



# VALUE ENGINEERING REPORT

**SR 400 / Northridge Road Interchange  
Fulton County  
NH000-0056-01(061), PI No. 751580**

November 8, 2011

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OWNER:



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

VALUE ENGINEERING CONSULTANT:



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Kennesaw, GA 30144

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SR 400 / Northridge Road Interchange  
Fulton County, Georgia  
State Project No. NH000-0056-01(061)

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## **EXECUTIVE SUMMARY**

# **Executive Summary**

## **VALUE ENGINEERING STUDY**

**SR 400 / Northridge Road Interchange**

**PI No. 751580**

**Fulton County**

**October 24 – 27, 2011**

### **Introduction**

This report presents the results of a value engineering (VE) study conducted on the proposed design for the widening and interchange ramp improvements of the Northridge Road Bridge over SR 400. The project also includes adding a standard parapet and sidewalk on the south side of the bridge, the placement of a concrete bridge overlay, adding an additional westbound traffic lane to Northridge Road, improvements to Roberts Drive and Dunwoody Place intersections, and constructing a mini roundabout at the Northridge Road / Somerset Court intersection.

Major contract work items include bridge widening and rehabilitation, concrete bridge overlay, asphalt and concrete paving, traffic signal upgrading, and the construction of curb and gutter, concrete medians, and sidewalk. The total estimated project cost including right-of-way (R/W) is \$5.28 million. The design is currently in the concept stage. The study took place October 24-27, 2011, at the Georgia DOT Headquarters Office in Atlanta, using a four person VE team.

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

### **Considerations**

The VE team was presented with several constraints to consider when developing their recommendations. The constraints were; the team should consider the project to be a "short term" fix since the Interchange will be reconstructed in the future when additional and/or managed lanes are added to SR 400, the project construction cost could not exceed \$5.5 million, construction impacts should be minimized, and no additional R/W could be required.

Current project status: The Project Concept Report has been prepared. The project will be let as a Design / Build project. Right-of-way acquisition is scheduled for March 2012 and construction is scheduled for 2012.

## **Results Obtained**

The VE team focused their efforts on the high cost items of the project. Through the use of functional analysis and “brain storming” techniques, the team generated 37 ideas with 23 being identified for additional evaluation as possible recommendations or design suggestions. The VE team developed 11 independent recommendations and 4 alternative recommendations. Implementation of the 11 independent recommendations has the potential to reduce the project cost by approximately \$1.014 million. A detailed write-up of each recommendation is contained in the respective portion of this report. A summary of the recommendations follows.

### **Recommendation Highlights**

#### **Idea # A-1: Reduce the width of the shared bike / vehicle lanes from 13 feet to 11 feet.**

The original design proposes a roadway typical section for Northridge Road of four 11-foot travel lanes; one 13-foot shared lane; curb and gutter; and five foot sidewalks. It will also widen the Northridge Road Bridge to accommodate a wider sidewalk, bike friendly lanes on both sides of the bridge, and new parapets.

This recommendation would reduce the width of the two shared bike friendly lanes on the Northridge Road Bridge and its approaches from 13 feet to 11 feet. There are no bike lanes on the existing Northridge Road. The additional two feet of pavement width in the shared bike lanes is insufficient to serve as a dedicated / striped bike lane forcing bicyclists to ride in the center portion of the lane.

*The total potential savings is \$193,000.*

#### **Idea # A-3: Construct the bridge widening over SR 400 using Type III Prestressed Concrete Beams in-lieu-of Steel Beams.**

The current design proposes to widen the existing Northridge Road Bridge using steel beams to match the existing bridge.

This recommendation would widen the bridge using Type 3 Prestressed Concrete AASHTO Beams. The main spans for the bridge are less than 100 feet long and have adequate vertical clearance on the north side of the bridge where the widening will take place to accommodate the Type 3 PSC beams. The use of Type 3 PSC beams is more economical than steel beams.

*The total potential savings is \$240,000.*

**Idea # A-10: Overlay the existing bridge deck with asphalt pavement instead of a concrete overlay with hydro-demolition.**

The original proposal to rehabilitate the Northridge Road Bridge deck is to performing hydro-demolition of the top 2 - 3 inches of existing bridge deck and overlay the surface with concrete.

This recommendation would replace the hydro-demolition / concrete overlay of the existing bridge with a 1 ½-inch asphalt concrete overlay. The function of the overly is to allow this bridge is to remain in service until the new Northridge Road / SR 400 Interchange is built. The project bridge deck evaluation report indicates the entire superstructure should be replaced; however, there is not sufficient funding for a total deck replacement. The asphalt overlay would improve the deck surface and provide a “short term” fix for the bridge. The asphalt overlay concept includes the life-cycle cost for a future overlay if required.

*The total potential savings is \$616,000.*

**Idea # B-2: Reduce the width of the shoulder on Northridge Road (Station 205 to Station 210) from 12 feet to 10 feet.**

The original concept proposes to install a 12-foot wide outside shoulder from Station 204+90 Left to Station 210+16 Left on Northridge Road.

This recommendation would install a 10-foot wide outside shoulder from Station 204+90 Left to Station 210+16 Left on Northridge Road. The purpose of the shoulder is to accommodate pedestrians on the sidewalk and provide a portion of the required roadway clear zone. The purpose can be accomplished with a 10-foot wide shoulder. Reducing the shoulder width will reduce the amount of R/W and permanent easement required to construct this project.

*The total potential savings is \$15,000.*

**Idea # C-1: Eliminate the temporary concrete barrier in Stage 3 and replace it with construction barrels.**

The original design uses temporary concrete barrier for all three construction stages for widening / rehabilitating the Northridge Road Bridge.

This recommendation would substitute construction drums for concrete barrier for the Stage 3 construction phase. Concrete barriers are required during bridge demolition, bridge widening, and to construct the new parapets / fencing. However, once both parapets are constructed, construction drums can be used in lieu of concrete barrier to complete any remaining bridge deck work. The bridge is located between two signalized intersections (approximately 950 feet apart) where operating speeds should be relatively low.

*The total potential savings is \$64,000.*

**Idea # G-2: Use asphalt pavement and overlay in-lieu-of concrete pavement for widening Ramp A & Ramp B intersection approaches.**

The original concept would construct the Ramp A and Ramp B pavement widening with concrete pavement under a “replace-in-kind” policy. The total ramp area to be widened is very small and has to be done in a confined area under traffic.

This recommendation would use full depth asphalt pavement in-lieu-of concrete pavement for the small amount of concrete ramp widening proposed on this project. The ramp widening is to improve traffic operations until the new Northridge Road / SR 400 Interchange is built. All remaining pavement on this project is asphalt pavement. Using asphalt pavement for these small areas will simplify construction, reduce construction time, reduce construction impacts on the traveling public, and reduce cost.

*The total potential savings is \$13,000.*

**Idea # G-2.1: Alternative to Idea G-2 Eliminate the 3-inch asphalt layer in the concrete pavement section.**

The original concept would construct the Ramp A and Ramp B pavement widening with concrete pavement under a “replace-in-kind” policy. The total ramp area to be widened is very small and has to be done in a confined area under traffic. The original concrete pavement design includes a 3-inch asphalt layer between the GAB and concrete pavement.

This recommendation would eliminate the 3-inch asphalt layer in the concrete pavement. The ramp widening is to improve traffic operations until the new Northridge Road / SR 400 Interchange is built. The 3 inch layer of asphalt serves primarily as a leveling layer and as a surface prep material for the concrete pavement constructed on top. It does not provide any structural integrity for the pavement structure and can be eliminated or reduced without sacrificing any performance.

*The total potential savings is \$11,000.*

**Idea # G-2.2: Alternative to Idea G-2 Use a 1 1/2 –inch thick asphalt layer in-lieu-of a 3-inch asphalt layer in the concrete pavement section.**

The original concept would construct the Ramp A and Ramp B pavement widening with concrete pavement under a “replace-in-kind” policy. The total ramp area to be widened is very small and has to be done in a confined area under traffic. The original concrete pavement design includes a 3-inch asphalt layer between the GAB and concrete pavement.

This recommendation would use a 1 ½-inch asphalt layer in-lieu-of the 3-inch asphalt layer in the concrete pavement. The ramp widening is to improve traffic operations until the new Northridge Road / SR 400 Interchange is built. The 3 inch layer of asphalt serves primarily as a leveling layer and as a surface prep material for the concrete pavement constructed on top. It

does not provide any structural integrity for the pavement structure and can be eliminated or reduced without sacrificing any performance.

*The total potential savings is \$6,000.*

**Idea # G-2.3: Alternative to Idea G-2 Use Filter Fabric in-lieu-of 3-inch asphalt layer in the concrete pavement section.**

The original concept would construct the Ramp A and Ramp B pavement widening with concrete pavement under a “replace-in-kind” policy. The total ramp area to be widened is very small and has to be done in a confined area under traffic. The original concrete pavement design includes a 3-inch asphalt layer between the GAB and concrete pavement.

This recommendation would substitute filter fabric for the 3 inch asphalt layer in the concrete pavement. The ramp widening is to improve traffic operations until the new Northridge Road / SR 400 Interchange is built. The 3 inch layer of asphalt serves primarily as a leveling layer and as a surface prep material for the concrete pavement constructed on top. It does not provide any structural integrity for the pavement structure and can be eliminated without sacrificing any performance. The filter fabric would eliminate any concern regarding filtration of fines and provide a smooth layer for the concrete pavement.

*The total potential savings is \$8,000.*

**Idea # G-5: Eliminate the roundabout intersection at the east end of the project and construct a gravel turn around.**

The original design would construct a roundabout at Northridge Road and Somerset Court. This roundabout would accommodate the unwanted U-turns from vehicles wishing to bypass the excessive back-ups for the EB to NB left turn movements at the Northridge Road / NB SR 400 Ramp intersection. This concept also provides access to the Somerset Court / Northridge Road Subdivisions.

This recommendation would eliminate the roundabout and construct a gravel turn-around. The proposed roundabout will actually entice drivers to use this location for unwarranted U-turns (travelers trying to by-pass the back-ups for the EB Northridge Road to NB SR 400 left turns). Constructing a driveway opening with only a gravel driveway will allow for a U-turn for the lost driver but will not entice drivers to by-pass the signal.

*The total potential savings is \$16,000.*

**Idea # G-5.1: Alternative to Idea G-5 Eliminate the roundabout intersection at the east end of the project and modify the east side of the Roberts Drive / Northridge Road Intersection.**

The original design would construct a roundabout at Northridge Road and Somerset Court. This roundabout would accommodate the unwanted U-turns from vehicles wishing to bypass the excessive back-ups for the EB to NB left turn movements at the Northridge Road / NB SR 400 Ramp intersection. This concept also provides access to the Somerset Court / Northridge Road Subdivisions.

This recommendation would eliminate the roundabout and maintain the current T-intersection with a U-turn Eyebrow opposite Somerset Court. It would also eliminate the direct right turn lane connecting Northridge Road to the SR 400 NB On-ramp and prohibit “right turns on red” for westbound Northridge Road. This concept will discourage vehicles wanting to use this intersection to “bypass” the eastbound Northridge Road to NB SR 400 On-ramp left turn movement at the Roberts Road intersection.

*The total potential savings is \$20,000.*

**Idea # G-7: Construct a second NB exit lane segment on SR 400 to tie directly into the existing two-lane NB exit ramp.**

The original design does not provide for any NB exit ramp improvements adjacent to SR 400. It only provides for NB Ramp widening to add additional turn lanes as the ramps approach the Northridge Road intersection.

This recommendation would construct an additional short NB SR 400 exit lane to tie directly into the existing two-lane NB Northridge Road exit ramp. The existing NB exit geometry provides a single SR 400 exit lane that ties into a two-lane exit ramp. This concept requires the first portion of the outside exit ramp lane to be striped out providing little time for vehicles to maneuver into the appropriate exit lane to access Northridge Road, Roberts Drive, or Dunwoody Place. The lane splits will be more significant when this project places a physical barrier between the WB Northridge Road and NB Dunwoody Place lanes. Adding a second exit lane would provide an additional 200 feet of storage and allow the two exit lanes to tie directly into the two ramp lanes.

*The total potential increase is \$72,000.*

**Idea # H-1: Use yellow cross-hatch striping in-lieu-of raised concrete median between the ramp entrance /exit areas in the signalized intersections.**

The original concept proposes to install curb and gutter / concrete median paving to separate the NB SR 400 entrance / exit ramps and SB SR 400 entrance / exit ramps.

This recommendation would eliminate the curb and gutter / concrete median paving and replace them with yellow cross-hatch striping. The purpose of the median area is to separate traffic

using the SR 400 entrance and exit ramps. Because of the large skew angle and multi-lane exit ramps in both of the Northridge Road / SR 400 ramp intersections, the Northridge Road left turn movement into these entrance ramps will be very wide (over 100 feet). Separating the ramps with a yellow cross-hatch striped median provides a visual barrier that motorists will recognize and stay to the right. It will also allow for the opportunity to correct a possible wrong-way movement situation.

*The total potential increase is \$15,000.*

**Idea # H-2: Add / revise overhead signing for the SR 400 NB off ramp.**

The original design includes standard exit signage for the NB SR 400 Off-Ramp.

This recommendation would revise the exit signage for NB SR 400 Off-Ramp. New and additional signs are needed to delineate the NB SR 400 dual-lane exit ramp for the separate NB SR 400 to NB Dunwoody Place designated lane and the separate NB SR 400 to Northridge Road exit lanes. The NB SR 400 exit ramp signs should show split destinations. A large cantilever mounted sign should be placed as close to the exit gore as possible to direct the motorists to the correct lane.

*The total potential increase is \$60,000.*

**Idea # H-4: Replace smaller concrete islands with white or yellow cross hatch striping.**

The original concept proposes to install various concrete islands in the Northridge Road / SR 400 ramp intersections.

This recommendation would install white or yellow cross hatch striped medians / traffic islands in-lieu-of raised concrete medians at some locations. The purpose of the concrete islands is to channel and direct traffic to the appropriate lane. This purpose can be accomplished by utilizing white or yellow cross hatch striping. This concept will simplify and accelerate construction.

*The total potential savings is \$4,000.*

**SR 400 / Northridge Road Interchange**  
**SUMMARY OF POTENTIAL COST SAVINGS**

ITEM No.	CREATIVE IDEA DESCRIPTION	ORIGINAL INITIAL COST	PROPOSED INITIAL COST	INITIAL COST SAVINGS	FUTURE SAVINGS	TOTAL LIFE CYCLE SAVINGS
	<b>RECOMMENDATIONS</b>					
A-1	Reduce the width of the shared Bike / Vehicle lanes from 13 feet to 11 feet.	\$193,000	\$0	\$193,000	N/A	\$193,000
A-3	Construct the bridge widening over SR 400 using Type III Prestressed Concrete Beams in-lieu-of Steel Beams.	\$773,000	\$533,000	\$240,000	N/A	\$240,000
A-10	Overlay the existing bridge deck with asphalt pavement instead of a concrete overlay with hydro-demolition.	\$637,000	\$11,000	\$626,000	(\$10,000)	\$616,000
B-2	Reduce the width of the shoulder on Northridge Road (Station 205 to Station 210) from 12 feet to 10 feet.	\$140,000	\$125,000	\$15,000	N/A	\$15,000
C-1	Eliminate the temporary concrete barrier in Stage 3 and replace it with construction barrels.	\$67,000	\$3,000	\$64,000	N/A	\$64,000
G-2	Use asphalt pavement and overlay in-lieu-of concrete pavement for widening Ramp A & Ramp B intersection approaches.	\$61,000	\$48,000	\$13,000	N/A	\$13,000
G-2.1	<b>Alternative to Idea G-2</b> Eliminate the 3-inch asphalt layer in the concrete pavement.	\$11,000	\$0	\$11,000	N/A	\$11,000
G-2.2	<b>Alternative to Idea G-2</b> Use a 1 1/2 -inch thick asphalt layer in-lieu-of a 3-inch asphalt layer in the concrete pavement section.	\$11,000	\$6,000	\$5,000	N/A	\$5,000

G-2.3	<b>Alternative to Idea G-2</b> Use Filter Fabric in-lieu-of 3-inch asphalt layer in the concrete pavement section.	\$11,000	\$3,000	\$8,000	N/A	\$8,000
G-5	Eliminate the roundabout intersection at the east end of the project and construct a gravel turn around.	\$20,000	\$4,000	\$16,000	N/A	\$16,000
G-5.1	<b>Alternative to Idea G-5</b> Eliminate the roundabout intersection at the east end of the project and modify the east side of the Roberts Drive / Northridge Road Intersection.	\$30,000	\$6,000	\$24,000	N/A	\$24,000
G-7	Construct a second NB exit lane segment on SR 400 to tie directly into the existing two-lane NB exit ramp.	\$0	(\$72,000)	(\$72,000)	N/A	(\$72,000)
H-1	Use yellow cross-hatch striping in-lieu-of raised concrete median between the ramp entrance /exit areas in the signalized intersections.	\$15,000	\$30,000	(\$15,000)	N/A	(\$15,000)
H-2	Add / revise overhead signing for the SR 400 NB off ramp.	\$7,000	\$67,000	(\$60,000)	N/A	(\$60,000)
H-4	Replace smaller concrete islands with white or yellow cross hatch striping.	\$10,000	\$6,000	\$4,000	N/A	\$4,000

## **STUDY IDENTIFICATION**

## Study Identification

<b>Project:</b> SR 400 / Northridge Road Interchange	<b>Date:</b> October 24 – 27, 2011
<b>Location:</b> Fulton County, Georgia	

### VE Team Members

Name:	Title:	Organization:	Telephone:
George Obaranec, P.E., CVS	Design Engineer	AMEC	770-421-3346
Aruna Sastry, P.E.	Structure Engineer	Sastry & Associates	678-366-9375
Gregory Mayo, P.E.	Construction Engineer	Stantec	678-432-3810
Keith Borkenhagen, P.E., CVS	VE Team Facilitator	AMEC	623-556-1875

### Project Description

This project is to widen the north side of the Northridge Road Bridge over SR 400 and adding add turn lanes to the SR 400 Off-ramps as they approach Northridge Road. The project also includes adding a standard parapet and sidewalk on the south side of the bridge, the placement of a concrete bridge overlay, adding an additional westbound traffic lane to Northridge Road, improvements to Roberts Drive and Dunwoody Place intersections, and constructing a mini roundabout at the Northridge Road / Somerset Court intersection.

Major contract work items include bridge widening and rehabilitation, concrete bridge overlay, asphalt and concrete paving, traffic signal upgrading, and the construction of curb and gutter, concrete medians, and sidewalk. The total estimated project cost including right-of-way (R/W) is \$5.28 million.

### Project Conditions and Constraints

The VE team was presented with several conditions / constraints to consider when developing their recommendations. The constraints were;

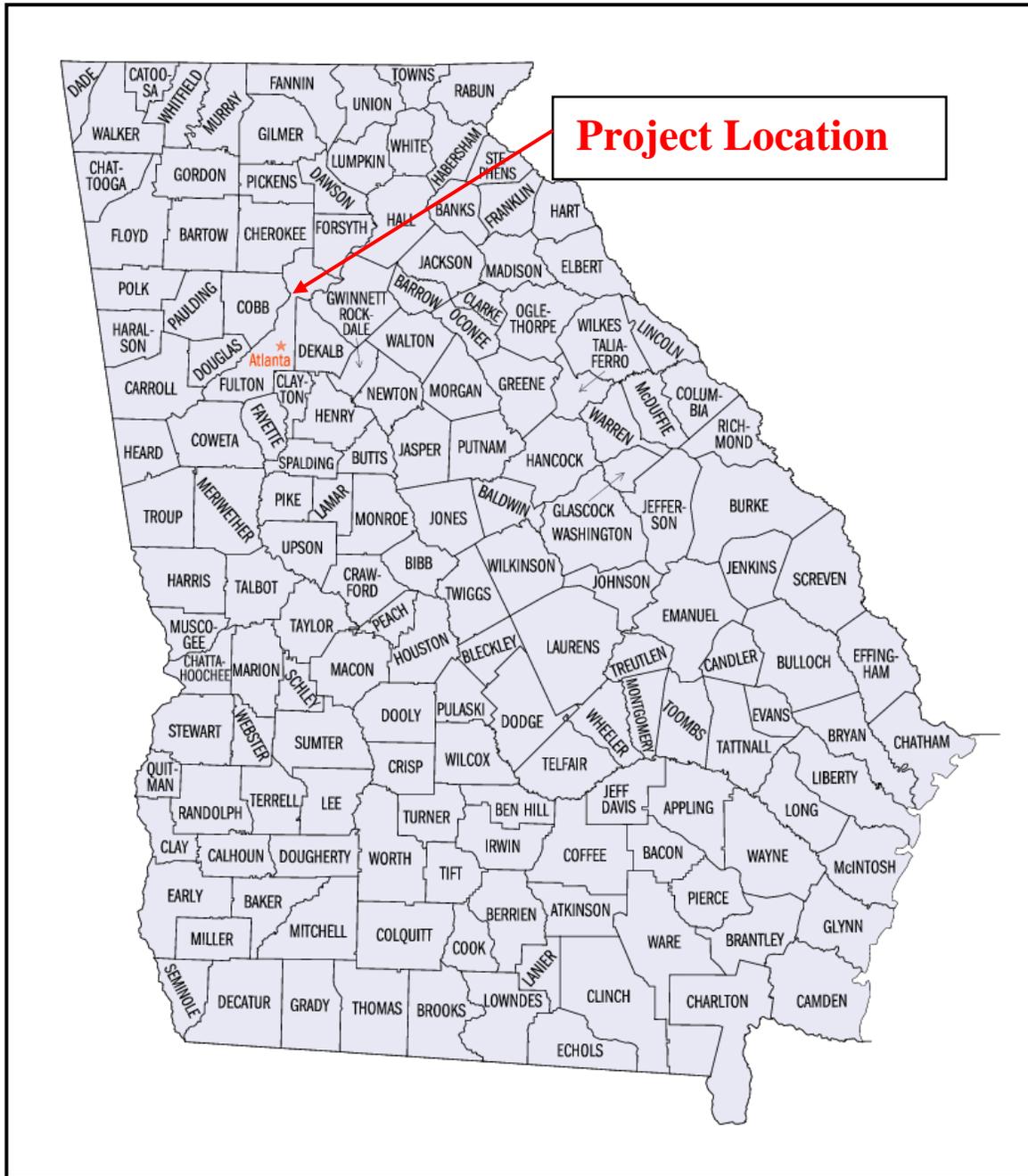
- the team should consider the project to be a “short term” fix since the Interchange will be reconstructed in the future when additional lanes are added to SR 400,
- the project construction cost cannot exceed \$5.5 million,
- minimize construction impacts, and
- no additional R/W can be acquired.

## **Project Briefing**

The VE team received a project briefing by Marlo Clowers, P.E., GDOT Program Manager, Gary Newton, P.E., Kimley Horn & Associates, and David Stricklin, Jr. P.E., Kimley Horn & Associates, project design consultant. The following comments were presented:

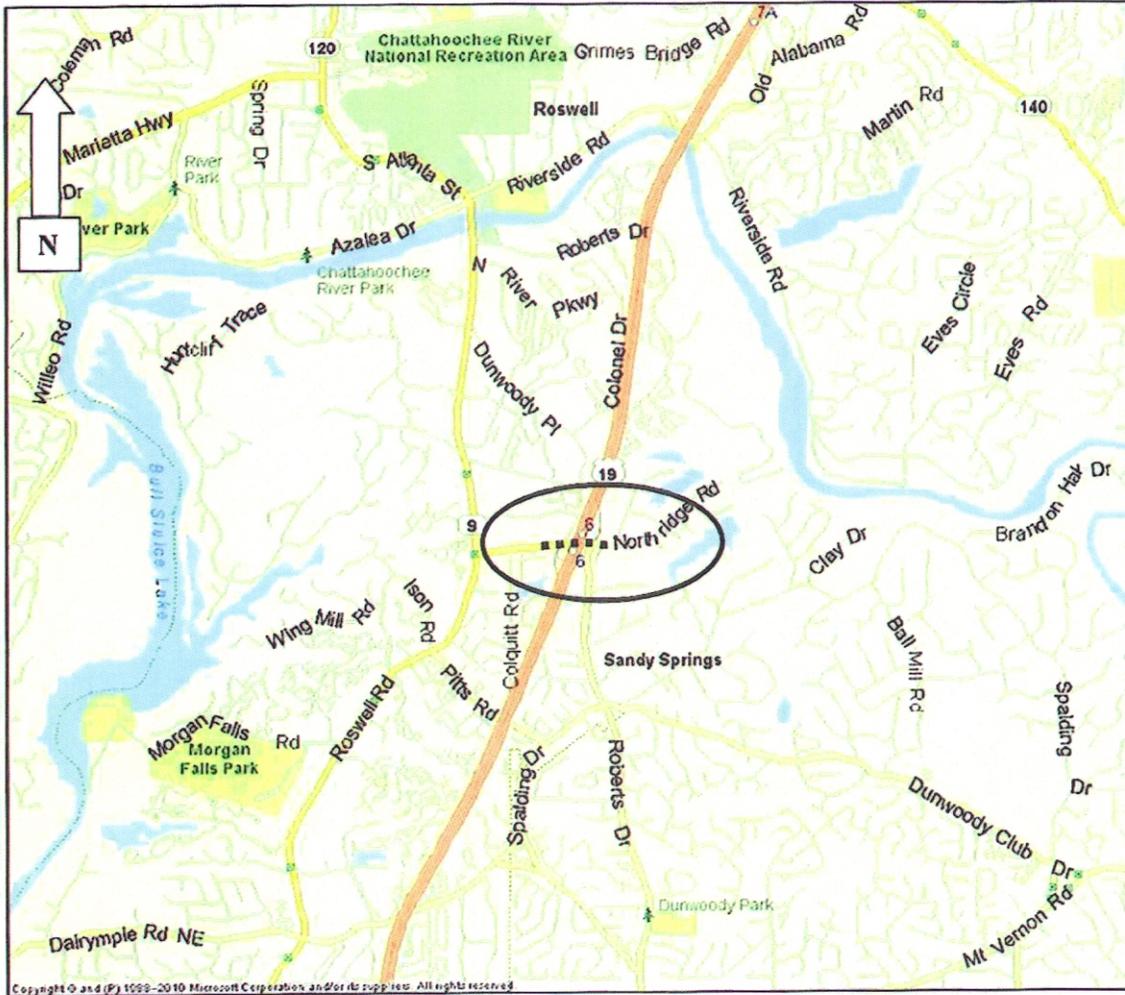
- This project involves the widening and rehabilitation of the Northridge Road Bridge over SR 400 in Fulton County. The bridge will be widened on the north side (adding a new ramp lane and widening the existing travel lanes), have a new sidewalk and parapet added to the south side, and have a concrete deck overlay placed on the old deck.
- There is adequate vertical clearance to widen the bridge and replace the south side sidewalk and parapet.
- This project will also include adding a second westbound lane to Northridge Road west of the bridge to tie into the existing Northridge Road section on the west end of the project.
- This contract will be let as a Design / Build contract to expedite getting work under construction. The project is funded from State toll revenues. The project has a total budget of \$7,000,000 and a construction budget of \$5,500,000. The \$5,500,000 total construction cost figure cannot be changed.
- The project is to improve traffic operation through the area, widen the narrow Northridge Road lanes on the existing bridge to 11 feet, add a dedicated lane to accommodate NB SR 400 traffic traveling NB on Dunwoody Place, and eliminate / minimize the wrong-way U-turn movement in the Somerset subdivision.
- The project includes a mini-roundabout on the east end of the project to accommodate the wrong-way U-turns in the residential area.
- The existing bridge deck will be rehabilitated through hydro blasting the top surface off and placing a concrete overlay on top.
- This project is considered to be a “short term fix” for the area until the entire Interchange is reconstructed when SR 400 is widened in the future.
- This project will upgrade the existing signalized intersections on both ends of the bridge. The new signals will be mast arms per Sandy Springs standards.
- Traffic control will be critical for this project. The bridge widening and parapet replacement will require probable lane closures on SR 400. Minimizing these lane closures is a top priority.

# Project Sketch Map



**Project Location Map  
Fulton County**

**SR 400 / Northridge Road Interchange**



## **VE RECOMMENDATIONS**

## DEVELOPMENT AND RECOMMENDATION PHASE

**Project: SR 400 / Northridge Road Interchange**

<b>IDEA No.:</b> A-1	<b>Sheet No.:</b> 1 of 3	<b>CREATIVE IDEA:</b> Reduce the width of the Shared Bike / Vehicle lanes from 13 feet to 11 feet.
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Comp By: G.A.O. Date: 10/25/2011 Checked By: K.B. Date: 10/31/11

**Original Concept:**

The original design proposes a roadway typical section for Northridge Road of four 11-foot travel lanes; one 13-foot shared lane; curb and gutter; and five foot sidewalks. The existing bridge over SR 400 will be widened to 82 feet 4 inches. The bridge will accommodate a new wider sidewalk on the south side, bike friendly lanes on both sides of the bridge, and new parapets.

**Proposed Change:**

This recommendation would reduce the width of the two shared bike friendly lanes over the Northridge Road Bridge and its approaches from 13 feet to 11 feet.

**Justification:**

There are no bike lanes on existing Northridge Road. The additional two feet of pavement width (13 feet vs. 11 feet) in the shared bike lanes is insufficient to serve as a dedicated / striped bike lane forcing bicyclists to ride in the center portion of the lane. Requiring the bicyclists to use the full lane eliminates the need to make this lane any wider than the other traffic lanes. Reducing these lane widths will reduce the cost of the project.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
<b>Original</b>	\$193,000		
<b>Proposed</b>	\$0		
<b>Savings</b>	\$193,000		\$193,000
<b>FUTURE COST: – Savings</b>		N/A	N/A
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$193,000</b>



## CALCULATIONS

**Project:** SR 400 / Northridge Road Interchange

Idea No.: A-1  
Client: GDOT  
Sheet 3 of 3

Assumed Length of Shared Bike Lanes (Between Dunwoody Place and Roberts Drive Intersections):

$$\begin{aligned} \text{Station 213+00} - \text{Station 214+55} + \text{Station 217+41} - \text{Station 219+65} &= 155 \text{ ft} + 224 \text{ ft} \\ \text{Bridge Length} &= \text{Station 214+55} - \text{Station 217+41} = 286 \text{ ft} \end{aligned}$$

### Original Design - Bridge Widening:

$$\text{Widened Bridge Section} = 22 \text{ ft} \times 286 \text{ ft} = 6,292 \text{ SF}$$

From the original cost estimate:

Superstructure (Class AA) .....	\$146,875
Superstructure (Rebar) .....	\$40,150
Structural Steel Beams .....	\$342,000
Substructure (Class AA).....	\$105,339
Substructure (Rebar)....	\$30,584
H-Piles .....	\$8,122
Remove Bridge Parts .....	\$100,000
Total	\$773,000

Bridge Widening / SF Cost:

$$\$773,000 / 6,292 \text{ SF} = \$122.85 \quad \text{Use } \mathbf{\$125.00 / SF}$$

Concrete Overlay @ \$335 / SY

### VE Concept:

Area Reduction from Reducing Shared Bike Lane Width from 13 feet to 11 feet:

$$\text{Bridge} = (2 \text{ ft} \times 286 \text{ ft}) \times 2 = 1,144 \text{ SF} / 9 = 127.1 \text{ SY} \quad \text{Use } 128 \text{ SY}$$

$$\text{Roadway} = (2 \text{ ft} \times (155 \text{ ft} + 224 \text{ ft})) \times 2 = 1,516 \text{ SF} / 9 = 168.4 \text{ SY} \quad \text{Use } 170 \text{ SY}$$

### Northridge Road Pavement Costs: 7.5 inches Asphalt on 12 inches GAB

$$(7.5 / 12 \text{ ft}) (150 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.046875 \text{ ton} / \text{SF}$$

$$(12 / 12 \text{ ft}) (135 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.0675 \text{ ton} / \text{SF}$$

Cost per SY:

$$(0.046875 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$70 / \text{ton}) + (0.0675 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$18.12 / \text{ton}) = \\ \$29.53 + \$11.00 = \$40.53 / \text{SY} \quad \text{Use: } \mathbf{\$41 \text{ per SY}}$$

## DEVELOPMENT AND RECOMMENDATION PHASE

**Project: SR 400 / Northridge Road Interchange**

<b>IDEA No.:</b> A-3	<b>Sheet No.:</b> 1 Of 4	<b>CREATIVE IDEA:</b> Construct the bridge widening over SR 400 using Type III Prestressed Concrete Beams in-lieu-of Steel Beams.
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Comp By: Aruna Sastry Date: 10/25/2011 Checked By: K.B. Date: 10/31/2011

**Original Concept:**

The current design for widening the existing Northridge Bridge uses steel beams (in-kind) to add an additional 22 feet of width to widen the through traffic lanes and accommodate a separate NB SR 400 to NB Dunwoody Place turn movement.

**Proposed Change:**

This recommendation would construct the bridge widening using Type 3 Prestressed Concrete AASHTO Beams in-lieu-of (in-kind) steel beams.

**Justification:**

A design condition for this project is that improvements constructed in this contract should be assumed to be “short term” since the entire Interchange will be reconstructed to accommodate the future widening of SR 400. The main spans for the bridge are less than 100 feet long. Adequate vertical clearance exists on the north side of the bridge where the widening will take place to accommodate the Type 3 PSC beams. The use of Type 3 PSC beams is more economical than steel beams.

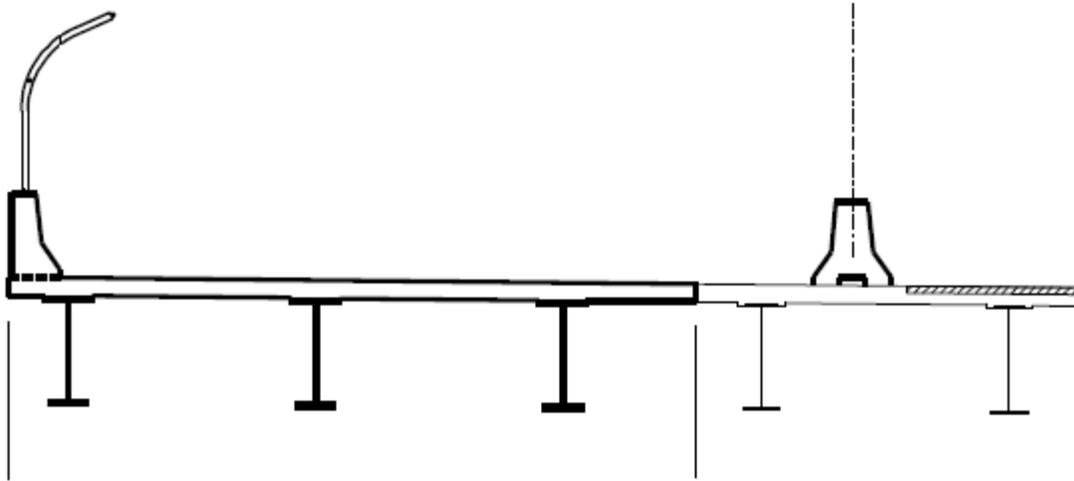
COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
<b>Original</b>	\$773,000		
<b>Proposed</b>	\$533,000		
<b>Savings</b>	\$240,000		\$240,000
<b>FUTURE COST: – Savings</b>		N/A	N/A
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$240,000</b>

# SKETCH

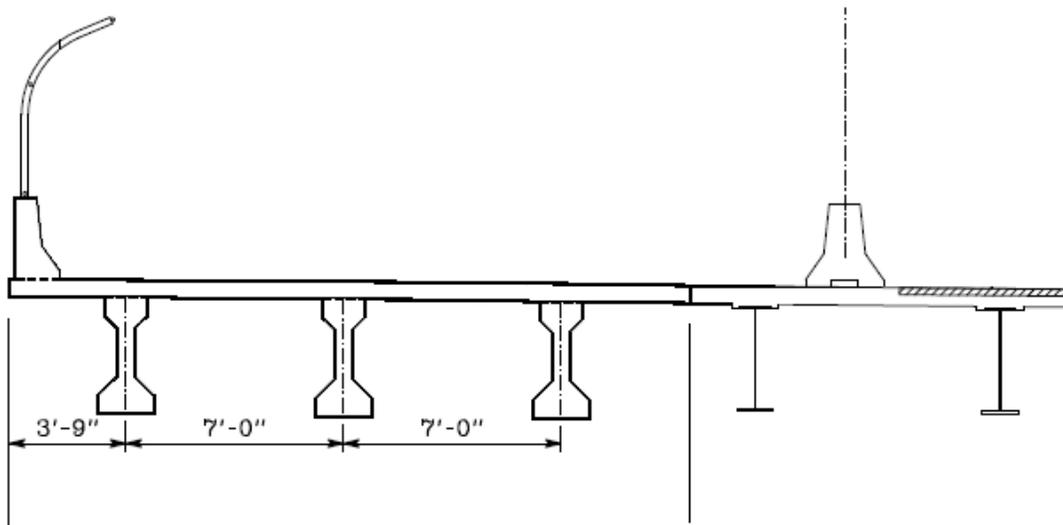
**Project:** Project: SR 400 / Northridge Road Interchange

Idea No.: A-3  
Client: GDOT  
Sheet 2 of 4

## Original Design – Steel Beam Widening



## VE Design – Type 3 Concrete Beam Widening



## COST WORKSHEET

<b>Project:</b> Project: SR 400 / Northridge Road Interchange					Idea No.: A-3 Client: GDOT Sheet 3 of 4		
CONSTRUCTION ELEMENT		ORIGINAL ESTIMATE			NEW ESTIMATE		
Item	Unit	No. Units	Cost/Unit	Total Cost	No. Units	Cost/Unit	Total Cost
<b>Original Design: Steel Beams</b>							
Structural Steel Beams	LS	1	\$342,000	\$342,000			
Superstructure Class AA	LS	1	\$146,875	\$146,875			
Superstructure Rebar	LS	1	\$40,150	\$40,150			
Substructure Class AA	CY	200	\$526.69	\$105,339			
Substructure Rebar	LB	45,000	\$0.67	\$30,150			
H-Piles	LF	125	\$59.11	\$7,389			
H-Pile Points	EA	5	\$146.66	\$733			
Bridge Removal	LS	1	\$100,000	\$100,000			
<b>VE Design: Type 3 PSC Beams</b>							
Type 3 PSC Beams	LF				858	\$119.00	\$102,102
Superstructure Class AA	LS				1	\$146,875	\$146,875
Superstructure Rebar	LS				1	\$40,150	\$40,150
Substructure Class AA	CY				200	\$526.69	\$105,339
Substructure Rebar	LB				45,000	\$0.67	\$30,150
H-Piles	LF				125	\$59.11	\$7,389
H-Pile Points	EA				5	\$146.66	\$733
Bridge Removal	LS				1	\$100,000	\$100,000
<b>SUBTOTAL</b>				<b>\$772,636</b>			<b>\$533,172</b>
<b>TOTAL ROUNDED</b>				<b>\$773,000</b>			<b>\$533,000</b>

## CALCULATIONS

**Project:** Project: SR 400 / Northridge Road Interchange

Idea No.: A-3  
Client: GDOT  
Sheet 4 of 4

### Bridge Widening:

Widened Bridge Section = 22 ft x 286 ft = 6,292 SF

### Original Design - Bridge Widening:

From the original cost estimate:

<b>Structural Steel Beams</b> .....	\$342,000
Superstructure (Class AA) .....	\$146,875
Superstructure (Rebar) .....	\$40,150
Substructure (Class AA).....	\$105,339
Substructure (Rebar).....	\$30,584
H-Piles .....	\$8,122
Remove Bridge Parts .....	\$100,000
Total	\$773,000

### VE Concept:

Use of Type 3 PSC beams instead of structural steel beams

286 ft x 3 = 858 ft @ \$199 / LF = \$102,102

22 ft wide of PSC beam bridge widening:

<b>Type 3 PSC beams</b> .....	\$102,102
Superstructure (Class AA) .....	\$146,875
Superstructure (Rebar) .....	\$40,150
Substructure (Class AA).....	\$105,339
Substructure (Rebar).....	\$30,584
H-Piles .....	\$8,122
Remove Bridge Parts .....	\$100,000
Total cost of PSC beams widening....	\$533,172

## DEVELOPMENT AND RECOMMENDATION PHASE

**Project: SR 400 / Northridge Road Interchange**

<b>IDEA No.:</b> A-10	<b>Sheet No.:</b> 1 Of 4	<b>CREATIVE IDEA:</b> Overlay the existing bridge deck with asphalt pavement instead of a concrete overlay with hydro-demolition.
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Comp By: Aruna Sastry Date: 10/25/2011 Checked By: K.B. Date: 10/31/2011

**Original Concept:**

The original proposal to rehabilitate the Northridge Road Bridge deck is to performing hydro-demolition of the top 2 - 3 inches of existing bridge deck and overlay the surface with concrete.

**Proposed Change:**

This recommendation would replace the hydro-demolition / concrete overlay of the bridge with a 1 ½-inch asphalt concrete overlay.

**Justification:**

A design condition for this project is that improvements constructed in this contract should be assumed to be “short term” since the entire Interchange will be reconstructed to accommodate the future widening of SR 400. The function of the overlay is to extend the service life and allow this bridge to remain in service until the new Northridge Road / SR 400 Interchange is built.

The bridge deck evaluation report indicates the entire superstructure should be replaced; however, there is not sufficient funding for a total deck replacement. The asphalt overlay concept would improve the deck surface and provide a “short term” fix for the bridge. The bridge plans for the original structure shows the bridge design can accommodate a 1 ½-inch overlay. The asphalt overlay concept includes the life-cycle cost for a future overlay if required. This concept significantly reduces construction time, simplifies construction, and reduces project cost.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
<b>Original</b>	\$637,000		
<b>Proposed</b>	\$11,000		
<b>Savings</b>	\$626,000		\$626,000
<b>FUTURE COST: – Savings</b>		(\$10,000)	(\$10,000)
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$616,000</b>



## CALCULATIONS

**Project:** Project: SR 400 / Northridge Road Interchange

Idea No.: A-10  
Client: GDOT  
Sheet 3 of 4

**Original concept:**

Perform hydro-demolition of top 2-3 inches of existing bridge deck and overlay with concrete.

Original Bridge Section = 1,900 SY

Cost estimate: Portland Cement Concrete Overlay \$637,000

**VE option:**

Overlay existing bridge deck with 1 ½ inches of asphalt.

Bridge Section = 1,900 SY

$1,900 \text{ SY} \times 1.5 \text{ in} \times 110 \text{ LB} / \text{SY} = 313,500 \text{ lb} / 2,000 = 156.75 \text{ tons}$  Use 157 Tons.

Overlay = 157 Tons @ \$70.20 / Ton = \$11,214 Use \$11,000

**Asphalt Milling:**

1,900 SY @ \$1.75 = \$3,325

## Development Phase – Life Cycle Cost Worksheet

Creative Idea: Overlay existing bridge deck with asphalt instead of concrete with hydro-demolition

Client: GDOT

Recommendation: A-10

Date: 10/25/2011

Discount Rate: 4%

Sheet 4 of 4

Economic Life: 10 Yrs.

	Original Design		Alternate No. 1	
	Original Cost	Life-Cycle Cost	Original Cost	Life-Cycle Cost
<b>1. Initial Cost:</b>	\$637,000	\$637,000	\$11,000	\$11,000
<b>Single Expenditures:</b>				
a. (Milling) Year 10 PWF 0.6756		\$0	\$3,325	\$2,246
b. (Overlay) Year 10 PWF 0.6756		\$0	\$11,000	\$7,432
c. Year _____ PWF _____				
d. Salvage / Unused Service Life Year _____ PWF _____				
<b>2. Future Single Costs:</b>		\$0		\$9,678
<b>Annual Costs:</b>				
a. General Maintenance PWF _____		N/A		N/A
b. Other Annual Costs PWF _____				
<b>3. Future Annual Costs:</b>		\$0		\$0
<b>4. Total Future Costs: (2 + 3)</b>		\$0		\$10,000
<b>5. Total Life Cycle Costs: (1 + 4)</b>		\$637,000		\$21,000

## DEVELOPMENT AND RECOMMENDATION PHASE

**Project: SR 400 / Northridge Road Interchange**

<b>IDEA No.:</b> B-2	<b>Sheet No.:</b> 1 of 4	<b>CREATIVE IDEA:</b> Reduce the width of the shoulder on Northridge Road (Station 205 to Station 210) from 12 feet to 10 feet.
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Comp By: G.T.M. Date: 10/25/2011 Checked By: K.B. Date: 10/31/2011

**Original Concept:**

The original concept proposes to install a 12-foot wide outside shoulder from Station 204+90 Left to Station 210+16 Left on Northridge Road.

**Proposed Change:**

The revised concept proposes to install a 10-foot wide outside shoulder from Station 204+90 Left to Station 210+16 Left on Northridge Road.

**Justification:**

The purpose of the outside shoulder is to accommodate pedestrians on the sidewalk and provide a portion of the required roadway clear zone. The purpose can be accomplished with a 10-foot wide shoulder. Reducing the shoulder width will reduce the amount of R/W and permanent easement required to construct this project. This concept places the sidewalk 1.5 feet from the back of the curb and gutter and 1-foot from the shoulder break point.

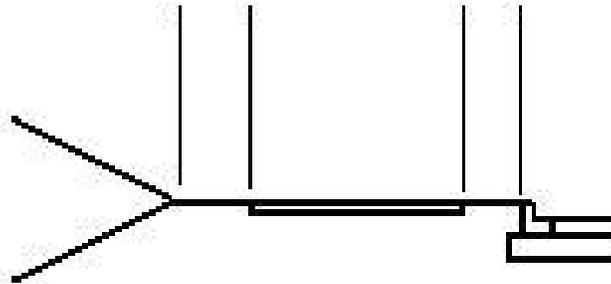
COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
<b>Original</b>	\$140,000		
<b>Proposed</b>	\$125,000		
<b>Savings</b>	\$15,000		\$15,000
<b>FUTURE COST: – Savings</b>		N/A	N/A
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$15,000</b>

**SKETCH**

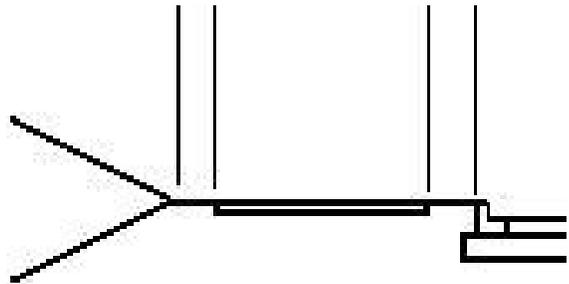
**Project:** Project: SR 400 / Northridge Road Interchange

Idea No.: B-2  
Client: GDOT  
Sheet 2 of 4

**Original 12-Foot Shoulder Concept**  
2 1/2-ft Grass, 5-ft Sidewalk, 2-ft grass, Curb & Gutter



**VE 10-Foot Shoulder Concept**  
1-ft Grass, 5-ft Sidewalk, 1 1/2-ft grass, Curb & Gutter





## CALCULATIONS

**Project:** Project: SR 400 / Northridge Road Interchange

Idea No.: B-2  
Client: GDOT  
Sheet 4 of 4

### Assumptions

Total R/W and Permanent Easement =  
Station 204+90 15 ft  
110 ft x (15 ft + 29 ft) / 2 = 2,420 SF  
Station 206+00 29 ft  
100 ft x (15 ft + 29 ft) / 2 = 2,200 SF  
Station 207+00 15'  
310 ft x (15 ft + 15 ft) / 2 = 4,650 SF  
Station 210+10 15 ft  
Miter (1/2) (15 ft) (28 ft) = 210 SF

TOTAL AREA 9,480 SF

R/W and Permanent Easement Land Cost Estimate = \$83,436.50

R/W and Permanent Easement Unit Cost = \$83,437.50 / 9,480 SF = \$8.80

R/W Expansion Factor (legal, relocation, administrative) = \$140,000 / \$83,437.50 = 1.67

### **VE Concept:**

2-foot width savings in R/W and Permanent Easement along Northridge Road

2 ft x 520 ft = 1,040 SF Savings

9,480 SF - 1,040 SF = **8,440 SF** Revised Concept

R/W Cost:

8,440 SF x \$8.80 x (1.67) = \$124,034.24 Use \$125,000

## DEVELOPMENT AND RECOMMENDATION PHASE

**Project: SR 400 / Northridge Road Interchange**

<b>IDEA No.:</b> C-1	<b>Sheet No.:</b> 1 of 2	<b>CREATIVE IDEA:</b> Eliminate the temporary concrete barrier in Stage 3 and replace it with construction barrels.
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Comp By: G.A.O. Date: 10/25/2011 Checked By: K.B. Date: 10/31/2011

**Original Concept:**

The original design concept uses temporary concrete barrier for all three construction stages for widening / rehabilitating the Northridge Road Bridge deck work.

**Proposed Change:**

This recommendation would substitute construction drums for concrete barrier for the Stage 3 construction phase.

**Justification:**

Concrete barriers are required during bridge demolition, bridge widening, and to construct the new parapets / fencing. However, once both parapets are constructed, construction drums can be used in lieu of concrete barrier to complete any remaining bridge deck work. Northridge Road is a local road with a design speed of 35 mph. The bridge is located between two signalized intersections (approximately 950 feet apart) where operating speeds should be relatively low.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
<b>Original</b>	\$67,000		
<b>Proposed</b>	\$3,000		
<b>Savings</b>	\$64,000		\$64,000
<b>FUTURE COST: – Savings</b>		N/A	N/A
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$64,000</b>



## DEVELOPMENT AND RECOMMENDATION PHASE

**Project: SR 400 / Northridge Road Interchange**

<b>IDEA No.:</b> G-2	<b>Sheet No.:</b> 1 of 4	<b>CREATIVE IDEA:</b> Use asphalt pavement and overlay in lieu of concrete pavement for widening Ramp A & Ramp B intersection approaches.
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Comp By: GAO Date: 10/26/2011 Checked By: K.B. Date: 10/31/2011

**Original Concept:**

The original concept would construct the Ramp A and Ramp B pavement widening with concrete pavement under a “replace-in-kind” policy. The total ramp area to be widened is very small and has to be done in a confined area under traffic. This concept also requires grinding 300 SY of concrete pavement.

**Proposed Change:** This recommendation would use full depth asphalt pavement in-lieu-of concrete pavement for the small amount of concrete ramp widening proposed on this project.

**Justification:**

A design condition for this project is that improvements constructed in this contract should be assumed to be “short term” since the entire Interchange will be reconstructed to accommodate the future widening of SR 400. The small area (942 SY) to be widened is in a confined area and will be constructed under traffic. The ramp widening is to improve traffic operations until the new Northridge Road / SR 400 Interchange is reconstructed. All remaining pavement on this project is asphalt pavement. Using asphalt pavement for these small areas will simplify construction, reduce construction time, reduce construction impacts on the traveling public, and reduce cost.

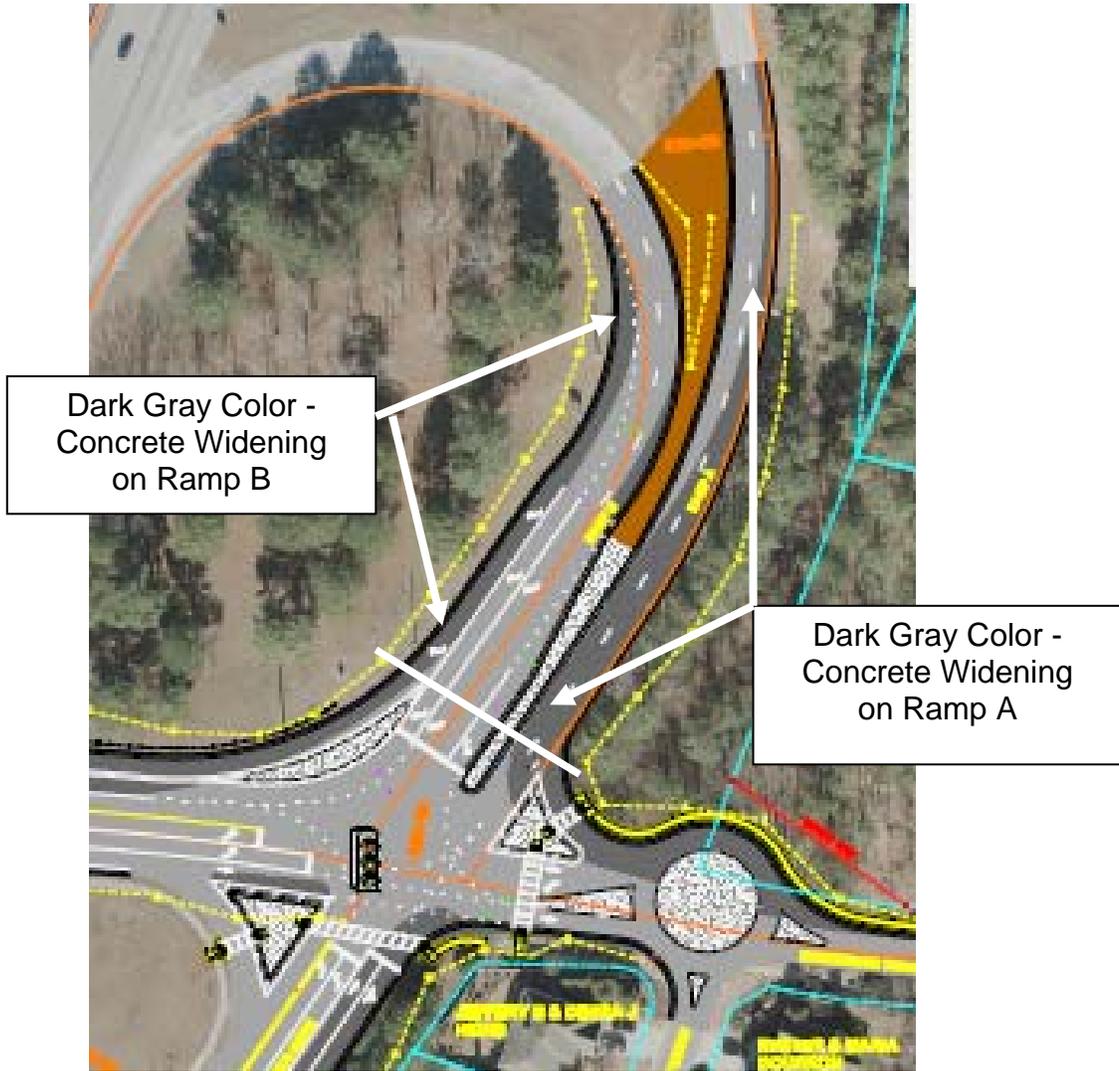
Widening these ramps with asphalt pavement and overlaying the remaining portions of the ramps would eliminate the concrete grinding and accentuate the new ramp lane striping patterns (new striping patterns will be on new asphalt and not conflict with existing concrete pavement joints or ground out striping).

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
<b>Original</b>	\$61,000		
<b>Proposed</b>	\$48,000		
<b>Savings</b>	\$13,000		\$13,000
<b>FUTURE COST: – Savings</b>		N/A	N/A
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$13,000</b>

# SKETCH

**Project:** Project: SR 400 / Northridge Road Interchange

Idea No.: G-2  
Client: GDOT  
Sheet 2 of 4





## CALCULATIONS

**Project:** Project: SR 400 / Northridge Road Interchange

Idea No.: G-2  
Client: GDOT  
Sheet 4 of 4

New Concrete Pavement areas (Ramp A and Ramp B Widening):

$$(22 \text{ ft} \times 200 \text{ ft}) + (8 \text{ ft} \times 300 \text{ ft}) + (14 \text{ ft} \times 120 \text{ ft}) = 4,400 + 2,400 + 1,680 = 8,480 \text{ SF} / 9 = \mathbf{942 \text{ SY}}$$

Existing ramp areas:

$$(350 \text{ ft} \times 30 \text{ ft}) + (250 \text{ ft} \times 15 \text{ ft}) = 10,500 + 3,750 = 14,250 \text{ SF} / 9 = \mathbf{1,583 \text{ SY}}$$

**Pavement costs:**

Cost of Asphalt Pavement; 7 ½ in asphalt / 12 inch GAB

$$(7.5 / 12 \text{ ft}) (150 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.046875 \text{ ton} / \text{SF}$$

$$(12 / 12 \text{ ft}) (135 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.0675 \text{ ton} / \text{SF}$$

Cost per SY

$$(0.046875 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$70 / \text{ton}) + (0.0675 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$18.12 / \text{ton}) = \$29.53 + \$11.00 = \$40.53 / \text{SY} \quad \mathbf{USE: \$41 \text{ per SY}}$$

Cost of Asphalt Resurfacing; 1 ½ in asphalt

$$(1.5 / 12 \text{ ft}) (150 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.009375 \text{ ton} / \text{SF}$$

Cost per SY

$$(0.009375 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$70 / \text{ton}) = \$5.91 / \text{SY} \quad \mathbf{USE: \$6 \text{ per SY}}$$

Cost of Concrete Pavement; 12 in concrete / 3 in asphalt / 12 inch GAB

$$(3 / 12 \text{ ft}) (150 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.01875 \text{ ton} / \text{SF}$$

$$(12 / 12 \text{ ft}) (135 \# / \text{CF}) (1 \text{ ton} / 2000\#) = 0.0675 \text{ ton} / \text{SF}$$

Cost per SY; concrete pavement is \$33.21 per SY

$$31.21 + (0.01875 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$70 / \text{ton}) + (0.0675 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$18.12 / \text{ton}) = \$31.21 + \$11.81 + \$11.00 = \$54.02 / \text{SY} \quad \mathbf{USE: \$54 \text{ per SY}}$$

**DEVELOPMENT AND RECOMMENDATION PHASE**

**Project: SR 400 / Northridge Road Interchange**

<b>IDEA No.:</b> G-2.1	<b>Sheet No.:</b> 1 of 3	<b>CREATIVE IDEA: <u>Alternative to Idea G-2</u></b> Eliminate the 3 inch asphalt layer between the GAB and concrete pavement.
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Comp By: GAO Date: 10/26/2011 Checked By: K.B. Date: 10/31/2011

**Original Concept:**

The original concept would construct the Ramp A and Ramp B pavement widening with concrete pavement under a “replace-in-kind” policy. The total ramp area to be widened is small (942 SY) and has to be done in a confined area with moderate traffic. The original concrete pavement design includes a 3-inch asphalt layer between the GAB and concrete pavement.

**Proposed Change:**

This recommendation would eliminate the 3-inch asphalt layer in the concrete pavement.

**Justification:**

A design condition for this project is that improvements constructed in this contract should be assumed to be “short term” since the entire Interchange will be reconstructed to accommodate the future widening of SR 400. The small (942 SY) area to be widened is in a confined area and will be constructed under traffic. The ramp widening is to improve traffic operations until the new Northridge Road / SR 400 Interchange is reconstructed.

The 3 inch layer of asphalt serves primarily as a leveling layer and as a surface prep material for the concrete pavement constructed on top. It does not provide any structural integrity for the pavement structure and can be eliminated and/or reduced without sacrificing any performance. There will be a modest cost savings and additionally, removing this layer will also eliminate a construction operation for the ramp widening.

<b>COST SUMMARY</b>	<b>INITIAL COST</b>	<b>FUTURE COST</b>	<b>TOTAL L. C. COST SAVINGS</b>
<b>Original</b>	\$11,000		
<b>Proposed</b>	\$0		
<b>Savings</b>	\$11,000		\$11,000
<b>FUTURE COST: – Savings</b>		N/A	N/A
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$11,000</b>



## CALCULATIONS

**Project:** Project: SR 400 / Northridge Road Interchange

Idea No.: G-2.1  
Client: GDOT  
Sheet 3 of 3

Ramps A and B Widening Area:

$$(22 \text{ ft} \times 200 \text{ ft}) + (8 \text{ ft} \times 300 \text{ ft}) + (14 \text{ ft} \times 120 \text{ ft}) = 4,400 \text{ SF} + 2,400 \text{ SF} + 1,680 \text{ SF} = 8,480 \text{ SF} / 9 = \mathbf{942 \text{ SY}}$$

**Original Concept:**

**Cost of Asphalt Pavement; 3 in asphalt**

$$(3 / 12 \text{ ft}) (150 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.01875 \text{ ton} / \text{SF}$$

Cost per SY

$$(0.01875 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$70.20 / \text{ton}) = \$11.85 / \text{SY} \quad \text{USE: } \mathbf{\$12 \text{ per SY}}$$

**VE Concept:**

Eliminate asphalt layer

## DEVELOPMENT AND RECOMMENDATION PHASE

**Project: SR 400 / Northridge Road Interchange**

<b>IDEA No.:</b> G-2.2	<b>Sheet No.:</b> 1 of 3	<b>CREATIVE IDEA: <u>Alternative to Idea G-2</u></b> Use a 1 1/2 –inch thick asphalt layer in-lieu-of a 3-inch asphalt layer in the concrete pavement section.
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Comp By: GAO Date: 10/26/2011 Checked By: K.B. Date: 10/31/2011

**Original Concept:**

The original concept would construct the Ramp A and Ramp B pavement widening with concrete pavement under a “replace-in-kind” policy. The total ramp area to be widened is small (942 SY) and has to be done in a confined area with moderate traffic. The original concrete pavement design includes a 3-inch asphalt layer between the GAB and concrete pavement.

**Proposed Change:**

This recommendation would use a 1 ½-inch asphalt layer in-lieu-of the 3-inch asphalt layer in the concrete pavement.

**Justification:**

A design condition for this project is that improvements constructed in this contract should be assumed to be “short term” since the entire Interchange will be reconstructed to accommodate the future widening of SR 400. The small (942 SY) area to be widened is in a confined area and will be constructed under traffic. The ramp widening is to improve traffic operations until the new Northridge Road / SR 400 Interchange is reconstructed.

The 3 inch layer of asphalt serves primarily as a leveling layer and as a surface prep material for the concrete pavement constructed on top. It does not provide any structural integrity for the pavement structure and can be reduced without sacrificing any performance. Using a thinner layer will result in a modest cost savings.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
<b>Original</b>	\$11,000		
<b>Proposed</b>	\$6,000		
<b>Savings</b>	\$5,000		\$5,000
<b>FUTURE COST: – Savings</b>		N/A	N/A
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$5,000</b>



## CALCULATIONS

**Project:** Project: SR 400 / Northridge Road Interchange

Idea No.: G-2.2  
Client: GDOT  
Sheet 3 of 3

Ramps A and B Widening Area:

$$(22 \text{ ft} \times 200 \text{ ft}) + (8 \text{ ft} \times 300 \text{ ft}) + (14 \text{ ft} \times 120 \text{ ft}) = 4,400 \text{ SF} + 2,400 \text{ SF} + 1,680 \text{ SF} = 8,480 \text{ SF} / 9 = \mathbf{942 \text{ SY}}$$

**Original Design:**

**Cost of Asphalt Pavement; 3 in asphalt**

$$(3 / 12 \text{ ft}) (150 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.01875 \text{ ton} / \text{SF}$$

Cost per SY

$$(0.01875 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$70.20 / \text{ton}) = \$11.85 / \text{SY} \quad \text{USE: } \mathbf{\$12 \text{ per SY}}$$

**VE Design:**

**Cost of Asphalt Pavement; 1-1/2 in asphalt**

$$(1.5 / 12 \text{ ft}) (150 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.009375 \text{ ton} / \text{SF}$$

Cost per SY

$$(0.009375 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$70.20 / \text{ton}) = \$5.92 / \text{SY} \quad \text{USE: } \mathbf{\$6 \text{ per SY}}$$

**DEVELOPMENT AND RECOMMENDATION PHASE**

**Project: SR 400 / Northridge Road Interchange**

<b>IDEA No.:</b> G-2.3	<b>Sheet No.:</b> 1 of 3	<b>CREATIVE IDEA: <u>Alternative to Idea G-2</u></b> Use Filter Fabric in-lieu-of 3-inch asphalt layer in the concrete pavement section.
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Comp By: GAO Date: 10/26/2011 Checked By: K.B. Date: 10/31/2011

**Original Concept:**

The original concept would construct the Ramp A and Ramp B pavement widening with concrete pavement under a “replace-in-kind” policy. The total ramp area to be widened is small (942 SY) and has to be done in a confined area with moderate traffic. The original concrete pavement design includes a 3-inch asphalt layer between the GAB and concrete pavement.

**Proposed Change:**

This recommendation would substitute filter fabric for the 3 inch asphalt layer in the concrete pavement.

**Justification:**

The small (942 SY) area to be widened is in a confined area and will be constructed under traffic. The ramp widening is to improve traffic operations until the new Northridge Road / SR 400 Interchange is reconstructed.

The 3 inch layer of asphalt serves as a leveling layer and as a surface prep material for the concrete pavement constructed on top. It does not provide any structural integrity for the pavement structure and can be eliminated without sacrificing any performance. If there is a concern regarding filtration of fines or providing a smooth layer for the concrete pavement, filter fabric can be substituted. There will be a modest cost savings and removing this layer will eliminate a construction operation for the ramp widening.

<b>COST SUMMARY</b>	<b>INITIAL COST</b>	<b>FUTURE COST</b>	<b>TOTAL L. C. COST SAVINGS</b>
<b>Original</b>	\$11,000		
<b>Proposed</b>	\$3,000		
<b>Savings</b>	\$8,000		\$8,000
<b>FUTURE COST: – Savings</b>		N/A	N/A
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$8,000</b>



## CALCULATIONS

**Project:** Project: SR 400 / Northridge Road Interchange

Idea No.: G-2.3  
Client: GDOT  
Sheet 3 of 3

Ramps A and B Widening Area:

$$(22 \text{ ft} \times 200 \text{ ft}) + (8 \text{ ft} \times 300 \text{ ft}) + (14 \text{ ft} \times 120 \text{ ft}) = 4,400 \text{ SF} + 2,400 \text{ SF} + 1,680 \text{ SF} = 8,480 \text{ SF} / 9 = \mathbf{942 \text{ SY}}$$

**Original Design:**

**Cost of Asphalt Pavement; 3 in asphalt**

$$(3 / 12 \text{ ft}) (150 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.01875 \text{ ton} / \text{SF}$$

Cost per SY  
 $(0.01875 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$70.20 / \text{ton}) = \$11.85 / \text{SY}$     **USE: \$12 per SY**

**VE Design:**

Use Filter Fabric

$$942 \text{ SY} @ \$3.00 = \$2,826$$

## DEVELOPMENT AND RECOMMENDATION PHASE

**Project: SR 400 / Northridge Road Interchange**

<b>IDEA No.:</b> G-5	<b>Sheet No.:</b> 1 of 4	<b>CREATIVE IDEA:</b> Eliminate the roundabout intersection at the east end of the project and construct a gravel turn around.
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Comp By: G.A.O. Date: 10/26/2011 Checked By: K.B. Date: 10/31/2011

**Original Concept:**

The original design would construct a roundabout at Northridge Road and Somerset Court. This roundabout would accommodate the unwanted U-turns from vehicles wishing to bypass the excessive back-ups for the EB to NB left turn movements at the Northridge Road / NB SR 400 Ramp intersection. This concept also provides access to the Somerset Court / Northridge Road Subdivisions.

**Proposed Change:**

This recommendation would eliminate the roundabout and construct a gravel turn-around.

**Justification:**

Due to the extensive back-ups and travelers trying to by-pass the NB SR 400 left turn, the residents on Somerset Court complain of U-turns on their road. The overall traffic improvements and double left turn lane proposed will help in alleviating the traffic backups for this movement. The proposed roundabout will actually entice drivers to use this location for an unwarranted U-turn however. Constructing a driveway opening with only a gravel driveway will allow for a U-turn for the lost driver but will not entice drivers to by-pass the signal.

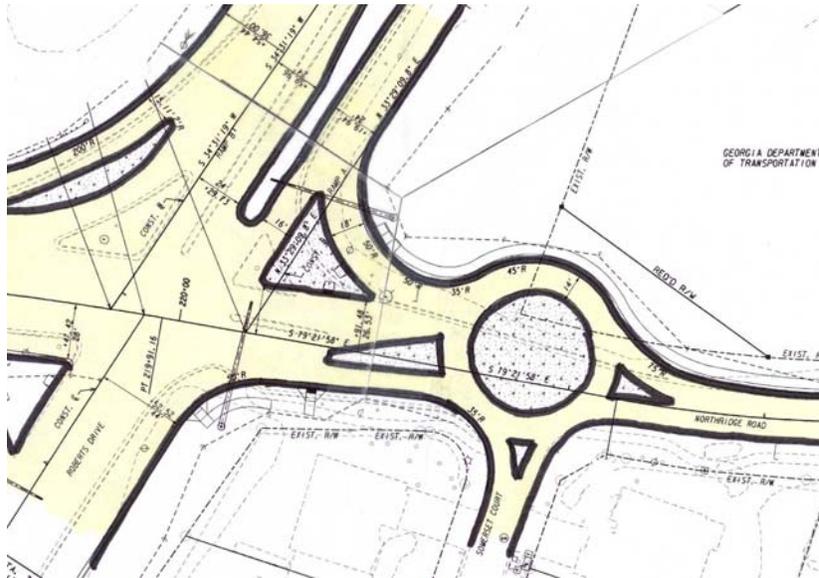
COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
<b>Original</b>	\$20,000		
<b>Proposed</b>	\$4,000		
<b>Savings</b>	\$16,000		\$16,000
<b>FUTURE COST: – Savings</b>		N/A	N/A
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$16,000</b>

# SKETCH

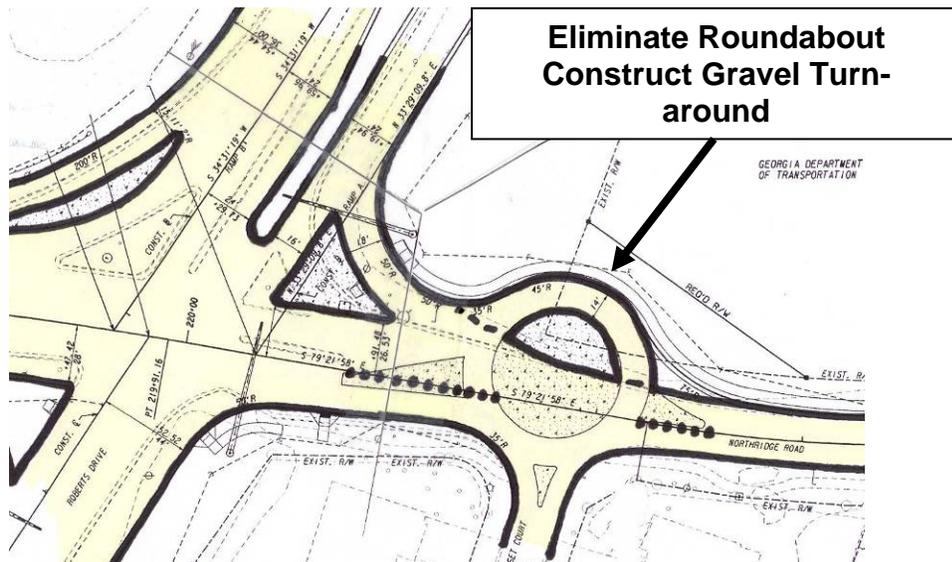
**Project:** Project: SR 400 / Northridge Road Interchange

Idea No.: G-5  
Client: GDOT  
Sheet 2 of 4

## Original Roundabout Design



## VE Gravel Turn-around Concept





## CALCULATIONS

**Project:** Project: SR 400 / Northridge Road Interchange

Idea No.: G-5  
Client: GDOT  
Sheet 4 of 4

### Assumptions:

Since the adjacent property is owned by GDOT, there are no R/W cost implications.

Substitute gravel paving for asphalt:

$$100 \text{ ft} \times 14 \text{ ft} = 1,400 \text{ SF} / 9 = 156 \text{ SY}$$

Area of new concrete islands:

$$3.14 (30 \text{ ft} \times 30 \text{ ft}) + (100 \text{ ft} \times 10 \text{ ft}) = 3,827 \text{ SF} / 9 = 425 \text{ SY}$$

Cost of Asphalt Resurfacing; Assume 1 ½ in asphalt

$$(1.5 / 12 \text{ ft}) (150 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.009375 \text{ ton} / \text{SF}$$

Cost per SY

$$(0.009375 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$70 / \text{ton}) = \$5.91 / \text{SY} \quad \text{Use: } \mathbf{\$6 \text{ per SY}}$$

Cost of Asphalt Pavement; 7 ½ in asphalt / 12 inch GAB

$$(7.5 / 12 \text{ ft}) (150 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.046875 \text{ ton} / \text{SF}$$

$$(12 / 12 \text{ ft}) (135 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.0675 \text{ ton} / \text{SF}$$

Cost per SY

$$(0.046875 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$70 / \text{ton}) + (0.0675 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$18.12 / \text{ton}) = \\ \$29.53 + \$11.00 = \$40.53 / \text{SY} \quad \text{Use: } \mathbf{\$41 \text{ per SY}}$$

## DEVELOPMENT AND RECOMMENDATION PHASE

**Project: SR 400 / Northridge Road Interchange**

<b>IDEA No.:</b> G-5.1	<b>Sheet No.:</b> 1 of 4	<b>CREATIVE IDEA: Alternative to Idea G-5</b> Eliminate the roundabout intersection at the east end of the project and modify the east side of the Roberts Drive / Northridge Road Intersection.
---------------------------	-----------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Comp By: G.A.O. Date: 11/26/2011 Checked By: K.B. Date: 10/31/2011

**Original Concept:**

The original design would construct a roundabout at Northridge Road and Somerset Court. This roundabout would accommodate the unwanted U-turns from vehicles wishing to bypass the excessive back-ups for the EB to NB left turn movements at the Northridge Road / NB SR 400 Ramp intersection. This concept also provides access to the Somerset Court / Northridge Road Subdivisions.

**Proposed Change:**

This recommendation would eliminate the roundabout and maintain the current T-intersection with a U-turn Eyebrow opposite Somerset Court. This concept also eliminates the direct right turn lane connecting Northridge Road to the SR 400 NB On-ramp and prohibits “right turns on red” movements for westbound Northridge Road traffic at the Northridge Road / Roberts Drive intersection.

**Justification:**

This concept provides a U-turn Eyebrow area for eastbound vehicles to make a U-turn without entering the Somerset Court Subdivision. This concept also eliminates the direct right turn connection (DHV of 5) to the SR 400 NB On-ramp and prohibits “right turns on red” at the Northridge Road / Roberts Drive intersection. This concept will discourage vehicles wanting to use this intersection to “bypass” the eastbound Northridge Road to NB SR 400 On-ramp left turn movement at the Roberts Road intersection.

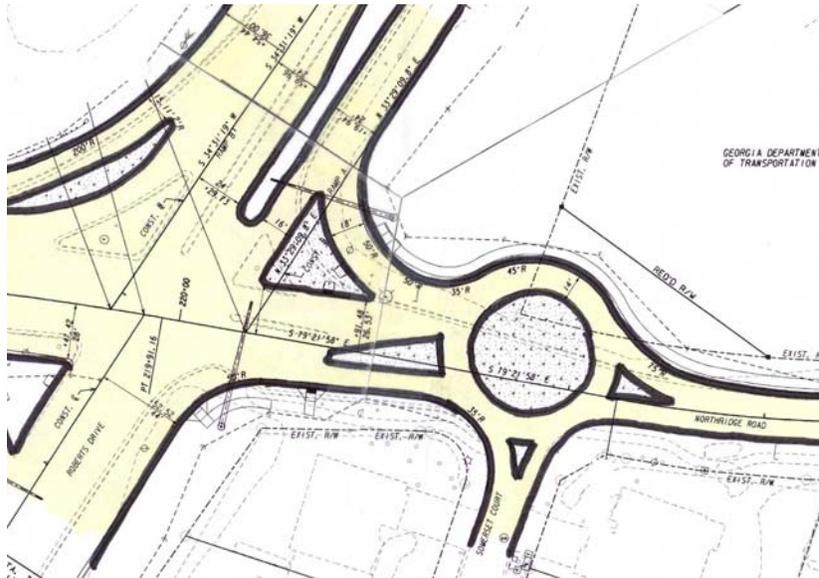
COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
<b>Original</b>	\$30,000		
<b>Proposed</b>	\$6,000		
<b>Savings</b>	\$24,000		\$24,000
<b>FUTURE COST: – Savings</b>		N/A	N/A
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$24,000</b>

# SKETCH

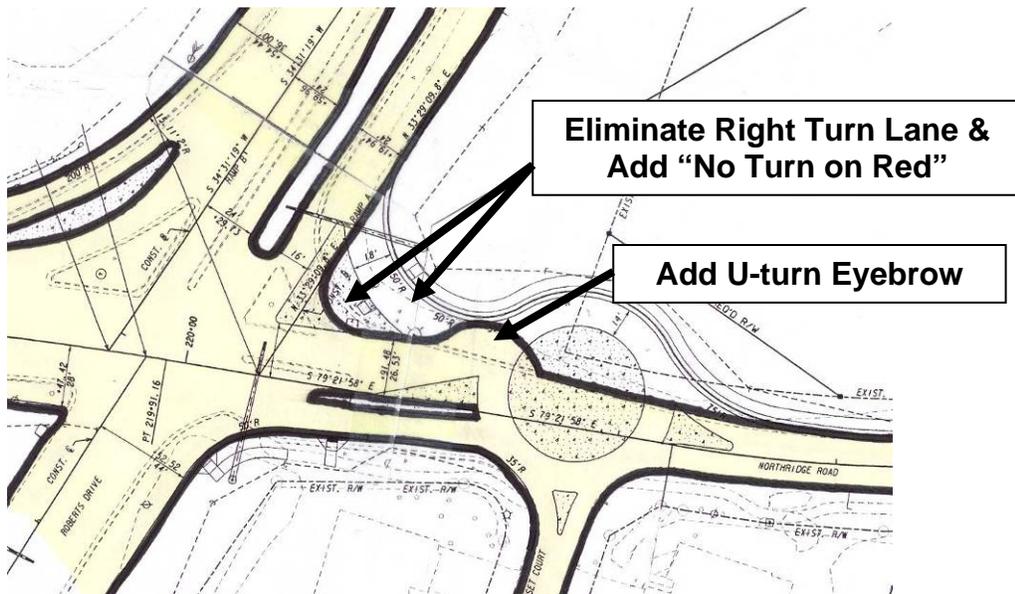
**Project:** Project: SR 400 / Northridge Road Interchange

Idea No.: G-5.1  
Client: GDOT  
Sheet 2 of 4

## Original Roundabout Design



## VE U-turn Eyebrow Design





## CALCULATIONS

**Project:** Project: SR 400 / Northridge Road Interchange

Idea No.: G-5.1

Client: GDOT

Sheet 4 of 4

### Original Design:

Construct a Roundabout

Items Eliminated From the Roundabout Concept

#### Concrete Median

$$\text{Circle Area} = (30 \text{ ft} \times 30 \text{ ft} \times 3.1416) = 2,827 \text{ SF} - (5 \text{ ft} \times 6 \text{ ft} \times 1/2) = 2,812 / 9 = 312.4 \text{ SY}$$

$$\text{Large Island} = (50 \text{ ft} \times 50 \text{ ft} \times 1/2) = 1,250 \text{ SF} / 9 = 138.9 \text{ SY}$$

$$\text{Median Island} = (55 \text{ ft} \times 20 \text{ ft} \times 1/2) = 550 \text{ SF} / 9 = 61.1 \text{ SY}$$

$$\text{Small Island} = (30 \text{ ft} \times 20 \text{ ft} \times 1/2) = 300 \text{ SF} / 9 = 33.3 \text{ SY}$$

$$\text{Total Area} = 545.7 \text{ SY} \quad \text{Use } \mathbf{546 \text{ SY}}$$

#### Pavement

Part of the Roundabout and Direct Right Turn Lane

$$(120 \text{ ft} \times 14 \text{ ft}) + (70 \text{ ft} \times 18 \text{ ft}) = 1,680 + 1,260 = 2,940 \text{ SF} / 9 = 326.7 \text{ SY}$$

Use **330 SY**

### VE Design:

Modify the existing T-Intersection to provide a U-turn Eyebrow.

#### Additional Concrete Median on Northridge Road

$$80 \text{ ft} \times 8 \text{ ft} = 640 \text{ SF} / 9 = 71.1 \text{ SY} \quad \text{Use } \mathbf{72 \text{ SY}}$$

$$\text{Additional pavement for U-turn Eyebrow} - 56 \text{ ft} \times 14 \text{ ft} = 784 \text{ SF} / 9 = 87.1 \text{ SY} \quad \text{Use } \mathbf{88 \text{ SY}}$$

#### Cost of Asphalt Pavement; 7 1/2 in asphalt / 12 inch GAB

$$(7.5 / 12 \text{ ft}) (150 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.046875 \text{ ton} / \text{SF}$$

$$(12 / 12 \text{ ft}) (135 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.0675 \text{ ton} / \text{SF}$$

#### Cost per SY

$$(0.046875 \text{ ton} / \text{SF} \times 9 \text{ SF/SY} \times \$70 / \text{ton}) + (0.0675 \text{ ton} / \text{SF} \times 9 \text{ SF/SY} \times \$18.12 / \text{ton}) =$$

$$\$29.53 + \$11.00 = \$40.53 / \text{SY} \quad \text{Use: } \mathbf{\$41 \text{ per SY}}$$

## DEVELOPMENT AND RECOMMENDATION PHASE

**Project: SR 400 / Northridge Road Interchange**

<b>IDEA No.:</b> G-7	<b>Sheet No.:</b> 1 of 3	<b>CREATIVE IDEA:</b> Construct a second NB exit lane on SR 400 to tie directly into the existing two-lane NB exit ramp.
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Comp By: G.A.O. Date: 10/26/2011 Checked By: K.B. Date: 10/31/2011

**Original Concept:**

The original design does not construct any NB exit ramp improvements adjacent to SR 400. The original concept does provide for NB Ramp widening to add additional turn lanes as it approaches the Northridge Road intersection.

**Proposed Change:**

This recommendation would construct an additional short NB SR 400 exit lane to tie directly into the existing two-lane NB exit ramp to Northridge Road.

**Justification:**

The existing NB exit geometry provides for a single exit lane on SR 400 that ties into a two-lane exit ramp. This geometry requires the first portion of the outside exit ramp lane to be striped out providing little time for vehicles to maneuver into the appropriate exit lane to access Northridge Road, Roberts Drive, or Dunwoody Place. The lane splits will be more significant when this project places a physical barrier between the Northridge Road and Dunwoody Place lanes.

Adding a second exit lane would provide an additional 200 feet of length on SR 400 and the full length of the two exit ramp lanes for storage and to maneuver into the correct lane. This recommendation will be further enhanced with the additional signage as discussed under Idea H-2. This recommendation may require FHWA involvement / review since the improvements would be on SR 400; however, other bridge improvements could also potentially trigger their review.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
<b>Original</b>	\$0		
<b>Proposed</b>	\$72,000		
<b>Savings</b>	(\$72,000)		(\$72,000)
<b>FUTURE COST: – Savings</b>		N/A	N/A
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>(\$72,000)</b>



## CALCULATIONS

**Project:** Project: SR 400 / Northridge Road Interchange

Idea No.: G-7  
Client: GDOT  
Sheet 3 of 3

Additional lane length = 200 ft x 12 ft wide + 100 ft taper  
 $(12 \text{ ft} \times 200 \text{ ft}) + (100 \text{ ft} \times 12 \text{ ft} \times \frac{1}{2}) = 3,000 \text{ SF} / 9 = 333.3 \text{ SY}$     Use 335 SY

Additional Shoulder length = 300 ft x 10 ft = 3,000 SF / 9 = 333.3 SY    Use 335 SY

### Cost of Asphalt Pavement; 7 ½ in asphalt / 12 inch GAB

$(7.5 / 12 \text{ ft}) (150 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.046875 \text{ ton} / \text{SF}$

$(12 / 12 \text{ ft}) (135 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.0675 \text{ ton} / \text{SF}$

Cost per SY

$(0.046875 \text{ ton} / \text{SF} \times 9 \text{ SF/SY} \times \$70 / \text{ton}) + (0.0675 \text{ ton} / \text{SF} \times 9 \text{ SF/SY} \times \$18.12 / \text{ton}) =$   
 $\$29.53 + \$11.00 = \$40.53 / \text{SY}$     **USE: \$41 per SY**

### Cost of Asphalt Shoulder; 3 in asphalt / 12 inch GAB

$(3 / 12 \text{ ft}) (150 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.01875 \text{ ton} / \text{SF}$

$(12 / 12 \text{ ft}) (135 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.0675 \text{ ton} / \text{SF}$

Cost per SY

$(0.01875 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$70 / \text{ton}) + (0.0675 \text{ ton} / \text{SF} \times 9 \text{ SF/SY} \times \$18.12 / \text{ton}) =$   
 $\$11.81 / \text{SY} + \$11.00 = \$22.81$     **USE: \$25 per SY**

### Earthwork prep for additional lane, shoulder and traffic control

Assume \$50,000

## DEVELOPMENT AND RECOMMENDATION PHASE

**Project: SR 400 / Northridge Road Interchange**

<b>IDEA No.:</b> H-1	<b>Sheet No.:</b> 1 of 5	<b>CREATIVE IDEA:</b> Use yellow cross-hatch striping in-lieu-of raised concrete median between the ramp entrance /exit areas in the signalized intersections.
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Comp By: G.T.M. Date: 10/25/2011 Checked By: K.B. Date: 10/31/2011

**Original Concept:**

The original concept proposes to install curb and gutter / concrete median paving to separate the NB SR 400 entrance / exit ramps and SB SR 400 entrance / exit ramps.

**Proposed Change:**

This recommendation would eliminate the curb and gutter / concrete median paving and replace them with yellow cross-hatch striping.

**Justification:**

The purpose of the median area is to separate traffic using the SR 400 entrance and exit ramps. This purpose can be accomplished by the use of yellow cross-hatch striping. Because of the large skew angle and multi-lane exit ramps in both of the Northridge Road / SR 400 ramp intersections, the Northridge Road left turn movement into these entrance ramps will be very wide (over 100 feet).

Separating the ramps with a yellow cross-hatch striped median provides a visual barrier that motorists will recognize and stay to the right. It will also allow for the opportunity to correct a possible wrong-way movement situation. This item has a potential cost increase because the striped median area will have to be constructed with full-depth pavement.

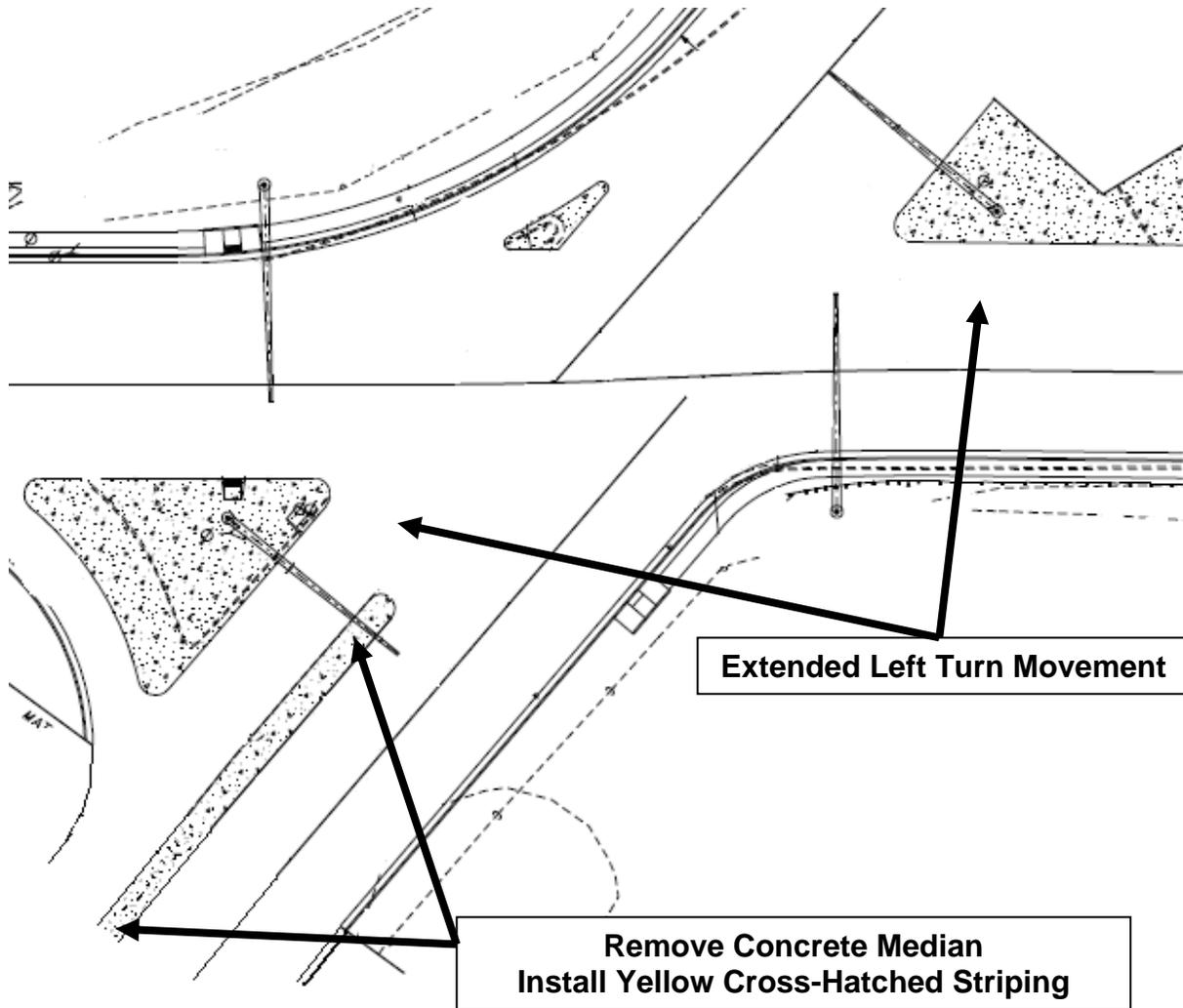
COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
<b>Original</b>	\$15,000		
<b>Proposed</b>	\$30,000		
<b>Savings</b>	(\$15,000)		(\$15,000)
<b>FUTURE COST: – Savings</b>		N/A	N/A
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>(\$15,000)</b>

**SKETCH**

**Project:** Project: SR 400 / Northridge Road Interchange

Idea No.: H-1  
Client: GDOT  
Sheet 2 of 5

**Northridge Road / SB SR 400 Intersection**

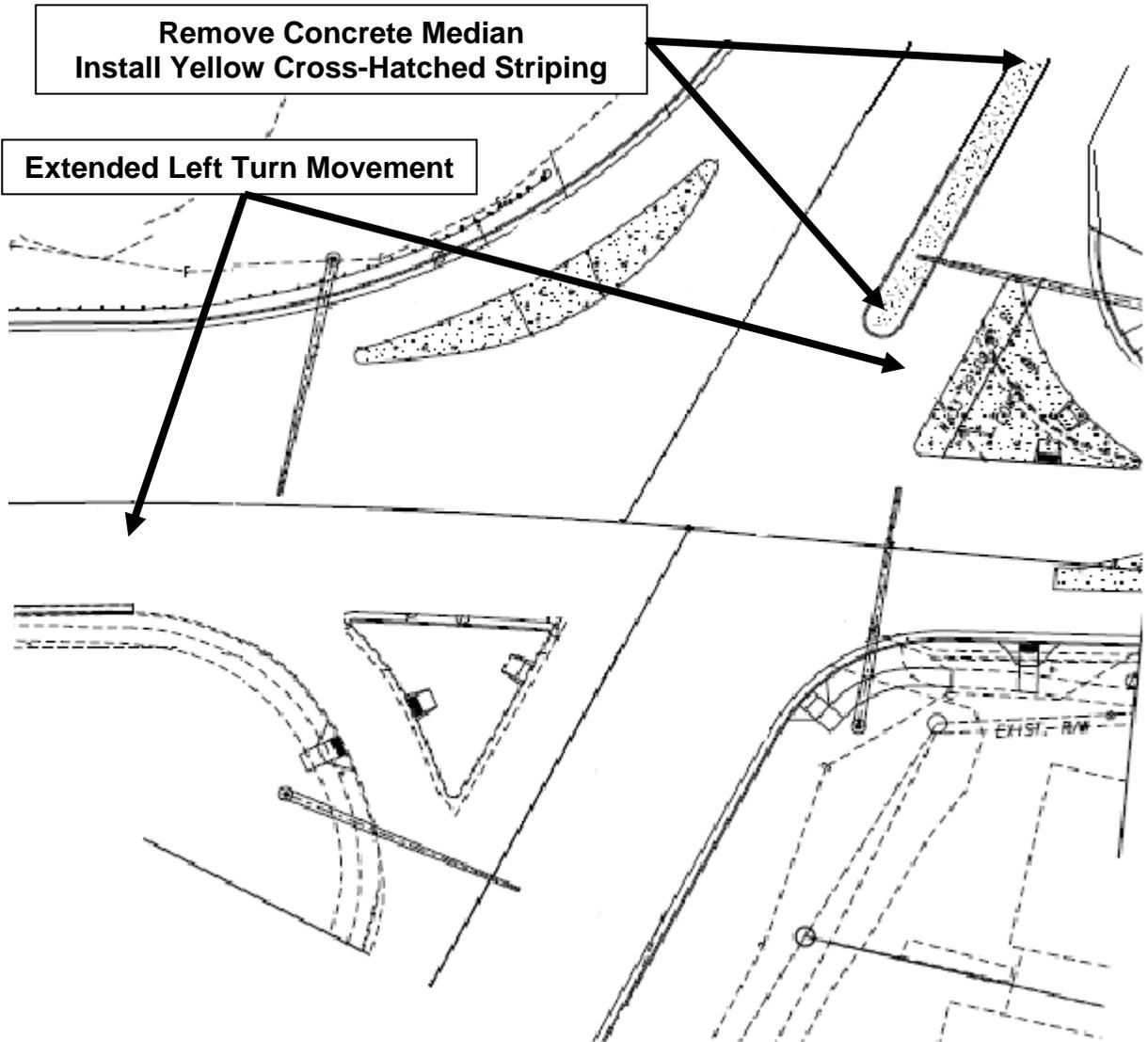


**SKETCH**

**Project:** Project: SR 400 / Northridge Road Interchange

Idea No.: H-1  
Client: GDOT  
Sheet 3 of 5

**Northridge Road / NB SR 400 Intersection**



## COST WORKSHEET

<b>Project:</b> Project: SR 400 / Northridge Road Interchange					Idea No.: H-1		
					Client: GDOT		
					Sheet 4 of 5		
CONSTRUCTION ELEMENT		ORIGINAL ESTIMATE			NEW ESTIMATE		
Item	Unit	No. Units	Cost/Unit	Total Cost	No. Units	Cost/Unit	Total Cost
<b>Original Design:</b>							
SB Entrance/Exit Ramps							
Concrete Median, 6 in	SY	130	\$30.96	\$4,024.80			
NB Entrance/Exit Ramps							
Concrete Median, 6 in	SY	212	\$30.96	\$6,563.52			
Concrete Curb & Gutter	LF	334	\$12.35	\$4,124.90			
<b>VE Design:</b>							
SB Entrance/Exit Ramps							
PCC Pavement	SY				202	\$33.21	\$6,708.42
19 mm Asphalt	Ton				33	\$70.20	\$2,316.60
GAB	CY				133	\$18.12	\$2,409.96
Striping	LF				520	\$0.59	\$306.80
NB Entrance/Exit Ramps							
PCC Pavement	SY				304	\$33.21	\$10,095.84
19 mm Asphalt	Ton				50	\$70.20	\$3,510.00
GAB	CY				201	\$18.12	\$3,642.12
Striping	LF				668	\$0.59	\$394.12
<b>SUBTOTAL</b>				\$14,713.22			\$29,383.86
<b>TOTAL ROUNDED</b>				\$15,000.00			\$30,000.00

## CALCULATIONS

**Project:** Project: SR 400 / Northridge Road Interchange

Idea No.: H-1  
Client: GDOT  
Sheet 5 of 5

### Original Concept:

SB Existing Median Paving  $9 \text{ ft} \times 130 \text{ ft} = 1,170 \text{ SF} / 9 = 130 \text{ SY}$   
 $130 \text{ SY} \times \$30.96 = \$4,024.80$

NB Existing Median Paving  $9 \text{ ft} \times 67 \text{ ft} = 603 \text{ SF}$   
 $((9 \text{ ft} + 17 \text{ ft}) / 2) \times 100 \text{ ft} = \underline{1,300 \text{ SF}}$   
 $1,903 \text{ SF} / 9 = 212 \text{ SY}$   
 $212 \text{ SY} \times \$30.96 = \$6,563.52$

NB Existing Curb & Gutter 334 LF  
 $334 \text{ LF} \times \$12.35 = \$4,124.90$

### VE Concept:

SB Pavement Area  $1,170 \text{ SF} + (130 \text{ ft}) (2.5 \text{ ft}) (2) = 1,820 \text{ SF} / 9 = 202 \text{ SY}$   
PCC  $202 \text{ SY} \times \$33.12 = \$6,708.42$   
19 mm Asphalt  $(202 \text{ SY} \times 3'' \times 110 \text{ \#} / \text{SY}) / 2,000 = 33 \text{ Tons} \times \$70.20 = \$2,316.60$   
GAB  $202 \text{ SY} \times 0.33 \text{ yd} \times 2 \text{ Tons} / \text{CY} = 133 \text{ Tons} \times \$18.12 = \$2,409.96$   
Striping  $130 \text{ ft} \times 2 = 260 \text{ LF} \times 2 \text{ stripes} = 520 \text{ LF} \times \$0.59 = \$306.80$

NB Pavement Area  $1,903 \text{ SF} + (334 \text{ ft}) (2.5 \text{ ft}) = 2,738 \text{ SF} / 9 = 304 \text{ SY}$   
PCC  $304 \text{ SY} \times \$33.21 = \$10,095.84$   
19 mm Asphalt  $(304 \text{ SY} \times 3'' \times 110 \text{ \#} / \text{SY}) / 2,000 = 50 \text{ Tons} \times \$70.20 = \$3,510.00$   
GAB  $304 \text{ SY} \times 0.33 \text{ yd} \times 2 \text{ Tons} / \text{CY} = 201 \text{ Tons} \times \$18.12 = \$3,642.12$   
Striping  $334 \text{ ft} \times 2 = 668 \text{ LF} \times \$0.59 = \$394.12$

## DEVELOPMENT AND RECOMMENDATION PHASE

**Project: SR 400 / Northridge Road Interchange**

<b>IDEA No.:</b> H-2	<b>Sheet No.:</b> 1 of 5	<b>CREATIVE IDEA:</b> Add additional signage to the SR 400 NB Off-Ramp
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Comp By: G.A.O. Date: 11/26/2011 Checked By: K.B. Date: 10/31/2011

**Original Concept:**

The original design includes standard exit signage for the NB SR 400 Off Ramp.

**Proposed Change:**

This recommendation would revise the exit signage for NB SR 400 Off Ramp.

**Justification:**

New and additional signs are needed to delineate the NB SR 400 dual-lane exit ramp for the separate NB SR 400 to NB Dunwoody Place designated lane and the separate NB SR 400 to Northridge Road exit lanes. The NB SR 400 exit ramp signs should show split destinations.

A large cantilever mounted sign should be placed as close to the exit gore as possible to direct the motorists to the correct lane. This idea will result in a cost increase to the project.

During the presentation phase, there was some discussion regarding additional signage; however, the current plans do not include additional signage at the present phase of development.

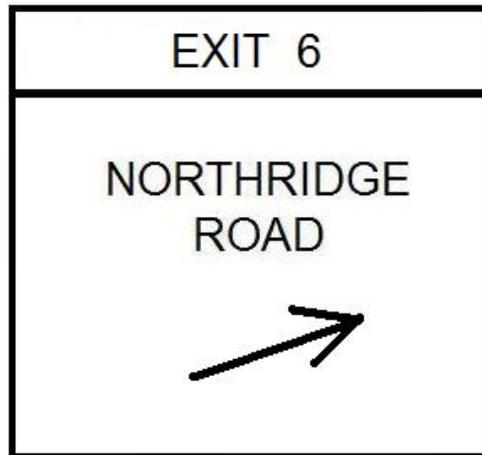
COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
<b>Original</b>	\$7,000		
<b>Proposed</b>	\$67,000		
<b>Savings</b>	(\$60,000)		(\$60,000)
<b>FUTURE COST: – Savings</b>		N/A	N/A
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>(\$60,000)</b>

# SKETCH

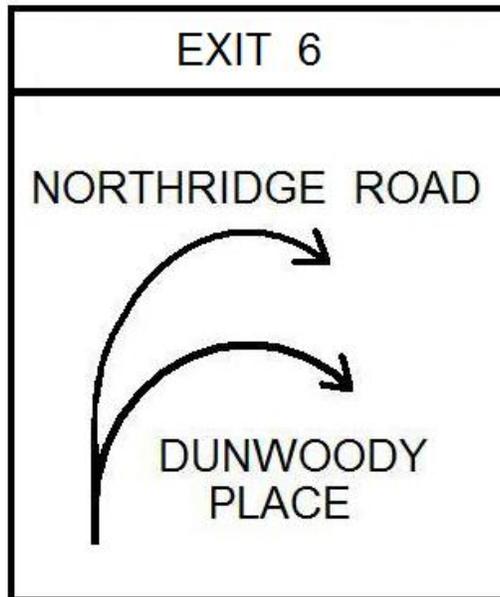
**Project:** SR 400 / Northridge Road Interchange

Idea No.: H-2  
Client: GDOT  
Sheet 2 of 5

## Existing NB Off Ramp Sign South of the Northridge Road Bridge



## New Sign to Replace the existing Off Ramp Sign

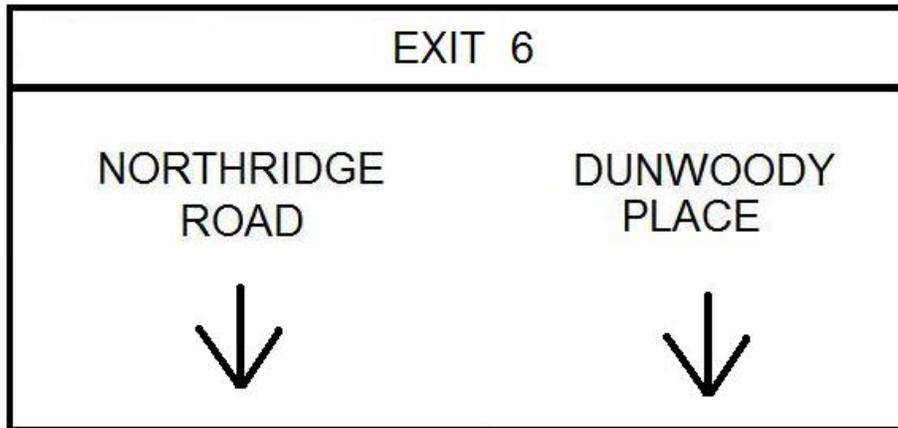


**SKETCH**

**Project:** SR 400 / Northridge Road Interchange

Idea No.: H-2  
Client: GDOT  
Sheet 3 of 5

**New Cantilever Sign over Dual NB Off Ramp Lanes  
Place Where Single Lane Ramp Splits into Two Lanes**





## CALCULATIONS

**Project:** SR 400 / Northridge Road Interchange

Idea No.: H-2  
Client: GDOT  
Sheet 5 of 5

### **Original Design:**

Assume the replacement of the existing SR 400 NB Exit Sign  
Assume size of 12 ft x 18 ft = 216 SF

### **VE Concept: Assumed Sign Size**

New Sign on SR 400 Replacing Existing Exit Sign:  
Assume size of 12 ft x 18 ft = 216 SF

New Cantilever Sign over Dual Off Ramp Lanes  
Assume size of 20 ft x 16 ft = 320 SF

Assume Cantilever Sign Structure  
LS of \$50,000

## DEVELOPMENT AND RECOMMENDATION PHASE

**Project: SR 400 / Northridge Road Interchange**

<b>IDEA No.:</b> H-4	<b>Sheet No.:</b> 1 of 4	<b>CREATIVE IDEA:</b> Replace smaller concrete islands with white or yellow cross hatch striping.
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Comp By: G.T.M. Date: 10/26/2011 Checked By: K.B. Date: 10/31/2011

**Original Concept:**

The original concept proposes to install various concrete islands in the Northridge Road / SR 400 ramp intersections.

**Proposed Change:**

This recommendation would install white or yellow cross hatch striped medians / traffic islands in-lieu-of raised concrete medians at some locations.

**Justification:**

The purpose of the concrete islands is to channel and direct traffic to the appropriate lane. This purpose can be accomplished by utilizing white or yellow cross hatch striping. This concept will simplify and accelerate construction.

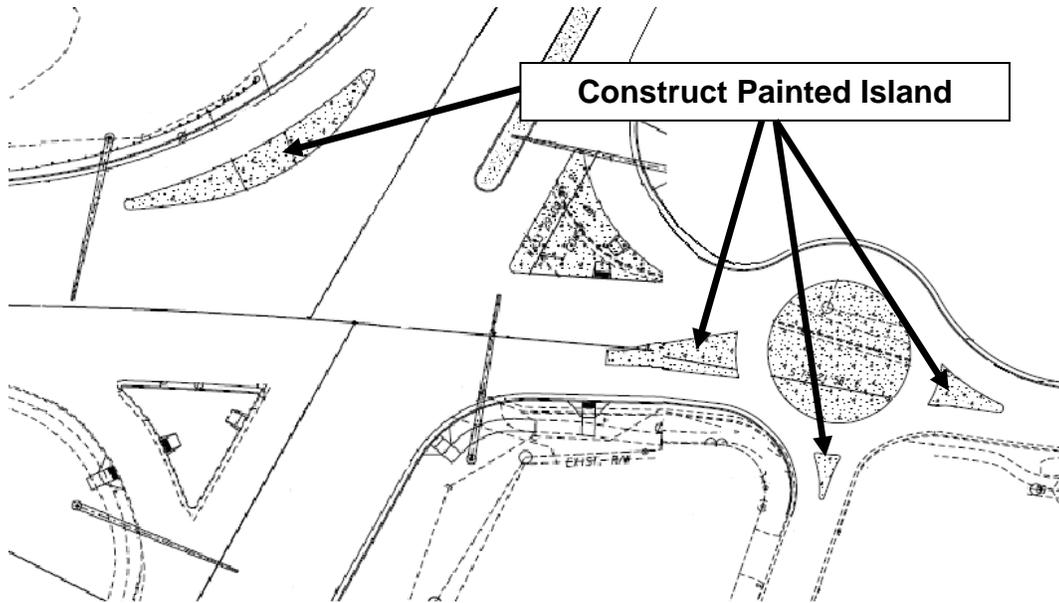
COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
<b>Original</b>	\$10,000		
<b>Proposed</b>	\$6,000		
<b>Savings</b>	\$4,000		\$4,000
<b>FUTURE COST: – Savings</b>		N/A	N/A
<b>TOTAL PRESENT WORTH SAVINGS</b>			<b>\$4,000</b>

**SKETCH**

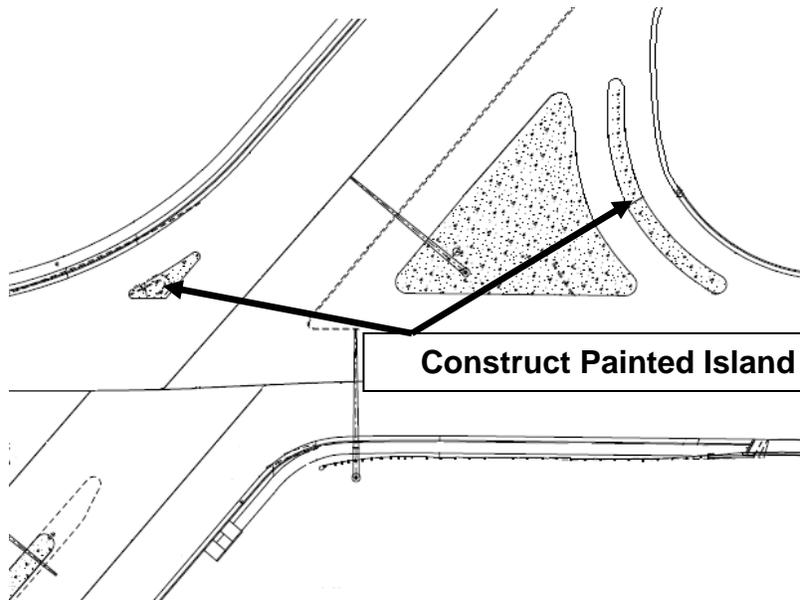
**Project:** Project: SR 400 / Northridge Road Interchange

Idea No.: H-4  
Client: GDOT  
Sheet 2 of 4

**Northridge Road / NB SR 400 Ramp Intersection**



**Northridge Road / SB SR 400 Ramp Intersection**





## CALCULATIONS

**Project:** Project: SR 400 / Northridge Road Interchange

Idea No.: H-4  
Client: GDOT  
Sheet 4 of 4

### Assumptions

Dunwoody Place to Northridge Road	$(1/2)(35')(10')/9 = 20$	SY
Northridge Road to Dunwoody Place	$(8')(125')/9 = 112$	SY
NB 400 Exit to Northridge Road	$(1/2)(105')(14')/9 = 82$	SY
Northridge Road Roundabout Islands	$(1/2)(58')(20')/9 = 65$	SY
	$(1/2)(58')(20')/9 = 12$	SY
	$(1/2)(58')(20')/9 = \underline{36}$	<u>SY</u>
<b>TOTAL</b>		<b>327 SY</b>

### **Original Concept:**

6" Concrete Median Paving 327 SY x \$30.96 = \$10,123.96

### **Revised Concept:**

Yellow Cross Hatch Striping 327 SY x \$18.20 = \$5,914.40

## **APPENDIX**

## VE Study Sign-In Sheet - Design Briefing

### VE STUDY SIGN-IN SHEET

Date: October 24-27, 2011

Project No.: NH1000-0056-01(061)

County: Fulton    PI No.: 751580-

Days

FIRST	LAST	NAME	DOT OFFICE OR COMPANY	PHONE NUMBER	EMAIL ADDRESS
<input checked="" type="checkbox"/>		Lisa L. Myers	Engineering Services	404-631-1770	lmyers@dot.ga.gov
<input checked="" type="checkbox"/>		Matt Sanders	Engineering Services	404-631-1752	msanders@dot.ga.gov
<input type="checkbox"/>		Bill DuVall	Bridge Design	404-631-1883	bduvall@dot.ga.gov
<input type="checkbox"/>		Ren Wishon	Engineering Services	404-631-1753	rwishon@dot.ga.gov
<input checked="" type="checkbox"/>		Keith Borkenhagen	AMEC	623-556-1875	kborkenhagen@msn.com
<input checked="" type="checkbox"/>		George Obaranec	AMEC	770-421-3346	George.Obaranec@amec.com
<input checked="" type="checkbox"/>		Greg Mayo	Stantec	678-764-1646	Greg.mayo@stantec.com
<input checked="" type="checkbox"/>		Peng Zhang	AMEC	770-421-7053	Peng.zhang@amec.com
<input checked="" type="checkbox"/>		Aruna Sastry	Sastry & Associates	678-366-9375	Sast9375@bellsouth.net
<input checked="" type="checkbox"/>		Marlo Clowers	GDOT- IPD	404-631-1713	mclowers@dot.ga.gov
<input checked="" type="checkbox"/>		Dexter Whaley	GDOT - Bridge Design	404-631-1909	dwhaley@dot.ga.gov
<input checked="" type="checkbox"/>		Jeff Woodward	GDOT - Construction	404-631-1971	jwoodward@dot.ga.gov
<input checked="" type="checkbox"/>		Michael Hester	GDOT - Environmental	404-631-1255	mhester@dot.ga.gov
<input checked="" type="checkbox"/>		Nabil Raad	GDOT - Traffic Ops	404-635-8126	nraad@dot.ga.gov
<input checked="" type="checkbox"/>		Gary Newton	Kimley - Horn	678-533-3902	Gary.newton@kimley-horn.com
<input checked="" type="checkbox"/>		David Stricklin	Kimley - Horn	404-419-8783	David.stricklin@kimley-horn.com
<input checked="" type="checkbox"/>		David Hannon	HNTB	404-275-2829	dhannon@hntb.com

Check all that attend   
  Did Not Attend   
  15 Attended Project Overview (Day 1)   
  Attended Project Presentation (Day 4)

## VE Study Sign-In Sheet - VE Presentation

### VE STUDY SIGN-IN SHEET

Date: October 24-27, 2011

County: Fulton      PI No.: 751580-

Project No.: NH000-0056-01(061)

NAME		DOT OFFICE OR COMPANY	PHONE NUMBER	EMAIL ADDRESS
FIRST	LAST			
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Engineering Services	404-631-1770	lmyers@dot.ga.gov
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Engineering Services	404-631-1752	msanders@dot.ga.gov
<input type="checkbox"/>	<input type="checkbox"/>	Bridge-Design	<del>404-631-1883</del>	<del>bduttell@dot.ga.gov</del>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Engineering Services	404-631-1753	rwishon@dot.ga.gov
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	AMEC	623-556-1875	kborkenhagen@msn.com
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	AMEC	770-421-3346	George.Obaranec@amec.com
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Stantec	678-764-1646	Greg.mayo@stantec.com
<input checked="" type="checkbox"/>	<input type="checkbox"/>	AMEC	770-421-7053	Peng.zhang@amec.com
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sastry & Associates	678-366-9375	Sast9375@bellsouth.net
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	GDOT- IPD	404-631-1713	mclowers@dot.ga.gov
<input checked="" type="checkbox"/>	<input type="checkbox"/>	GDOT - Bridge Design	404-631-1909	dwhaley@dot.ga.gov
<input checked="" type="checkbox"/>	<input type="checkbox"/>	GDOT - Construction	404-631-1971	jwoodward@dot.ga.gov
<input checked="" type="checkbox"/>	<input type="checkbox"/>	GDOT - Environmental	404-631-1255	mhester@dot.ga.gov
<input checked="" type="checkbox"/>	<input type="checkbox"/>	GDOT - Traffic Ops	404-635-8126	nraad@dot.ga.gov
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Kimley - Horn	678-533-3902	Gary.newton@kimley-horn.com
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Kimley - Horn	404-419-8783	David.stricklin@kimley-horn.com
<input checked="" type="checkbox"/>	<input type="checkbox"/>	HNTB	404-275-2829	dhannon@hntb.com
<input type="checkbox"/>	<input type="checkbox"/>			
<input type="checkbox"/>	<input type="checkbox"/>			
<input type="checkbox"/>	<input type="checkbox"/>			
<input type="checkbox"/>	<input type="checkbox"/>			

Days

Check all that attend     
  Did Not Attend     
  15 Attended Project Overview (Day 1)     
  10 Attended Project Presentation (Day 4)

## Sources

### Approving/Authorizing Persons

<b>Name:</b>	<b>Position:</b>	<b>Telephone:</b>
Marlo Clowers	GDOT Project Manager	404-631-1713
Ron Wishon	Engineering Services	404-631-1753

### Personal Contacts

<b>Name:</b>	<b>Telephone:</b>	<b>Notes:</b>
Gary Newton	404-631-1713	Design Briefing of Project
David Stricklin	678-533-3902	Design Briefing of Project
Marlo Clowers	404-419-8783	Design Briefing of Project

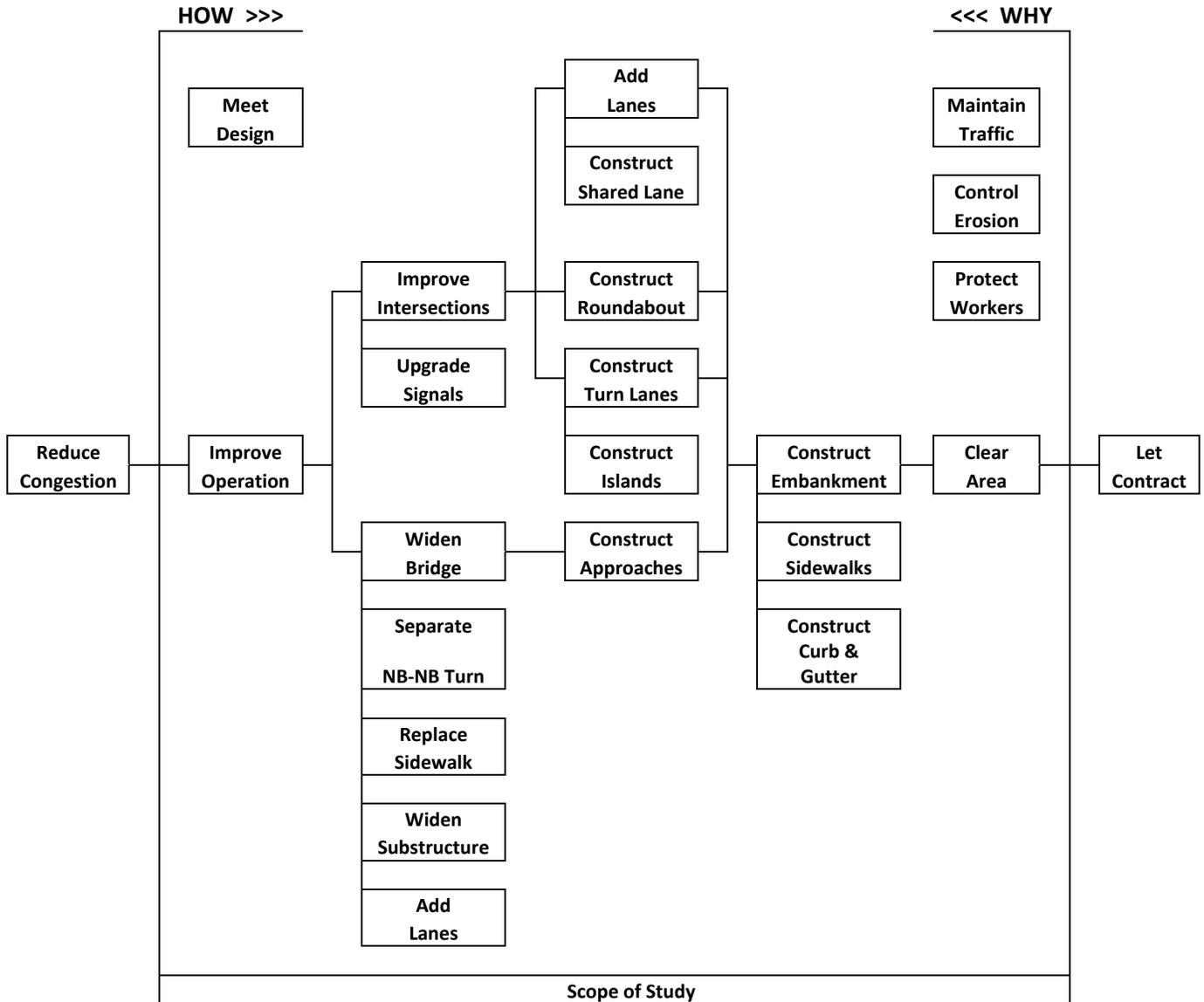
### Documents/Abstracts

<b>Reference:</b>	<b>Reference:</b>
40 Scale Layout Display of Project	Preliminary Construction Cost Estimate
40 Scale Layout Display of Project Staging	Preliminary R/W Cost estimate
Preliminary Plans	Draft Concept Report
Preliminary Cross-Sections	



# FAST DIAGRAM

## Northridge Road



## INFORMATION PHASE – FUNCTION ANALYSIS

**Project:** SR 400 / Northridge Road Interchange

**Function:** Improve Traffic Operations

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	% of Total	Worth/Save
<b>A</b>	<b>Bridge Widening &amp; Repair</b>	Widen	Lanes	\$1,446,000	27.4%	Yes
		Separate	Right Turn Lane			
		Reconstruct	Sidewalk			
		Accommodate	Shared Bike Lane			
		Extend	Service Life			
		Upgrade	Parapets			
		Increase	Sufficiency Rateing			
		Improve	Traffic Operations			
<b>B</b>	<b>Right of Way</b>	Accommodate	New WB Lane	\$1,000,000	18.9%	Yes
		Accommodate	Turn Lanes			
		Accommodate	Sidewalks			
<b>C</b>	<b>Traffic Control</b>	Maintain	Traffic	\$700,000	13.3%	Yes
		Stage	Construction			
		Protect	Workers			
		Widen	Piers & Abutments			
		Inform	Public			

## INFORMATION PHASE – FUNCTION ANALYSIS

**Project:** SR 400 / Northridge Road Interchange

**Function:** Improve Traffic Operations

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	% of Total	Worth/Save
<b>D</b>	<b>Grading Complete</b>	Construct	New Lanes	\$500,000	9.5%	Yes
		Widen	Ramps			
		Construct	Roundabouts			
		Construct	Sidewalks			
		Widen	Roadways			
<b>E</b>	<b>Miscellaneous</b>	Construct	Project	\$447,000	8.5%	No
<b>F</b>	<b>Traffic Signals &amp; Poles</b>	Replace	Existing Signals	\$440,000	8.3%	Yes
		Upgrade	Existing Signals			
		Comply With	City Design			
		Control	Traffic			
		Control	Pedestrians			
<b>G</b>	<b>Pavement &amp; Base</b>	Widen	Lanes	\$411,000	7.7%	Yes
		Match	Current Roadways			
		Add	Turn Lanes			
		Add	WB Mainline Lane			

## INFORMATION PHASE – FUNCTION ANALYSIS

**Project:** SR 400 / Northridge Road Interchange

**Function:** Improve Traffic Operations

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	% of Total	Worth/Save
	<b>Asphalt Pavement &amp; Base (cont.)</b>	Construct	Roundabout			
		Support	Concrete Pavement			
<b>H</b>	<b>Pavement Markings &amp; Signing</b>	Direct	Traffic	\$91,000	1.7%	Yes
		Separate	Lanes			
		Depict	Traffic Islands			
		Advise	Motorists			
		Separate	NB Ramp Traffic			
<b>I</b>	<b>Erosion Control Measures</b>	Comply	With Standards	\$89,000	1.7%	No
		Control	Sediment			
		Protect	Environment			
<b>J</b>	<b>Concrete Curb &amp; Gutter</b>	Match	Existing Curb	\$69,000	2.3%	No
		Control	Traffic			
		Control	Drainage			
		Separate	Traffic			
		Separate	Road / Sidewalk			

## INFORMATION PHASE – FUNCTION ANALYSIS

**Project:** SR 400 / Northridge Road Interchange

**Function:** Improve Traffic Operations

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	% of Total	Worth/Save
<b>K</b>	<b>Concrete Median</b>	Control	Traffic	\$46,000	0.9%	Yes
		Delineate	Lanes			
		Direct	Traffic			
<b>L</b>	<b>Concrete Sidewalk</b>	Accommodate	Pedestrians	\$41,000	0.8%	Yes
		Match	Existing Sidewalk			
		Provide	Access			

<b>CREATIVE PHASE Creative Idea Listing</b>		<b>JUDGMENT PHASE Idea Evaluation</b>	
<b>No.</b>	<b>CREATIVE IDEA</b>	<b>COMMENTS</b>	<b>IDEA RATING</b>
<b>A</b>	<b>Bridge Widening &amp; Repair</b>		
A-1	Reduce the Shared Bike Lanes on the Bridge from 13 feet to 11 feet.	Reduce the width of the bridge widening, reduce cost	✓
A-2	Patch the existing Bridge Deck in-lieu-of Deep Depth Overlay.	Reduce cost, Meet short term concept, Simplify construction	✓
A-3	Use Concrete Beams in-lieu-of Steel Beams to widen Bridge.	Reduce cost, Short spans,	✓
A-4	Construct the New Widened Bridge Portion to span the Ultimate Future SR 400 Width.	Deflection concerns, Higher cost, Unknown SR 400 ultimate concept	X
A-5	Construct the Bridge Sidewalk using Class A Concrete in-lieu-of Class AA Concrete	Not practical	X
A-6	Construct the New Widened Bridge Portion by Spanning between the Center Pier and the New Abutments.	Not sufficient vertical clearance, Eliminate widening two end piers	X
A-7	Construct a new Separate Bridge over SR 400 to Carry the NB SR 400 to NB Dunwoody turn movement.	Eliminate need to rehab existing bridge	✓
A-8	Construct a separate Pedestrian / Bike Bridge over SR 400	Not cost effective	X
A-9	Construct a New Bridge over SR 400 in-lieu-of Widening and rehabilitating the existing Bridge.	Unknown width of future SR 400, Increased Cost, Unknown future Interchange type	X
✓ = Will be considered further; X = will be dropped; DS = Design suggestion –written for consideration by design team			

<b>CREATIVE PHASE Creative Idea Listing</b>		<b>JUDGMENT PHASE Idea Evaluation</b>	
<b>No.</b>	<b>CREATIVE IDEA</b>	<b>COMMENTS</b>	<b>IDEA RATING</b>
A-10	Overlay the existing Bridge with asphalt pavement in-lieu-of Deep Depth Overlay.	Reduce cost, Simplify construction, Meet short term concept,	✓
<b>B</b>	<b>Right of Way</b>		
B-1	Reduce the width of the Shared Bike lane from 13 feet to 11 feet.	See Idea A-1	X
B-2	Reduce the width of the shoulder on Northridge Road from 12 feet to 10 feet (Station 205 – Station 210).	Reduce Cost, Reduce the amount of R/W needed for the project	✓
B-3	Redesign / eliminate the roundabout at the east end of Northridge Road.	See Idea G-5	X
B-4	Construct noise walls net to residential areas	Making improvements in Residential area	✓
B-5	Construct a small retaining wall alongside Northridge Road (Station 205 – Station 210) to reduce the amount of R/W needed to construct the project.	Reduce R/W take, Reduce cost	✓
<b>C</b>	<b>Traffic Control</b>		
C-1	Eliminate the temporary barrier in Stage 3 and replace it with barrels.	Wide area on bridge can be protected by barrels without need for concrete barrier.	✓
✓ = Will be considered further; X = will be dropped; DS = Design suggestion –written for consideration by design team			

<b>CREATIVE PHASE Creative Idea Listing</b>		<b>JUDGMENT PHASE Idea Evaluation</b>	
<b>No.</b>	<b>CREATIVE IDEA</b>	<b>COMMENTS</b>	<b>IDEA RATING</b>
C-2	Restrict overhead bridge work affecting SR 400 to weekends and / or night work only.	Minimize construction impacts to SR 400	DS
C-3	Demo both sides of the existing bridge at the same time to minimize closures on SR 400.	Minimize construction impacts to SR 400	DS
C-4	Review parapet / sidewalk removal method.	Clarify plans	DS
<b>D</b>	<b>Grading Complete</b>		
D-1	Eliminate / modify the roundabout on the east end of the project.	See Idea G-5	X
<b>F</b>	<b>Traffic Signals</b>		
F-1	Eliminate the mast arms and use strain poles with wire	Does not comply with City's signal design	X
F-2	Make the City of Sandy Springs pay the additional cost to install traffic signals with mast arms.	Not practical	X
F-3	Evaluate the impact the closeness of the roundabout has on the signalized intersection	See Idea G-5	X
✓ = Will be considered further; X = will be dropped; DS = Design suggestion –written for consideration by design team			

<b>CREATIVE PHASE Creative Idea Listing</b>		<b>JUDGMENT PHASE Idea Evaluation</b>	
<b>No.</b>	<b>CREATIVE IDEA</b>	<b>COMMENTS</b>	<b>IDEA RATING</b>
<b>G</b>	<b>Pavement and Base Course</b>		
G-1	Reduce the Shared Bike Lanes from 13 feet to 11 feet.	See Idea A-1	X
G-2	Replace the concrete pavement with asphalt pavement.	Reduce cost, Short term concept, speed const	✓
G-2.1	Eliminate / reduce the thickness of the asphalt layer in the concrete pavement section.	Reduce Cost	✓
G-3	Reduce the depth of the concrete pavement section.	Reduce cost, Short term concept	DS
G-4	Reduce the depth of the GAB course under the concrete pavement.	Reduce cost, Short term concept	DS
G-5	Redesign the roundabout intersection at the east end of the project.	Reduce cost, simplify community intersection	✓
G-5.1	Keep the existing intersection in-lieu-of roundabout	Reduce cost	✓
G-7	Add a short second NB SR 400 off lane to tie into the existing NB two-lane loop off-ramp.	Help out dual destination ramp lanes, Impacts SR 400	✓
<b>H</b>	<b>Pavement Marking &amp; Signing</b>		
H-1	Use pavement markings in-lieu-of raised concrete medians in the on / off ramp gore areas.	Minimize Wrong Way Movements,	✓
✓ = Will be considered further; X = will be dropped; DS = Design suggestion –written for consideration by design team			

<b>CREATIVE PHASE Creative Idea Listing</b>		<b>JUDGMENT PHASE Idea Evaluation</b>	
<b>No.</b>	<b>CREATIVE IDEA</b>	<b>COMMENTS</b>	<b>IDEA RATING</b>
H-2	Add additional overhead signing to depict the lane usage / split for the NB SR 400 off ramp.	Inform motorists of split lanes	✓
H-3	Add roadway directional signage on the pavement to designate lane usage in the NB SR 400 off-ramp.	See Idea H-2	X
H-4	Use pavement markings in-lieu-of raised concrete median for traffic islands.	Reduce Cost, Simplify Construction	✓
<b>K</b>	<b>Concrete Medial</b>		
K-1	Replace the concrete medians with pavement markings.	Reduce Cost, Simplify Construction See H-4	X
<b>L</b>	<b>Concrete Sidewalk</b>		
L-1	Use 4” thick sidewalk in-lieu-of 8” thick sidewalk.	Reduce Costs	✓
✓ = Will be considered further; X = will be dropped; DS = Design suggestion –written for consideration by design team			