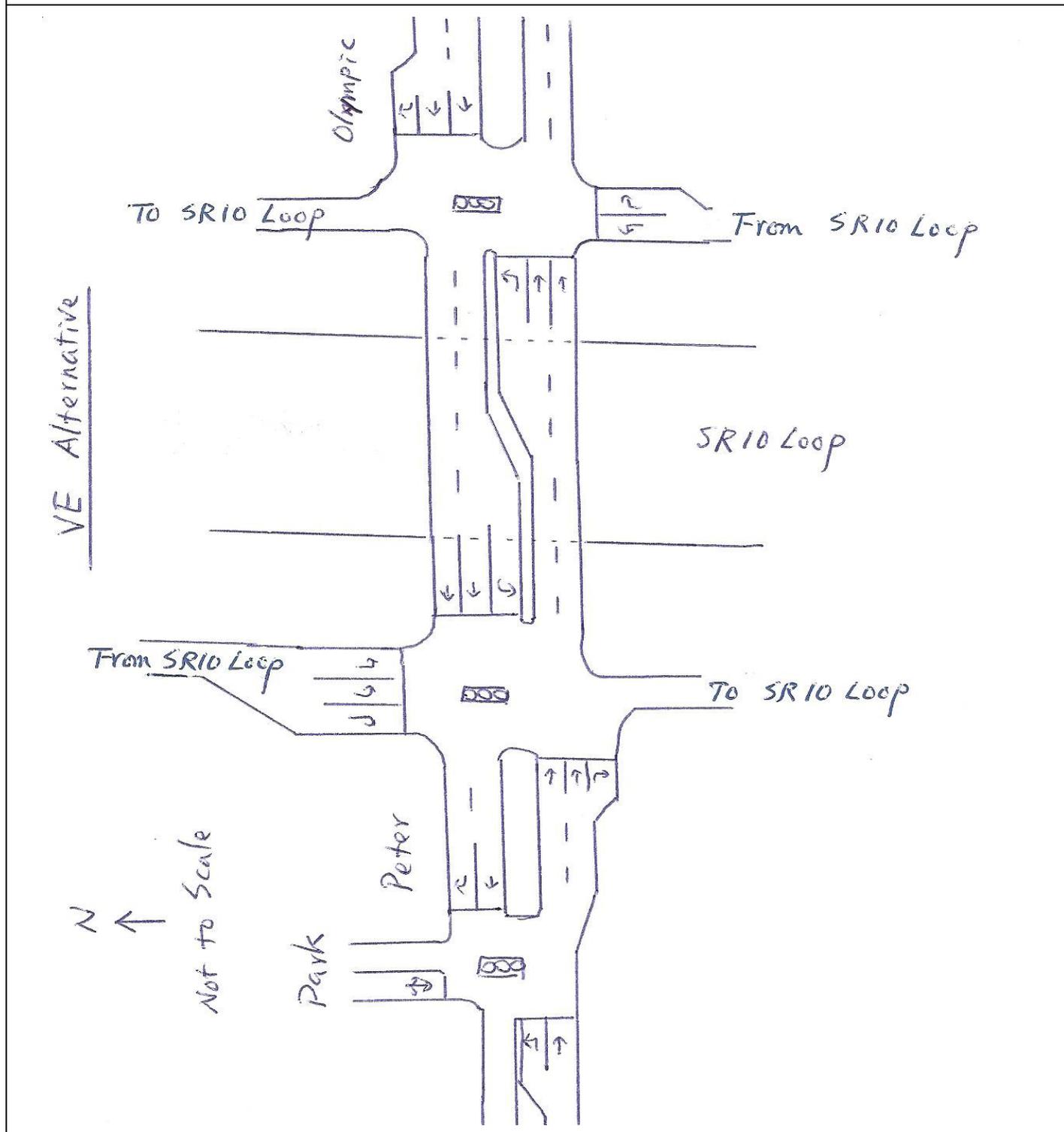
# Illustration

PROJECT: **Georgia Department of Transportation  
NH-051-1(25) – P.I. 122850  
SR 10 Loop - Clarke County**

ALTERNATIVE NO.:  
**AP-21**

DESCRIPTION: **Construct a compressed diamond interchange**

SHEET NO.: **3 of 5**



# Calculations



PROJECT: **Georgia Department of Transportation  
NH-051-1(25) – P.I. 122850  
SR 10 Loop - Clarke County**

ALTERNATIVE NO.:  
**AP-21**

DESCRIPTION: **Construct a compressed diamond interchange**

SHEET NO.: **4 of 5**

Utilizes approximately 1,300' less roadway than original design.

Average ramp widths: 25' - GAB, 34' - Full build-up asphalt.

**GAB:**

$1,300\text{LF} \times 25'\text{w}/9 = 3,611.11\text{SY} \times 1,200/2,000 = 2,166.67 \text{ tons}$

**Base:**

$1,300\text{LF} \times 34'\text{w}/9 = 4,911.11\text{SY} \times 400/2,000 = 982.22 \text{ tons}$

**Binder:**

$1,300 \text{ LF} \times 34'\text{w}/9 = 4,911.11 \text{ SY} \times 200/2,000 = 491.11 \text{ tons}$

**Seal:**

$1,300 \text{ LF} \times 34'\text{w}/9 = 4,911.11\text{SY} \times 150/2,000 = 368.33 \text{ tons}$



# Value Analysis Design Alternative



PROJECT:	<b>Georgia Department of Transportation NH-051-1(25) – P.I. 122850 SR 10 Loop - Clarke County</b>	ALTERNATIVE NO.:	<b>AP-22</b>
DESCRIPTION:	<b>Delete sidewalks and bike lanes on Peter Street/Olympic Drive; build one 10' multi-use trail on one side of the road</b>	SHEET NO.:	<b>1 of 4</b>

### Original Design:

The original design calls for 4'-0" bike lanes at the edge of the road and 8'-0" sidewalks next to the curb under the bridge with a 5'-0" sidewalk full length for the balance of the project

### Alternative:

The alternative would to combine the bike lane with the sidewalk resulting in a one multi-use trail on the south side of Peters and Olympic Street. The trail would be divided with bikes on one portion and pedestrians on the remaining portion. The two would be separated by a paved stripe with reflectors just as used when separating the bikes from automobiles and trucks.

### Opportunities:

- Maintain functional requirements while Significantly reducing the project cost.
- Increase safety for bikes and automobiles

### Risks:

- Increase design costs

### Technical Discussion:

The proposed design would locate the bicyclist adjacent to trucks and automobiles moving at 45 MPH. By removing them for the travel lanes and locating them adjacent to the pedestrians, the project safety would be improved. In this geographical area, there is a county park and residential area nearby. Possible usage would be by folks riding from the residential area to the park.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 192,104	\$ 0	\$ 192,104
ALTERNATIVE	\$ 116,065	\$ 0	\$ 116,065
SAVINGS	\$ 76,039	\$ 0	\$ 76,039

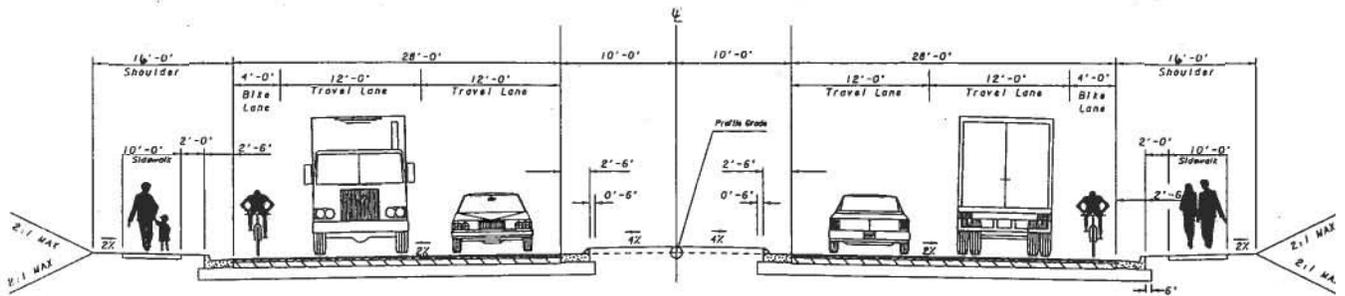
# Illustration

PROJECT: Georgia Department of Transportation  
NH-051-1(25) – P.I. 122850  
SR 10 Loop - Clarke County

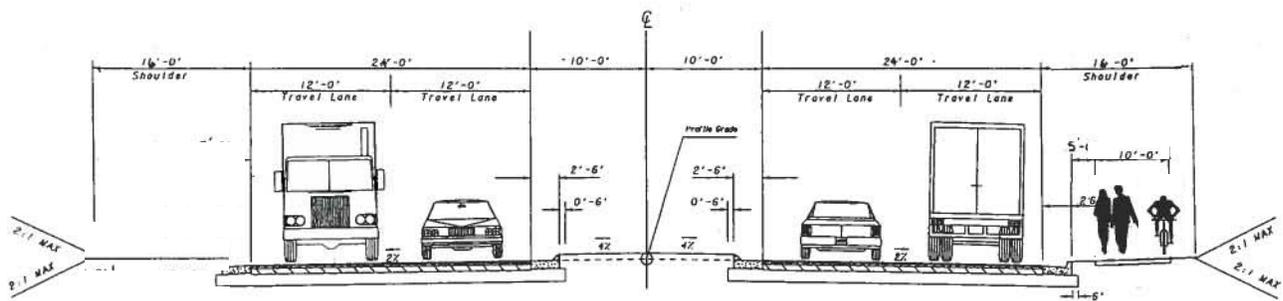
ALTERNATIVE NO.:  
**A-22**

DESCRIPTION: Delete sidewalks and bike lanes on Peter Street/Olympic Drive; build one 10' multi-use trail on one side of the road

SHEET NO.: 2 of 4



ORIGINAL DESIGN



ALTERNATE DESIGN

# Calculations



PROJECT: **Georgia Department of Transportation  
NH-051-1(25) – P.I. 122850  
SR 10 Loop - Clarke County**

ALTERNATIVE NO.:  
**AP-22**

DESCRIPTION: **Delete sidewalks and bike lanes on Peter Street/Olympic Drive; build one 10' multi-use trail on one side of the road**

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

There are bike lanes in each direction from station 87+71.66 through the end of the project to station 116+14.02. The alternate is to remove the bike lanes from the road way deleting the 4' of road width, and providing one multi-use trail.

Current design for bike lanes - Sta. 87+71.66 to Sta. 116+14.02 = 2842.36lf x 2; = 5,684.72 lf x 4' = 22,738.88 sf, or 2,526 sy of bike lanes.

Current design for side walks north side – Sta. 87+71.66 to Sta. 116+14.02 = 2842.36 lf -148 lf (street crossings) and -45 lf (under bridge) = 2,649 lf x 5'-0" = 13,245 sy/9 + (45 lf x 8'-0" /9 (under bridge) = 40sy) = 1,511 sy concrete

Current design for side walks south side – Sta. 87+71.66 to Sta. 116+14.02 = 2842.36lf less 108 lf (street crossings) and -45lf (under bridge) = 2,689 lf x 5'-0" = 13,447sy/9 +(45 lf x 8'-0" /9 (under bridge) = 40sy) = 1,534 sy concrete

The total SY of concrete for side walk = 3,045 sy

New design for the south side multi-use trail would be 2779lf x 10'-0" = 27790sy /9 = 3,087 sy of concrete

$$12'' \text{ GAB} \Rightarrow 2,576 \text{ sy} \times 100\#/\text{sy} / 2000\#/\text{ton} = 126 \text{ tons}$$

$$(22738.88\text{sf})/9 \times (150\#/\text{sy}) / (2000\#/\text{ton}) \Rightarrow 189 \text{ tons}$$

$$(22738.88\text{sf})/9 \times (400\#/\text{sy}) / (2000\#/\text{ton}) \Rightarrow 505 \text{ tons}$$

$$(22738.88\text{sf})/9 \times (200\#/\text{sy}) / (2000\#/\text{ton}) \Rightarrow 252 \text{ tons}$$

4" Concrete

Original design 3,045 sy

New design 3,087 sy



# Value Analysis Design Alternative



PROJECT:	<b>Georgia Department of Transportation NH-051-1(25) – P.I. 122850 SR 10 Loop - Clarke County</b>	ALTERNATIVE NO.:	<b>BR-5</b>
DESCRIPTION:	<b>Use MSE Walled Abutments to accommodate Single Span Bridges</b>	SHEET NO.:	<b>1 of 6</b>

**Original Design:** (At the time of the VE Study, the bridges were in the Preliminary stage of design)

The original design calls for the construction of twin 3-span bridges, 192’ long with 41.5’ end spans and 109’ intermediate spans, over Peter St./Olympic Dr. The West bridge is 53.25’ wide and the East bridge is 41.25’ wide. The bridges are skewed approximately 6° to the normal to the SR 10 Loop. End spans 1 and 3 are comprised of five Type I Mod beams with 63” Bulb Tee Fascia beams evenly spaced on the West bridge and four Type I Mod beams with 63” Bulb Tee Fascia beams evenly spaced on the East bridge. The intermediate spans are comprised of seven 63” Bulb Tee beams evenly spaced on the West bridge and six 63” Bulb Tee beams evenly spaced on the East bridge. In the final configuration, the bridges accommodate 4’ inside and 10’ outside shoulders, two 12’ travel lanes and a 12’ turn lane on the West bridge only. The bents are made up of concrete caps and columns. Due to the presence of boulders in the underlying soil, it is anticipated that the intermediate bents will be founded on micropiles. The barrier rail is standard.

**Alternative:**

The proposed alternative eliminates the 41.5’ end spans and reduces the bridge lengths to 121’. This can be accomplished by providing walled abutments at about the current Bent 2 and Bent 3 locations (set back about 6’ to accommodate the MSE Walls).

The alternative maintains the vertical clearance to Peter St./Olympic Dr., other current geometry and staging sequence.

**Opportunities:**

- Cost savings by reducing bridge length
- Cost savings on slope paving
- Reduced construction time
- Reduced excavation, associated shoring and incidental costs.

**Risks:**

- This configuration is typically used in urban areas where availability of Right-Of-Way is limited
- Re-design effort will require additional time and design fee

**Technical Discussion:**

Special design for MSE walls will be required. The same beam depth and configuration as in the original design can be used for the alternate.

See the following sheets for the calculation of the savings noted below.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,636,276	\$ 0	\$ 1,636,276
ALTERNATIVE	\$ 1,109,400	\$ 0	\$ 1,109,400
SAVINGS	\$ 526,875	\$ 0	\$ 526,875

# Illustration

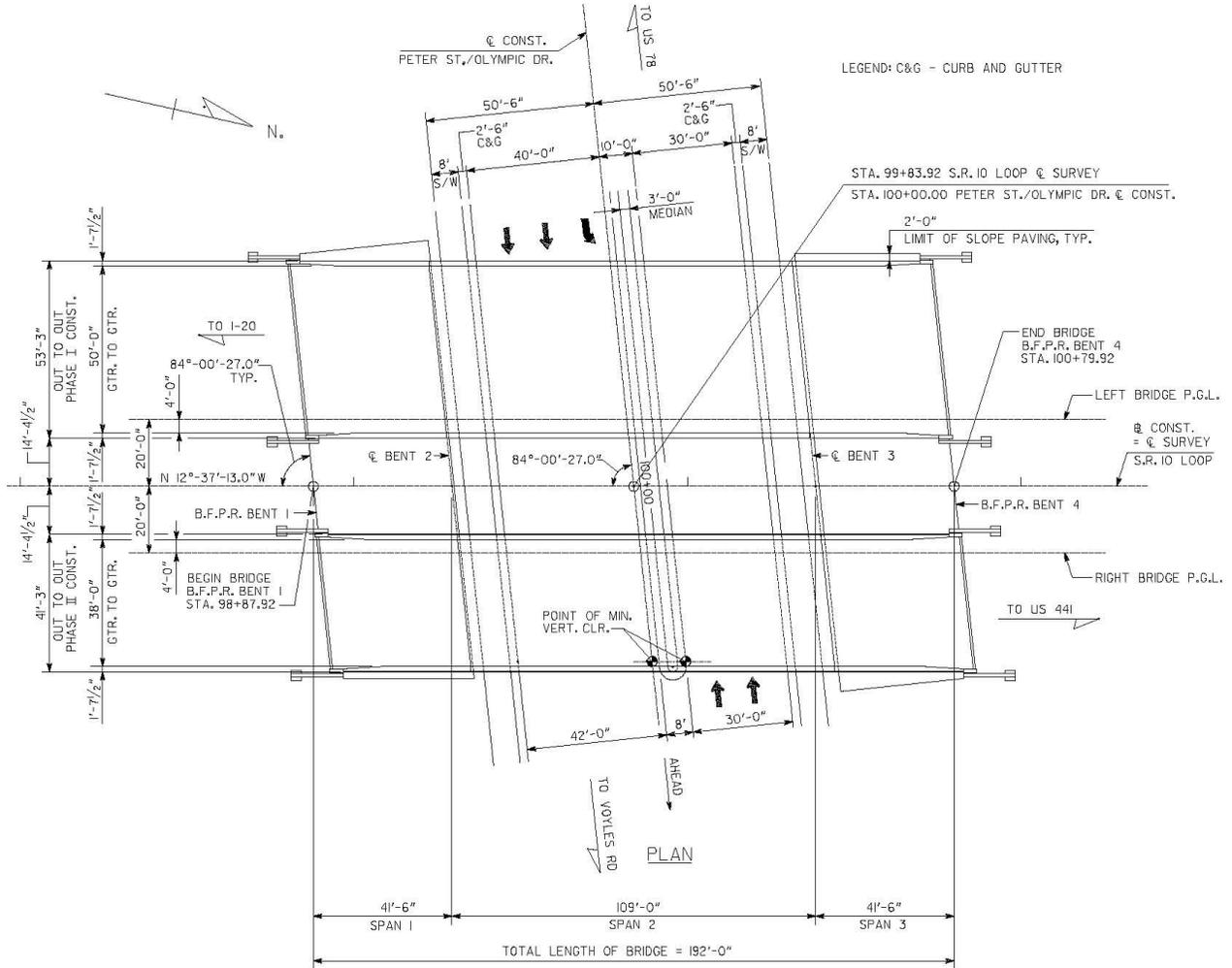


PROJECT: **Georgia Department of Transportation  
NH-051-1(25) – P.I. 122850  
SR 10 Loop - Clarke County**

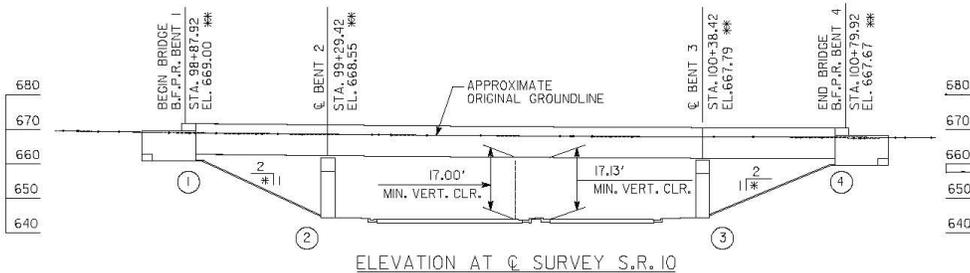
ALTERNATIVE NO.:  
**BR-5**

DESCRIPTION: **Use MSE Walled Abutments to accommodate Single  
Span Bridges**

SHEET NO.: **2 of 6**



## CURRENT DESIGN



# Illustration

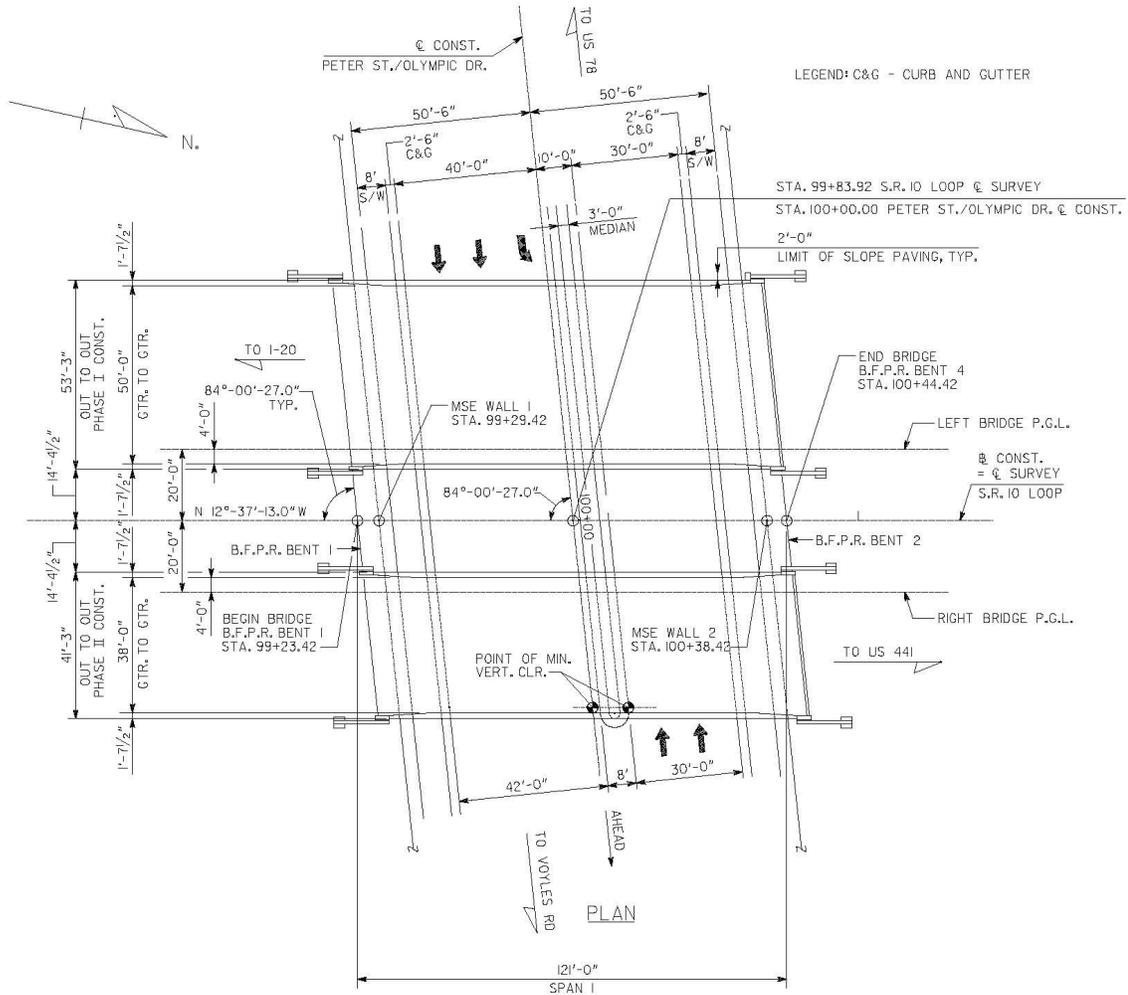


PROJECT: **Georgia Department of Transportation  
NH-051-1(25) – P.I. 122850  
SR 10 Loop - Clarke County**

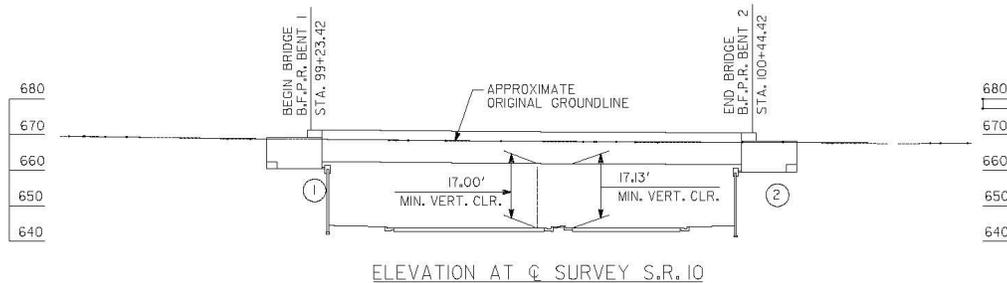
ALTERNATIVE NO.:  
**BR-5**

DESCRIPTION: **Use MSE Walled Abutments to accommodate Single  
Span Bridges**

SHEET NO.: **3** of **6**



## ALTERNATIVE BR-5



# Calculations



PROJECT: **Georgia Department of Transportation  
NH-051-1(25) – P.I. 122850  
SR 10 Loop - Clarke County**

ALTERNATIVE NO.:  
**BR-5**

DESCRIPTION: **Use MSE Walled Abutments to accommodate Single  
Span Bridges**

SHEET NO.: **4 of 6**

## Current Design (Two 3 Span Bridges – 192' Long, 53.25' and 41.25' wide each)

**Superstructure: (Some values are assumed since the current design is in the preliminary phase)**

Deck Area =  $(41.25' + 53.25') * 192' = 18,144 \text{ SF}$

Volume of 7 1/2" thick Class AA Superstructure Deck concrete =  $[18144 * (7.5"/12)] / 27 = 420 \text{ CY}$

Area of Grooved concrete (approx.) =  $(34' + 46') * 192' / 9 = 1706.67 \text{ SY}$

Total length of BT-63 PPC Girders (approx.) =  $(7+6)*109' + 2*2*2*41.5 = 1,749 \text{ LF}$

Total length of Type I Mod. PPC Girders (approx.) =  $2*(5+4)*41.5 = 747 \text{ LF}$

Total length of Standard Jersey Barriers =  $2*2*192 = 768 \text{ LF}$

Area of 4" Sloped Paving (approx.) =  $2*45'*126.5/9 = 1,265 \text{ SY}$

### **Substructure:**

Volume of Class AA concrete (average dimensions of Caps (4.5'X4.5', Columns (4'X4') & Pile Caps (9'X9'), Columns @ 15' high):

Intermediate Bents:  $2 * \{ [(50' + 38') * 4.5' * 4.5') + (4 * 15' * 4' * 4') \} + [4 * 3 * 9' * 9'] / 27 = 275 \text{ CY}$

End Bents (Caps + Backwall):  $4 * \{ [(3' * 3') + (6' * 1')] * (53.25' + 41.25') \} / 27 = 210 \text{ CY}$

(Wingwalls have been ignored for a conservative comparison).

Total Volume of Class AA concrete = 485 CY

Since the foundation design is not complete, 9 Steel H piles per footing and one under each beam at the end bents have been assumed. It may be anticipated that the H piles would require pile points for driving through rocky soils.

Length of Steel HP 14X73 Piles (End Bents – assumed 30 ft piles) =  $2 * [(7 + 6) * 30'] = 780 \text{ LF}$

Length of Steel HP 14X73 Piles (Intermediate Bents – assumed 60 ft piles) =  $2 * 4 * (9 * 60') = 4,320 \text{ LF}$

Total length of Steel HP 14X73 Piles = 5,100 LF

# Calculations



PROJECT: **Georgia Department of Transportation  
NH-051-1(25) – P.I. 122850  
SR 10 Loop - Clarke County**

ALTERNATIVE NO.:  
**BR-5**

DESCRIPTION: **Use MSE Walled Abutments to accommodate Single  
Span Bridges**

SHEET NO.: **5 of 6**

## Alternative (Single Span – 121' long, 53.25' and 41.25' wide each)

### **Superstructure: (Some values are assumed)**

Deck Area =  $(41.25' + 53.25') * 121' = 11,434.5$  SF

Volume of 7 1/2" thick Class AA Superstructure Deck concrete =  $[18144 * (7.5''/12)]/27 = 264$  CY

Area of Grooved concrete (approx.) =  $(34' + 46') * 121'/9 = 1075$  SY

Total length of BT-63 PPC Girders (approx.) =  $(7+6)*121' = 1,573$  LF

Total length of Type I Mod. PPC Girders (approx.) NONE

Total length of Standard Jersey Barriers =  $2*2*121 = 484$  LF

Area of 4" Sloped Paving (approx.) = NONE

### **Substructure:**

Volume of Class AA concrete (average dimensions of Caps (4.5'X4.5', Columns (4'X4') & Pile Caps (9'X9'), Columns @ 15' high):

End Bents (Caps + Backwall):  $4 * \{[(3' * 3') + (6' * 1')]\} * (53.25' + 41.25') / 27 = 210$  CY

Length of Steel HP 14X73 Piles (End Bents – assumed 30 ft piles) =  $4 * [(7 + 6) * 30'] = 1560$  LF

### **MSE Walls:**

Assume MSE Walls, 17' high, extending to the outer limits of both bridges and tapering down 17' at 2:1 beyond the limits of the bridge.

Length of MSE Walls =  $123.5' + 2 * 30' = 183'$

Area of MSE Walls =  $2 * [(123.5' * 17') + 0.5 * (34' * 17')] = 4777$  SF

Length of Coping =  $2 * (123.5' + 34') = 315$  LF

Note: Special backfill required for MSE Walls is assumed offset by the savings in reduced excavation requirements.

For about 90 SY of additional Asphalt paving required on SR 10 Loop, the quantities for GAB & Superpave (12.5 mm, 19 mm, 25 mm) are 4.5, 6.75, 9 & 18 Tons respectively.



# Value Analysis Design Alternative



PROJECT:	<b>Georgia Department of Transportation NH-051-1(25) – P.I. 122850 SR 10 Loop - Clarke County</b>	ALTERNATIVE NO.:	<b>BR-8</b>
DESCRIPTION:	<b>Construct Two 12' Lanes with 4' and 6'-6" Shoulders on Both Bridges</b>	SHEET NO.:	<b>1 of 5</b>

**Original Design:** (At the time of the VE Study, the bridges were in the Preliminary stage of design)

The original design calls for the construction of twin 3-span bridges, 192' long with 41.5' end spans and 109' intermediate spans, over Peter St./Olympic Dr. The West bridge is 53.25' wide and the East bridge is 41.25' wide. The bridges are skewed approximately 6° to the normal to the SR 10 Loop. End spans 1 and 3 are comprised of five Type I Mod beams with 63" Bulb Tee Fascia beams evenly spaced on the West bridge and four Type I Mod beams with 63" Bulb Tee Fascia beams evenly spaced on the East bridge. The intermediate spans are comprised of seven 63" Bulb Tee beams evenly spaced on the West bridge and six 63" Bulb Tee beams evenly spaced on the East bridge. In the final configuration, the bridges accommodate 4' inside and 10' outside shoulders, two 12' travel lanes and a 12' turn lane on the West bridge only. The bents are made up of concrete caps and columns. Due to the presence of boulders in the underlying soil, it is anticipated that the intermediate bents will be founded on micropiles. The barrier rail is standard.

**Alternative:**

The proposed alternative, in conjunction with Alternative AP-21, includes a redesigned interchange and Maintenance of Traffic Plan resulting in eliminating one lane (turn lane) on the West Bridge. Additionally, the shoulders are reduced in width (4' inside and 6'-6" outside on both bridges) to match the SR 10 Loop cross section.

The alternative maintains the vertical clearance to Peter St./Olympic Dr., other current geometry and staging sequence.

**Opportunities:**

- Cost savings by reducing bridge widths
- Cost savings on slope paving
- Reduced construction time
- Reduced excavation associated shoring and incidental costs.

**Risks:**

- Re-design effort will require additional time and design fee
- Redesign of MOT will be required

**Technical Discussion:**

Interchange redesign and revised Maintenance of Traffic Plan will be required to facilitate the reduction in the bridge widths. Both bridges (East & West) are similar in all aspects in dimensions.

See the following sheets for the calculation of the savings noted below.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,636,276	\$ 0	\$ 1,636,276
ALTERNATIVE	\$ 1,503,111	\$ 0	\$ 1,503,111
SAVINGS	\$ 133,165	\$ 0	\$ 133,165

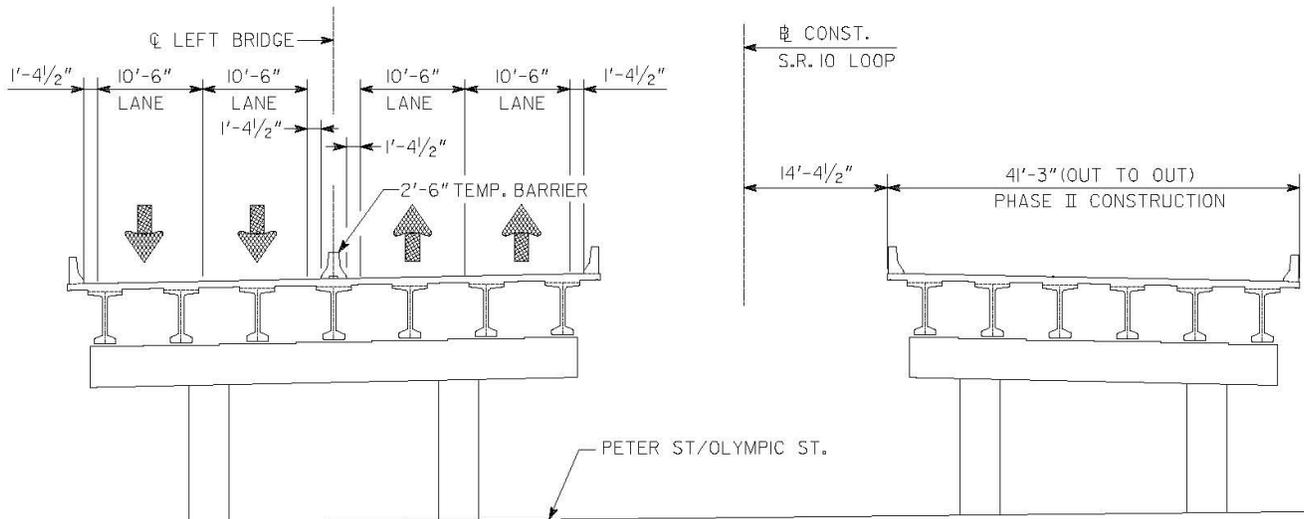
# Illustration

PROJECT: **Georgia Department of Transportation  
NH-051-1(25) – P.I. 122850  
SR 10 Loop - Clarke County**

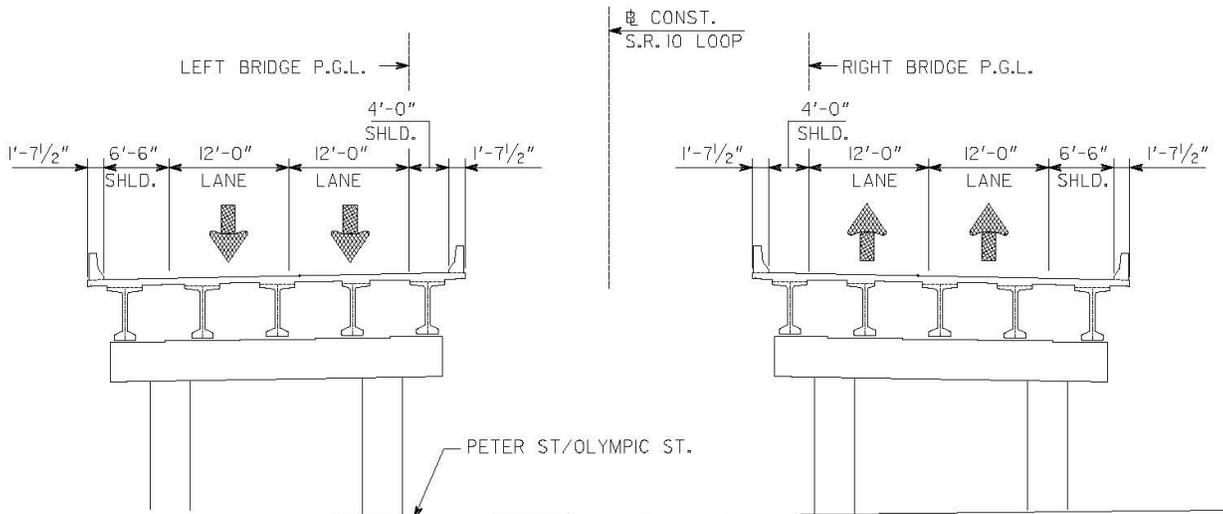
ALTERNATIVE NO.:  
**BR-8**

DESCRIPTION: **Construct two 12' Lanes with 4' and 6'-6" shoulders on both bridges**

SHEET NO.: **2 of 5**



CURRENT DESIGN



ALTERNATIVE BR-8

# Calculations



PROJECT: **Georgia Department of Transportation  
NH-051-1(25) – P.I. 122850  
SR 10 Loop - Clarke County**

ALTERNATIVE NO.:  
**BR-8**

DESCRIPTION: **Construct Two 12' Lanes with 4' and 6'-6" Shoulders on  
Both Bridges**

SHEET NO.: **3 of 5**

## Current Design (Two 3 Span Bridges – 192' Long, 53.25' and 41.25' wide each)

### **Superstructure: (Some values are assumed since the current design is in the preliminary phase)**

Deck Area =  $(41.25' + 53.25') * 192' = 18,144 \text{ SF}$

Volume of 7 1/2" thick Class AA Superstructure Deck concrete =  $[18144 * (7.5"/12)] / 27 = 420 \text{ CY}$

Area of Grooved concrete (approx.) =  $(34' + 46') * 192' / 9 = 1706.67 \text{ SY}$

Total length of BT-63 PPC Girders (approx.) =  $(7+6)*109' + 2*2*2*41.5 = 1,749 \text{ LF}$

Total length of Type I Mod. PPC Girders (approx.) =  $2*(5+4)*41.5 = 747 \text{ LF}$

Total length of Standard Jersey Barriers =  $2*2*192 = 768 \text{ LF}$

Area of 4" Sloped Paving (approx.) =  $2*45'*126.5/9 = 1,265 \text{ SY}$

### **Substructure:**

Volume of Class AA concrete (average dimensions of Caps (4.5'X4.5', Columns (4'X4') & Pile Caps (9'X9'), Columns @ 15' high):

Intermediate Bents:  $2 * \{ [(50' + 38') * 4.5' * 4.5') + (4 * 15' * 4' * 4') \} + [4 * 3 * 9' * 9'] / 27 = 275 \text{ CY}$

End Bents (Caps + Backwall):  $4 * \{ [(3' * 3') + (6' * 1')] * (53.25' + 41.25') \} / 27 = 210 \text{ CY}$

(Wingwalls have been ignored for a conservative comparison).

Total Volume of Class AA concrete = 485 CY

Since the foundation design is not complete, 9 Steel H piles per footing and one under each beam at the end bents have been assumed. It may be anticipated that the H piles would require pile points for driving through rocky soils.

Length of Steel HP 14X73 Piles (End Bents – assumed 30 ft piles) =  $2 * [(7 + 6) * 30'] = 780 \text{ LF}$

Length of Steel HP 14X73 Piles (Intermediate Bents – assumed 60 ft piles) =  $2 * 4 * (9 * 60') = 4,320 \text{ LF}$

Total length of Steel HP 14X73 Piles = 5,100 LF

# Calculations



PROJECT: **Georgia Department of Transportation  
NH-051-1(25) – P.I. 122850  
SR 10 Loop - Clarke County**

ALTERNATIVE NO.:  
**BR-8**

DESCRIPTION: **Construct Two 12' Lanes With 4' and 6'-6" Shoulders on  
Both Bridges**

SHEET NO.: **4 of 5**

## Alternative (Similar Twin Bridges – 192' long, 36.75' wide each)

### **Superstructure: (Some values are assumed since the current design is in the preliminary phase)**

Deck Area =  $(2 \times 36.75') \times 192' = 14,112 \text{ SF}$

Volume of 7 1/2" thick Class AA Superstructure Deck concrete =  $[14112 \times (7.5''/12)]/27 = 326.67 \text{ CY}$

Area of Grooved concrete (approx.) =  $(2 \times 29.5') \times 192'/9 = 1258.67 \text{ SY}$

Total length of BT-63 PPC Girders (approx.) =  $(6+6) \times 109' + 2 \times 2 \times 2 \times 41.5' = 1,640 \text{ LF}$

Total length of Type I Mod. PPC Girders (approx.) =  $2 \times (4+4) \times 41.5 = 664 \text{ LF}$

Total length of Standard Jersey Barriers =  $2 \times 2 \times 192 = 768 \text{ LF}$

Area of 4" Sloped Paving (approx.) =  $2 \times 45' \times 107.5/9 = 1,075 \text{ SY}$

### **Substructure:**

Volume of Class AA concrete (average dimensions of Caps (4.5' X 4.5', Columns (4' X 4') & Pile Caps (9' X 9'), Columns @ 15' high):

Intermediate Bents:  $2 \times \{[(34.5' + 34.5') \times 4.5' \times 4.5'] + (4 \times 15' \times 4' \times 4')\} + [4 \times 3 \times 9' \times 9'] / 27 = 246.61 \text{ CY}$

End Bents (Caps + Backwall):  $4 \times \{[(3' \times 3') + (6' \times 1')\} \times (36.75' + 36.75') / 27 = 163.33 \text{ CY}$

(Wingwalls have been ignored)

Total Volume of Class AA concrete = 410 CY

Since the foundation design is not complete, 9 Steel H piles per footing and one under each beam at the end bents have been assumed. It may be anticipated that the H piles would require pile points for driving through rocky soils.

Length of Steel HP 14X73 Piles (End Bents – assumed 30 ft piles) =  $2 \times [(6 + 6) \times 30'] = 720 \text{ LF}$

Length of Steel HP 14X73 Piles (Intermediate Bents – assumed 60 ft piles) =  $2 \times 4 \times (9 \times 60') = 4,320 \text{ LF}$

Total length of Steel HP 14X73 Piles = 5,040 LF

# Cost Worksheet



PROJECT:	<b>Georgia Department of Transportation</b> <b>NH-051-1(25) P.I. 122850</b> <b>SR 10 Loop - Clarke County</b>	ALTERNATIVE NO.:	<b>BR-8</b>
DESCRIPTION:	<b>Construct Two 12' Lanes with 4' and 6'-6"</b> <b>Shoulders on both Bridges</b>	SHEET NO.:	<b>5 of 5</b>

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
BT 63 PSC Beams	LF	1749	\$ 181.62	\$ 317,653.38	1640	\$ 181.62	\$ 297,856.80
Type I Mod Beams	LF	747	\$ 98.14	\$ 73,310.58	664	\$ 98.14	\$ 65,164.96
Class "AA" Concrete (Sup)	CY	420	\$ 533.26	\$ 223,969.20	326.67	\$ 533.26	\$ 174,200.04
Class "AA" Concrete (Sub)	CY	485	\$ 376.75	\$ 182,723.75	410	\$ 376.75	\$ 154,467.50
Concrete Deck Grooving	SY	1706.67	\$ 4.05	\$ 6,912.01	1258.7	\$ 4.05	\$ 5,097.61
Concrete Side Barrier	LF	768	\$ 362.00	\$ 278,016.00	768	\$ 362.00	\$ 278,016.00
Steel H, HP 14X73	LF	5100	\$ 63.64	\$ 324,564.00	5040	\$ 63.64	\$ 320,745.60
Pile Points	LF	98	\$ 205.46	\$ 20,135.08	96	\$ 205.46	\$ 19,724.16
Sloped Paving	SY	1265	\$ 47.62	\$ 60,239.30	1075	\$ 47.62	\$ 51,191.50
<b>Sub-total</b>				\$ 1,487,523			\$ 1,366,464
<b>Mark-up at 10.00%</b>				\$ 148,752			\$ 136,646
<b>TOTAL</b>				\$ 1,636,276			\$ 1,503,111
Estimated Savings:							\$133,165

# Value Analysis Design Alternative



PROJECT:	<b>Georgia Department of Transportation NH-051-1(25) – P.I. 122850 SR 10 Loop - Clarke County</b>	ALTERNATIVE NO.:	<b>BR-9</b>
DESCRIPTION:	<b>Construct Two 12' Lanes with 4' and 6'-6" Shoulders on East Bridge</b>	SHEET NO.:	<b>1 of 5</b>

**Original Design:** (At the time of the VE Study, the bridges were in the Preliminary stage of design)

The original design calls for the construction of twin 3-span bridges, 192' long with 41.5' end spans and 109' intermediate spans, over Peter St./Olympic Dr. The West bridge is 53.25' wide and the East bridge is 41.25' wide. The bridges are skewed approximately 6° to the normal to the SR 10 Loop. End spans 1 and 3 are comprised of five Type I Mod beams with 63" Bulb Tee Fascia beams evenly spaced on the West bridge and four Type I Mod beams with 63" Bulb Tee Fascia beams evenly spaced on the East bridge. The intermediate spans are comprised of seven 63" Bulb Tee beams evenly spaced on the West bridge and six 63" Bulb Tee beams evenly spaced on the East bridge. In the final configuration, the bridges accommodate 4' inside and 10' outside shoulders, two 12' travel lanes and a 12' turn lane on the West bridge only. The bents are made up of concrete caps and columns. Due to the presence of boulders in the underlying soil, it is anticipated that the intermediate bents will be founded on micropiles. The barrier rail is standard.

**Alternative:**

In the proposed alternative, the outside shoulder on the East Bridge is reduced in width by 3.5' (from 10' in the current design to 6'-6") to match the SR 10 Loop cross section.

The alternative maintains the same configuration as in the current design on the West Bridge, the current vertical clearance to Peter St./Olympic Dr., and other current geometry and staging sequence.

**Opportunities:**

- Cost savings by reducing bridge width
- Cost savings on slope paving
- Reduced excavation, associated shoring and incidental costs.

**Risks:**

- Re-design effort will require additional time and design fee
- Limits the bridge width

**Technical Discussion:**

The same number of beams may be required for the revised cross section as in the current design. Savings will be on the deck slab only.

See the following sheets for the calculation of the savings noted below.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 1,636,276	\$ 0	\$ 1,636,276
ALTERNATIVE	\$ 1,592,513	\$ 0	\$ 1,592,513
SAVINGS	\$ 43,763	\$ 0	\$ 43,763

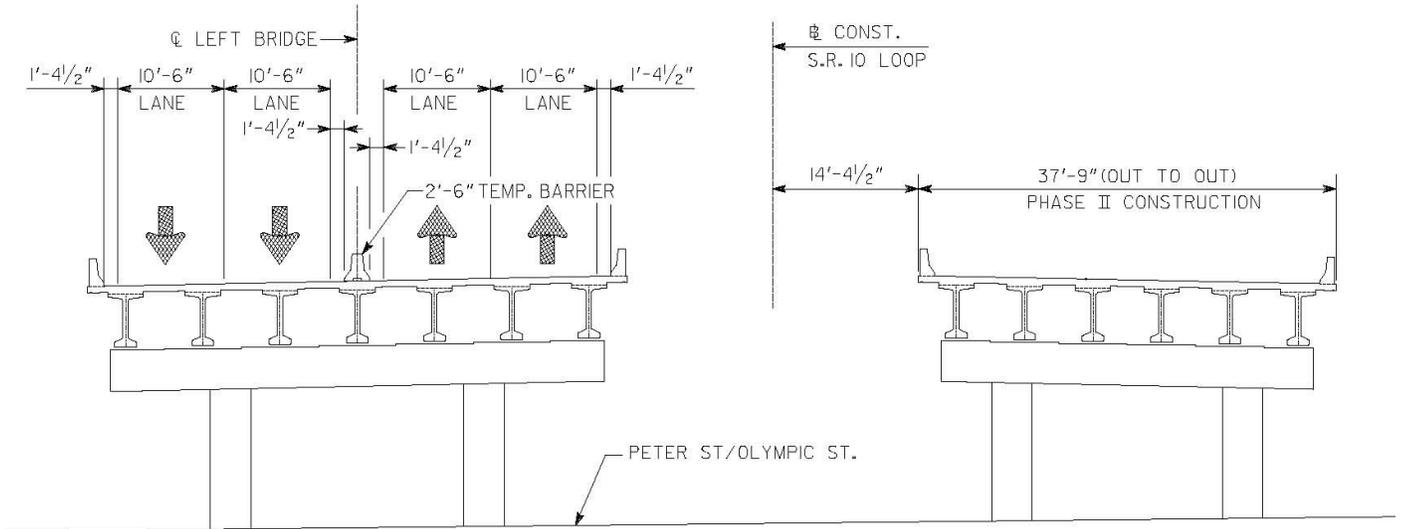
# Illustration

PROJECT: **Georgia Department of Transportation  
NH-051-1(25) – P.I. 122850  
SR 10 Loop - Clarke County**

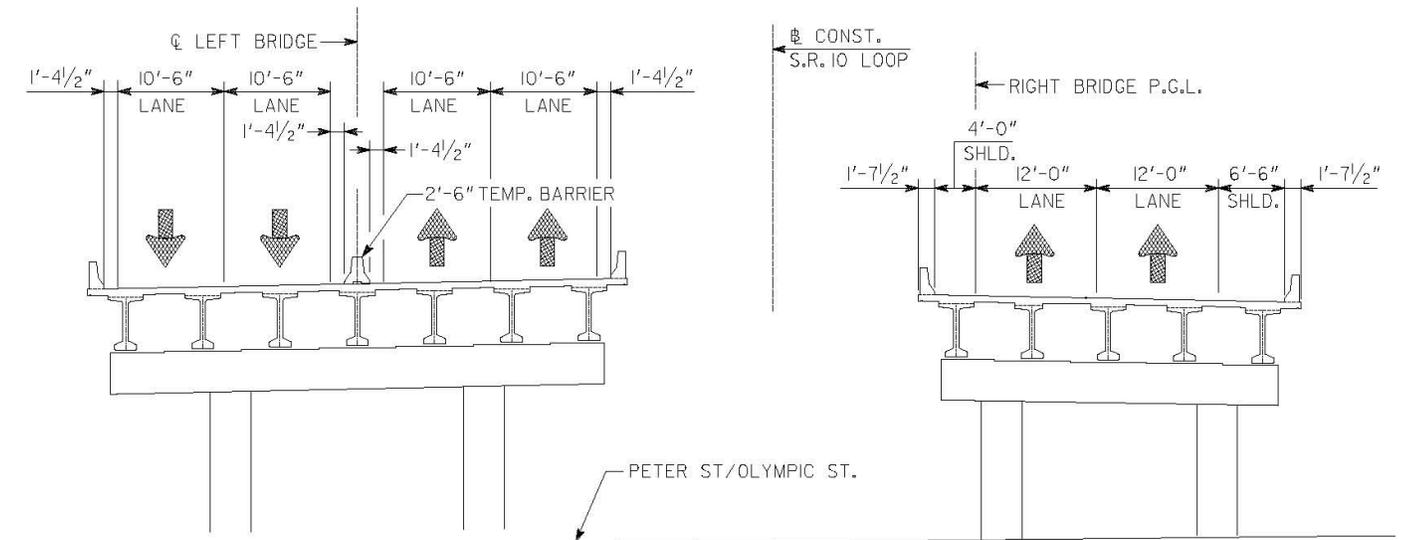
ALTERNATIVE NO.:  
**BR-9**

DESCRIPTION: **Construct Two 12' Lanes with 4' and 6'-6" Shoulders on East Bridge**

SHEET NO.: **2 of 5**



CURRENT DESIGN



ALTERNATIVE BR-9

# Calculations



PROJECT: **Georgia Department of Transportation  
NH-051-1(25) – P.I. 122850  
SR 10 Loop - Clarke County**

ALTERNATIVE NO.:  
**BR-9**

DESCRIPTION: **Construct Two 12' Lanes With 4' and 6'-6" Shoulders on  
East Bridge**

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

## Current Design (Two 3 Span Bridges – 192' Long, 53.25' and 41.25' wide each)

**Superstructure: (Some values are assumed since the current design is in the preliminary phase)**

Deck Area =  $(41.25' + 53.25') * 192' = 18,144$  SF

Volume of 7 1/2" thick Class AA Superstructure Deck concrete =  $[18144*(7.5"/12)]/27 = 420$  CY

Area of Grooved concrete (approx.) =  $(34' + 46') * 192'/9 = 1706.67$  SY

Total length of BT-63 PPC Girders (approx.) =  $(7+6)*109' + 2*2*2*41.5 = 1,749$  LF

Total length of Type I Mod. PPC Girders (approx.) =  $2*(5+4)*41.5 = 747$  LF

Total length of Standard Jersey Barriers =  $2*2*192 = 768$  LF

Area of 4" Sloped Paving (approx.) =  $2*45'*126.5/9 = 1,265$  SY

## **Substructure:**

Volume of Class AA concrete (average dimensions of Caps (4.5'X4.5', Columns (4'X4') & Pile Caps (9'X9'), Columns @ 15' high):

Intermediate Bents:  $2*[(50'+38')*4.5'*4.5'] + (4*15'*4'*4') + [4*3*9'*9'] /27 = 275$  CY

End Bents (Caps + Backwall):  $4*[(3'*3') + (6'*1')]*(53.25'+41.25')/27 = 210$  CY

(Wingwalls have been ignored for a conservative comparison).

Total Volume of Class AA concrete = 485 CY

Since the foundation design is not complete, 9 Steel H piles per footing and one under each beam at the end bents have been assumed. It may be anticipated that the H piles would require pile points for driving through rocky soils.

Length of Steel HP 14X73 Piles (End Bents – assumed 30 ft piles) =  $2*[(7 + 6)*30'] = 780$  LF

Length of Steel HP 14X73 Piles (Intermediate Bents – assumed 60 ft piles) =  $2*4*(9*60') = 4,320$  LF

Total length of Steel HP 14X73 Piles = 5,100 LF

# Calculations



PROJECT: **Georgia Department of Transportation  
NH-051-1(25) – P.I. 122850  
SR 10 Loop - Clarke County**

ALTERNATIVE NO.:  
**BR-9**

DESCRIPTION: **Construct Two 12' Lanes With 4' and 6'-6" Shoulders on  
East Bridge**

SHEET NO.: **4 of 5**

## Alternative (Two 3 Span Bridges – 192' long, 53.25' and 39.75' wide each)

**Superstructure: (Some values are assumed since the current design is in the preliminary phase)**

Deck Area =  $(39.75' + 53.25') * 192' = 17,856 \text{ SF}$

Volume of 7 1/2" thick Class AA Superstructure Deck concrete =  $[17856 * (7.5"/12)]/27 = 413.33 \text{ CY}$

Area of Grooved concrete (approx.) =  $(32.5' + 46') * 192'/9 = 1675 \text{ SY}$

Total length of BT-63 PPC Girders (approx.) =  $(7+6)*109' + 2*2*2*41.5 = 1,749 \text{ LF}$

Total length of Type I Mod. PPC Girders (approx.) =  $2*(5+4)*41.5 = 747 \text{ LF}$

Total length of Standard Jersey Barriers =  $2*2*192 = 768 \text{ LF}$

Area of 4" Sloped Paving (approx.) =  $2*45'*123.0/9 = 1,230 \text{ SY}$

### **Substructure:**

Volume of Class AA concrete (average dimensions of Caps (4.5'X4.5', Columns (4'X4') & Pile Caps (9'X9'), Columns @ 15' high):

Intermediate Bents:  $2* \{ [(50'+36')*4.5'*4.5') + (4*15'*4'*4') \} + [4*3*9'*9'] \} / 27 = 272 \text{ CY}$

End Bents (Caps + Backwall):  $4* \{ [(3'*3') + (6'*1')] * (53.25' + 39.75') \} / 27 = 207 \text{ CY}$

(Wingwalls have been ignored for a conservative comparison).

Total Volume of Class AA concrete = 479 CY

Since the foundation design is not complete, 9 Steel H piles per footing and one under each beam at the end bents have been assumed. It may be anticipated that the H piles would require pile points for driving through rocky soils.

Length of Steel HP 14X73 Piles (End Bents – assumed 30 ft piles) =  $2*[(7 + 6)*30'] = 780 \text{ LF}$

Length of Steel HP 14X73 Piles (Intermediate Bents – assumed 60 ft piles) =  $2*4*(9*60') = 4,320 \text{ LF}$

Total length of Steel HP 14X73 Piles = 5,100 LF

# Cost Worksheet



PROJECT:	<b>Georgia Department of Transportation</b> <b>NH-051-1(25) P.I. 122850</b> <b>SR 10 Loop - Clarke County</b>	ALTERNATIVE NO.:	<b>BR-9</b>
DESCRIPTION:	<b>Construct Two 12' Lanes With 4' and 6'-6" Shoulders on East Bridge</b>	SHEET NO.:	<b>5 of 5</b>

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE				
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL		
BT 63 PSC Beams	LF	1749	\$ 181.62	\$317,653.38	1640	\$ 181.62	\$ 297,856.80		
Type I Mod Beams	LF	747	\$ 98.14	\$ 73,310.58	664	\$ 98.14	\$ 65,164.96		
Class "AA" Concrete (Sup)	CY	420	\$ 533.26	\$223,969.20	413.33	\$ 533.26	\$ 220,412.36		
Class "AA" Concrete (Sub)	CY	485	\$ 376.75	\$182,723.75	479	\$ 376.75	\$ 180,463.25		
Concrete Deck Grooving	SY	1706.67	\$ 4.05	\$ 6,912.01	1675	\$ 4.05	\$ 6,783.75		
Concrete Side Barrier	LF	768	\$ 362.00	\$278,016.00	768	\$ 362.00	\$ 278,016.00		
Steel H, HP 14X73	LF	5100	\$ 63.64	\$324,564.00	5040	\$ 63.64	\$ 320,745.60		
Pile Points	LF	98	\$ 205.46	\$ 20,135.08	96	\$ 205.46	\$ 19,724.16		
Sloped Paving	SY	1265	\$ 47.62	\$ 60,239.30	1230	\$ 47.62	\$ 58,572.60		
<b>Sub-total</b>				\$ 1,487,523				\$ 1,447,739	
<b>Mark-up at</b>	<b>10.00%</b>				\$ 148,752				\$ 144,774
<b>TOTAL</b>				<b>\$ 1,636,276</b>				<b>\$ 1,592,513</b>	
Estimated Savings:							\$43,762		

# Value Analysis Design Alternative



PROJECT:	<b>Georgia Department of Transportation NH-051-1(25) – P.I. 122850 SR 10 Loop - Clarke County</b>	ALTERNATIVE NO.:	<b>EW-7</b>
DESCRIPTION:	<b>Eliminate SR 10 Loop grade correction on northern section.</b>	SHEET NO.:	<b>1 of 4</b>

## Original Design:

The original design calls for a grade correction on SR 10 Loop with an insertion of a 1,100' vertical curve from PVC STA. 116+00 to PVT STA. 127+00, allowing for a design speed rating of 65 mph, in excess of the posted limit of 55 MPH.

## Alternative:

The alternative would be to either accept a lower design speed, say 60 mph or even 55 mph, or to simply eliminate this section from the scope of this project (move northerly termini to the south) thereby removing the vertical grade correction in its entirety.

## Opportunities:

- Reduction in excavation costs.
- Reduction in pavement costs.
- Decreased construction time.
- Less lane disruption on SR 10 Loop during construction phase.

## Risks:

- Less than desirable design speed rating.
- Minimal design impacts.
- Should “they” desire to increase the speed limit above a reasonable rate of 55 or even 60 mph in the future, they would have to either make an exception or redo the roadway.

## Technical Discussion:

The SR 10 Loop is currently posted at a 55 MPH speed limit. The roadway is supposedly designed for 65 mph, however, there is at least one portion (just north of this intersection) which appears to be designed for less than 65 mph. The current project plan calls for adjusting the grade of the existing roadway by doing a vertical grade correction consisting of a revising the existing 1,100' vertical curve, **to lower its profile grade line by only 2'**. Cost savings include full build-up of asphalt and GAB for roadway and shoulders that will not have to be removed and replaced using the alternative. From inspection of the existing “loop” road, it does not appear reasonable to believe that one would ever consider raising the speed limit on this roadway. Additionally, the entire roadway has substandard shoulders and probably other significant deficiencies which might be addressed before doing a minor (major cost) adjustment of an existing grade.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 4,714,836	\$ 0	\$ 4,714,836
ALTERNATIVE	\$ 4,374,594	\$ 0	\$ 4,374,594
SAVINGS	\$ 340,241	\$ 0	\$ 340,241

# Illustration

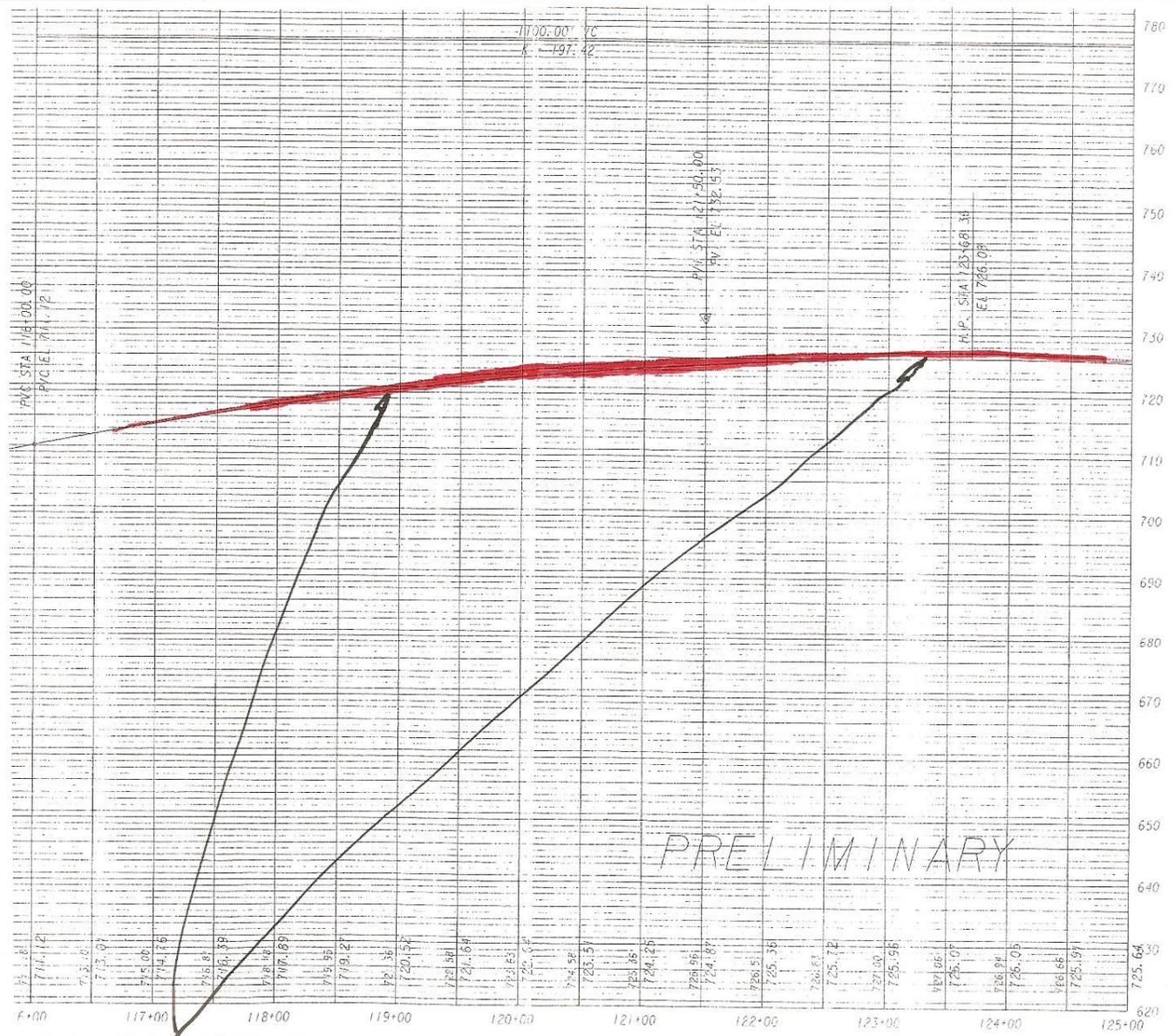


PROJECT: Georgia Department of Transportation  
NH-051-1(25) – P.I. 122850  
SR 10 Loop - Clarke County

ALTERNATIVE NO.:  
**EW-7**

DESCRIPTION: Eliminate SR 10 Loop grade correction on northern section

SHEET NO.: 2 of 4



ELIMINATE GRADE CORRECTION ON SR 10 LOOP. USE EXISTING P.G.L. TO SAVE EXCAVATION COSTS, AS WELL AS TO MINIMIZE LANE DISRUPTION DURING CONSTRUCTION ON S.R. 10 LOOP.

# Calculations



PROJECT: **Georgia Department of Transportation  
NH-051-1(25) – P.I. 122850  
SR 10 Loop - Clarke County**

ALTERNATIVE NO.:  
**EW-7**

DESCRIPTION: **Eliminate SR 10 Loop grade correction on northern  
section**

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

## Assumptions:

- Prices for Unclassified Excavation are from estimate report provided dated 9/2/2008.
- Length of vertical curve is 1,100 LF, from PVC 116+00 to PVT 127+00.
- Average depth appears to be 1.5', with a 3' median depth feathering to zero at the north and south ties.
- Asphalt and GAB figures are shown as saved as they will not be removed and replaced in the alternative design.

### Unclassified Excavation-

$$1,100 \text{ LF} \times 1.5' = 1,650$$

$$\text{Roadway width} = 24' \text{ lane width} \times 2 = 48'$$

$$\text{Shoulder width} = 10' \text{ existing (6' outside/4' inside)} \times 2 = 20'$$

$$48' + 20' = 68' \text{ total width}$$

$$68' \times 1,650 = 112,200/27 = \mathbf{4,156 \text{ CY}}$$

$$4,156 \text{ CY} @ \$3.23/\text{CY} = \$13,423.88$$

### GAB-

$$1,100 \text{ LF} \times 68' \text{ width}/9 = 8311.11 \text{ SY} @ 1200\text{LB}/\text{SY}/2000 = \mathbf{4,987 \text{ TN saved}}$$

### 25mm Superpave-

$$8,311.11 \text{ SY} \times 400\text{LB}/\text{SY}/2,000 = \mathbf{1,662 \text{ TN saved.}}$$

### 19mm Superpave-

$$8,311.11 \text{ SY} \times 200\text{LB}/\text{SY}/2,000 = \mathbf{831.11 \text{ TN saved.}}$$

### 12.5mm Superpave-

$$8,311.11 \text{ SY} \times 150\text{LB}/\text{SY}/2,000 = \mathbf{623.33 \text{ TN saved.}}$$



## *Project Description*

## **PROJECT INTRODUCTION**

This Project Number is NH-051-1(25) for Clarke County. The project will replace an existing at-grade intersection of SR 10 Loop (Federal Route Number US441) and Peter Street/Olympic Drive with a grade-separated intersection. Plans call for SR 10 Loop alignment to cross over Peter Street/Olympic Drive. Total project length on SR 10 Loop is approximately 0.75 miles. SR 10 Loop is a controlled access perimeter highway around the city of Athens. Peter Street is a major access route into downtown Athens and to the University of Georgia parking facilities located around the perimeter of the campus.

The improvements included in the preliminary design call for the construction of a new combination cloverleaf and diamond grade separation intersection, regrading of SR 10 Loop to correct original design/construction errors, new access to park, new Peters Street/ Olympic Drive urban section, new bike lanes, new sidewalks and signalization.

The projected construction cost is estimated to be \$15,047,051.50 which includes a 10% E & C rate. Right of Way acquisition is estimated at \$3,016,700 including scheduling contingency and administrative and court costs; for a total project budget of \$18,095,662.

## **REPRESENTATIVE DOCUMENTS**

- Georgia Department of Transportation
- MACTEC Documents
  - The Concept Validation Report and Plans
  - Construction Cost Estimates
  - Preliminary Right-of-Way Cost Estimate

The VE Team utilized the supplied project materials noted above and the current standard drawings, details and specifications provided by MACTEC Engineering and Consulting.

Also included are photos taken at the project site by the Value Engineering team.

# CONCEPT VALIDATION REPORT

## SR 10 Loop/Athens Perimeter at Peter Street and Olympic Drive

Project Number: NH-051-1(25)  
P.I. Number: 122850  
Clarke County

FEDERAL ROUTE NUMBER: US 441  
STATE ROUTE NUMBER: SR 10 Loop  
COUNTY ROUTE NUMBER: N/A



DEPARTMENT OF TRANSPORTATION  
STATE OF GEORGIA

Office of Program Delivery and Consultant Design

**MACTEC ENGINEERING AND CONSULTING**



March 2, 2005

## SR 10 Loop/Athens Perimeter at Peters Street/Olympic Drive

Project Number: NH-051-1(25)

P.I. Number: 122850

Clarke County

### **PROJECT STATUS**

The concept was developed by Arcadis Geraghty & Miller. The Concept Meeting was held on November 18, 1999, and the project concept was approved by GDOT on July 13, 2000. MACTEC Engineering and Consulting is now under contract with the GDOT Office of Program Delivery and Consultant Design to design the project.

**Contacts:** Joe Wheeler, GDOT Project Manager (404-657-9759) [joe.wheeler@dot.state.ga.us](mailto:joe.wheeler@dot.state.ga.us)  
Paul Weldon, MACTEC Project Manager (770-421-3344) [paul.weldon@mactec.com](mailto:paul.weldon@mactec.com)

### **PROJECT OVERVIEW**

The SR 10 Loop is a controlled access perimeter highway around the city of Athens. Peter Street is a major access route into downtown Athens and to University of Georgia parking facilities located around the perimeter of the campus. East of the SR 10 Loop, the name of Peter Street changes to Olympic Drive.

This project will replace an existing at-grade intersection of SR 10 Loop and Peter Street/Olympic Drive with a new grade-separated interchange. The project will carry the mainline SR 10 Loop alignment over Peter Street/Olympic Drive. The interchange will consist of a southbound quarter-cloverleaf exit loop and a southbound entrance ramp outside the loop, while the two remaining ramps will be in a compressed diamond configuration on the east side of the SR 10 Loop. The SR 10 typical section will maintain the existing typical section of four 12-foot lanes (two in each direction) with a 40-foot depressed median and 10-foot paved outside shoulders. The typical section for Peter Street/Olympic Drive will have four 12-foot lanes (two in each direction) with curb and gutter, separated by a 32' raised median. The typical section for Peter Street/Olympic Drive will also include a 4-foot bicycle lane on each side of the road. Turn lanes will be provided at a proposed park entrance and at the SR 10 entrance ramps. Design speed and posted speed for the SR 10 Loop will be 65 mph; design speed and posted speed for Peter Street/Olympic Drive will be 45 mph. Total project length on SR 10 is approximately 0.75 miles.

### **CONCEPT VALIDATION**

The approved concept report has been reviewed. Six concept alternatives, including "no build," were considered during concept development. The preferred alternative was a quarter cloverleaf interchange, which was determined to provide the greatest improvement in safety and operations.

The concept report was approved in mid-2000, and site conditions have not changed significantly. Traffic volumes (current counts and future projections) were furnished by GDOT OEL in 1998. Since the concept report was approved, no new projects or land developments are known to have been proposed that would significantly increase the projected traffic volumes. During concept development, a County park (Peters Park) had been proposed for the northwest quadrant of the interchange, and the southbound SR 10 Loop exit loop junction with Peter Street was located to align with the park entrance. Athens-Clarke County has since shifted the proposed park entrance and requested a relocation of the interchange loop ramp junction to align with the park entrance. This request is reasonable, and we recommend that the loop ramp alignment be revised to shift the ramp junction approximately 200 feet westward on Peter Street. This will shift the loop ramp junction on the west side of SR 10 Loop further away from the diamond ramp junctions on the east side of SR 10, which will provide increased queuing lengths for left turns onto SR 10 and will result in an increased Level of Service (see "Traffic Studies"). Both ramp intersections with Peter Street will be signalized. The relocation of the loop ramp junction may require slightly more right of way or easements along Peter Street.

The proposed Peter Street park will be approximately 100 acres in size. Construction is expected to begin in the near future. The park will consist of soccer and baseball fields, tennis courts, and possibly a community center. Athens-Clarke County was unable to provide traffic projections, so trip generator tables were used to estimate traffic volumes created by the park.

The typical sections for Peter Street/Olympic Drive will be revised as necessary to ensure that the sidewalk location is in accordance with current GDOT policy. All sidewalks and crosswalks will be designed to be fully ADA/ADAAG-compliant.

The proposed design criteria meet current AASHTO and GDOT policies for an urban principal arterial, and no design exceptions or design variances are anticipated at this time. Since the project concept was approved, AASHTO has published two new versions of the "Green Book" (2001 and 2004). Significant changes in the methodology for determining vertical alignment stopping sight distance were included in the new versions. The proposed SR 10 vertical alignment will be restudied during the preliminary design phase, and profile grades will be adjusted where possible. These revisions may reduce earthwork volumes significantly.

Trail Creek, a tributary of the North Oconee River, crosses the SR 10 Loop alignment a few hundred feet north of Peter Street/Olympic Drive. FEMA Flood Insurance Rate Maps (FIRM) maps were studied to verify that the affected section of Trail Creek is not in a flood hazard zone. An existing quadruple 10' x 10' concrete box culvert will be replaced by a new culvert, with the size to be determined during the preliminary design phase. A Nationwide COE Section 404 Permit will be required.

At the time of concept approval, there was no Project Management Agreement ("PMA" - formerly called a Local Government Project Agreement). On December 2, 2002, Athens-Clarke County signed a PMA for adjustment/relocation of public utilities.

No railroads are located within the project limits.

The Athens Transit System has no bus routes within the project limits.



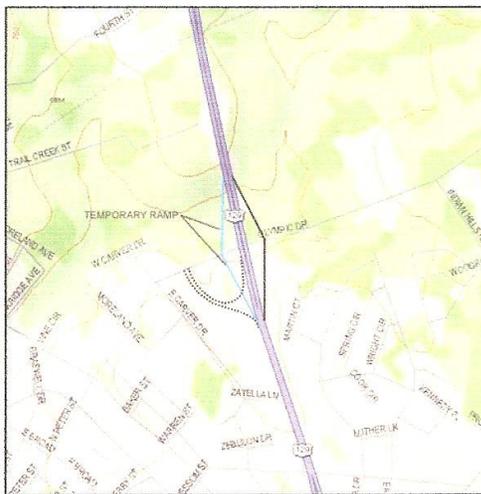
**MOT plan # 3** would allow traffic to flow on SR 10 throughout construction by detouring all traffic to the east on a combination of permanent and temporary construction.

- This plan would be expensive to construct, and much of the grading and paving would have to be removed at completion of the project.
- Temporary easements may have to be acquired in the northeast quadrant of the interchange.
- The junctions for the two permanent ramps may have to be shifted further down SR 10 (away from Peter Street) to allow for the major four-lane traffic shift on SR 10.



NOTE: RAMP LOCATIONS AND LENGTHS ARE NOT TO SCALE

### MOT # 3



NOTE: RAMP LOCATIONS AND LENGTHS ARE NOT TO SCALE

### MOT # 4

**MOT plan # 4** would allow traffic to flow on SR 10 throughout construction by first constructing four diamond ramps (two permanent, two temporary), then constructing the SR 10 paving and bridges. The permanent loop ramp would be constructed in segments until it is completed.

- This plan would be expensive to construct, and the grading and paving for the temporary ramps would have to be removed.
- Stage construction and maintenance of traffic would have to be carefully designed and coordinated.
- The temporary southbound exit ramp would pass through a proposed public park that will be under construction soon. Also, the primary access to the park will be located on Peter Street very close to the temporary ramp intersection at Peter Street. **(FATAL FLAW?)**
- There would be some additional temporary impact to Trail Creek, and a large temporary culvert would have to be constructed, then removed later, or the permanent culvert would have to be longer than would have been required.

**Summary and Recommendation**

There are a number of variations on these schemes, but all suffer from some significant drawbacks. MOT # 1 would be preferable if there was no park (and park entrance) planned for the near future. Section 4(f) legislation, as established under the U.S. Department of Transportation Act of 1966 (49 USC 303, 23 USC 138), provides protection for publicly owned parks, recreation areas, historic sites, wildlife and/or waterfowl refuges from conversion to other use. The FHWA may not approve the use of land from a significant publicly owned park, recreation area, or wildlife and waterfowl refuge, or any significant historic site, unless a determination is made that: (1) there is no feasible and prudent alternative to the use of the land from the property; and (2) the action includes all possible planning to minimize harm to the property resulting from such use. It would be difficult to obtain approval for the impact to the park, and the location of the temporary ramp would require the closing of the main park access for a period of a year or more.

MOT # 2 could be acceptable if traffic volumes were substantially less, but this alternate would temporarily require approximately 1,500 vph to turn left from westbound Peter Street onto the SR 10 southbound entrance ramp. This would far exceed the capacity of the intersection. In addition, MOT # 2 would require three closely spaced traffic signals, which would be difficult to coordinate. This plan would also impact the park and require a 4(f) evaluation, although the impact on the park would be much less than with MOT # 1.

MOT # 3 would shift all traffic off SR 10 and route the traffic onto a temporary detour located to the east of SR 10. Much of this detour would be temporary grading and paving to be removed later; however, the two permanent interchange ramps could be incorporated into the temporary detour, thus lessening the amount of regrading and pavement removal after traffic is shifted back to SR 10 on completion of the project. MOT # 3 would be expensive to construct, due to the extensive amount of temporary grading and paving that would have to be removed; however, MOT # 3 is the only plan that would not impact the park.

MOT # 4 would essentially consist of constructing a conventional diamond interchange, with the two ramps on the west side of SR 10 being temporary. There are several possible variations of this plan. The plan has a conflict where the temporary southbound entrance ramp crosses the permanent loop ramp; however, with proper construction staging, all traffic movements can be accommodated. As with MOT # 1 and MOT # 2, MOT # 4 would have a temporary impact on park property.

\* \* \* \* \*

**MOT # 3 and MOT # 4 are the only feasible maintenance of traffic plans of the four plans shown. MOT # 1 and # 2 have fatal flaws due to 4(f) issues. Of the two feasible plans, we recommend MOT # 3.** MOT # 3 is the only one of the maintenance of traffic plans that would not impact the proposed park. MOT # 4 would have relatively minimal impact on the park, but this would prompt a 4(f) process, which could be very lengthy, and it may be difficult to demonstrate that MOT # 4 is the only feasible and prudent alternative. For this reason, we recommend MOT # 3. MOT # 3 should provide an acceptable level of service, safe operation, and simple detours with a minimum of circuitous travel.

The following are simplified schematic descriptions of MOT # 3 and # 4. These descriptions are conceptual-level only for the purpose of demonstrating the feasibility of the two plans. Detailed stage construction and maintenance of traffic plans will be developed during the preliminary and final plan design phases. Note that some temporary traffic signals may be required.

## MOT # 4

### STAGE 1

Construct the two permanent diamond ramps on the east side of SR 10.

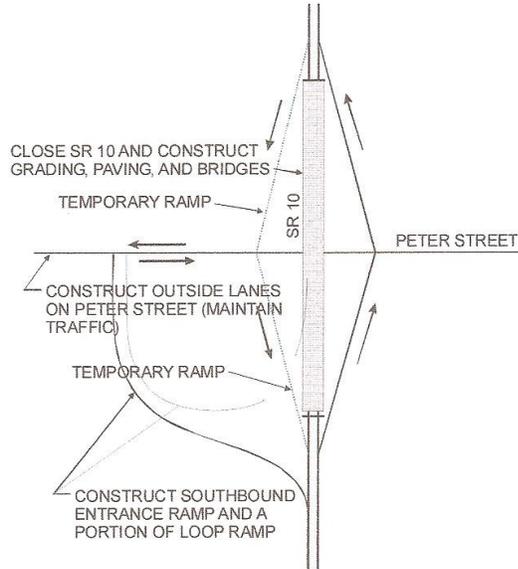
Construct two temporary diamond ramps on the west side of SR 10.

Shift all SR 10 traffic to the four diamond ramps.

Close the segment of SR 10 between the ramp entrances/exits and construct the SR 10 grading and paving.

Construct the widened section of Peter Street. Maintain traffic on the existing lanes of Peter Street.

Construct the SR 10 southbound entrance ramp and a portion of the loop ramp as shown.



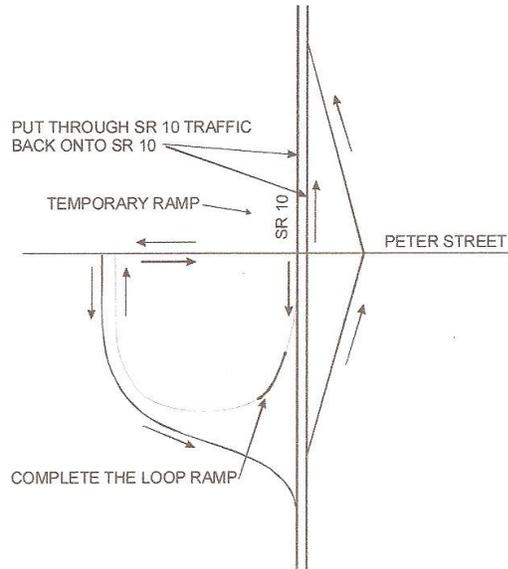
### STAGE 2

Complete the loop ramp. It may be possible to do this work under traffic. Alternately, the temporary southbound SR 10 entrance ramp built in Stage 1 may have to be closed briefly to allow the completion of the loop ramp.

Close and remove the temporary southbound SR 10 exit ramp built in Stage 1.

Open the loop ramp and the southbound SR 10 entrance ramp to traffic.

Shift Peter Street traffic to the new outside lanes built in Stage 1. Complete the construction on Peter Street.



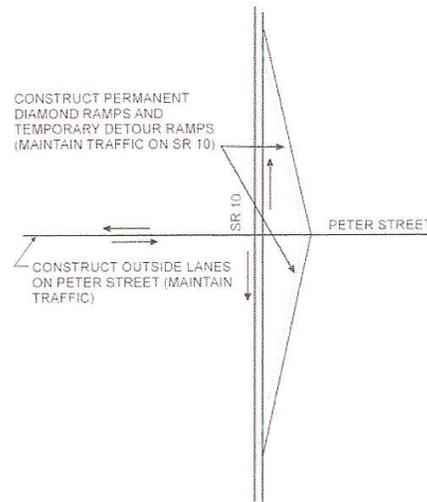
## MOT # 3

### STAGE 1

Construct the two permanent diamond ramps on the east side of SR 10. Construct two temporary diamond ramps parallel and adjacent to the permanent ramps.

Shift all SR 10 traffic to the diamond ramps.

Construct the widened section of Peter Street. Maintain traffic on the existing lanes of Peter Street.

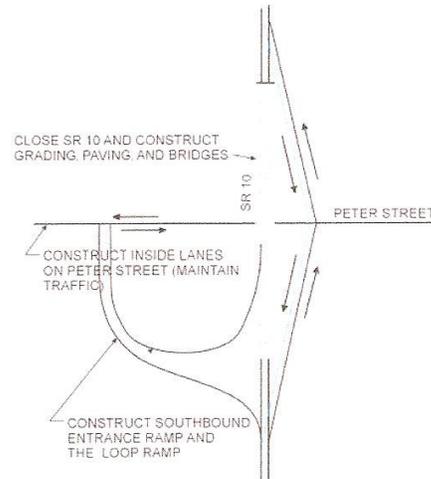


### STAGE 2

Close the segment of SR 10 between the ramp entrances/exits and construct the SR 10 grading, paving, and bridges.

Construct the southbound entrance ramp and the loop ramp.

Shift Peter Street traffic to the new outside lanes built in Stage 1. Complete the construction on Peter Street.



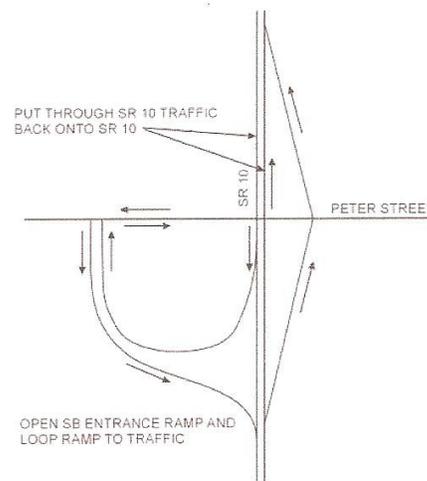
### STAGE 3

Re-open SR 10 to through traffic.

Open the loop ramp and the southbound SR 10 entrance ramp to traffic.

Complete work on Peter Street.

Remove the temporary diamond ramps.



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## **PUBLIC INVOLVEMENT**

The public involvement program for this project is expected to be minimal, with one public information open house and one public hearing open house. The primary concerns of the public are expected to be right of way impacts, traffic operations impacts on local neighborhoods, and disruptions to traffic during construction. If necessary, meetings could be held with neighborhood and civic groups to address their concerns.

## **IMPACTS TO PROPERTIES (DISPLACEMENTS)**

The reconstruction of Peter Street is not expected to displace any residences or business; however, it is possible that some limited right of way and/or easements will be required along Peter Street beyond the right of way that was originally acquired for SR 10. Depending on the stage construction/traffic control plan, some temporary easements may be required in the proposed park property in the northwest quadrant of the interchange. Right of way and/or easements may be required from approximately 2-4 parcels. Every effort will be made to minimize right of way requirements.

## **UTILITIES**

Georgia Power owns an overhead transmission line mounted on large transmission towers. Based on the conceptual design, two of the towers will have to be relocated. During preliminary design, this issue will be coordinated closely with Georgia Power. The lead time for relocating these towers is significant, so coordination will begin during preliminary design.

## **ENVIRONMENTAL IMPACTS**

GDOT is responsible for environmental studies and documentation, and environmental screening was done during concept development. Since the original concept was developed, a public park has been proposed for the northwest quadrant of the SR 10/Peter Street interchange. Stage construction may require the temporary use of a small portion of the park property. The portion of the park that would be involved is not in the portion of the park property that will be developed, and any impacts would be temporary, with the affected areas to be restored to natural conditions after construction has been completed. Stage construction and maintenance of traffic during construction may temporarily impact the proposed park entrance on Peter Street.

No underground storage tanks or hazardous waste sites are known to exist.

## **STEPS TO MINIMIZE ENVIRONMENTAL IMPACTS**

Construction plans will focus on reducing or mitigating any adverse environmental impacts. Four issues will be especially critical:

- The existing culvert for Trail Creek will be removed and replaced. Trail Creek is a large stream with the potential for significant erosion and sediment transport. In addition, Trail

Creek may be habitat for endangered or threatened species of fish. Design of effective erosion controls and sediment runoff controls will be especially important. Consideration will be given to using a three-sided box culvert in order to reduce sediment during construction and to preserve aquatic habitat.

- Environmental justice is an issue with this project, since minority neighborhoods along Peter Street will be affected. Every reasonable effort will be made by the designers to avoid or minimize right of way impacts and disruption of these neighborhoods.
- Due to the nature of the work, temporary traffic control during construction will be difficult for this project. Both natural and manmade environments may be affected. The selected maintenance of traffic plan will be carefully designed to minimize disruption of traffic and the adjacent residents. However, every feasible and practical maintenance of traffic scheme will have temporary impacts on the natural environment, notably on Trail Creek and an unnamed tributary. The construction of temporary ramps will require additional or longer culverts, which have the potential for contributing to additional erosion and sediment runoff. Proper design of erosion control installations will minimize this potential.
- A public park is planned by Athens-Clark County in the northwest quadrant of the interchange. It is not known when construction of the park will begin, but it is likely that the park will be in place at the time the SR 10 project is let to construction. Some maintenance of traffic plans will require temporary construction easements on park property, although the portion of the park property that will be developed can be avoided.

### **STEPS TO MINIMIZE UNEXPECTED DESIGN AND RIGHT OF WAY PROBLEMS**

The public information open house will be held before preliminary design begins. These meetings often produce useful comments that can influence the design of the project, as well as bring attention to operational or right of way issues that the designers may be unaware of. Every effort will be made to minimize right of way requirements. This may include the use of retaining walls where appropriate. From the outset of preliminary design, we will work closely with the GDOT Utilities Office to verify the utility owners and which facilities may cause conflicts. Environmental issues or geotechnical problems may also influence the project design, and these will be addressed as early as possible in preliminary design.

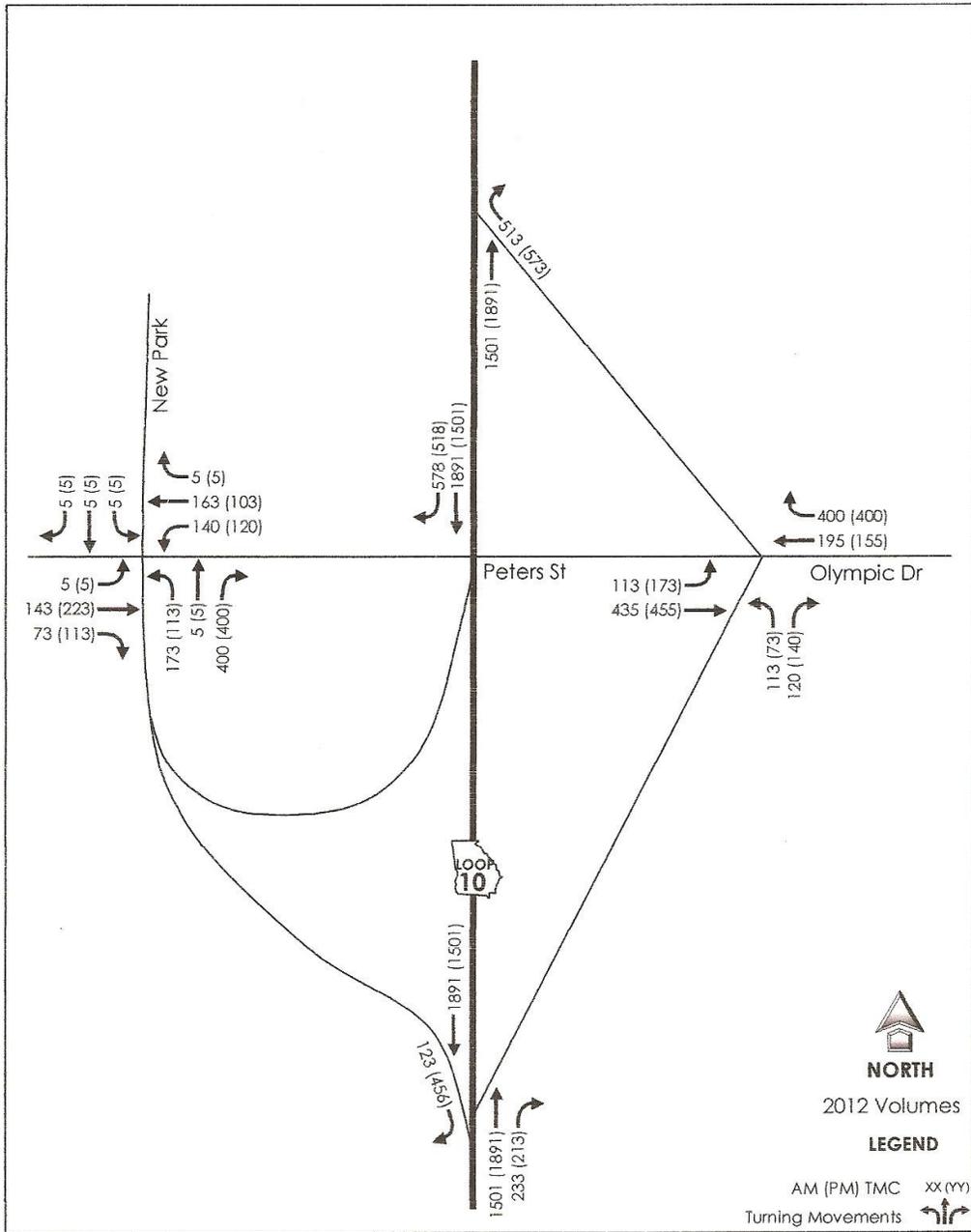
### **ACCIDENT DATA**

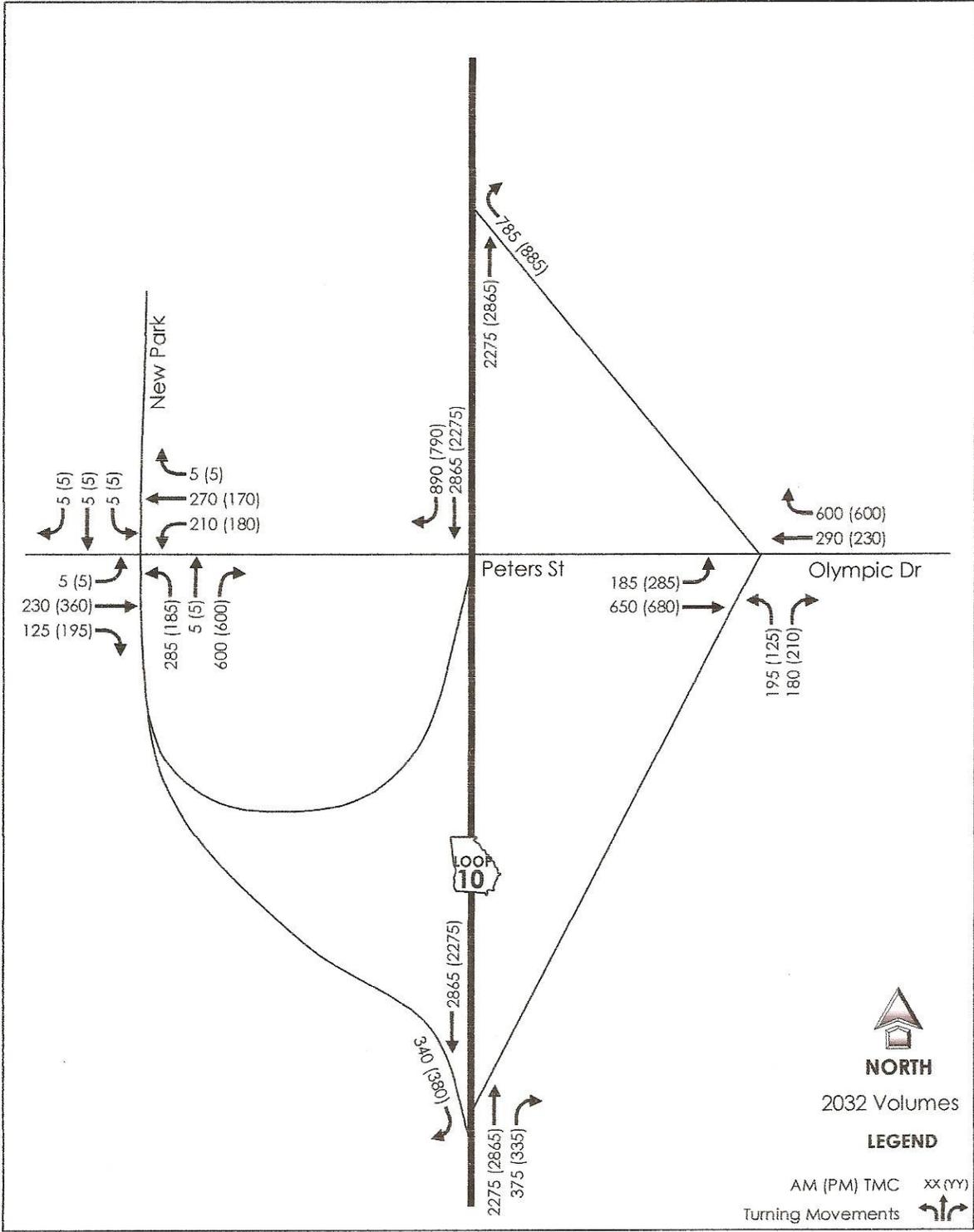
Accident data for the intersection of SR 10 and Peter Street/Olympic Drive has been updated. These numbers were provided by GDOT in February 2005.

Year	Angle	Sideswipe	Rearend	Other	# of Collisions
2001	0	0	8	1	9
2002	0	3	22	1	26
2003	4	0	18	4	26

## TRAFFIC VOLUMES

Updated projected traffic volumes, including turning movements were obtained from GDOT. AM and PM peak hour volumes are shown for both the base year (2012) and design year (2032).





## TRAFFIC STUDIES

Based on the projected volumes and lane configurations provided by GDOT, the following tables summarize the capacity analyses done for the 2012 and 2032 horizon years at the SR 10 interchange at Peter Street, in Athens, for both 600 foot and 800 foot interchange ramp separations. The analysis tool used to evaluate the peak hour interchange operations was Trafficware's Synchro 6.0.

Year 2012 600 ft Spacing						Year 2012 800 ft Spacing						
Intersection	Movement	AM LOS		PM LOS		Intersection	Movement	AM LOS		PM LOS		
		Approach	Overall	Approach	Overall			Approach	Overall	Approach	Overall	
Peter St at Park/SR 10 SB Ramp	NB	A (2.3)	B (10.7)	A (1.6)	B (4.0)	Peter St at Park/SR 10 SB Ramp	NB	A (2.3)	B (11.8)	A (1.7)	B (11.9)	
	SB	A (5.1)		A (4.9)			A (5.1)					
	EB	B (16.4)		B (18.0)			B (17.5)					
	WB	C (22.8)		C (24.0)			C (27.5)					
Peter St/Olympic Dr at SR 10 NB Ramps	NB	A (7.0)	B (17.3)	A (10.0)	B (13.4)	Peter St/Olympic Dr at SR 10 NB Ramps	NB	A (6.7)	B (17.8)	A (8.9)	B (14.6)	
	EB	B (17.4)		B (11.6)			B (13.3)					
	WB	C (21.2)		B (16.8)			B (18.2)					
Year 2032 600 ft Spacing	Peter St at Park/SR 10 SB Ramp	NB	A (4.4)	B (12.1)	A (3.3)	B (12.2)	Year 2032 800 ft Spacing	Peter St at Park/SR 10 SB Ramp	NB	A (4.2)	B (12.3)	A (3.4)
		SB	A (7.8)		A (8.9)				A (9.1)			
		EB	B (13.3)		B (13.8)				B (13.5)			
		WB	C (25.5)		C (29.3)				C (27.1)			
Peter St/Olympic Dr at SR 10 NB Ramps	NB	B (10.8)	B (14.9)	B (13.6)	B (12.4)	Peter St/Olympic Dr at SR 10 NB Ramps	NB	B (12.0)	B (14.0)	B (14.7)	B (11.7)	
	EB	B (14.2)		B (10.3)			A (9.3)					
	WB	B (17.3)		B (14.3)			B (13.2)					

( ) - Average delay per vehicle in seconds

Two traffic signals, located at the SR 10 ramp junctions with Peter Street, will replace the single traffic signal currently in place at the intersection of SR 10 and Peter Street. With exception of moving the loop ramp signal to the west to match the relocated ramp as discussed previously, the locations of the two additional signals, as presented in the original concept report, are acceptable and no other additional signals are required.

Based on the guidelines outlined in GDOT's Driveway and Encroachment Control Regulations, the following table summarizes the turn-lane lengths required to support 2032 peak hour horizon year conditions at the SR 10 interchange at Peter Street.

Intersection	Lane	Storage (ft)	Taper (ft)
Peter St at SR 10 SB Ramps	NB RT	225	50
	SB RT	150	50
	EB LT	235	100
	EB RT	175	100
	WB LT	235	100
	WB RT	175	100
Peter St/Olympic Dr	NB RT	100	50
	EB LT	235	100

## PRELIMINARY COST ESTIMATE

The preliminary cost estimate has been reviewed. The estimated quantities are reasonably accurate for a conceptual level of detail. The most recent GDOT item mean summary (January 2004 - December 2004) was used to check unit costs, and where necessary, these costs were revised. In some cases, current bid prices were significantly higher than those used in the concept report. The preliminary cost estimate was then inflated three years at five percent per year. Revised items are highlighted in red.

<b>PROJECT COST</b>	
<b>A. RIGHT-OF-WAY:</b>	
1. PROPERTY (LAND & EASEMENT)	\$150,000
2. DISPLACEMENTS; RES: 0, BUS: 0, M.H.: 0	\$0
3. OTHER COST (DAMAGES, ADM. / COURT, INFL., ETC.)	\$0
SUBTOTAL: A	\$150,000
<b>B. REIMBURSABLE UTILITIES:</b>	
1. RAILROAD	\$0
2. TRANSMISSION LINES	\$0
3. SERVICES	\$200,000
SUBTOTAL: B	\$200,000
<b>C. CONSTRUCTION:</b>	
<b>1. MAJOR STRUCTURES:</b>	
a. 220' x 125' New Bridge (\$80 / sq. ft.)	\$2,200,000
b. Relocate 100' Transmission Poles X 2 @ \$50,000 ea.	\$100,000
c. Quadruple Box Culvert 300'	
Cu. Yds. Concrete \$500 / cu. yd. (Design 4 - 7.0494 cu. yd. / ft @ 300 ft)	\$1,057,000
Lbs of bar reinforcement \$0.80 / linear ft. (Design 4 - 948.7 lbs. / ft. @ 300 ft)	\$228,000
SUBTOTAL: C-1	\$3,585,000
<b>2. GRADING AND DRAINAGE:</b>	
a. EARTHWORK - Unclassified 146,000 cu. yds. (\$5 / cu. yd)	\$730,000
b. DRAINAGE - 1.5 miles (\$50,000 / mile)	\$75,000
SUBTOTAL: C-2	\$805,000
<b>3. BASE AND PAVING:</b>	
a. GR AGGR BASE CRS - (100,000 SY [12" thickness] x \$14)	\$1,400,000
<b>b. ASPHALT PAVING:</b>	
1. Asph Conc, 4" superpave base (23,000 tons x \$42)	\$966,000
2. Asph Conc, 2" superpave binder (11,500 tons x \$42)	\$483,000
3. Asph Conc, 1 1/2" superpave surface (13,800 tons x \$42)	\$580,000
c. BITUMINOUS TACK COAT - (7000 gal x \$1.00)	\$7,000
d. MILLING, ASPH CONC, 1 1/2" (40,000 SY X \$1.50)	\$60,000
TEMPORARY PAVING FOR TEMPORARY DETOURS	\$100,000

	SUBTOTAL: C-3	\$3,596,000
4. LUMP ITEMS:		
a. TRAFFIC CONTROL		\$350,000
b. CLEARING AND GRUBBING		\$250,000
c. GRASSING		\$30,000
d. EROSION CONTROL		\$300,000
e. SIGNALS		
1. SB Ramp @ Peters Street		\$60,000
2. NB Ramp @ Olympic Drive		\$60,000
3. Interconnect Cable (Fiber) (900 ft x \$10)		\$9,000
	SUBTOTAL: C-4	\$1,059,000
5. MISCELLANEOUS:		
a. SIGNING & STRIPING		\$275,000
b. FIELD OFFICE		\$50,000
c. CONCRETE CURB AND GUTTER – 10000 ft (\$15 / ft)		\$150,000
d. GUARDRAIL		\$100,000
e. CONCRETE MEDIAN		\$300,000
	SUBTOTAL: C-5	\$875,000
6. SPECIAL FEATURES		
		0

ESTIMATE SUMMARY	
A. RIGHT-OF-WAY:	\$150,000
B. REIMBURSABLE UTILITIES:	\$200,000
C. CONSTRUCTION:	
1. MAJOR STRUCTURES	\$3,585,000
2. GRADING AND DRAINAGE	\$805,000
3. BASE AND PAVING	\$3,596,000
4. LUMP ITEMS	\$1,059,000
5. MISCELLANEOUS	\$875,000
6. SPECIAL FEATURES	\$0
SUBTOTAL CONSTRUCTION COST	\$9,920,000
E. & C. (10%)	\$992,000
INFLATION (5% PER YEAR)	\$1,637,000
NUMBER OF YEARS: 3	
TOTAL CONSTRUCTION COST	\$12,549,000
<b>GRAND TOTAL PROJECT COST</b>	<b>\$12,549,000</b>

**Estimate Report for file "122850 (9-2-08)"**

<b>Section Roadway</b>					
<b>Item Number</b>	<b>Quantity</b>	<b>Units</b>	<b>Unit Price</b>	<b>Item Description</b>	<b>Cost</b>
009-3000	1	Lump Sum	100000.00	MISCELLANEOUS CONSTRUCTION	100000.00
150-1000	1	LS	150000.00	TRAFFIC CONTROL -	150000.00
153-1300	1	EA	67522.56	FIELD ENGINEERS OFFICE TP 3	67522.56
201-1500	1	LS	2500000.00	CLEARING & GRUBBING -	2500000.00
205-0001	215934	CY	3.23	UNCLASS EXCAV	697466.82
205-0210	100000	CY	10.00	EXCAVATION - ROCK	1000000.00
208-0100	65427	CY	4.90	IN PLACE EMBANKMENT	320592.30
310-1101	58600	TN	18.73	GR AGGR BASE CRS, INCL MATL	1097578.00
402-1811	1000	TN	113.01	RECYCLED ASPH CONC LEVELING, INCL BITUM MATL	113010.00
402-3113	10210	TN	72.16	RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME	736753.60
402-3121	14300	TN	62.07	RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME	887601.00
402-3190	13250	TN	65.42	RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME	866815.00
413-1000	7400	GL	2.07	BITUM TACK COAT	15318.00
433-1000	590	SY	157.44	REINF CONC APPROACH SLAB	92889.60
441-0016	281	SY	39.09	DRIVEWAY CONCRETE, 6 IN TK	10984.29
441-0104	3100	SY	34.18	CONC SIDEWALK, 4 IN	105958.00
441-0301	4	EA	2031.32	CONC SPILLWAY, TP 1	8125.28
441-0740	500	SY	33.79	CONCRETE MEDIAN, 4 IN	16895.00
441-0748	500	SY	54.00	CONCRETE MEDIAN, 6 IN	27000.00
441-3999	1705	LF	21.88	CONCRETE V GUTTER	37305.40
441-4020	45	SY	39.67	CONC VALLEY GUTTER, 6 IN	1785.15
441-6022	6400	LF	16.29	CONC CURB & GUTTER, 6 IN X 30 IN, TP 2	104256.00
441-6720	4000	LF	15.95	CONC CURB & GUTTER, 6 IN X 30 IN, TP 7	63800.00
500-3101	1500	CY	301.48	CLASS A CONCRETE	452220.00
511-1000	125000	LB	0.87	BAR REINF STEEL	108750.00
543-9000	16850	CY	80.00	CONSTRUCTION OF BRIDGE COMPLETE	1348000.00
550-1180	3052	LF	35.17	STORM DRAIN PIPE, 18 IN, H 1-10	107338.84
550-1181	339	LF	41.93	STORM DRAIN PIPE, 18 IN, H 10-15	14214.27
550-1240	480	LF	43.56	STORM DRAIN PIPE, 24 IN, H 1-10	20908.80
550-2240	52	LF	35.88	SIDE DRAIN PIPE, 24 IN, H 1-10	1865.76
550-3424	1	EA	1183.86	SAFETY END SECTION 24 IN, SIDE DRAIN, 4:1 SLOPE	1183.86
550-4124	1	EA	623.05	FLARED END SECTION 24 IN, SIDE DRAIN	623.05
550-4218	2	EA	640.07	FLARED END SECTION 18 IN, STORM DRAIN	1280.14
550-4224	6	EA	783.96	FLARED END SECTION 24 IN, STORM DRAIN	4703.76
620-0100	5000	LF	31.99	TEMPORARY BARRIER, METHOD NO. 1	159950.00
621-3020	50	LF	50.75	CONCRETE BARRIER, TYPE 20	2537.50
621-3021	535	LF	184.00	CONCRETE BARRIER, TYPE 21	98440.00
621-4020	290	LF	315.00	CONCRETE SIDE BARRIER, TYPE 2	91350.00
638-1001	1	LS	80600.00	STR SUPPORT FOR OVERHEAD SIGN, TP I , STA -	80600.00
639-4004	8	EA	6116.34	STRAIN POLE, TP IV	48930.72
641-1100	250	LF	48.92	GUARDRAIL, TP T	12230.00
641-1200	7000	LF	16.34	GUARDRAIL, TP W	114380.00
641-5001	10	EA	643.31	GUARDRAIL ANCHORAGE, TP 1	6433.10
641-5012	16	EA	1815.74	GUARDRAIL ANCHORAGE, TP 12	29051.84
647-0220	3	LS	84500.00	TRAFFIC SIGNAL INSTALLATION, TEMPORARY	253500.00
648-1350	2	EA	16675.00	IMPACT ATTENUATOR UNIT, TYPE P -	33350.00
668-1100	20	EA	2636.78	CATCH BASIN, GP 1	52735.60
668-2100	35	EA	2410.62	DROP INLET, GP 1	84371.70
700-6910	30	AC	920.79	PERMANENT GRASSING	27623.70
999-9999	1	Lump Sum	1500000.00	EROSION CONTROL	1500000.00
<b>Section Sub Total:</b>					<b>\$13,678,228.64</b>

**Total Estimated Cost: \$13,678,228.64**

**Subtotal Construction Cost \$13,678,228.64**

E&C Rate 10.0 %	\$1,367,822.86
Inflation Rate 0.0 % @ 0 Years	\$0.00
<hr/>	
<b>Total Construction Cost</b>	<b>\$15,046,051.50</b>
Right Of Way	\$0.00
ReImb. Utilities	\$0.00
<hr/>	
<b>Grand Total Project Cost</b>	<b>\$15,046,051.50</b>

# Department of Transportation State of Georgia

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Interdepartmental Correspondence

**FILE** R/W Cost Estimate **OFFICE** Atlanta  
**DATE** April 11, 2008  
**FROM** Phil Copeland, Right of Way Administrator  
**TO** To: Babs Abubakari, P.E. State Consultant Design Engineer  
**Attention : David Norwood**

**SUBJECT** **Preliminary Right of Way Cost Estimate**  
**Project: NH-051-1(25)Clarke**  
**P.I. No.: 122850**  
**Description: SR 10 Loop & Peter St. Interchange Improvement**

As per your request, attached is a copy of the approved Preliminary Right of Way Cost Estimates on the above referenced projects.

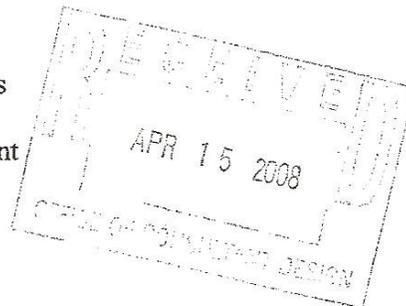
Please note the area of Required R/W was furnished with your request.  
**Please include total Required R/W areas for the entire corridor in all future requests.**

If you have any questions, please contact Jerry Milligan at the West Annex Right of Way Office at (770) 986-1541.

PC:GAM

Attachments

c: Brian Summers, Engineering Services  
Wes Brock, R/W  
Windy Bickers, Financial Management  
File



# Preliminary Right of Way Cost Estimate

  
**Phil Copeland**  
 Right of Way Administrator  
 By: Jerry Milligan

**Date:** April 11, 2008  
**Project:** NH-051-1(25)Clarke  
**Existing/Required R/W:** Varies/Varies  
**Project Termini :** SR 10 Loop and Peter St. / Olympic Dr. Interchange  
**Project Description:** SR 10 and Peter St. Interchange Improvement Project

**P.I. Number:** 122850  
**No. Parcels:** 8

<b>Land:</b>			
Commercial R/W: 72,675sf @ \$ 7.25/sf	\$	526,900	
Commercial Esmt.: 2,283sf @ \$ 7.25/sf @ 50%		8,276	
Residential R/W: 1,721sf @ \$ .70/sf		<u>1,205</u>	\$ 536,381
<b>Improvements :</b> residences, mobile home, misc. site improvements			520,000
<b>Relocation:</b> Commercial (0)			
	Residential (4)		160,000
<b>Damage :</b> Proximity			
	Consequential		
	Cost to Cure		<u>0</u>
	<b>Net Cost</b>		\$ 1,216,381
<b>Net Cost</b>			\$ 1,216,381
<b>Scheduling Contingency</b>	55 %		669,009
<b>Adm/Court Cost</b>	60		<u>1,131,234</u>
			\$ 3,016,624

**Total Cost                      \$3,016,700**

Note: The Market Appreciation (40%) is not included in the updated Preliminary Cost Estimate.

## *Value Engineering Process*

# ***VALUE ENGINEERING PROCESS***

## **Introduction**

This report summarizes the analysis and conclusions by the PBS&J Value Engineering team as they performed a VE Study during the period of September 16 through September 19, 2008 in Atlanta, Georgia, for the Georgia Department of Transportation.

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
John Luh, Ph.D., P.E., PTOE, AICP, 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

A Site Visit was performed on September 14, 2008 (see pictures included).

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 MACTEC 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 suppose to do?”, and “How is it suppose 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 Safety**
    - **Increase Capacity**
    - **Separate Traffic**
    - **Provide for future growth**
  - **Project Basic Functions**
    - **Construct new Bridges**
    - **Additional Traffic Lanes**
    - **Construction Additional Turn Lanes**
    - **Provide Separation of Traffic**
    - **Provide Access to Park**
    - **Provide Traffic Controls**
    - **Provide Bike Lanes and Sidewalks**
- **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
  - Maintainability
  - Ability to Implement the Idea
  - General Acceptability of the Alternatives
  - Constructability

Based on these measurement sticks, 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. 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. NH-051-1(25)**  
**P.I. No. 122850**  
**Clarke County**

**September 16-19, 2008**

**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 (schools, businesses, etc.)
  - Sidewalk, 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)**

- Site Visit if applicable
- 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**  
**NH-051-1(25) – P.I. 122850**  
**SR 10 Loop - Clarke County**

SHEET NO.: 1 of 2

NO.	ELEMENT	FUNCTION			COST (000)	WORTH (000)	COMMENTS
		VERB	NOUN	KIND			
1	<b>OVERALL PROJECT</b>	Increase	Traffic Capacity	B	18,096	15,000	C/W = 1.2
		Improve	Access	B			
		Enhance	Safety	S			
2	<b>RIGHT-OF-WAY</b>	Accommodate	Widening	B	3,016	1,500	C/W= 2.0
		Facilitate	Utilities	RS			
3	<b>BASE AND PAVING</b>	Create	Lanes	B	2,619	2,000	C/W = 1.31
		Increase	Capacity	B			
		Enhance	Safety	RS			
4	<b>CLEARING &amp; GRUBBING</b>	Remove	Vegetation	S	2,500	2,500	CW=1.0
5	<b>EROSION CONTROL</b>	Stabilize	Earthwork	S	1,500	1,500	CW=1.0
		Protect	Environment	RS			
6	<b>BRIDGE</b>	Cross	Road	B	1,348	1,000	CW=1.35
		Separate	Traffic	B			

Function defined as: Action Verb  
 Measurable Noun

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

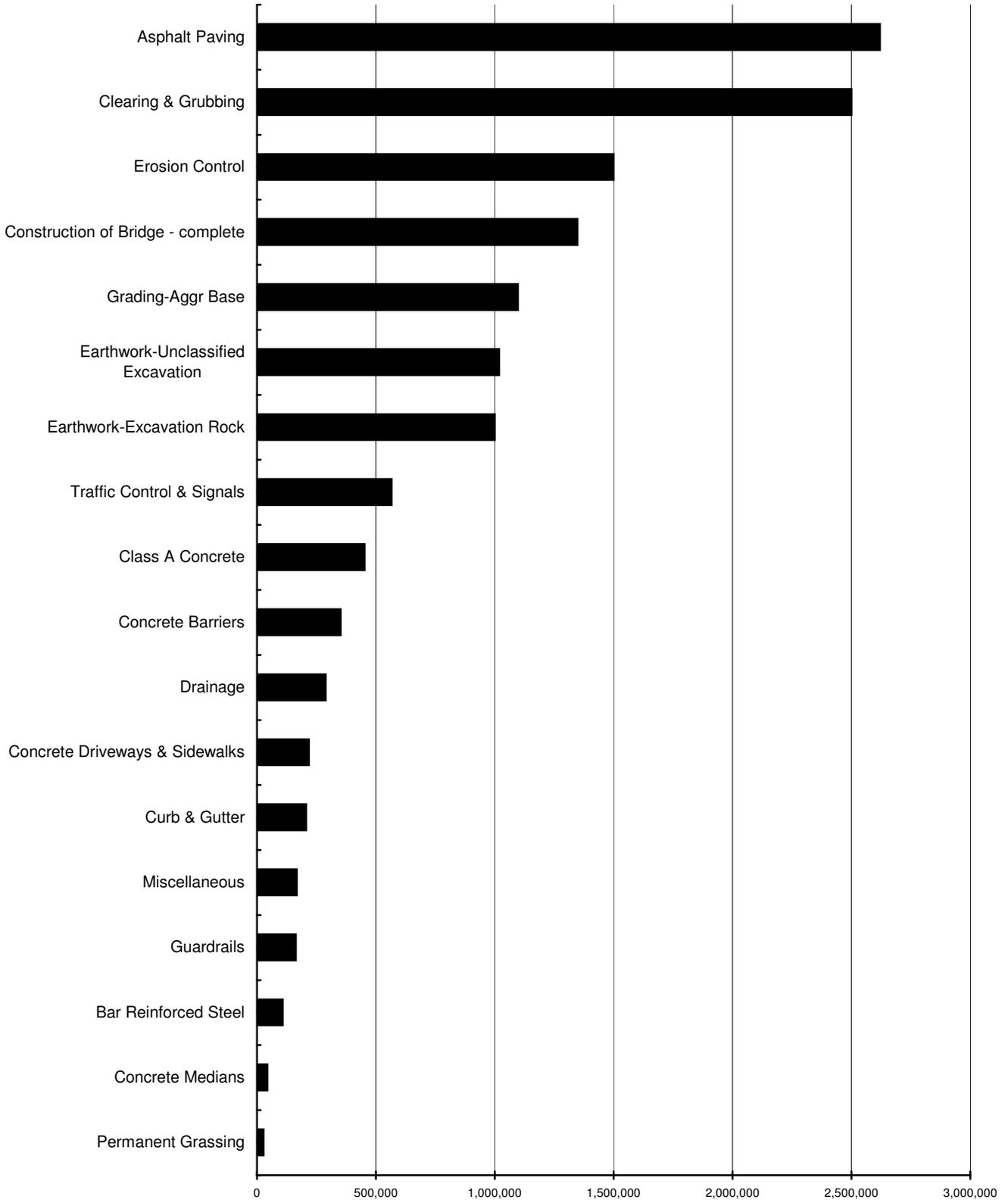
Cost/Worth Ratio =  
 (Total Cost ÷ Basic Worth)



# PARETO CHART - COST HISTOGRAM

PROJECT: <b>Georgia Department of Transportation</b> <b>NH-051-1(25) - P.I. No. 122850</b> <b>SR 10 Loop - Clarke County</b>			
PROJECT ELEMENT	COST	PERCENT	CUM. PERCENT
Asphalt Paving	2,619,498	19.15%	19.15%
Clearing & Grubbing	2,500,000	18.28%	37.43%
Erosion Control	1,500,000	10.97%	48.39%
Construction of Bridge - complete	1,348,000	9.86%	58.25%
Grading-Aggr Base	1,097,578	8.02%	66.27%
Earthwork-Unclassified Excavation	1,018,059	7.44%	73.72%
Earthwork-Excavation Rock	1,000,000	7.31%	81.03%
Traffic Control & Signals	565,528	4.13%	85.16%
Class A Concrete	452,220	3.31%	88.47%
Concrete Barriers	352,278	2.58%	91.04%
Drainage	289,277	2.11%	93.16%
Concrete Driveways & Sidewalks	217,957	1.59%	94.75%
Curb & Gutter	207,146	1.51%	96.27%
Miscellaneous	167,523	1.22%	97.49%
Guardrails	162,895	1.19%	98.68%
Bar Reinforced Steel	108,750	0.80%	99.48%
Concrete Medians	43,895	0.32%	99.80%
Permanent Grassing	27,624	0.20%	100.00%
<b>Subtotal not including ROW costs</b>	<b>\$ 13,678,228</b>	<b>100.00%</b>	
<b>E &amp; C Rate @ 10%</b>	<b>\$ 1,400,734</b>		
<b>Subtotal =</b>	<b>\$ 15,078,962</b>		
<b>Total Construction Cost =</b>	<b>\$ 15,078,962</b>		
<b>Right-of-Way =</b>	<b>\$ 3,016,700</b>		
<b>Reimb. Utilities =</b>	<b>\$ -</b>		
<b>TOTAL</b>	<b>\$ 18,095,662</b>	<b>Comp Mark-up:</b>	<b>10%</b>

Project No. NH-051-1(25)  
P.I. No. 122850  
Clarke County



# DESIGNER PRESENTATION



## MEETING PARTICIPANTS

Georgia Department of Transportation			September 16, 2008	
NH-051-1(25) - P.I. 122850 - Clarke County				
NAME		ORGANIZATION & TITLE	E-MAIL	PHONE
Lisa Myers		GDOT - Engineering Services	<a href="mailto:lisa.myers@dot.state.ga.us">lisa.myers@dot.state.ga.us</a>	404-631-1770
Amber Phillips		GDOT	<a href="mailto:aphillips@dot.ga.gov">aphillips@dot.ga.gov</a>	404-099-4408
David Norwood		GDOT-Consult.Design	<a href="mailto:dnorwood@dot.ga.gov">dnorwood@dot.ga.gov</a>	404-631-1581
Michael Haithcock		GDOT-Consult. Design	<a href="mailto:mhaithcock@dot.ga.gov">mhaithcock@dot.ga.gov</a>	404-631-1581
Ron Wishon		GDOT-Engineering Services	<a href="mailto:rwishon@dot.ga.gov">rwishon@dot.ga.gov</a>	404-61-1753
Jack Muirhead		GDOT-Bridge Design	<a href="mailto:jmuirhead@dot.ga.gov">jmuirhead@dot.ga.gov</a>	404-631-1877
Landon Perry		GDOT-Traffic OPS	<a href="mailto:lperry@dot.ta.gov">lperry@dot.ta.gov</a>	404-635-8235
Jason Wiggins		GDOT-District 4 Design	<a href="mailto:jwiggins@dot.ga.gov">jwiggins@dot.ga.gov</a>	
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Randy S. Thomas, CVS		PBS&J	<a href="mailto:rsthomas@pbsj.com">rsthomas@pbsj.com</a>	678-677-6420
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Ramesh Kalvakaalva, P.E., AVS		Civil Services, Inc.	<a href="mailto:rameshk@civilservicesinc.com">rameshk@civilservicesinc.com</a>	404-685-8001
Brian Blair, AVS		DBC	<a href="mailto:bblairdbc@aol.com">bblairdbc@aol.com</a>	757-304-1514

**VE TEAM PRESENTATION  
MEETING PARTICIPANTS**



Georgia Department of Transportation		September 19, 2008		
NH-051-1(25) - P.I. 122850 - Clarke County				
NAME		ORGANIZATION & TITLE	E-MAIL	PHONE
Lisa Myers		GDOT - Engineering Services	<a href="mailto:lisa.myers@dot.state.ga.us">lisa.myers@dot.state.ga.us</a>	404-631-1770
David Norwood		GDOT-Consult.Design	<a href="mailto:dnorwood@dot.ga.gov">dnorwood@dot.ga.gov</a>	404-631-1581
Ron Wishon		GDOT-Engineering Services	<a href="mailto:rwishon@dot.ga.gov">rwishon@dot.ga.gov</a>	404-61-1753
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# CREATIVE IDEA LISTING



PROJECT: **Georgia Department of Transportation**  
**NH-051-1(25) – P.I. 122850**  
**SR 10 Loop - Clarke County**

SHEET NO.: **1 of 3**

NO.	IDEA DESCRIPTION	RATING
<b>ASPHALT PAVING (AP)</b>		
AP-1	Reduce lane width to 11' on Peter Street/ Olympic Drive	1
AP-2	Remove 2' space inside shoulder on Peter Street/Olympic Drive	4
AP-3	Reduce outside should on SR 10 Loop to match existing +/- 4'	3
AP-4	Reduce paved shoulder width on Peter Street/ Olympic Drive	1
AP-5	Use multi-use trails on both sides of Peter Street/ Olympic Drive in-lieu of 4' bike lanes and 8' sidewalks	1
AP-6	Use 2 lane undivided roadway on Peter Street/Olympic Drive with left turn and right turn bays to accommodate traffic turning from Peter Street/Olympic Drive onto SR Loop 10	5
AP-7	Shift exit ramp C and D to the west	3
AP-8	Use roundabout at ramp C and D	1
AP-9	Move ramp C to the east to preserve future construction flexibility	
AP-10	Construct partial cloverleaf on ramp C and D to make ½ cloverleaf	1
AP-11	Put Peter Street/Olympic Drive over SR 10 Loop	1
AP-12	Adjust vertical separation between Peter Street/Olympic Drive and SR Loop 10	2
AP-13	Use a single point urban interchange	3
AP-14	Same as AP-11, but use a 2 lane undivided crossing	2
AP-15	Move the logical terminus of the eastern portion of Peter Street /Olympic Drive westerly	4
AP-16	Move the logical termini of SR 10 Loop to the north	2
AP-17	Move ramp B intersection with Peter Street/ Olympic Drive to the east and re-align ramp A and move the park entrance to line up with the new intersection	4
AP-18	Use four flyovers instead of two bridges	1
AP-19	Compare life cycle costs of asphalt versus concrete	3
AP-20	Construct ramps A and B in close proximity to SR 10 Loop staying within the existing Right-of-Way	1

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

# CREATIVE IDEA LISTING



PROJECT: **Georgia Department of Transportation**  
**NH-051-1(25) – P.I. 122850**  
**SR 10 Loop - Clarke County**

SHEET NO.: **2 of 3**

NO.	IDEA DESCRIPTION	RATING
<b>ASPHALT PAVING (AP) cont.</b>		
AP-21	Construct a compressed diamond interchange	5
AP-22	Delete sidewalks and bike lanes on Peter Street/Olympic Drive; build one 10' multi-use trail on one side of the road	5
AP-23	Construct diamond interchange and two lane Peter Street/Olympic Drive	3
<b>CLEARING AND GRUBBING (CG)</b>		
CG-1	Revisit costs in the cost estimate	2
CG-2	Reduce temporary construction in southeast corner of the project	2
<b>BRIDGE (BR)</b>		
BR-1	Use BEBO double long arch structure in-lieu of bridges	3
BR-2	Use twin two lane arches	1
BR-3	Build off ramp in northwest quadrant	3
BR-4	Use single arch to accommodate three lanes	1
BR-5	Use MSE walls to accommodate single span bridges	5
BR-6	Use steel girder bridge	2
BR-7	Use single bridge to accommodate both directions of SR Loop 10	1
BR-8	Construct two-12' lanes with 4' and 6.6' shoulders on both bridges	4
BR-9	Construct two-12' lanes with 4' and 6'6" shoulders on east bridge	4
<b>EXCAVATION-EARTHWORK</b>		
EW-1	Move ramps C and D to the west	1
EW-2	Adjust the grade on ramp C to reduce rock excavation	3
EW-3	Build ramp D on existing alignment	2
EW-4	Build ramp C on existing alignment	2

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

