

# Value Engineering Report

## Effingham Parkway From SR 30 to Blue Jay Road Chatham and Effingham Counties CSMSL-0006-00(700); PI No. 0006700

July 6, 2016

Prepared for:



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# VALUE ENGINEERING REPORT

## Effingham Parkway

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CSMSL-0006-00(700); PI No. 0006700  
Chatham and Effingham Counties

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## **EXECUTIVE SUMMARY**

# **Executive Summary**

## **VALUE ENGINEERING STUDY**

Effingham Parkway  
CSMSL-0006-00(700); PI No. 0006700  
Chatham and Effingham Counties

June 14-17, 2016

### **Introduction/Background**

This report presents the results of a value engineering (VE) study conducted on the concept layout for the Effingham Parkway, from SR 30 to Blue Jay Road in Chatham and Effingham Counties, Georgia.

The proposed Effingham Parkway is preferred Alternate 3 and will be a new location, two-lane roadway from SR 30 to Blue Jay Road, a distance of 6.36 miles. The southern tie-in will be about 1.5 miles west of SR 21 on SR 30 and meet the planned Benton Blvd. extension by Chatham County. The northern terminus will connect to and continue along Blue Jay Road, about 3.2 miles west of SR 21. The westerly section of Blue Jay Road will “T” into the new Effingham Parkway.

The new facility will include 6 major bridges totaling 7,000 feet. The bridges are included to reduce impacts to wetland areas. The bridges will be 55-60 foot prestressed concrete beam spans using 5, Type II AASHTO beams at 9 foot spacing. The substructure will consist of prestressed piles under each beam with a reinforced concrete cap.

The current project schedule is for Right-of-Way acquisition to begin in 2018 and construction to start in 2020. The total estimated project cost is \$40,074,684 and includes \$3,011,000 for ROW and \$979,750 for utilities. This estimate is based on the concept construction estimate prepared by Effingham County’s design consultant as part of the Concept Report.

The VE study was conducted June 14 -17, 2016, in GDOT’s general offices in Atlanta, GA using a 4 person VE team. This report presents the VE 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 contains information about the project and the team. The VE Recommendations presents a 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.

## **Results Obtained**

The VE team focused their efforts on the key and most impactful project elements. Using function analysis and brain storming techniques, the team generated 37 ideas with 23 identified for additional evaluation as possible recommendations. The VE team developed 14 independent recommendations. Implementing the independent, exclusive recommendations has the potential to reduce the project cost by approximately \$17,292,000. A detailed write-up of each recommendation is contained in the respective portion of this report. The following is a summary of the recommendations.

## **Recommendation Summary**

### **Recommendation A-1; Shorten the bridges.**

Shortening the bridges spanning the wetland areas will have a significant cost benefit to the overall project while only slightly increasing the wetland impacts and staying within acceptable levels to obtain US ACE concurrence. It is more efficient to mitigate the impacts at \$72,000 per acre rather than span them. In many locations, shifting the abutments closer will have no effects to the wetlands while reducing the project costs.

***The total potential savings is \$3,512,000***

### **Recommendation A-2; Place the crest of the profile on the bridge.**

Redesigning the profile to eliminate increased vertical clearance will both lower the amount of earthwork/borrow needed and improve/steepen the profile grades in this flat area thereby improving the drainage condition, especially on the bridges.

***The total potential savings is \$94,000***

### **Recommendation A-6; Review and optimize the bridge layouts.**

Based on the analysis, it appears the AASHTO Type 1 Mod superstructure on PSC pile bents can reduce the costs by 15%.

***The total potential cost increase is \$1,220,000***

### **Recommendation A-7: Break up the longer bridges and span only the wetlands.**

Some of the longer bridges also span gaps in the wetlands areas. Not spanning these gaps, which range from 100 to 250 feet will have benefits to the project.

***The total potential cost increase is \$758,000***

**Recommendation B-1; Cross-slope the road to one side only.**

Cross-sloping the road to one side will optimize the MS4 compliance measures to mostly one side. This could reduce impacts, maintenance and potentially ROW.

***The total potential savings is \$200,000***

**Recommendation B-4; Lower the profile.**

The current profile can be lowered and still maintain acceptable clearances and conform to required criteria, while saving earthwork and reducing wetland impacts.

***The total potential savings is \$353,000***

**Recommendation B-6; Adjust the alignment to minimize impacts to wetland areas.**

Minor adjustments throughout the length of the project can yield substantial benefits and reduce wetland impacts.

***The total potential savings is \$1,033,000***

**Recommendation B-7; Realign the roundabout at Benton Blvd./SR 30.**

This will improve the roundabout alignment and tie-in at the southern end to the Chatham County improvements and reduce the wetland impacts.

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

**Recommendation B-8; Use a 55-mph alignment at the northern tie-in.**

The current design provides a 45 mph alignment that will be within 55 mph roadway at each end. Provide a 55-mph design.

***The potential cost increase is \$91,000***

**Recommendation B-12; Review pavement design.**

Current GDOT policy is to allow 15% under-design for the pavement structure. Review and redesign to within that limit, reducing the overall pavement thickness.

***The total potential savings is \$373,000***

**Recommendation B-15; Use the adjacent gas easement for the permanent condition.**

Investigate an alternative to shift the alignment towards the easement and overlap onto it. If allowable and approved with the gas company, this will reduce wetland impacts and ROW.

***The total potential savings is \$490,000***

**Recommendation B-16; Use the gas easement for constructability.**

The current gas easement has an access road that could be utilized for the contractor's access to construct the northern section of the project, about 3 miles in length. If negotiated and approved with the gas company, this could reduce the contractor's mobilization and clearing efforts.

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

**Recommendation B-18; Use the lower part of alignment 3 and transition to the upper part of alignment 2.**

This modified alternate makes use of the existing corridor and roadway for the northern section of the project significantly reducing the ROW, roadway pavement, earthwork and wetlands impacts without any displacements. It also maintains access to the undeveloped areas within this section of the project and meets the project's need and purpose.

***The total potential savings is \$12,289,000***

**Recommendation B-20; Use roundabout at Goshen Road.**

A roundabout at this location is a good fit based on the preliminary analysis of the traffic volumes and will be a more efficient intersection than a stop-condition layout.

***The potential cost increase is \$56,000***

## Effingham Parkway

### SUMMARY OF RECOMMENDATIONS AND POTENTIAL COST SAVINGS

ITEM No.	CREATIVE IDEA DESCRIPTION	ORIGINAL INITIAL COST	PROPOSED INITIAL COST	INITIAL COST SAVINGS	FUTURE SAVINGS	TOTAL PRESENT WORTH SAVINGS	Maximum Savings in Combination with other VE Proposals
A-1	Shorten bridges, do not span all wetlands	3,893,000	381,000	3,512,000	0	\$3,512,000	\$2,100,000
A-2	Place profile crest on bridges	94,000	0	94,000	0	\$94,000	\$50,000
A-6	Optimize bridge layout	1,220,000	0	1,220,000	0	\$1,220,000	\$700,000
A-7	Break up longer bridges	811,000	53,000	758,000	0	\$758,000	\$758,000
B-1	Cross-slope roadway to one side	600,000	400,000	200,000	0	\$200,000	\$50,000
B-4	Lower profile	353,000	0	353,000	0	\$353,000	\$130,000
B-6	Realign roadway to reduce wetlands impacts	10,860,000	9,827,000	1,033,000	0	\$1,033,000	\$1,033,000
B-7	Realign roundabout at Benton Blvd/SR 30	13,000	0	13,000	0	\$13,000	\$13,000
B-8	Redesign northern tie-in curve	367,000	458,000	(91,000)	0	(\$91,000)	0
B-12	Reduce pavement thickness	1,491,000	1,118,000	373,000	0	\$373,000	\$225,000
B-15	Use gas easement for permanent condition	490,000	0	490,000	0	\$490,000	0
B-16	Use gas easement for constructability	15,000	0	15,000	0	\$15,000	0

## Effingham Parkway

### SUMMARY OF RECOMMENDATIONS AND POTENTIAL COST SAVINGS

ITEM No.	CREATIVE IDEA DESCRIPTION	ORIGINAL INITIAL COST	PROPOSED INITIAL COST	INITIAL COST SAVINGS	FUTURE SAVINGS	TOTAL PRESENT WORTH SAVINGS	Maximum Savings in Combination with other VE Proposals
B-18	Use lower part of alignment 3 and transition to upper part of alignment 2	14,653,000	2,364,000	12,289,000	0	\$12,289,000	\$12,289,000
B-20	Use roundabout at Goshen Road	661,000	717,000	(56,000)	0	(\$56,000)	(56,000)

## **STUDY IDENTIFICATION**

## Study Identification

<b>Project: Effingham Parkway</b>	<b>Date: June 14-17, 2016</b>
<b>Study Location: GDOT Offices, Atlanta, GA</b>	

### VE Team Participants

Name	Title / Discipline	Organization
George Obaranec	Team Facilitator	Michael Baker
Ben Clopper	Roadway Design	Michael Baker
Greg Mayo	Construction	Michael Baker
Greg Grant	Structural Design	RS&H

### Project Description

Effingham Parkway is planned as a new location roadway to address the growing areas of Effingham County and the Savannah Metropolitan area. The need for an additional north-south roadway in Effingham County was identified in the Comprehensive Growth Management Plan for Effingham County (1998). Additionally, the Comprehensive Economic Development Strategy (CEDS) published in April 2009 by the Coastal Georgia Regional Development Center (CGRDC) identified the need for a new major transportation facility and has stated that such a facility is vital to the transportation system of Effingham County. In 2008, Effingham Parkway was specifically identified as a needed project for truck traffic and economic development by the Effingham County Multi-modal Transportation Study conducted by GDOT.

With the exception of SR 21, the local roadway network in Effingham County consists solely of two-lane roadways with no continuous north-south connectivity to the interstate system or arterial system of Chatham County that would facilitate commuter traffic. As growth continues in the area, improved roadway connectivity is needed to accommodate future travel demands of its residents.

The proposed Effingham Parkway is preferred Alternate 3 and will be a new location, two-lane roadway from SR 30 to Blue Jay Road, a distance of 6.36 miles. The southern tie-in will be about 1.5 miles west of SR 21 on SR 30 and meet the planned Benton Blvd. extension by Chatham County. The northern terminus will connect to and continue along Blue Jay Road, about 3.2 miles west of SR 21. The westerly section of Blue Jay Road will “T” into the new Effingham Parkway.

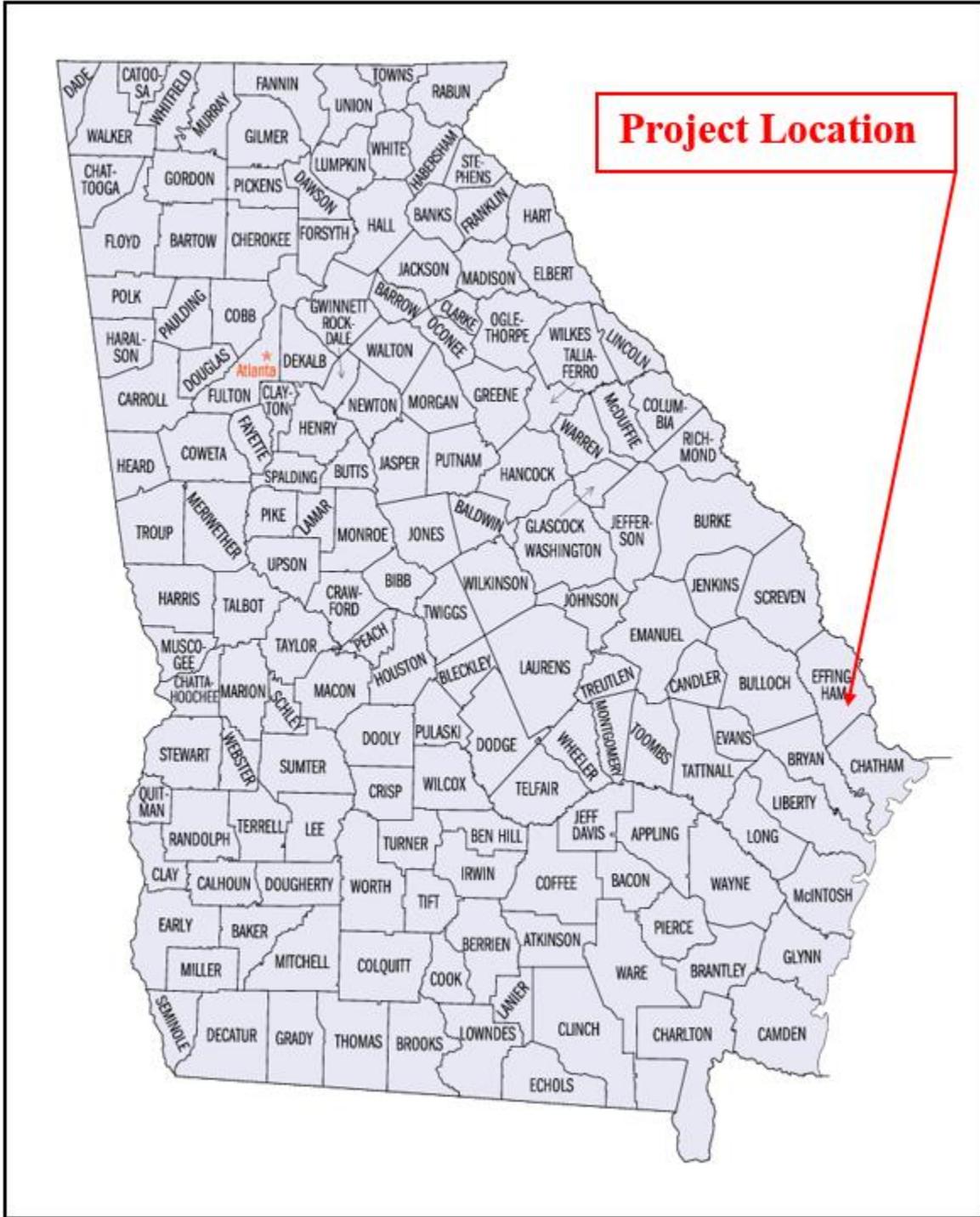
The new facility will include 6 major bridges totaling 7,000 feet. The bridges are included to reduce impacts to wetland areas. The bridges will be 55-60 foot prestressed concrete beam spans using 5, Type II AASHTO beams at 9 foot spacing. The substructure will consist of prestressed piles under each beam with a reinforced concrete cap.

The current project schedule is for Right-of-Way acquisition to begin in 2018 and construction to start in 2020. The total estimated project cost is \$40,074,684 and includes \$3,011,000 for ROW and \$979,750 for utilities. This estimate is based on the concept construction estimate prepared by Effingham County's design consultant as part of the Concept Report.

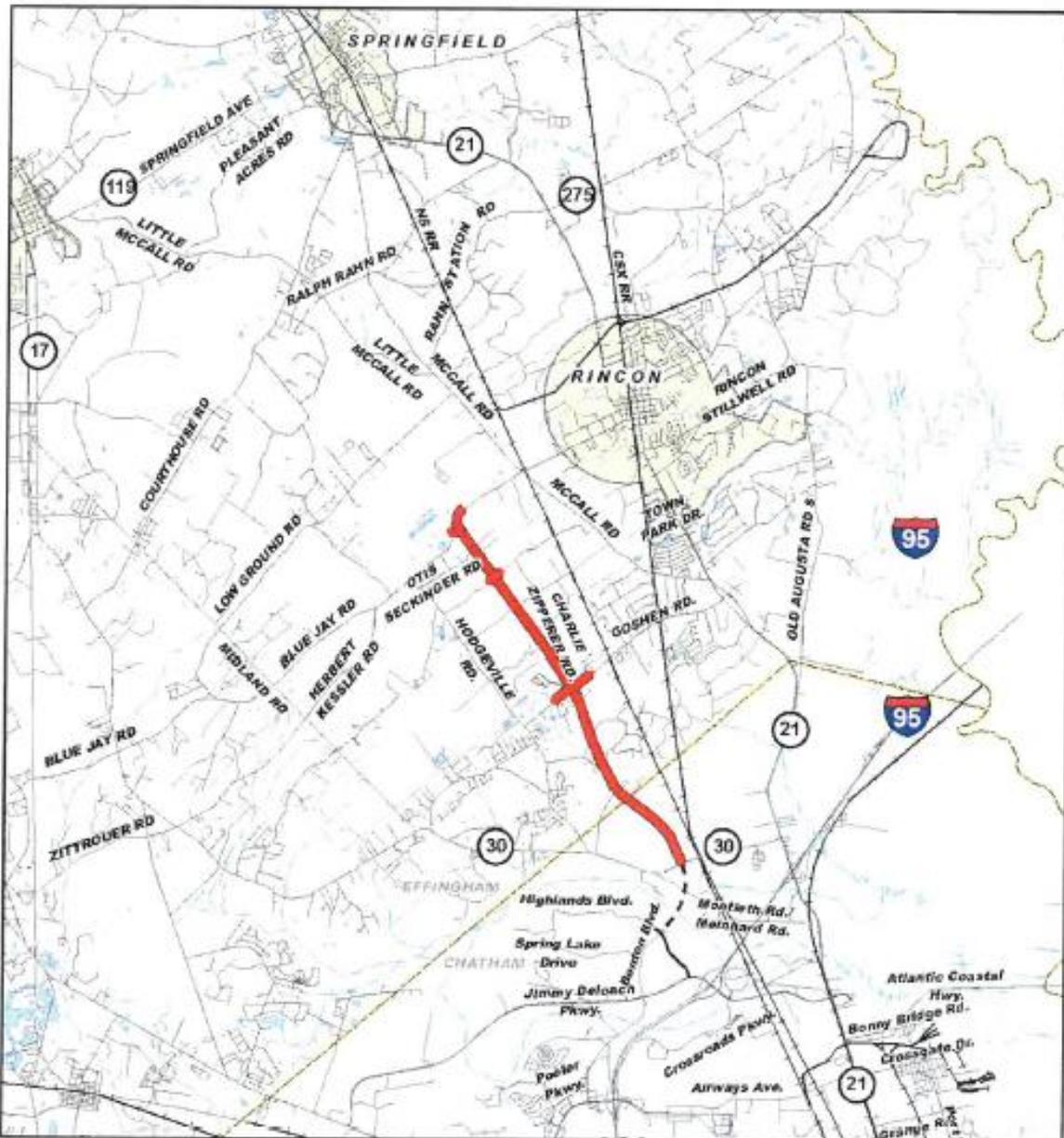
## **Project Design Briefing**

The VE team received a project briefing from Moreland Altobelli, Effingham County's design consultants. Their presentation was led by L.N. Manchi and M.J. Sheehan and included material and displays reflecting the current alternative as well as other pertinent project information. Several of the key topics presented included the following:

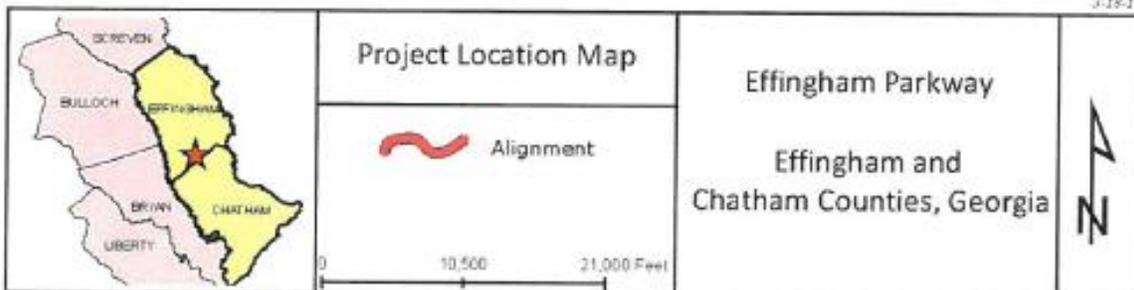
- This project has been planned and discussed for several years. Recently, the project has regained some momentum and is in a position to move forward.
- There were several alternatives presented and studied during the project's development. They are depicted as Alternates 1, 1A, 2, 3, 4 and 5 on the graphic entitled "Effingham Parkway Alternatives" that were included as part of the information package.
- The alternatives are grouped into 3 corridors, A, B and C. The current preferred alternate is 3, in the central corridor, B.
- The project's need and purpose is to:
  - Provide north-south connectivity and mobility
  - Relieve traffic on SR 21
  - Reduce crashes on SR 21
  - Provide economic growth and sustainability by accessing undeveloped land.
- A major concern of the project is the wetland impacts. The current design, alternate 3, significantly reduced the impacted wetlands to 7.62 acres. This figure is generally approved by the USACE who is the permitting authority for this project.
- The southern portion of the project, south of Goshen Road, traverses the Coldbrook Plantation that has a restrictive covenant on the area. Meetings with USACE have been productive as the USACE have provided a satisfactory acknowledgment that the permit and amendment will be granted if wetland impacts will remain as shown on alignment 3.
- As part of the USACE requirement for permitting the project and granting the amendment, both Effingham and Chatham Counties will be involved in advance at-risk, Right-of-Way acquisition in the Coldbrook Plantation area.
- There is a location referred to as the John Odom parcel, within the Colbrook Plantation area where the alignment has been shifted to maximize the remaining area. This is a commitment that has to be maintained.
- The wetlands impact approach was to span areas where the impacts were greater than an acre. For areas less than an acre, the typical roadway template was applied.
- This project is part of the Effingham County Comprehensive Plan to allow for bikes along this new corridor.
- The design speed is 55 mph although the northern tie-in at Blue Jay Road is designed for 45 mph.
- The preferred alternate is primarily on new alignment, therefore MOT is not a significant concern however accessibility and constructability are, especially in the northern section.



**Project Location Map**

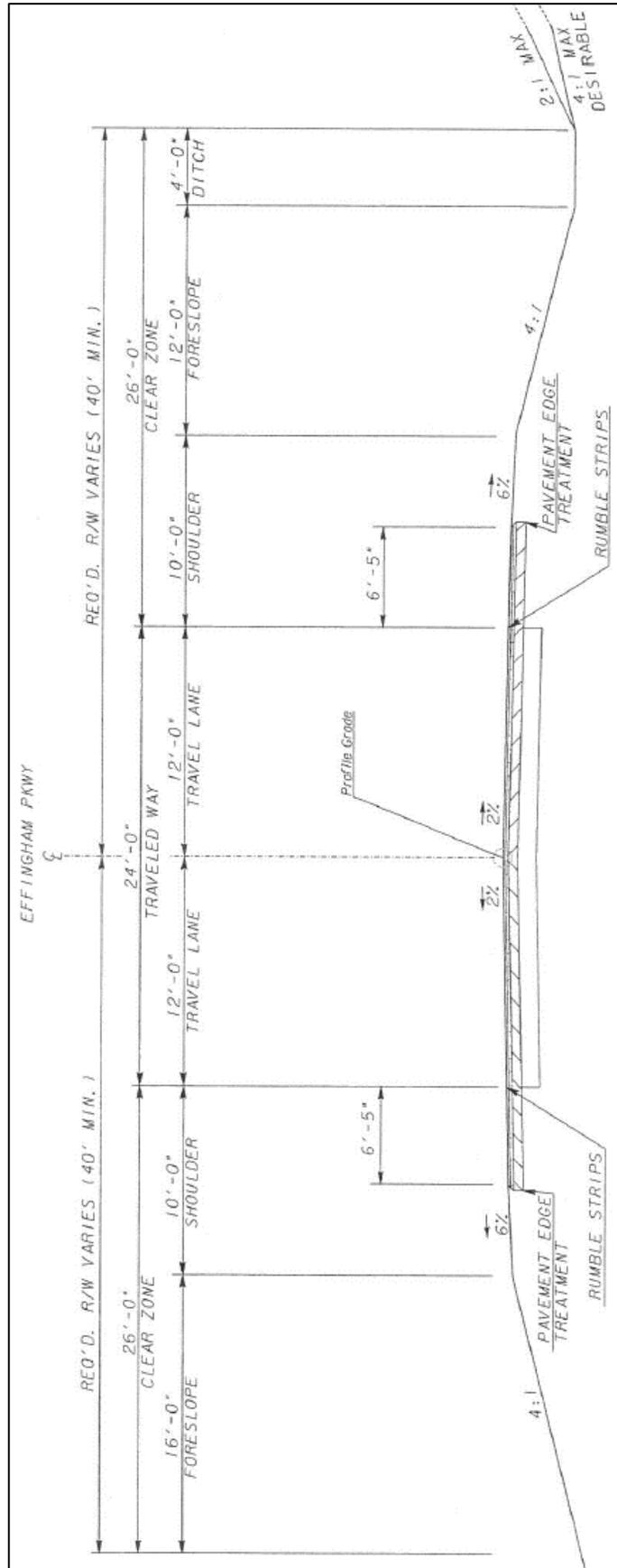


3-18-14



## Project Area Layout

**Typical Section  
Effingham Parkway  
Alternative 3  
Normal Crown Section  
N.T.S.**



# **VALUE ENGINEERING RECOMMENDATIONS**

<b>SUMMARY</b>		<b>Recommendation A-1</b>		Page 1/4
Project: Effingham Parkway			Date: June 16, 2016	
<b>Recommendation:</b> Shorten the bridges in lieu of full span over wetlands				
<b>Team Member:</b> Greg Grant				
<b>Present Design Overview:</b>				
<p>The current design includes 6 bridges as shown on the tables in this recommendation.</p> <p>The length of the bridges was determined based on spanning the wetland areas that the alignment crosses by the following strategy:</p> <ul style="list-style-type: none"> <li>• If the amount of wetland affected by the roadway crossing was less than one (1) acre, then the roadway template is carried across the wetland and a bridge is not used.</li> <li>• If the amount of wetland affected by the roadway crossing is greater than one (1) acre, then the roadway template is not used and a bridge is used from the start of the delineated wetland area to the end of the wetland area. In general, where a bridge is introduced and two wetland areas are close together, the bridge is lengthened to span both.</li> </ul> <p>In the Alternate 3 (Preferred) Alignment, a total of 7.62 acres of wetlands are impacted.</p>				
<b>Recommended Design Overview:</b>				
This recommendation would shorten the length of the bridges and thereby encroach into some of the previously spanned wetlands.				
<b>Benefits:</b> <ul style="list-style-type: none"> <li>• Reduced cost</li> <li>• Reduced construction time</li> <li>• Reduced bridge maintenance cost</li> </ul>		<b>Issues / Concerns:</b> <ul style="list-style-type: none"> <li>• Increased wetland impact</li> <li>• Permitting concerns, review with USACE.</li> </ul>		
<b>LIFE CYCLE COST SUMMARY</b>	<b>PRESENT WORTH COSTS</b>			
	<b>Initial Cost</b>	<b>O &amp; M / LCCA</b>	<b>Total Cost</b>	
Present Design	\$3,893,000	\$0	\$3,893,000	
Recommended Design	\$381,000	\$0	\$381,000	
Savings	\$3,512,000	\$0	<b>\$ 3,512,000</b>	

<b>DISCUSSION</b>	<b>Recommendation A-1</b>	Page 2/4
<b>Project:</b> Effingham Parkway		Date: June 16, 2016

The Present Design Strategy of addressing the wetland areas is to span/bridge any area greater than 1 acre. The following table shows the current bridges and their respective lengths.

BRIDGE	PRESENT DESIGN		
	BEGN BRIDGE	END BRIDGE	BRIDGE LENGTH
	STATION	STATION	
1	29+50	38+50	900
2	95+00	108+00	1300
3	147+00	170+00	2300
4	224+50	233+50	900
5	271+50	282+00	1050
6	297+50	303+00	550

Spanning the wetlands areas is an intrusive and costly method of minimizing impacts. The current alternate 3 represents a significant decrease in wetlands impacts down to 7.62 total acres. This figure was presented and reviewed by the USACE and was mentioned that the target impacts should be kept under 10 acres overall. The Recommended Design would shorten the bridges and encroach on some of the wetlands they presently span. The idea considered several bridge length reduction increments however the calculations are based on a bridge reduction of 100 foot per abutment, or 200 feet per bridge. The exact lengths and their respective effects can be reviewed and specifically addressed as part of the implementation phase.

BRIDGE	WETLAND IMPACTS AS A RESULT OF BRIDGE SHORTENING (ACRES)				
	FEET REDUCED FROM EACH END				
	20	30	40	50	100
1	0.0397	0.0596	0.0794	0.0993	0.1986
2	0.0397	0.0596	0.0794	0.0993	0.1986
3	0.0397	0.0596	0.0794	0.0993	0.1986
4	0.0397	0.0596	0.0794	0.0993	0.1986
5	0.0397	0.0596	0.0794	0.0993	0.1986
6	0.0397	0.0596	0.0794	0.0993	0.1986
<b>TOTALS</b>	<b>0.2383</b>	<b>0.3574</b>	<b>0.4766</b>	<b>0.5957</b>	<b>1.1915</b>

For a bridge reduction of 100 feet per abutment, 200 foot per bridge, the anticipated additional wetland impacts are 1.1915 acres

<b>CALCULATIONS</b>	<b>Recommendation A-1</b>	Page 3/4
<b>Project:</b> Effingham Parkway		<b>Date:</b> June 16, 2016

Bridge reduction: per bridge; 2 x 100 feet = 200 feet

Bridge width – 43.25 feet

Bridge area reduction – 200 ft x 43.25 ft = 8,650 sq ft x 6 bridges = 51,900 sq ft Total

Pavement Cost: 6.5 inches of asphalt over 8 inches of cement stabilized base

$$(6.5 \text{ in} / 12 \text{ ft}) (150 \text{ \#} / \text{CF}) (1 \text{ Ton} / 2,000 \text{ \#}) = 0.040625 \text{ Ton} / \text{SF}$$

Unit Cost: Asphalt: use \$65 per ton; Base \$8.93 per SY

Cost per SY:

$$(0.040625 \text{ ton/sf} \times 9 \text{ sf/sy} \times \$65/\text{ton}) + 8.93 = 23.77 + 8.93 = \$32.70 \text{ per SY} \quad \textbf{USE: \$35 per SY}$$

Pavement area: 6 {200 ft (24 + 13)} (1/9) = 4,933 SY

Additional earthwork: assume 5 foot height, average width – 60 ft

6 x (60 x 5 x 200) cf (1/27) = 13,333 CY x \$5.05 per CY = \$67,332 **Use \$70,000 LS**

Wetland mitigation costs:

Total disturbed acreage – 7.62 acres

Cost of mitigation credits: \$548,000 for 13.7 credits = \$40,000 per credit

13.7 credits / 7.62 acres = 1.8 credit per acre

\$40,000 x 1.8 = \$72,000 per acre



<b>SUMMARY</b>		<b>Recommendation A-2</b>		Page 1/5
Project: Effingham Parkway			Date: June 16, 2016	
<b>Recommendation:</b> Place the profile crest on the bridge.				
<b>Team Member:</b> Greg Grant, Ben Clopper				
<b>Present Design Overview:</b>				
The current profile grades are flat, generally less than 0.5% with some of the bridges on a straight grade. This will introduce stormwater run-off collection and discharge issues, especially over wetland areas.				
<b>Recommended Design Overview:</b>				
Increase the profile grades and redesign the profiles to introduce crest vertical curves on the bridges.				
<b>Benefits:</b>		<b>Issues / Concerns:</b>		
<ul style="list-style-type: none"> <li>Improves run-off and bridge drainage</li> <li>Reduces earthwork and some impacts</li> </ul>		<ul style="list-style-type: none"> <li>Review design of crest vertical curves on bridges; ensure adequate K value for top of crest</li> </ul>		
<b>LIFE CYCLE COST SUMMARY</b>	<b>PRESENT WORTH COSTS</b>			
	<b>Initial Cost</b>	<b>O &amp; M / LCCA</b>	<b>Total Cost</b>	
Present Design	\$94,000	\$0	\$94,000	
Recommended Design	\$0	\$0	\$0	
Savings	\$94,000	\$0	<b>\$94,000</b>	

<b>DISCUSSION</b>	<b>Recommendation A-2</b>	Page 2/5
<b>Project:</b> Effingham Parkway		<b>Date:</b> June 26, 2016

The current profile layout of using relatively flat grades of 0.5% or less will be problematic for bridge drainage and collecting and discharging run-off. Introducing steeper grades and placing crest vertical curves on the bridges will help the drainage condition, reduce earthwork and should also lessen some wetland impacts. Based on the current profile review, it appears that this type of modification can be incorporated at bridges 1, 2 and 5. The sketch shows a potential revision at bridge no. 1, however this approach can and should be more closely reviewed for application and implementation at the other bridges also.

<b>SKETCH</b>	<b>Recommendation A-2</b>	Page 3/5
Project: Effingham Parkway		Date: June 26, 2016



Bridge No. 1  
Sta 29+50 to 38+50

<b>CALCULATIONS</b>	<b>Recommendation A-2</b>	Page 4/5
<b>Project:</b> Effingham Parkway		<b>Date:</b> June 16, 2016

Assume about a 3 foot reduction in lowering the profile for about 500 feet for each of the bridge approaches for bridges no. 1, 2 and 5.

The earthwork template is about 56 feet wide for this analysis.

$$[(500 \text{ ft} \times 56 \text{ ft}) \times 3 \text{ ft}] \times 6 \text{ approaches} = 504,000 \text{ cu ft} = 18,667 \text{ cu yds}$$



<b>SUMMARY</b>		<b>Recommendation A-6</b>		Page 1/5
Project: Effingham Parkway			Date: June 16, 2016	
Recommendation: Optimize span arrangement for most economical bridge				
Team Member: Greg Grant				
<b>Present Design Overview:</b>				
<p>The present design doesn't specifically detail span arrangement, but from an email from Steve Wyche to LN Manchi, dated 5/26/16, the intent is to use AASHTO Type II beams on PSC Pile Bents.</p> <p>The selection of PSC pile bents is consistent with the direction in the GDOT Bridge Design Manual.</p>				
<b>Recommended Design Overview:</b>				
<p>This recommendation is to review and optimize the span arrangements and bridge layout using AASHTO Type 1 Mod superstructure on PSC pile bents for an anticipated 15% cost reduction. Prior to suggesting this recommended design, several assumptions were made with regard to slab thickness, pile size and span length. A cost model was prepared and detailed calculations and tables are included.</p>				
<b>Benefits:</b>		<b>Issues / Concerns:</b>		
<ul style="list-style-type: none"> <li>Cost improvement, more efficient layout.</li> </ul>		<ul style="list-style-type: none"> <li>None apparent.</li> </ul>		
<b>LIFE CYCLE COST SUMMARY</b>	<b>PRESENT WORTH COSTS</b>			
	<b>Initial Cost</b>	<b>O &amp; M / LCCA</b>	<b>Total Cost</b>	
Present Design	\$1,220,000	\$0	\$1,220,000	
Recommended Design	\$0	\$0	\$0	
Savings	\$ 1,220,000	\$0	<b>\$ 1,220,000</b>	

<b>CALCULATIONS</b>	<b>Recommendation A-6</b>	Page 2/5
<b>Project:</b> Effingham Parkway		<b>Date:</b> June 16, 2016

**LEAST EXPENSIVE WAY TO SPAN DISTANCE**

FO SIMPLICITY SAKE ASSUME THE BRIDGE DECK IS A CONSTANT 8" AND COMMON TO ALL ALTERNATES

USE ONLY A 5 BEAM CROSS SECTION

SO USING THE LRFD CHARTS IN THE BRIDGE DESIGN MANUAL

SO  
43.25 FEET WIDE  
5 BEAMS  
9 FOOT BEAM SPACING  
3.625 FOOT OVERHANGS

<b>CALCULATIONS</b>	<b>Recommendation A-6</b>	Page 3/5
<b>Project:</b> Effingham Parkway		<b>Date:</b> June 16, 2016

COST OF A CONCRETE INTERMEDIATE PILE BENT

PSC PILE BENT FOR MOD I
-------------------------

CAP	42	FEET LONG
	3	FEET WIDE
	2	FEET DEEP
	<hr/>	
	252	CU FT
	9.33	CU YD

CLASS A including rebar = \$ 1,040.30 per CU YD

Piles	Say 5 piles		
	PSC PILES	x	40 feet long
	14" PSC		58.76 per foot

	5	PILES
	40	FEET
	<hr/>	
	200	FEET
	x 58.76	/ FT
	<hr/>	
	\$ 11,752	

TOTAL COST PER BENT	\$ 11,752	PILING
	\$ 1,040.30	CONCRETE
TOTAL	<hr/>	
	\$ 12,792.30	

<b>CALCULATIONS</b>	<b>Recommendation A-6</b>	Page 4/5
<b>Project:</b> Effingham Parkway		<b>Date:</b> June 16, 2016

COST OF A CONCRETE INTERMEDIATE PILE BENT

PSC PILE BENT FOR MOD I
-------------------------

42	FEET LONG
3	FEET WIDE
2	FEET DEEP
<hr/>	
252	CU FT
9.33	CU YD

CLASS A including rebar = \$ 1,040.30 per CU YD

Say 5 piles  
PSC PILES x 40 feet long

16" PSC 56.9 per foot

	5	PILES
	40	FEET
	<hr/>	
	200	FEET
X	56.9	/ FT
	<hr/>	
	\$	11,380

TOTAL COST PER BENT	\$	11,380	PILING
	\$	1,040.30	CONCRETE
TOTAL	\$	12,420.30	

BRIDGE	PRESENT DESIGN		MAX 40 FEET		MAX 60 FEET		MAX 70 FEET	
	BEGN BRIDGE	END BRIDGE	AASHTO MOD I		AASHTO TYPE II		AASHTO TYPE III	
	STATION	STATION	BRIDGE LENGTH	NUMBER OF SPANS	SPAN LENGTH	NUMBER OF SPANS	SPAN LENGTH	NUMBER OF SPANS
1	29+50	38+50	900	23	39.13	15	60.00	13
2	95+00	108+00	1300	33	39.39	22	59.09	19
3	147+00	170+00	2300	58	39.66	39	58.97	33
4	224+50	233+50	900	23	39.13	15	60.00	13
5	271+50	282+00	1050	27	38.89	18	58.33	15
6	297+50	303+00	550	14	39.29	10	55.00	8

**Cost of a mod I per foot \$110.37**  
**Cost of a Type II per foot \$168.11**  
**Cost of a Type III per foot \$189.64**

BRIDGE	PRESENT DESIGN		BEAM COST			BENT COST = COST /BENT * (SPANS +1)			TOTAL				
	BEGN BRIDGE	END BRIDGE	STATION	BRIDGE LENGTH	MOD I	TYPE II	TYPE III	MOD I	TYPE II	TYPE III	MOD I	TYPE II	TYPE III
1	29+50	38+50	38+50	900	\$ 496,665.00	\$ 756,495.00	\$ 853,380.00	\$ 307,015.20	\$ 198,724.80	\$ 443,888.20	\$ 803,680.20	\$ 955,219.80	\$ 1,297,268.20
2	95+00	108+00	108+00	1300	\$ 717,405.00	\$ 1,092,715.00	\$ 1,232,660.00	\$ 434,938.20	\$ 285,666.90	\$ 634,126.00	\$ 1,152,343.20	\$ 1,378,381.90	\$ 1,866,786.00
3	147+00	170+00	170+00	2300	\$ 1,269,255.00	\$ 1,933,265.00	\$ 2,180,860.00	\$ 754,745.70	\$ 496,812.00	\$ 1,078,014.20	\$ 2,024,000.70	\$ 2,430,077.00	\$ 3,258,874.20
4	224+50	233+50	233+50	900	\$ 496,665.00	\$ 756,495.00	\$ 853,380.00	\$ 307,015.20	\$ 198,724.80	\$ 443,888.20	\$ 803,680.20	\$ 955,219.80	\$ 1,297,268.20
5	271+50	282+00	282+00	1050	\$ 579,442.50	\$ 882,577.50	\$ 995,610.00	\$ 358,184.40	\$ 235,985.70	\$ 507,300.80	\$ 937,626.90	\$ 1,118,563.20	\$ 1,502,910.80
6	297+50	303+00	303+00	550	\$ 303,517.50	\$ 462,302.50	\$ 521,510.00	\$ 191,884.50	\$ 136,623.30	\$ 285,356.70	\$ 495,402.00	\$ 598,925.80	\$ 806,866.70
											\$ 6,216,733.20	\$ 7,436,387.50	\$ 10,029,974.10

**MOD I on pile bents appear to be least expensive**

BRIDGE	DIFFERENTIAL SAVINGS VERSES THE MOD I		
	MOD I	TYPE II	TYPE III
1	\$ -	\$ 151,539.60	\$ 493,588.00
2	\$ -	\$ 226,038.70	\$ 714,442.80
3	\$ -	\$ 406,076.30	\$ 1,234,873.50
4	\$ -	\$ 151,539.60	\$ 493,588.00
5	\$ -	\$ 180,936.30	\$ 565,283.90
6	\$ -	\$ 103,523.80	\$ 311,464.70
Savings		\$ 1,219,654.30	\$ 3,813,240.90

**Mod 1 Saves \$1,220,000 versus the Type II**

<b>SUMMARY</b>		<b>Recommendation A-7</b>		Page 1/5
Project: Effingham Parkway			Date: June 16, 2016	
<b>Recommendation:</b> Reduce the length of the long bridges; span only the wetlands				
<b>Team Member:</b> Greg Grant				
<b>Present Design Overview:</b>				
In the present design, Bridge 1 spans over Wetland #40, Bridge 2 spans over Wetland #34. Within the limits of the bridge, there is a location beneath each bridge where the wetland is discontinuous but it being spanned with bridges. This length is approximately 100 feet for Bridge 1 and 150 feet for Bridge 2.				
<b>Recommended Design Overview:</b>				
Span only the wetlands areas. Reduce the lengths of the bridges at these “non-wetland” areas				
<b>Benefits:</b> <ul style="list-style-type: none"> <li>• Shorter bridges and lower bridge cost</li> <li>• Lower bridge maintenance cost</li> </ul>			<b>Issues / Concerns:</b> <ul style="list-style-type: none"> <li>• None apparent.</li> </ul>	
<b>LIFE CYCLE COST SUMMARY</b>	<b>PRESENT WORTH COSTS</b>			
	<b>Initial Cost</b>	<b>O &amp; M / LCCA</b>	<b>Total Cost</b>	
Present Design	\$811,000	\$0	\$811,000	
Recommended Design	\$53,000	\$0	\$53,000	
Savings	\$ 758,000	\$0	<b>\$758,000</b>	

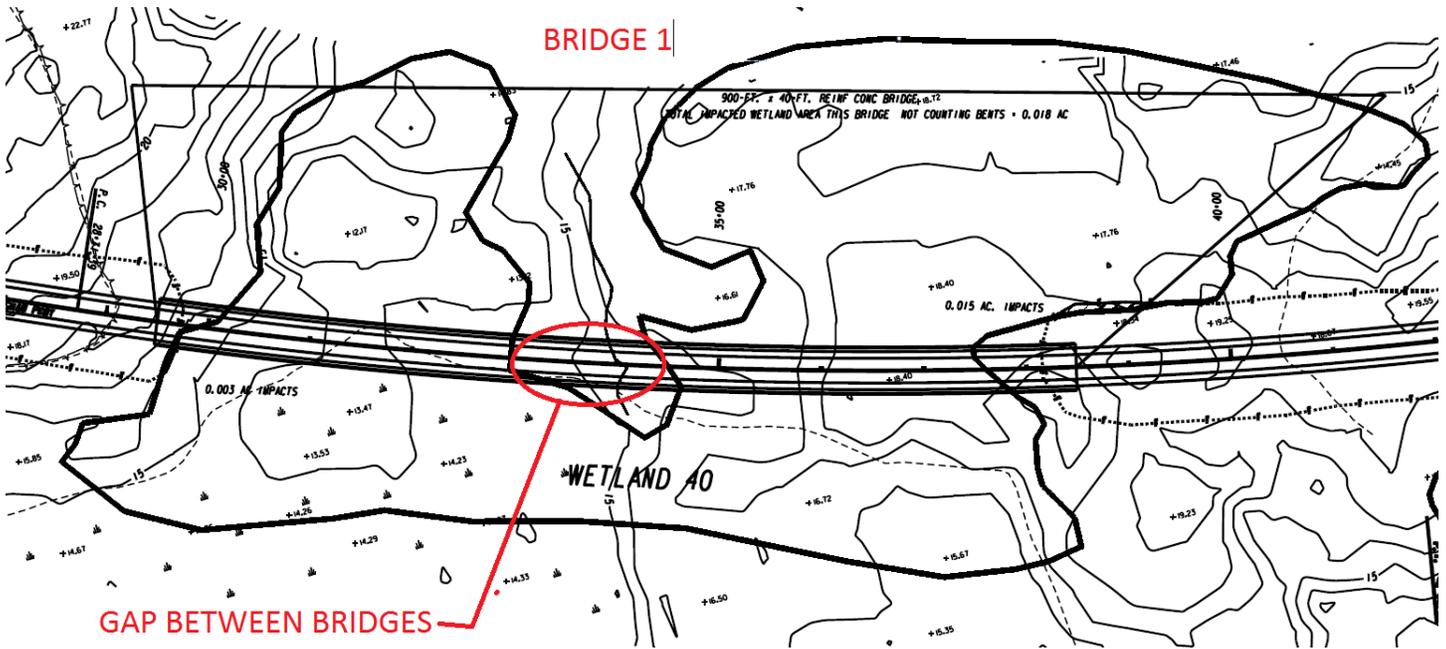
<b>DISCUSSION</b>	<b>Recommendation A-7</b>	Page 2/5
<b>Project:</b> Effingham Parkway		<b>Date:</b> June 16, 2016

Shortening the long bridges where there are significant lengths, anything greater than 100 feet, of non-wetlands areas will lower the project costs. This will meet the intent of spanning only the wetlands and not require additional mitigation costs or credits.

There are no other known environmental constraints, therefore this recommendation to break up the bridges and span only the wetlands will improve the overall project.

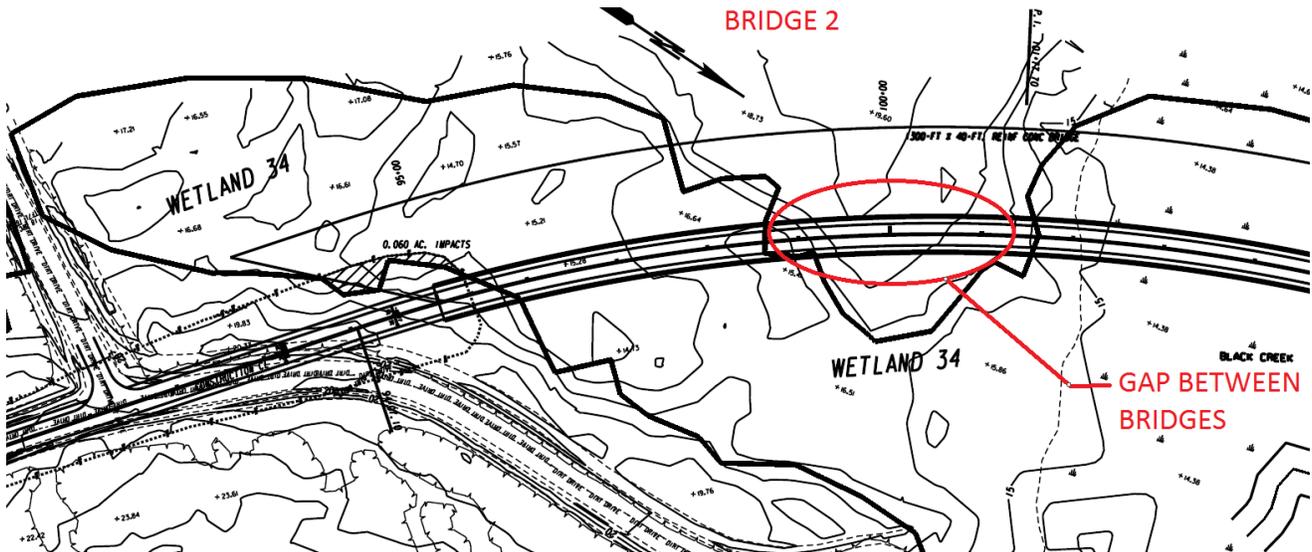
This was reviewed and confirmed with Steve Gaston of the GDOT Bridge Office during the VE study.

<b>SKETCH</b>	<b>Recommendation A-7</b>	Page 3/5
Project: Effingham Parkway		Date: June 16, 2016



LOCATION TO BREAK UP BRIDGE 1 INTO TWO BRIDGES

Shorter bridge length – 100 feet



LOCATION TO BREAK UP BRIDGE 2 INTO TWO BRIDGES

Shorter bridge length – 150 feet

<b>CALCULATIONS</b>	<b>Recommendation A-7</b>	Page 4/5
<b>Project:</b> Effingham Parkway		<b>Date:</b> June 16, 2016

Bridge reduction: Bridge 1 – 100 feet, Bridge 2 – 150 feet, total length – 250 feet

Bridge width – 43.25 feet

Total bridge area reduction – 250 ft x 43.25 ft = 10,812.5 sq ft

Pavement Cost: 6.5 inches of asphalt over 8 inches of cement stabilized base

$$(6.5 \text{ in} / 12 \text{ ft}) (150 \text{ \#} / \text{CF}) (1 \text{ Ton} / 2,000 \text{ \#}) = 0.040625 \text{ Ton} / \text{SF}$$

Unit Cost: Asphalt: use \$65 per ton; Base \$8.93 per SY

Cost per SY:

$$(0.040625 \text{ ton/sf} \times 9 \text{ sf/sy} \times \$65/\text{ton}) + 8.93 = 23.77 + 8.93 = \$32.70 \text{ per SY} \quad \textbf{USE: \$35 per SY}$$

Pavement area:

$$250 \text{ ft} (24 + 13) (1/9) = 1,028 \text{ SY}$$

Additional earthwork: assume 6 foot height, average width – 60 ft

$$(60 \times 6 \times 250) \text{ cf} (1/27) \times \$5.05 \text{ per CY} = \$16,833 \quad \textbf{Use \$17,000 LS}$$

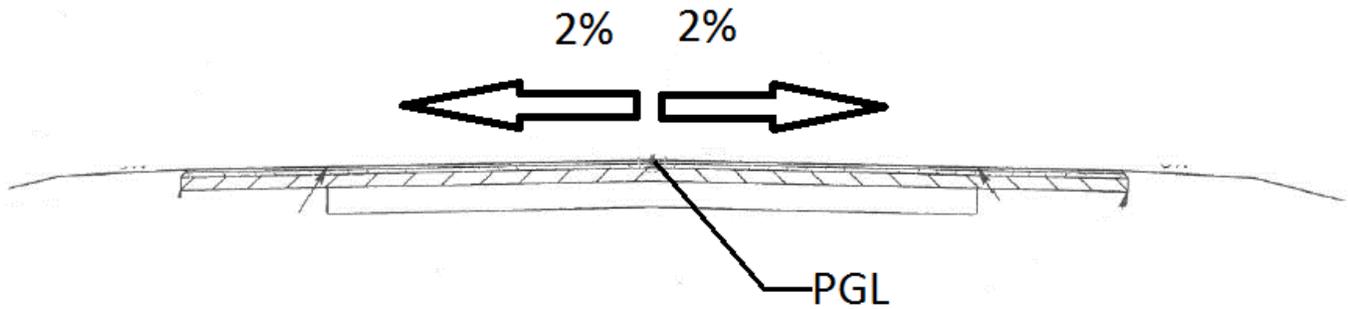


<b>SUMMARY</b>		<b>Recommendation B-1</b>		Page 1/5
Project: Effingham Parkway			Date: June 16, 2016	
Recommendation: Cross slope road to one side				
Team Member: Greg Mayo				
<b>Present Design Overview:</b>				
Currently Effingham Parkway is crowned at the centerline and sloped to each side.				
<b>Recommended Design Overview:</b>				
Remove the crown at the centerline and cross-slope to one side only, most likely in the easterly direction. This will limit MS-4 compliance and should reduce it to the east side of the project by an assumed factor of 1/3. Wetland impacts may also be reduced somewhat on the west side of Effingham Parkway along with right of way.				
<b>Benefits:</b>		<b>Issues / Concerns:</b>		
<ul style="list-style-type: none"> <li>Reduction of land needed for MS-4 compliance</li> <li>Reduction of wetland impacts</li> <li>Reduction of right of way</li> </ul>		<ul style="list-style-type: none"> <li>More runoff across the north bound lane where grades are relatively flat. 2 lanes will sheet flow across the road however this is common and acceptable in most rural cases.</li> </ul>		
<b>LIFE CYCLE COST SUMMARY</b>	<b>PRESENT WORTH COSTS</b>			
	<b>Initial Cost</b>	<b>O &amp; M / LCCA</b>	<b>Total Cost</b>	
Present Design	\$600,000	\$0	\$600,000	
Recommended Design	\$400,000	\$0	\$400,000	
Savings	\$200,000	\$0	<b>\$200,000</b>	

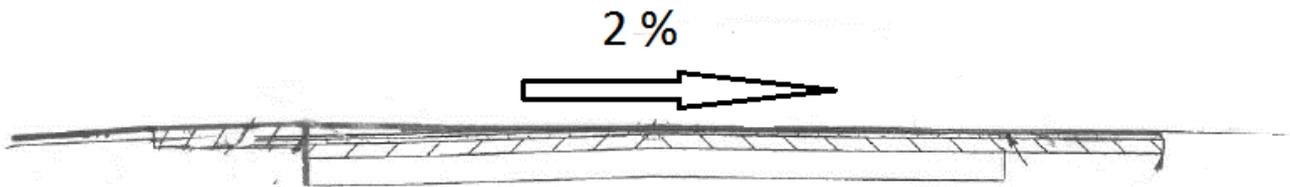
<b>DISCUSSION</b>	<b>Recommendation B-1</b>	Page 2/5
<b>Project:</b> Effingham Parkway		<b>Date:</b> June 16. 2016

Currently Effingham Parkway is crowned at the centerline with the pavement sloping away, except in curved, superelevated areas. There is a lump sum cost of \$600,000 for MS-4 compliance for the project. By sloping the roadway in one direction for all the tangent sections, the cost of MS-4 compliance may be reduced by a factor of 1/3. Wetland impacts may also be reduced along with right of way.

<b>SKETCH</b>	<b>Recommendation B-1</b>	Page 3/5
Project: Effingham Parkway		Date: June 16. 2016



**CURRENT SECTION**



**RECOMMENDED SECTION**

<b>CALCULATIONS/ASSUMPTIONS</b>	<b>Recommendation B-1</b>	Page 4/5
<b>Project:</b> Effingham Parkway		Date: June 16, 2016

Construction Complete - MS4 Water Treatment Ponds: \$600,000

By removing the crown and cross-sloping Effingham Parkway all to one side, assume a savings of 1/3 may be realized.

$$\$600,000 \times 1/3 = \$200,000$$



<b>SUMMARY</b>		<b>Recommendation B-4</b>		Page 1/4
Project: Effingham Parkway			Date: June 16, 2016	
<b>Recommendation:</b> Lower the profile.				
<b>Team Member:</b> Greg Grant, Ben Clopper				
<b>Present Design Overview:</b>				
The current profile as shown on the project displays appears to be higher than needed based on the existing ground line.				
<b>Recommended Design Overview:</b>				
Lower the profile to reduce excessive fill as noted. Introduce more vertical curves with steeper grades to improve drainage conditions.				
<b>Benefits:</b> <ul style="list-style-type: none"> <li>Improves run-off and drainage measures</li> <li>Reduces required earthwork/fill</li> <li>Wetland impacts reduction</li> </ul>			<b>Issues / Concerns:</b> <ul style="list-style-type: none"> <li>None apparent although all revised areas will require a review of the hydraulic and flooding elevations</li> </ul>	
<b>LIFE CYCLE COST SUMMARY</b>	<b>PRESENT WORTH COSTS</b>			
	<b>Initial Cost</b>	<b>O &amp; M / LCCA</b>	<b>Total Cost</b>	
Present Design	\$353,000	\$0	\$353,000	
Recommended Design	\$0	\$0	\$0	
Savings	\$353,000	\$0	<b>\$353,000</b>	

<b>DISCUSSION</b>	<b>Recommendation B-4</b>	Page 2/4
<b>Project:</b> Effingham Parkway		Date: June 16, 2016

The current profile layout appears to be elevated more than necessary, based on the existing ground line and any depicted hydraulic or flooding constraints. Modifying and lowering the profile will reduce the amount of fill required to construct the roadway template and should also slightly reduce impacts, although any impact reductions are not calculated or included in this analysis.

Introducing more vertical curves with steeper grades will also help the drainage and run-off concerns with an extremely flat profile. Rather than typical grades of 0.8% or less, look to use grades of 1.5% or greater as feasible.

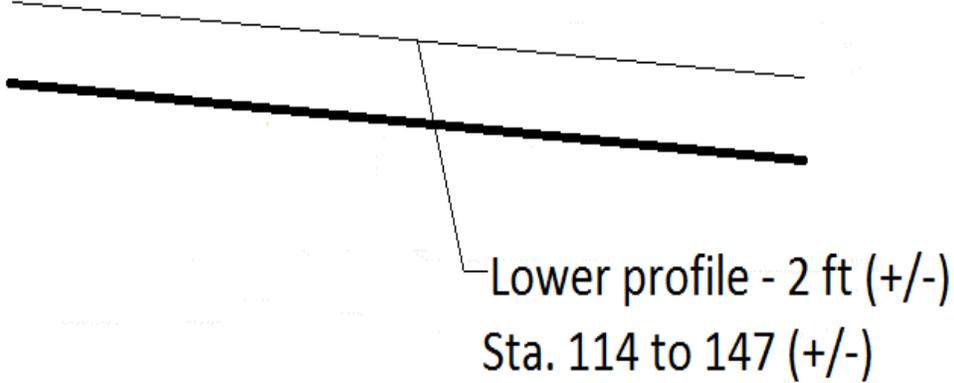
Areas of the project where the profile can be potentially lowered, assume 2 feet:

LOCATION	BEGIN STATION	END STATION	LENGTH
1	39	71	3,200
2	114	147	3,300
3	206	224	1,800
4	234	271	3,700
5	282	297	1,500
6	305	338	3,300
		<b>Total</b>	<b>16,800</b>

16,800 ft x 2 feet x 56 feet wide = 1,881,600 cu ft = 69,689 cu yds

This represents an overall earthwork savings of about 15% for the project.

<b>SKETCH</b>	<b>Recommendation B-4</b>	Page 3/4
Project: Effingham Parkway		Date: June 16, 2016





<b>SUMMARY</b>		<b>Recommendation B-6</b>		Page 1/8
Project: Effingham Parkway			Date: June 16, 2016	
Recommendation: Review/Adjust Alignment to reduce wetland impacts				
Team Member: Ben Clopper				
<b>Present Design Overview:</b>				
This analysis uses the current preferred alignment 3 throughout.				
<b>Recommended Design Overview:</b>				
Review and adjust the alignment at the locations shown to reduce wetland impacts and in some areas, also reduce the bridge length.				
<b>Benefits:</b>		<b>Issues / Concerns:</b>		
<ul style="list-style-type: none"> <li>Overall reduced wetland areas and associated mitigation costs</li> <li>Shortens some bridges</li> <li>Allows potential flexibility in other areas of design for great adjustments and benefits.</li> </ul>		<ul style="list-style-type: none"> <li>Each area needs to be reviewed and adjusted for an overall best fit.</li> </ul>		
<b>LIFE CYCLE COST SUMMARY</b>	<b>PRESENT WORTH COSTS</b>			
	<b>Initial Cost</b>	<b>O &amp; M / LCCA</b>	<b>Total Cost</b>	
Present Design	\$10,860,000	\$0	\$10,860,000	
Recommended Design	\$9,827,000	\$0	\$9,827,000	
Savings	\$1,033,000	\$0	<b>\$1,033,000</b>	

<b>DISCUSSION</b>	<b>Recommendation B-6</b>	Page 2/8
Project: Effingham Parkway		Date: June 16, 2016

Incorporating alignment adjustments throughout the project can have substantial benefits in reducing the overall wetland impacts and associated mitigation costs. It will also provide an improved horizontal alignment that will decrease construction costs. The following sketches reflect 6 areas of potential improvements however this idea can and should also be applied throughout the alignment as project conditions warrant.

Reducing the overall wetland area impacts can also have the benefit of additional flexibility to shorten bridges and adjust the alignment as presented in other recommendations, while keeping the overall wetland impacts within reasonable conformity to USACE conditions.

### Reduced Wetland Areas and Locations

Location	Station	Impacted Wetlands	Reduced Area (acre)
1	11+92 to 39+54	40 and 42	0.193
2	39+08 to 61+40	38, 39 and 40	0.088
3	61+40 to 90+80	35 and 36	0.592
4	94+51 to 124+00	28, 31 and 34	0.116
5	124+00 to 154+06	25, 26 and 28	0.522
6	124+00 to 154+06	20, 21 and 22	0.313
<b>Total</b>			<b>1.824</b>

Wetland mitigation costs:

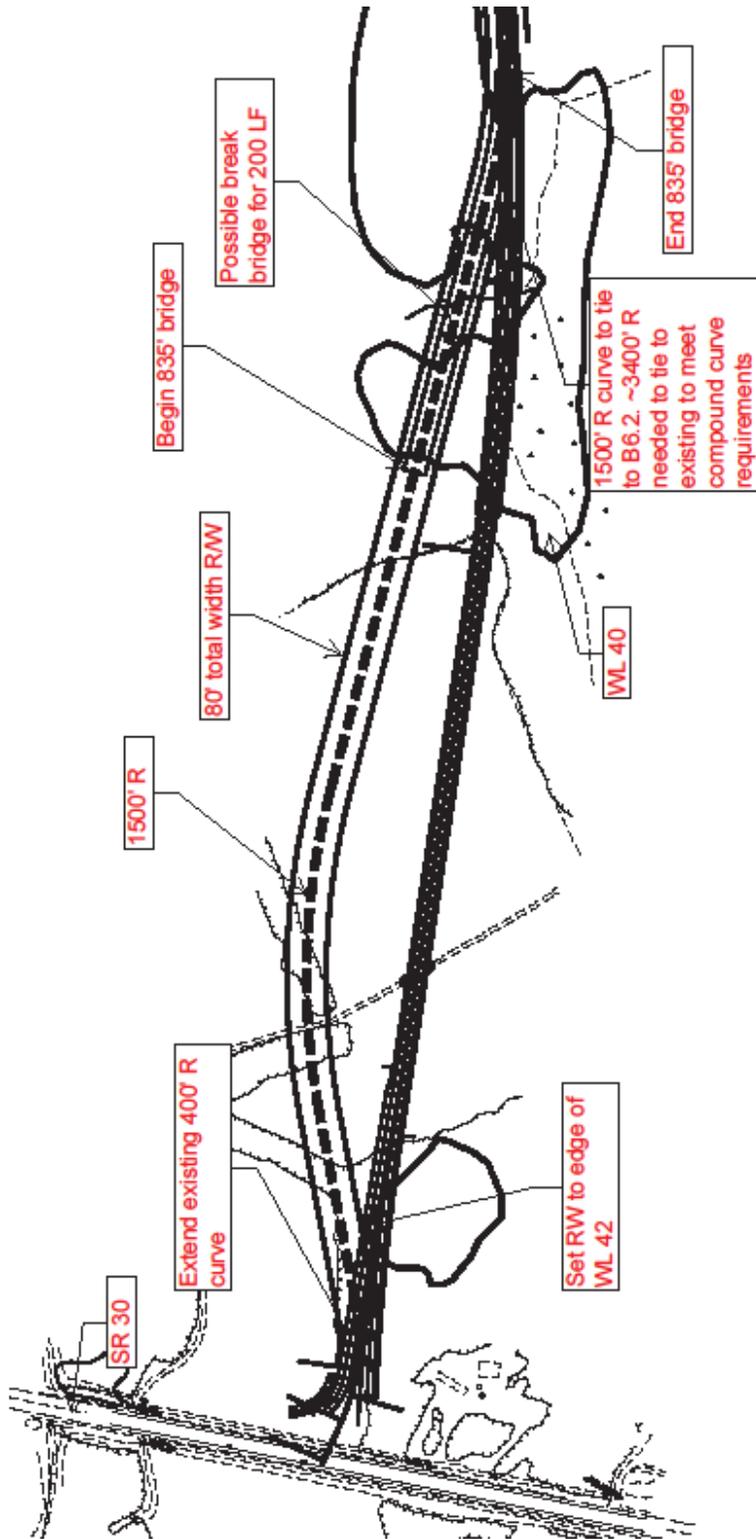
Total disturbed acreage – 7.62 acres

Cost of mitigation credits: \$548,000 for 13.7 credits = \$40,000 per credit

13.7 credits / 7.62 acres = 1.8 credit per acre

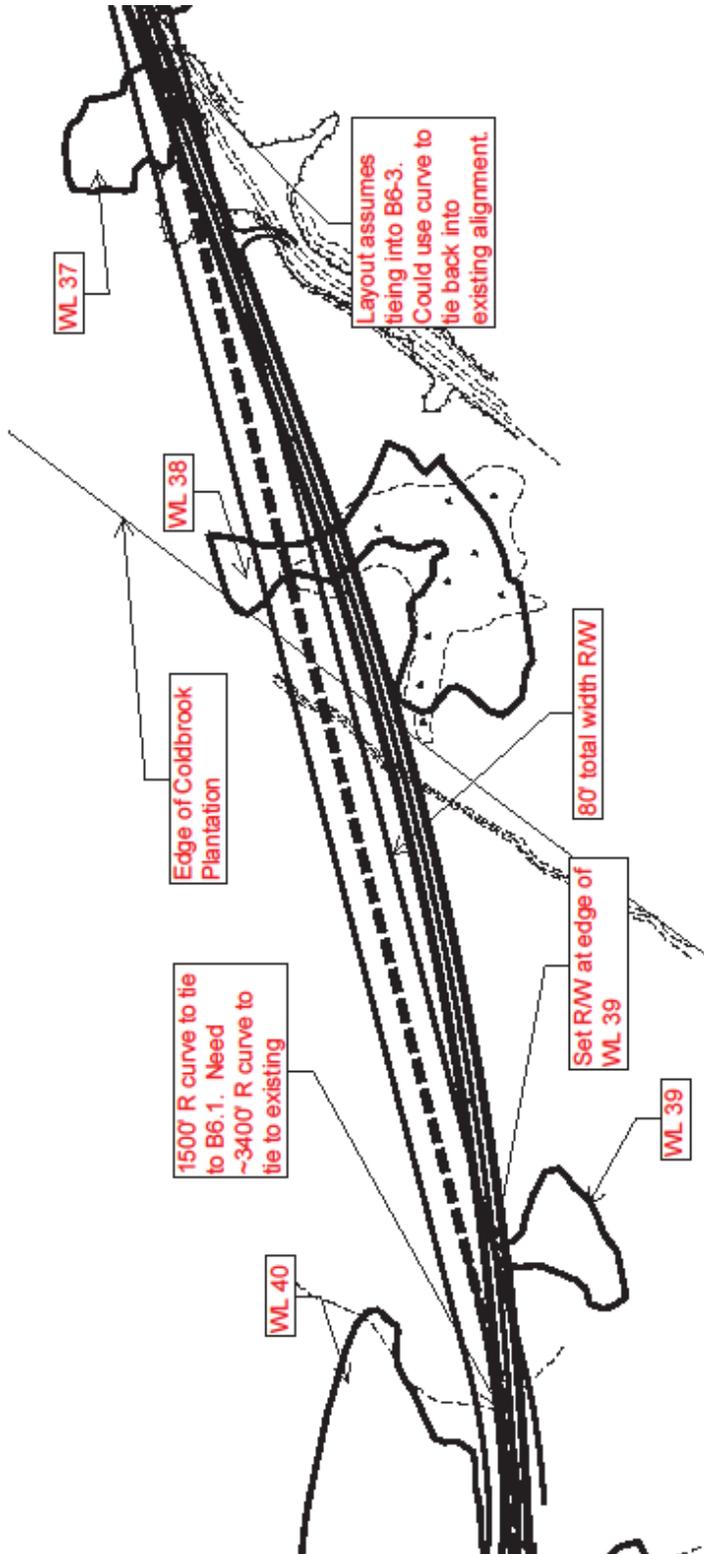
\$40,000 x 1.8 = \$72,000 per acre

<b>SKETCH</b>	<b>Recommendation B-6.1</b>	Page 3/8
Project: Effingham Parkway		Date: June 16, 2016



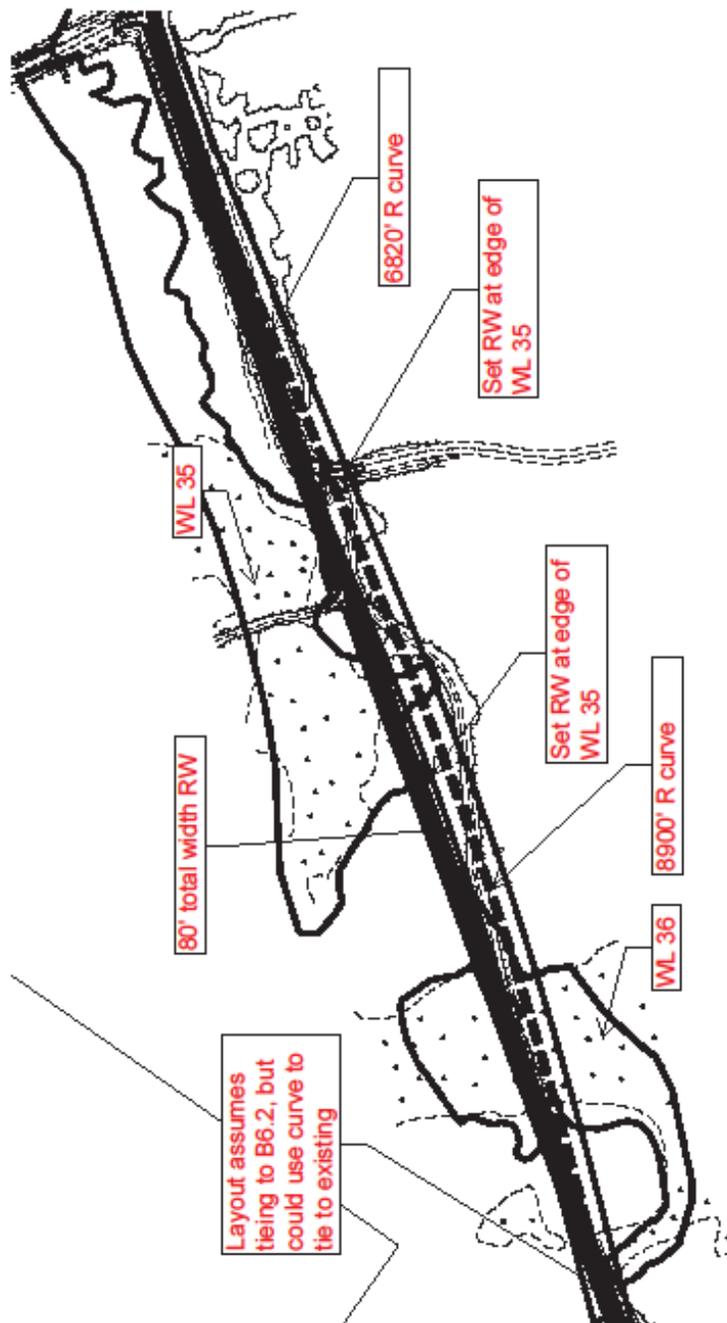
**Location 1**

<b>SKETCH</b>	<b>Recommendation B-6.2</b>	Page 3/8
Project: Effingham Parkway		Date: June 16, 2016



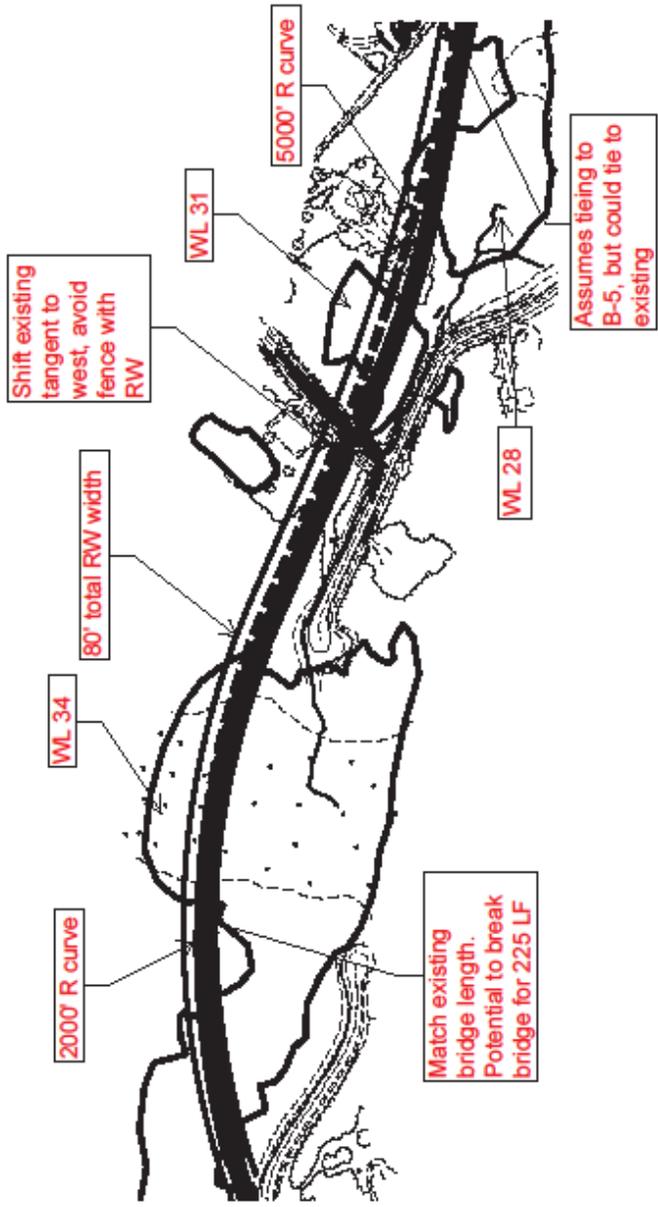
**Location 2**

<b>SKETCH</b>	<b>Recommendation B-6.3</b>	Page 4/8
Project: Effingham Parkway		Date: June 16, 2016



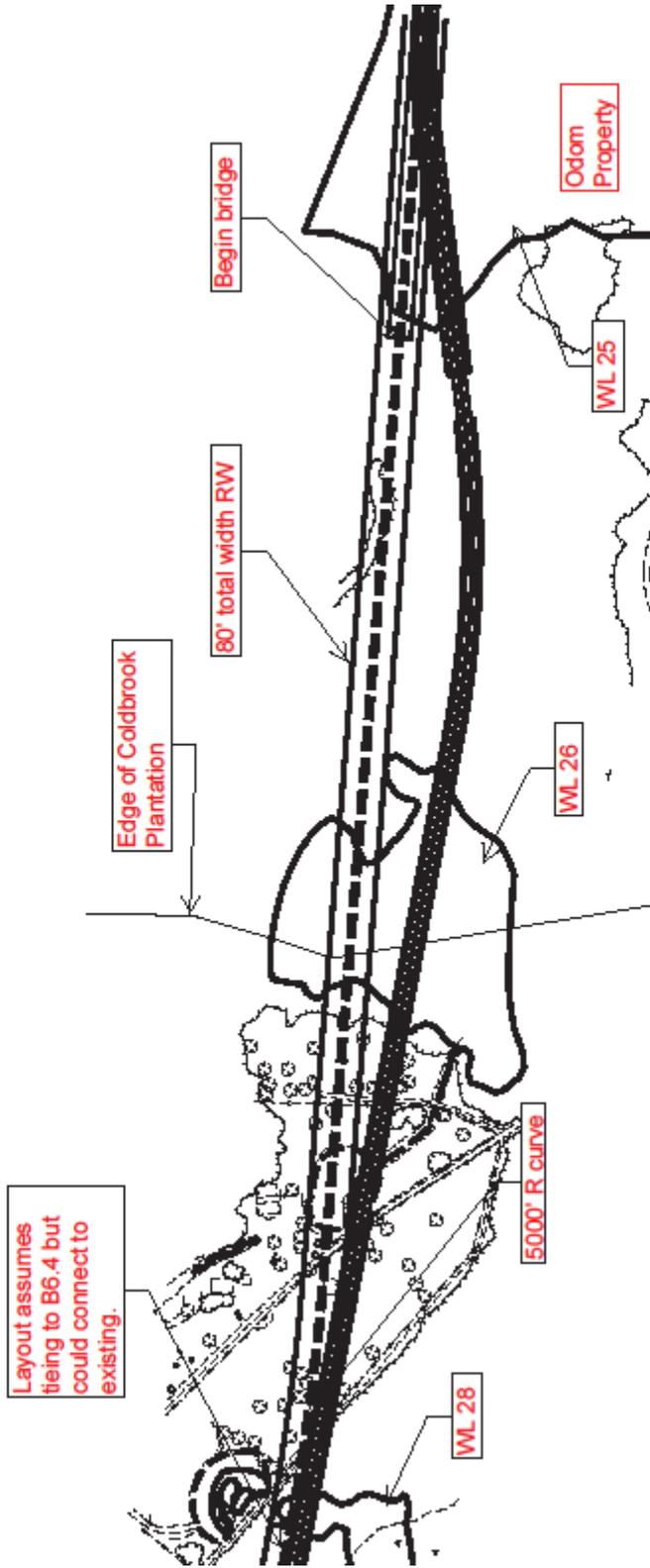
**Location 3**

<b>SKETCH</b>	<b>Recommendation B-6.4</b>	Page 5/8
<b>Project:</b> Effingham Parkway		<b>Date:</b> June 16, 2016



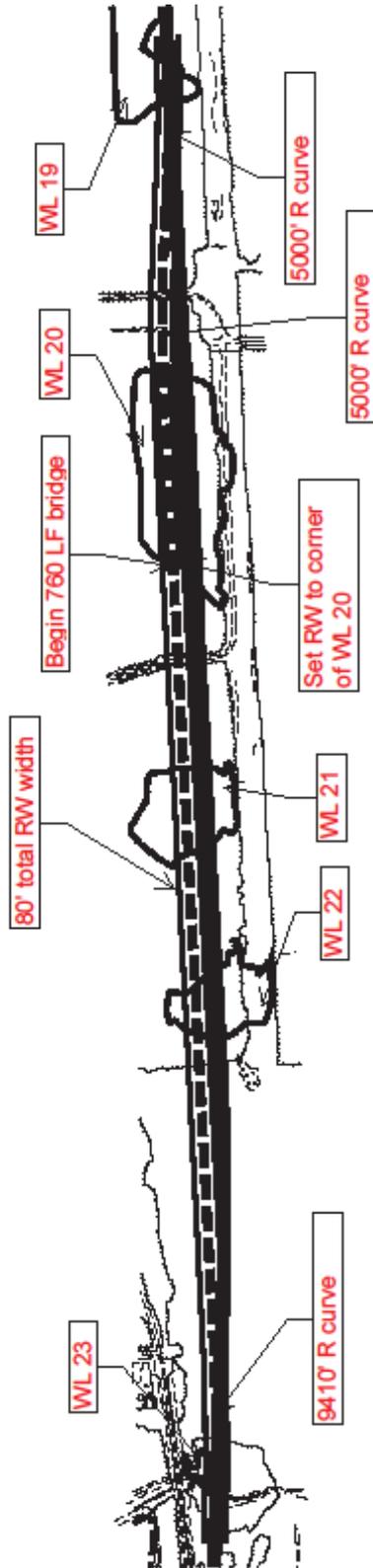
**Location 4**

<b>SKETCH</b>	<b>Recommendation B-6.5</b>	Page 6/8
Project: Effingham Parkway		Date: June 16, 2016



**Location 5**

<b>SKETCH</b>	<b>Recommendation B-6.6</b>	Page 7/8
<b>Project:</b> Effingham Parkway		Date: June 16, 2016



**Location 6**

**COST WORKSHEET****RECOMMENDATION B-6**

Page 8/8

**PROJECT:** Effingham Parkway**PI NO.:** 0006700**RECOMMENDATION:** Revise Alignment, minimize wetland impacts**Team Member:** Ben Clopper**Date:** June 16, 2016

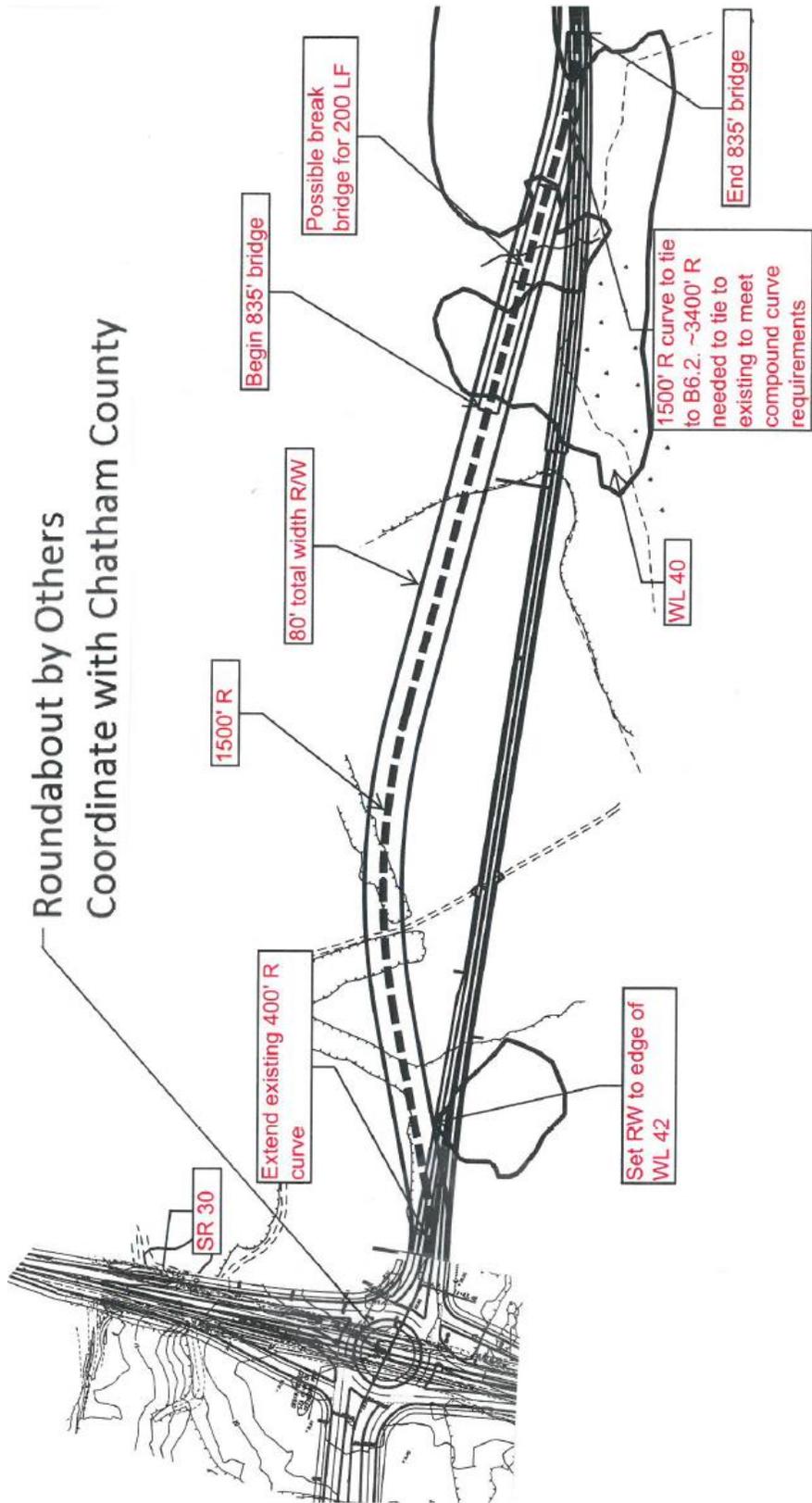
DESCRIPTION		PRESENT DESIGN COST			RECOMMENDED DESIGN COST		
Item	Unit	No. Units	Cost/ Unit	Total	No. Units	Cost/ Unit	Total
(1) Roadway Paving	LF	2,762	120	331,440	2,793	120	335,160
(1) Wetlands Mitigation	AC	0.193	72,000	13,896	0	72,000	-
(1) Bridge	SF	38,925	75	2,919,375	36,114	75	2,708,550
				-		-	-
(2) Roadway Paving	LF	2,232	120	267,840	2,220	120	266,400
(2) Wetlands Mitigation	AC	0.347	72,000	24,984	0.259	72,000	18,648
				-		-	-
(3) Roadway Paving	LF	2,940	120	352,800	2,946	120	353,520
(3) Wetlands Mitigation	AC	1.417	72,000	102,024	0.825	72,000	59,400
				-		-	-
(4) Roadway Paving	LF	2,946	120	353,520	2,951	120	354,120
(4) Wetlands Mitigation	AC	0.733	72,000	52,776	0.617	72,000	44,424
				-		-	-
(5) Roadway Paving	LF	3,006	120	360,720	2,978	120	357,360
(5) Wetlands Mitigation	AC	1.113	72,000	80,136	0.591	72,000	42,552
(5) Bridge	SF	30,621	75	2,296,575	27,464	75	2,059,800
				-		-	-
(6) Roadway Paving	LF	5,567	120	668,040	5,567	120	668,040
(6) Wetlands Mitigation	AC	1.613	72,000	116,136	1.300	72,000	93,600
(6) Bridge	SF	38,925	75	2,919,375	32,870	75	2,465,250
				-		-	-
				-		-	-
				-		-	-
Subtotal:				10,859,637			9,826,824
Effective Mark-Up 0.00%			0.00%	-		0.00%	-
TOTAL				10,859,637			9,826,824
<b>TOTAL ROUNDED</b>				<b>10,860,000</b>			<b>9,827,000</b>

<b>SUMMARY</b>		<b>Recommendation B-7</b>		Page 1/6
Project: Effingham Parkway			Date: June 15, 2016	
<b>Recommendation:</b> Realign roundabout at SR 30 and Benton Blvd. to avoid wetland impacts				
<b>Team Member:</b> Greg Mayo				
<b>Present Design Overview:</b>				
<p>The current roundabout is located at SR 30 in such a way to impact Wetland #42 with 0.175 acres of impacts. There is a curve on the northern end of Benton Boulevard Extension just south of the tie in to SR 30 at the roundabout.</p>				
<b>Recommended Design Overview:</b>				
<p>By realigning the roundabout at SR 30 westerly along SR 30, Wetland #42 will be avoided eliminating 0.175 acres of impacts. Also, Benton Boulevard Extension is proposed to tie into SR 30 opposite Effingham Parkway. Benton Boulevard Extension will be aligned with Effingham Parkway by moving the roundabout westward.</p>				
<b>Benefits:</b>		<b>Issues / Concerns:</b>		
<ul style="list-style-type: none"> <li>Eliminate 0.175 acres impacts at Wetland #42</li> <li>Align Benton Boulevard Extension with Effingham Parkway</li> </ul>		<ul style="list-style-type: none"> <li>Coordinate the redesign with Chatham County</li> </ul>		
<b>LIFE CYCLE COST SUMMARY</b>	<b>PRESENT WORTH COSTS</b>			
	<b>Initial Cost</b>	<b>O &amp; M / LCCA</b>	<b>Total Cost</b>	
Present Design	\$13,000	\$	\$13,000	
Recommended Design	\$0	\$	\$0	
Savings	\$13,000	\$	<b>\$13,000</b>	

<b>DISCUSSION</b>	<b>Recommendation B-7</b>	Page 2/6
<b>Project:</b> Effingham Parkway		Date: June 15, 2016

Currently the alignment near the roundabout at SR 30 impacts 0.175 acres of wetlands at Wetland #42. By shifting the roundabout slightly to the west, these impacts can be avoided. The shift to the west will also better align the proposed Benton Boulevard Extension. This effort will require coordination with Chatham County for any adjustments however, they have not yet started the Right-of-Way acquisition so any revisions should be implementable.

<b>SKETCH</b>	<b>Recommendation B-7</b>	Page 3/5
<b>Project:</b> Effingham Parkway		Date: June 15, 2016



<b>CALCULATIONS</b>	<b>Recommendation B-7</b>	Page 4/5
<b>Project:</b> Effingham Parkway		<b>Date:</b> June 16, 2016

Wetlands mitigation costs:

Total disturbed acreage – 7.62 acres

Cost of mitigation credits: \$548,000 for 13.7 credits = \$40,000 per credit

13.7 credits / 7.62 acres = 1.8 credit per acre

\$40,000 x 1.8 = \$72,000

Assuming the cost of an acre of wetland impacts is \$72,000 per acre:

0.175 acre wetland impacts x \$72,000 = \$12,600



<b>SUMMARY</b>		<b>Recommendation B-8</b>		Page 1/5
Project: Effingham Parkway			Date: June 16, 2016	
<b>Recommendation:</b> Realign the northern tie-in with a 55mph design speed curve				
<b>Team Member:</b> Ben Clopper				
<b>Present Design Overview:</b>				
The current alignment is a 45 mph design speed horizontal curve. The remainder of the proposed project uses a 55 mph design speed and Blue Jay Road also has a 55 mph design speed.				
<b>Recommended Design Overview:</b>				
Replace the reverse curves at the north end of the project with a single 1200' radius curve connecting the long tangent of Effingham Pkwy with Blue Jay Road.				
<b>Benefits:</b>		<b>Issues / Concerns:</b>		
<ul style="list-style-type: none"> <li>Provides a consistent design speed for the entire project corridor</li> <li>Eliminates impacts to Wetland 2</li> <li>Improves tie-ins for properties along Blue Jay Rd</li> </ul>		<ul style="list-style-type: none"> <li>Increases impacts to Wetland 4</li> <li>Increases length of new construction</li> <li>Increased required R/W</li> <li>Requires gas easement crossing</li> </ul>		
<b>LIFE CYCLE COST SUMMARY</b>	<b>PRESENT WORTH COSTS</b>			
	<b>Initial Cost</b>	<b>O &amp; M / LCCA</b>	<b>Total Cost</b>	
Present Design	\$367,000	\$0	\$367,000	
Recommended Design	\$458,000	\$0	\$458,000	
Savings	(\$91,000)	\$0	<b>(\$91,000)</b>	

<b>DISCUSSION</b>	<b>Recommendation B-8</b>	Page 2/5
<b>Project:</b> Effingham Parkway		Date: June 16, 2016

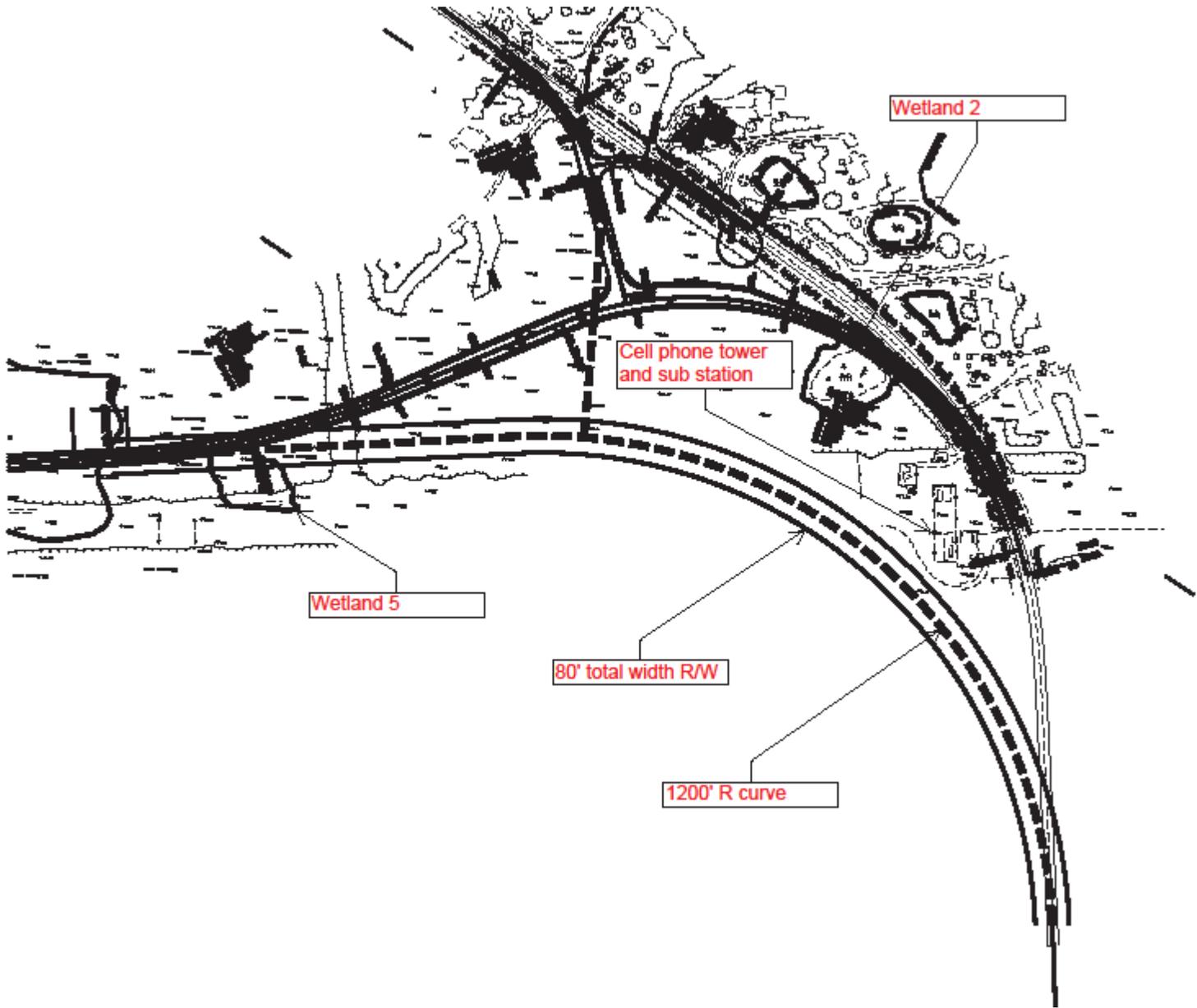
The recommended alignment, using a 1200' radius curve, provides a 55 mph design speed through the tie-in. Given the 55mph design speed on either side of the tie-in on Blue Jay Road and the proposed Effingham Pkwy this is considered advantageous from a driver consistency and expectations standpoint so that the traveling public does not have to adjust speed through the curve.

The proposed alignment will eliminate impacts to Wetland 2 but increase impacts to Wetland 5. The total offset is a reduction of 0.174 ac of impacts.

A major feature at this location is the cell phone tower and utility sub-station, the proposed alignment avoids both of these facilities. Additional coordination would be required with the gas pipeline in order to cross the easement south of existing Blue Jay Rd.

The proposed length of the new alignment, as well as the necessary extension of the Blue Jay Rd connector is longer than the existing design however it does provide the continuous design speed of 55 mph. In addition the parcel access to several properties, including Wheeler and Dowd, will need to be examined, but this can likely be handled from the existing cul-de-sac. The proposed property tie-ins will be better aligned and addressed as part of this recommendation, using the existing Blue Jay Road.

<b>SKETCH</b>	<b>Recommendation B-8</b>	Page 3/5
Project: Effingham Parkway		Date: June 16, 2016



<b>CALCULATIONS</b>	<b>Recommendation B-8</b>	Page 4/5
<b>Project:</b> Effingham Parkway		<b>Date:</b> June 16, 2016

Wetlands:

Existing: WL2 – 0.220 ac  
 WL5 – 0.083 ac  
 Proposed: WL2 – 0 ac  
 WL5 – 0.129 ac

Impact Reduction: 0.174 ac

Roadway – Assumes paved shoulders are 1.5” surface coarse, 2” binder and 8” soil cement. Blue Jay Road is graded shoulders only

Existing (Mainline) (324+88.70 to End) – 2427 LF  
 Existing (Blue Jay Rd Connector) (902+86.58 to End) – 307 LF

Proposed (Mainline) (324+88.70 to End) – 2857 LF  
 Proposed (Blue Jay Rd Connector) (902+86.58 to End) – 615 LF

Difference (Mainline) – 430 LF  
 Difference (Blue Jay Rd Connector) – 308 LF

12.5mm = 165 lbs/sy \* (430 lf \* 37 lf + 308 lf \* 24 lf) / 9 sf/sy / 2000 tn/sy = 203 tns  
 214 tns \* \$58.49/tn = \$12,500  
 19mm = 220 lbs/sy \* (430 lf \* 37 lf + 308 lf \* 24 lf) / 9 sf/sy / 2000 tn/sy = 271 tns  
 285 tns \* \$71.12/tn = \$20,300  
 25mm = 330 lbs/sy \* (430 lf \* 24 lf + 308 lf \* 24 lf) / 9 sf/sy / 2000 tn/sy = 312 tns  
 325 tns \* \$70.92/tn = \$23,000  
 8” Soil Cement = (430 lf \* 37 lf + 308 \* 24 lf) / sf/sy = 2466 sy  
 2589 sy \* \$8.93/sy = \$23,100

Total paving cost increase = \$78,900

Right of Way – Assumes all roadways are 80’ existing and proposed R/W widths

Existing – 3.63 ac Req’d R/W  
 Proposed – 6.04 ac Req’d R/W

Difference = 2.41 ac

Appears to be mainly agricultural property - \$5,000/ac

Cost = 2.41 ac \* \$5,000/ac x 2 (administrative factor) = \$24,100

# COST WORKSHEET

## RECOMMENDATION B-8

Page 5/5

PROJECT: Effingham Parkway

PI NO.: 0006700

RECOMMENDATION: Realign northern tie-in

Team Member: Ben Clopper

Date: June 16, 2016

DESCRIPTION		PRESENT DESIGN COST			RECOMMENDED DESIGN COST		
Item	Unit	No. Units	Cost/Unit	Total	No. Units	Cost/Unit	Total
R/W	acre	3.63	10,000	36,300	6.04	10,000	60,400
12.5 mm mix	Tn	891	58	52,115	1,104	58	64,573
19 mm mix	Tn	1,188	71	84,491	1,472	71	104,689
25 mm mix	Tn	1,203	71	85,317	1528	71	108,366
8" Soil Cement	Sy	10,796	9	96,408	13385	9	119,528
wetlands mitigation	acre	0.174	72,000	12,528		72,000	0
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Subtotal:				67,158			457,555
Effective Mark-Up 0.00%			0.00%	-		0.00%	-
TOTAL				367,158			457,555
<b>TOTAL ROUNDED</b>				<b>367,000</b>			<b>458,000</b>

<b>SUMMARY</b>		<b>Recommendation B-12</b>		Page 1/4
Project: Effingham Parkway			Date: June 16, 2016	
Recommendation: Revise Pavement Design				
Team Member: Ben Clopper				
<b>Present Design Overview:</b>				
<p>The existing pavement design is:  165 lbs/sy 12.5 mm superpave  220 lbs/sy 19 mm superpave  330 lbs/sy 25 mm superpave  8" soil cement base  The existing design is 5.57% underdesign</p>				
<b>Recommended Design Overview:</b>				
<p>The recommended design replaces the 8" soil cement base with a 6" soil cement base for a 14.67% overall pavement underdesign, within acceptable guidelines.</p>				
<b>Benefits:</b>		<b>Issues / Concerns:</b>		
<ul style="list-style-type: none"> <li>The reduced depth of the soils cement base will reduce the price</li> </ul>		<ul style="list-style-type: none"> <li>The reduced overall pavement depth could require resurfacing on an earlier schedule however the relatively low traffic volumes should not warrant an increased maintenance schedule.</li> </ul>		
<b>LIFE CYCLE COST SUMMARY</b>	<b>PRESENT WORTH COSTS</b>			
	<b>Initial Cost</b>	<b>O &amp; M / LCCA</b>	<b>Total Cost</b>	
Present Design	\$1,491,000	\$0	\$1,491,000	
Recommended Design	\$1,118,000	\$0	\$1,118,000	
Savings	\$373,000	\$0	<b>\$373,000</b>	

<b>DISCUSSION</b>	<b>Recommendation B-12</b>	Page 2/4
<b>Project:</b> Effingham Parkway		Date: June 16, 2016

The proposed pavement design is 5.57% underdesigned. The Pavement Design Manual allows for pavement designs of 10-15% underdesign for rural projects, which takes into account future resurfacings throughout the project lifespan.

Reducing the soils cement base from 8” to 6” changes the underdesign value from 5.57% to 14.67% which is within the range allowed by the Pavement Design Manual. This would reduce the cost of the soil cement base by approximately 25%.

The reduced pavement section will likely need to be resurfaced sooner which will accelerate, but not increase, life cycle costs although the traffic volumes for the proposed Effingham Parkway are rather low at less than 10,000 ADT for the design year 2039.

<b>CALCULATIONS</b>	<b>Recommendation B-12</b>	Page 3/4
Project: Effingham Parkway		Date: June 16, 2016

Required SN (per concept pavement design): 4.43

Current Pavement Design

Material	Thck (in)	Struct Coeff	Struct Value
12.5 mm Superpave	1.5	0.44	0.66
19 mm Superpave	2	0.44	0.88
25 mm Superpave	1	0.44	0.44
	2	0.30	0.60
8" Soil Cement Base	8	0.20	1.60
Total:			4.18

Underdesign =  $(1 - 4.18/4.43) = 0.0564$  (5.64%)

Proposed Pavement Design

Material	Thck (in)	Struct Coeff	Struct Value
12.5 mm Superpave	1.5	0.44	0.66
19 mm Superpave	2	0.44	0.88
25 mm Superpave	1	0.44	0.44
	2	0.30	0.60
8" Soil Cement Base	6	0.20	1.20
Total:			3.78

Underdesign  $(1 - 3.78/4.43) = 0.1467$  (14.67%)

Cost

8" Soil Cement Base - \$8.93/sy

6" Soil Cement Base -  $6"/8" * \$8.93/sy = \$6.70/sy$

167,000 sy \* \$8.93/sy = \$1,491,310

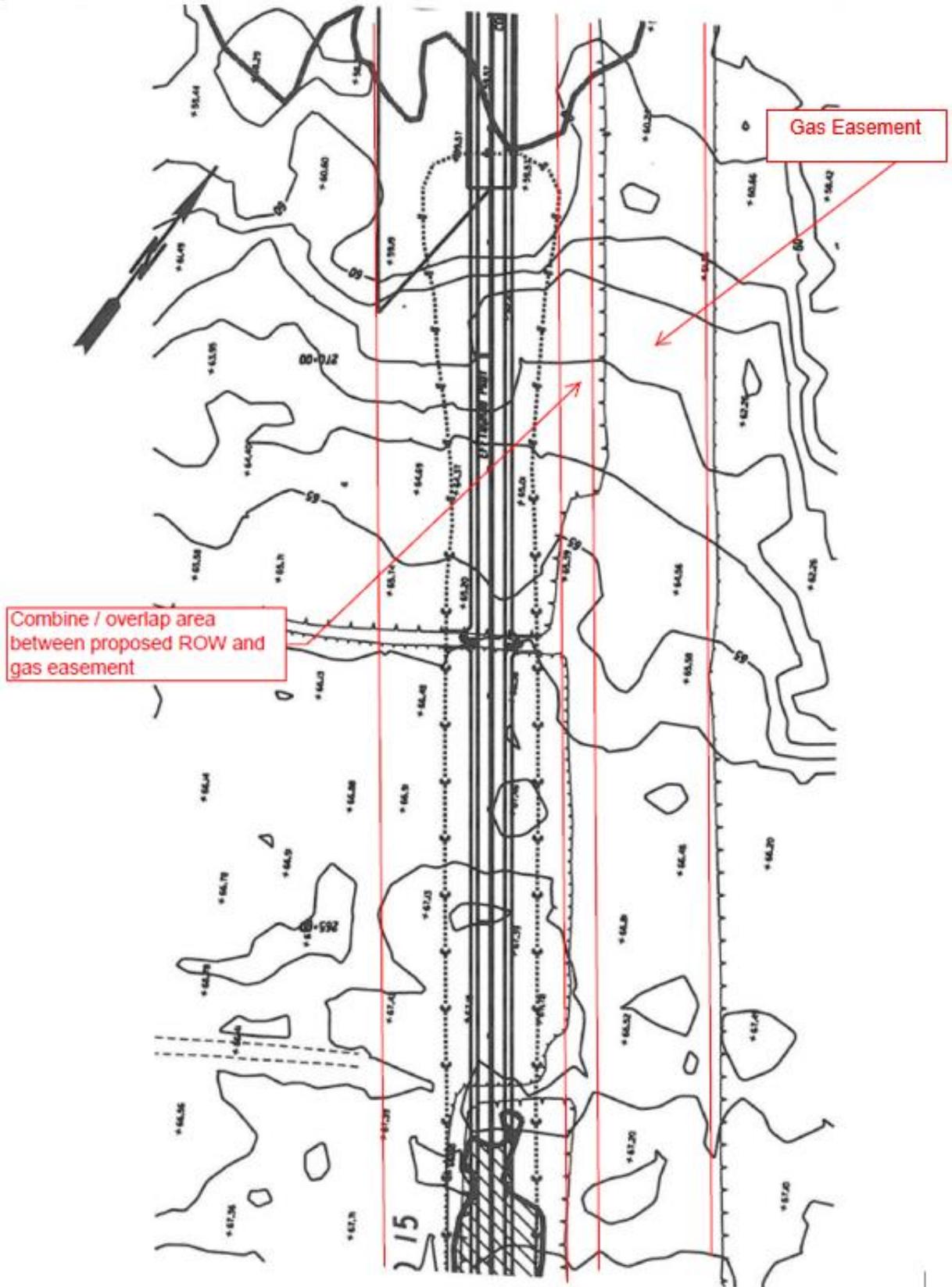
167,000 sy \* \$6.70/sy = \$1,118,900



<b>SUMMARY</b>		<b>Recommendation B-15</b>		Page 1/5
Project: Effingham Parkway			Date: June 16, 2016	
Recommendation: Consolidate right of way using gas easement				
Team Member: Greg Mayo				
<b>Present Design Overview:</b>				
The project is designed running parallel to a gas easement from Goshen Road to Blue Jay Road for approximately 3 miles. There is a separation between the roadway and the gas easement.				
<b>Recommended Design Overview:</b>				
Shift the alignment of Effingham Parkway easterly to overlap the gas easement to reduce clearing and grubbing and right of way costs. Overlap with the gas line easement.				
<b>Benefits:</b>		<b>Issues / Concerns:</b>		
<ul style="list-style-type: none"> <li>• Reduce clearing and grubbing cost</li> <li>• Reduce right of way cost</li> <li>• Reduced wetlands impacts and bridge lengths</li> </ul>		<ul style="list-style-type: none"> <li>• Requires gas company concession for the easement overlap.</li> </ul>		
<b>LIFE CYCLE COST SUMMARY</b>	<b>PRESENT WORTH COSTS</b>			
	<b>Initial Cost</b>	<b>O &amp; M / LCCA</b>	<b>Total Cost</b>	
Present Design	\$490,000	\$0	\$490,000	
Recommended Design	\$0	\$0	\$0	
Savings	\$490,000	\$0	<b>\$490,000</b>	

<b>DISCUSSION</b>	<b>Recommendation B-15</b>	Page 2/5
<b>Project:</b> Effingham Parkway		Date: June 16, 2016

Shift the Effingham Parkway alignment easterly to overlap the gas easement to reduce clearing and grubbing and right of way costs. For this recommendation, we estimated a 10 foot overlap however this can be increased as discussed and agreed to with the gas company. This recommendation will require negotiations with the gas company however in an effort to reduce both construction costs and wetlands impacts, an overlap onto the gas easement is recommended. Future considerations such as access road maintenance can be included in the negotiations however any costs as part of this are not included in our analysis at this point. Additional benefits of this recommendation will be a reduction in wetlands impacts, mitigations and potentially bridge costs.



<b>CALCULATIONS</b>	<b>Recommendation B-15</b>	Page 4/5
<b>Project:</b> Effingham Parkway		Date: June 16, 2016

Clearing and Grubbing total is \$1,600,000 which is assumed to be based on a width of 80' with a length of 6.36 miles yielding a cost of \$26,000 per acre. For every 10' of consolidation, clearing and grubbing is reduced by 4 acres (10' x (3 miles x 5280')/43,560 = 4 acres). 4 acres at \$26,000 per acre yields a savings of \$104,000.

Right of Way in the area north of Goshen Road is considered industrial at a cost of \$75,000 per acre. This does not include valuation services, legal services, relocation, demolition or administrative costs. Calculations are based on land cost alone. Likewise, for every 10' of consolidation, right of way is reduced by 4 acres. 4 acres at \$75,000 per acre yields a savings of \$300,000.

Right-of-Way mitigation costs are estimated at \$72,000 per acre. Assume a reduction of say 0.5 acre. Assume a bridge reduction, lump sum cost of \$50,000.

Total savings for consolidation with the gas easement is based on a 10 foot width.



<b>SUMMARY</b>		<b>Recommendation B-16</b>		Page 1/4
Project: Effingham Parkway			Date: June 15, 2016	
<b>Recommendation:</b> Use gas easement for construction access				
<b>Team Member:</b> Greg Mayo				
<b>Present Design Overview:</b>				
The existing gas easement is parallel to the Alternate #3 corridor from approximately Goshen Road to the northern end of the project at Blue Jay Road. The gas easement is not being utilized as part of this project.				
<b>Recommended Design Overview:</b>				
Locate Alternate #3 alignment immediately adjacent to the gas easement from a point just north of Goshen Road to the northern end of the project at Blue Jay Road. Use the gas easement with the associated utility road for access to construct the bridges, earthwork and roadway.				
<b>Benefits:</b>		<b>Issues / Concerns:</b>		
<ul style="list-style-type: none"> <li>Provides access to northern section of project.</li> <li>Access road currently in-place; reduces some construction time.</li> <li>Reduce the cost of clearing and grubbing and constructing an access road</li> <li>Reduce the cost of other items</li> </ul>		<ul style="list-style-type: none"> <li>Location of gas lines may not permit access</li> <li>Crossing the gas lines with heavy equipment</li> <li>Liability associated with using gas easement</li> </ul>		
<b>LIFE CYCLE COST SUMMARY</b>	<b>PRESENT WORTH COSTS</b>			
	<b>Initial Cost</b>	<b>O &amp; M / LCCA</b>	<b>Total Cost</b>	
Present Design	\$15,000	\$0	\$15,000	
Recommended Design	\$0	\$0	\$0	
Savings	\$15,000	\$0	<b>\$15,000</b>	

<b>DISCUSSION</b>	<b>Recommendation B-16</b>	Page 2/4
<b>Project:</b> Effingham Parkway		<b>Date:</b> June 16, 2016

Effingham Parkway is a new location roadway. Access points for construction would be located at cross roads including SR 30, Keller Road, Forest Haven Drive, Squirrel Run, Goshen Road, Walter Tuten Road and Blue Jay Road. From Goshen Road to the northern end of the project, the access points are at Goshen Road, Walter Tuten Road and Blue Jay Road. The contractor will only be able to access the project for road and bridge construction at these points and build the roadway outward or away from the access points. By using the gas easement and access road from Goshen Road northward, the contractor will have an existing corridor in place to use as a haul road and will save some initial costs needed to construct a new access/haul road. The contractor will also not be limited to 3 access points on local roads. Access will then be continuous from Goshen Road to Blue Jay Road.

This recommendation is dependent on gas company negotiations and allowance for this work. A key element will be the specific location of the gas main(s) and their relation to the access road for any large or oversize loads. Any protection considerations could have a potential negative effect for this recommendation and will have to be closely analyzed.

<b>CALCULATIONS</b>	<b>Recommendation B-16</b>	Page 3/4
<b>Project:</b> Effingham Parkway		<b>Date:</b> June 16, 2016

The contractor will most likely cost and price the construction of a haul road within the cost for clearing and grubbing. Assume the cost of a 3 mile dirt haul road at approximately \$5,000 per mile. At a 3 mile length, the haul road would cost approximately \$15,000. It is assumed minimal grading would have to occur in the easement. Clearing and Grubbing is currently estimated at \$1,600,000 of which should include haul road construction within the right of way. The cost of the haul road should be saved from the cost of clearing and grubbing. Other costs may also be saved from individual items because of the easier access to the project.



<b>SUMMARY</b>		<b>Recommendation B-18</b>		Page 1/4
Project: Effingham Parkway			Date: June 16, 2016	
Recommendation: Follow Alternate #2 north of Goshen Road				
Team Member: Greg Mayo				
<b>Present Design Overview:</b>				
The current Effingham Parkway alignment follows Alternate #3 throughout the entire project with most of it on new alignment.				
<b>Recommended Design Overview:</b>				
Use Alternate #2 north of Goshen Road to Blue Jay Road. Tie to Alternate #3 near Goshen Road. This recommendation would utilize the existing Hodgeville Road corridor with significant reductions in Right-of-Way, pavement and overall project impacts.				
<b>Benefits:</b>		<b>Issues / Concerns:</b>		
<ul style="list-style-type: none"> <li>• Uses existing roadway and corridor; less new pavement needed</li> <li>• Less wetland impacts</li> <li>• Less right of way</li> <li>• Meets need and purpose within corridor B</li> <li>• Significant reduction in bridges</li> </ul>		<ul style="list-style-type: none"> <li>• None apparent</li> </ul>		
<b>LIFE CYCLE COST SUMMARY</b>	<b>PRESENT WORTH COSTS</b>			
	<b>Initial Cost</b>	<b>O &amp; M / LCCA</b>	<b>Total Cost</b>	
Present Design	\$14,653,000	\$0	\$14,653,000	
Recommended Design	\$2,364,000	\$0	\$2,364,000	
Savings	\$12,289,000	\$0	<b>\$12,289,000</b>	

<b>DISCUSSION</b>	<b>Recommendation B-18</b>	Page 2/4
<b>Project:</b> Effingham Parkway		Date: June 16, 2016

The current Effingham Parkway approved alignment follows Alternate 3 for the entire length of the project, all on new alignment. This recommendation is to continue to use Alternate 3 for the southern section, through the Coldbrook Plantation, restricted covenant area, intersect Goshen Road as currently shown and then transition to Alternate 2 for the northern section.

This recommendation will utilize the existing Hodgeville Road corridor as much as feasible with significant reductions in pavement, Right-of-Way and wetlands impacts. Also, the bridges in the northern section as shown on alignment 3 will no longer be required. Alternate 2 was originally discarded as unfeasible due to the number of displacements. The displacements were all in the southern section. This recommendation combines the desirable elements of each alternate 2 and 3 with no displacements and reduced wetland impacts while providing the project need and purpose within the acceptable corridor B area.

The following assumptions are made:

- Hodgeville Road/Alternate #2 will only need to be resurfaced with 12.5 mm asphalt and all shoulders will need to be fully constructed.
- Wetland impacts for Alternate #2 but are 10% of Alternate 3.
- Hodgeville Road has an existing right of way width of 60'. An additional 20' will be needed for the full width Right-of-Way to match the current alignment.
- Minimal borrow is only needed to construct the shoulders on Hodgeville Road. Approximately ½ of the earthwork needed for Alternate #3 will not be needed in this recommendation.

<b>CALCULATIONS</b>	<b>Recommendation B-18</b>	Page 3/4
<b>Project:</b> Effingham Parkway		Date: June 16, 2016

Assumptions: Right-of-Way: existing width – 60 feet; additional required width – 20 feet

Assume full-width overlay and similar shoulder construction.

90% reduction in wetland impacts and mitigation costs.

Current Conditions:

- 12.5 mm
  - $37' \times 15,840' / 9 \times 165 \text{ lbs/sy} / 2000 = 5372.40 \text{ tons} \times \$58.49 = \$314,231.68$
- 19 mm
  - $37' \times 15840' / 9 \times 220 \text{ lbs/sy} / 2000 = 7163.20 \text{ tons} \times \$71.12 = \$509,446.78$
- 25 mm
  - $24' \times 15840' / 9 \times 330 \text{ lbs/sy} / 2000 = 6969.60 \text{ tons} \times \$70.92 = \$494,284.03$
- Soil Cement
  - $37' \times 15840' / 9 = 65120 \text{ sy} \times \$8.93 = \$581,521.60$
- Earthwork
  - $432,774 \text{ cy} \times \$5.05 = \$2,185,508.70$
- Wetland Impacts
  - $3.852 \text{ Acres} \times \$72,000 = \$277,344.00$
- Right of Way
  - $80' \times 15840' / 43,560 = 29.09 \text{ Acres} \times \$75,000 = \$2,181,750.00$

Recommended alternate:

- 12.5 mm
  - $37' \times 15,840' / 9 \times 165 \text{ lbs/sy} / 2000 = 5372.40 \text{ tons} \times \$58.49 = \$314,231.68$
- 19 mm
  - $13' \times 15840' / 9 \times 220 \text{ lbs/sy} / 2000 = 2516.80 \text{ tons} \times \$71.12 = \$178,994.82$
- Soil Cement
  - $13' \times 15840' / 9 = 22,880.00 \text{ sy} \times \$8.93 = \$204,318.40$
- Earthwork
  - $216387 \text{ cy} \times \$5.05 = \$1,092,754.35$
- Wetland Impacts
  - $0.39 \text{ Acres} \times \$72,000 = \$28,080.00$
- Right of Way
  - $20' \times 15840' / 43,560 = 7.27 \text{ Acres} \times \$75,000 = \$545,454.55$

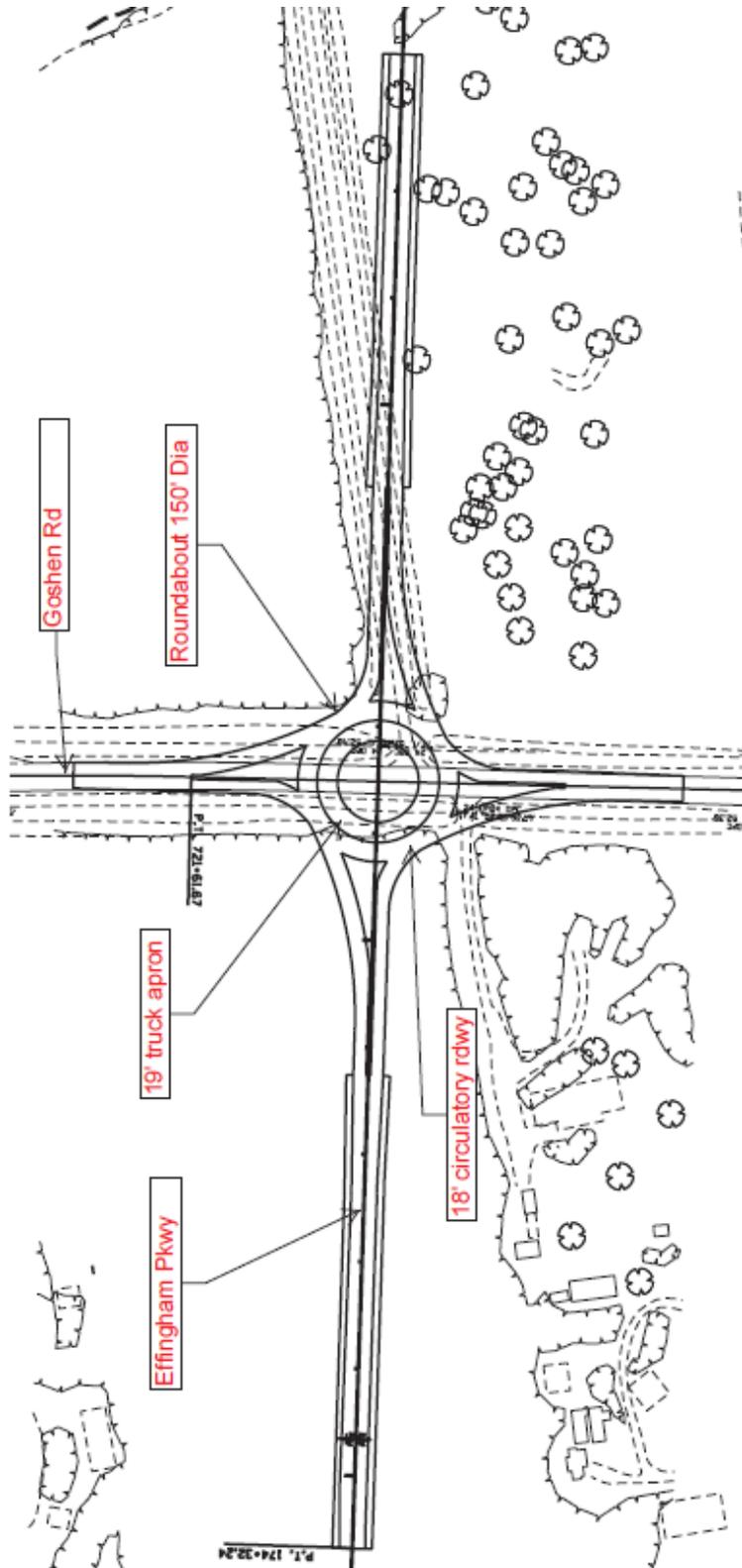
Eliminated bridges No's 4, 5 and 6 – total length 2,500 ft; width – 43.25 ft

Total bridge area reduction:  $2,500 \times 43.25 = 108,125 \text{ sq ft}$

See cost sheet for detailed cost calculations.



<b>SUMMARY</b>		<b>Recommendation B-20</b>		Page 1/3
Project: Effingham Parkway			Date: June 16, 2016	
<b>Recommendation:</b> Construct a roundabout at Effingham Pkwy and Goshen Rd				
<b>Team Member:</b> Ben Clopper				
<b>Present Design Overview:</b>				
The existing intersection is a traditional at grade with left and right turn lanes. It is assumed that Goshen Road will be stop controlled.				
<b>Recommended Design Overview:</b>				
Construct a roundabout with a 150' inscribed circle at the intersection. This size roundabout will accommodate large trucks and be a more efficient intersection alternative than stop-condition.				
<b>Benefits:</b>		<b>Issues / Concerns:</b>		
<ul style="list-style-type: none"> <li>• A roundabout is a more efficient and flowing intersection alternative than a stop condition.</li> <li>• Reduces the length of required construction along Goshen Rd, the length is limited to just beyond the length of the splitter lanes instead of turn lanes and tapers.</li> <li>• There is a small reduction in the amount of required R/W. The R/W is concentrated at the intersection as opposed to along each roadway.</li> </ul>		<ul style="list-style-type: none"> <li>• Lighting is required and is a long term maintenance and cost commitment.</li> <li>• Slight cost increase.</li> </ul>		
<b>LIFE CYCLE COST SUMMARY</b>	<b>PRESENT WORTH COSTS</b>			
	<b>Initial Cost</b>	<b>O &amp; M / LCCA</b>	<b>Total Cost</b>	
Present Design	\$661,000	\$0	\$661,000	
Recommended Design	\$717,000	\$0	\$717,000	
Savings	(\$56,000)	\$0	<b>(\$56,000)</b>	





# APPENDIX

## Key Authorizing Persons

Name:	Position:	email:
Matt Sanders	VE Specialist	msanders@dot.ga.gov
Michelle Wright	GDOT Project Manager	micwright@dot.ga.gov
Toss Allen	County Administrator	tallen@effinghamcounty.org
L.N. Manchi	Project Manager	lmanchi@maai.net

## Personal Contacts / Resources

Name:	GDOT Department:	Notes:
Steve Gaston	Bridge Design	Maintain/ conform to GDOT bridge shoulder policy and guidelines.
Robert McCall	District 5 Maintenance	GDOT has no specific vertical clearance criteria for inspections.
Brad McManus	Design Policy and Support	Effingham County work on this project will be grandfathered for MS4 compliance.
David Hedeem Richard O'Hara	Ecology	No species concerns preventing direct scupper discharge to wetlands.
Tom McQueen	Planning	This project is serving as a reliever/back-door for the SR 21 traffic.

## Available Documents

See the following Letter of Transmittal, dated May 26, 2016, from the County's design consultant, Moreland Altobelli Associates, Inc.



LETTER OF TRANSMITTAL

Moreland Altobelli Associates, Inc.
2450 Commerce Avenue, Suite 100
Duluth, Georgia 30096-8910
Phone: 770-263-5945 Fax: 770-263-0166

To: Office of Engineering Services
Georgia Department of Transportation
600 West Peachtree St.
5th Floor
Atlanta, GA 30308

Table with project details: Date: 5/26/16, MA Project No.: EFF08, Project: P.I. No. 0006700, Effingham Parkway from Blue Jay Road to SR 30, Effingham & Chatham City's

Attention: VE TEAM MEMBER

From: M.J. Sheehan of: Moreland Altobelli Associates, Inc.

WE ARE SENDING YOU THE FOLLOWING ITEMS:

- Plans
Prints
Other:

Table with 2 columns: Copies, Description. Rows include Roll Plan & Profile with contours (4), Color Plan Roll with PAR alternatives and Wetlands, VE Commitments Sheet, CES, Utility & R/W estimate, Typical Sections, Wetland Area takes & bridge locations, IRT Meeting Update for PAR, Concept Report.

- For your use
For approval
Other:
For review and comment
As requested

REMARKS:

Information for VE scheduled on June 14th, 2016

Sincerely,

L.N. Manchi

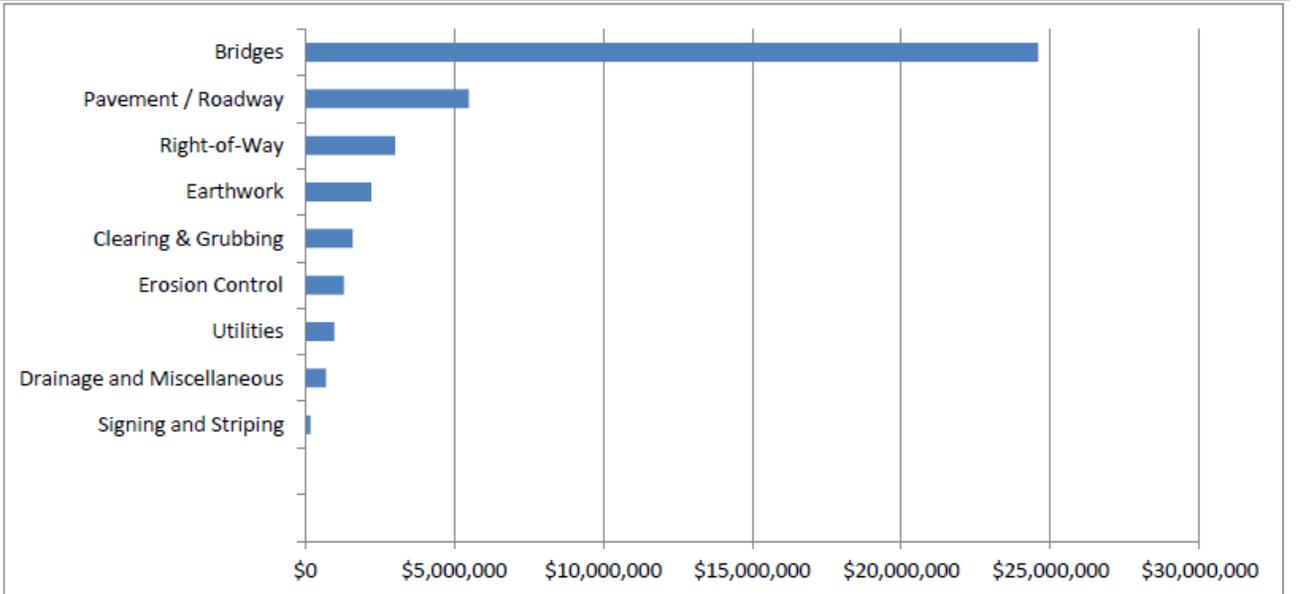
Handwritten signature: M.J. Sheehan for

Information Phase

**PI No. 0006700  
Effingham Parkway**

**Cost Model / Distribution**

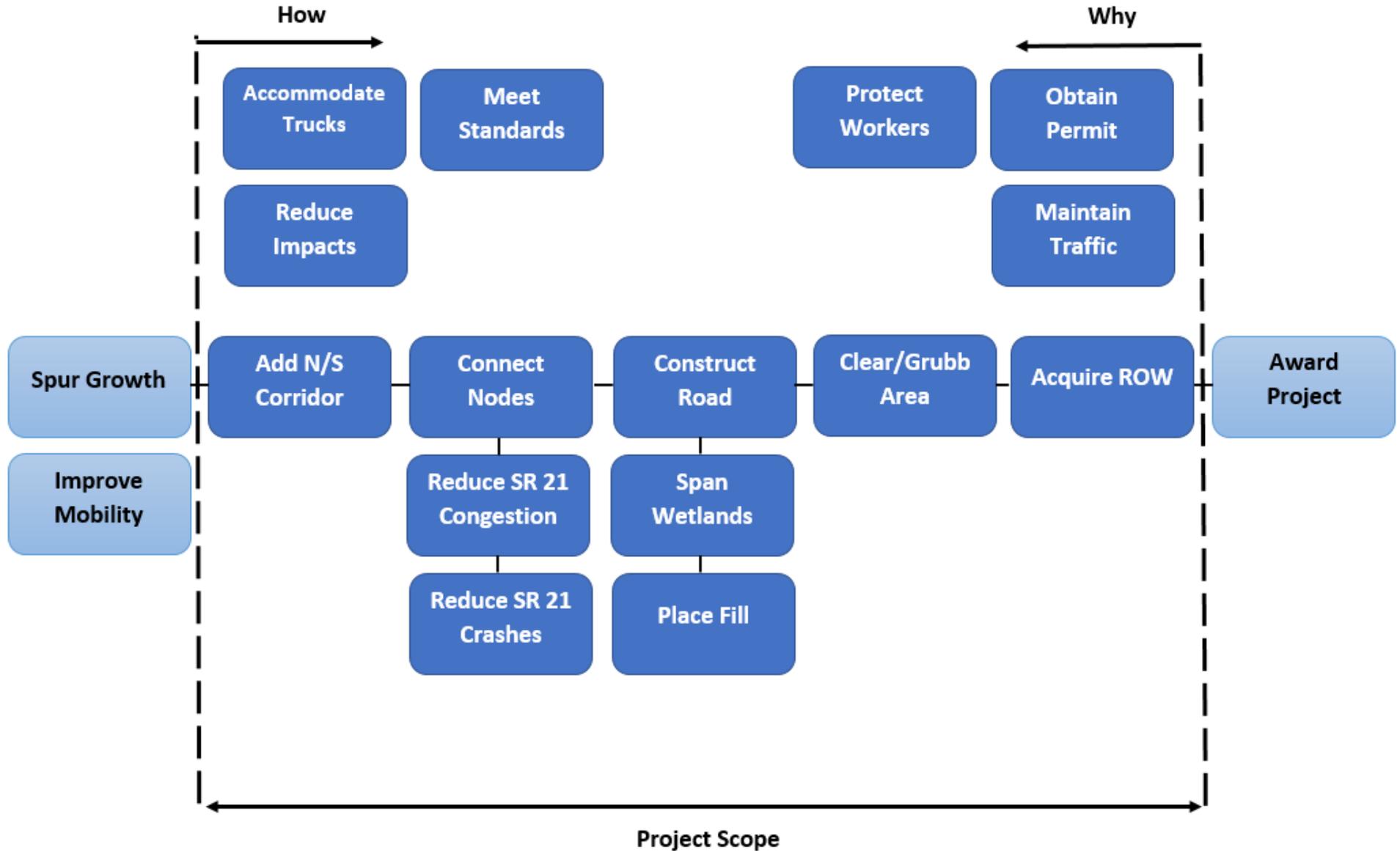
Project: Effingham Parkway Project No.: PI No. 0006700			
Project Element	Cost	Percent	Cum. Percent
<b>A</b>	Bridges	24,585,000	61.35%
<b>B</b>	Pavement / Roadway	5,487,094	13.69%
<b>C</b>	Right-of-Way	3,011,000	7.51%
<b>D</b>	Earthwork	2,221,974	5.54%
<b>E</b>	Clearing & Grubbing	1,600,000	3.99%
<b>F</b>	Erosion Control	1,302,661	3.25%
<b>G</b>	Utilities	979,750	2.44%
<b>H</b>	Drainage and Miscellaneous	703,191	1.75%
<b>I</b>	Signing and Striping	184,014	0.46%
<b>J</b>		0	0.00%
<b>Subtotal - Base Bid:</b>		40,074,684	100.00%
<i>Contingency: 0%</i>		0	
<b>Subtotal:</b>		40,074,684	
		0	
<i>Other mark-ups; Staking, Mob: 0.0%</i>		0	
<b>Total w/ All Contingencies:</b>		40,074,684	Effective Mark-up: 0.00%



1 Element costs include contingencies.

2 Costs based on Job Estimate Report, prepared by Design Team, MAA, 10-19-15.

**Effingham Parkway  
From SR 30 to Blue Jay Road  
PI No. 0006700  
F.A.S.T. Diagram**



**Information Phase - Function Analysis**  
**Project: Effingham Parkway; PI No. 0006700**  
**Basic Function: *add north/south corridor***

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	% of Total	Worth/Save
<b>A</b>	<b>Bridges</b>	span	wetlands	\$24,585,000	61.35	yes
		carry	load			
		separate	grade			
		connect	approaches			
		meet	criteria			
		reduce	impacts			
		obtain/secure	permit			
		by-pass	parcel			
		allow	development			
		accommodate / protect	bicyclists			
		reduce	maintenance			
<b>B</b>	<b>Roadway/Pavement</b>	support	loads	\$5,487,094	13.69	yes
		promote	development			
		separate	traffic			
		connect	nodes			
		increase	mobility			
		reduce	crashes			
		accommodate	bicyclists			
		relieve	congestion			
		adjust	posted speed			
		minimize	Impacts			
<b>C</b>	<b>Right-of-Way</b>	store/own	clear zone	\$3,011,000	7.51	yes
		contain	impacts			
		create	corridor			
		treat/contain	run-off (MS4)			
<b>D</b>	<b>Earthwork</b>	support	loads	\$2,221,974	5.54	yes
		meet	clearances			
		establish	grade			
		maintain/inspect	bridges			
		create	template			

**Information Phase - Function Analysis**

Project: Effingham Parkway; PI No. 0006700

Basic Function: *add north/south corridor*

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	% of Total	Worth/Save
E	<b>Clearing and Grubbing</b>	clear	corridor	\$1,600,000	3.99	no
		mobilize	contractor			
		remove	obstructions			
F	<b>Erosion Control</b>	capture	run-off	\$1,302,661	3.25	yes
		meet	standards			
		collect	material			
		retain	run-off			
		clean	contaminants			
G	<b>Utilities</b>	service	customers	\$979,750	2.44	no
		create/use	corridor			
		allow	development			
H	<b>Drainage and Miscellaneous Items</b>	discharge	run-off	\$703,191	1.75	no
		equalize	flow			
		administer	project			
I	<b>Signing and Striping</b>	inform	motorists	\$184,014	0.46	no
		direct	traffic			
		delineate	lanes			

No.	RISK IDENTIFICATION AREAS
1	Wetlands constructability and impacts
2	Advance right-of-way acquisition
3	Environmental permit / USACE review and authorization
4	Restrictive covenant amendment
5	Benton Extension – work by others / Chatham County
6	Delivering need and purpose of project
7	Geotechnical and site conditions
8	Availability of materials
9	Flat grades, poor drainage
10	Bridge drainage and allowable outfalls

<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>Bridges</b>		
1	Shorten bridges, do not span all wetlands	Increases impacts, keep within tolerable limits	✓
2	Put crest curves on bridges	Improves drainage situation on bridges	✓
3	Narrow bridge shoulder, 4' and 6.5'	Bridge policy prohibitive	x
4	Use alternate material for higher barrier; accommodating bicyclists		✓
5	Consider multi-use path	Cost prohibitive, long-term additional maintenance	x
6	Optimize span arrangement		✓
7	Break up long bridges; span only wetlands		✓
8	Use culverts in lieu of bridges	Increase wetlands impacts	x
9	Review bridge drainage system; collect, pipe and discharge	Effingham County is MS4 grandfathered	✓
10	Review bridge drainage system; single point discharges	Effingham County is MS4 grandfathered	✓
<b>B</b>	<b>Pavement / Roadway</b>		
1	Superelevate roadway to one side	Reduces BMP's	✓
2	Use urban section; curb and gutter	Not desirable for this corridor; increases drainage costs	x
3	Use 45 mph design speed	Allows more flexibility in wetland avoidance, programmatic change	x
4	Lower profile	Reduces earthwork, improves drainage	✓
5	Use 4 foot paved shoulder	Does not accommodate bicyclists	x
6	Shift alignment to avoid/minimize wetland impacts		✓
7	Realign roundabout at Benton Blvd./ SR 30	Improve approach angle; reduce wetland impacts	✓

<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>
8	Incorporate 55 mph curve at north end; improve location and tie-in	Consistent posted speed limit; improved access	✓
9	Review alignments 3 and 4; mix and match		✓
10	Use guard rail and 2:1 sideslopes throughout project	Undesirable corridor effect; long-term maintenance	x
11	Use guard rail and 2:1 sideslopes in select areas	Reduces impacts in some areas	✓
12	Review pavement design	Reduce section to acceptable limits	✓
13	Improve SR 21 only	Does not provide new N/S connectivity; does not address all project purpose and need	x
14	Use SR 21 south alignment and transition to alignment 4	By-pass covenant area; numerous displacements	x
15	Use existing gas easement as permanent condition	Consolidates required ROW; reduces impacts	✓
16	Use existing gas easement for constructability / haul road		✓
17	Investigate new SR 21 extension to I-95	Does not provide new N/S connectivity; existing welcome center	x
18	Use lower part of alignment 3 and transition to upper alignment 2	Incorporates existing roadway corridor, no displacements	✓
19	Realign through covenant area to reduce impacts	Some minor improvements can be provided; See B-6. Honor previous commitments	✓
20	Use roundabout at Goshen Road		✓
21	Improve SR 21; narrow 6-lane typical section	Does not provide new N/S connectivity	x
<b>C</b>	<b>Right-of-Way</b>		

<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>D</b>	<b>Earthwork</b>		
1	Review/lower profile	Reduces borrow; See B-4	✓
2	Use walls to reduce impacts	Potential use in select areas	✓
<b>E</b>	<b>Clearing and Grubbing</b>		
<b>F</b>	<b>Erosion Control</b>		
1	Super roadway to one side	Reduces BMP's; See B-1	✓
2	Acquire required Right-of-Way		DC
3	Slope roadway towards center; incorporate median drainage	Operationally problematic, high maintenance and safety concerns	x
4	Use MS4 capture and cleaning system on bridges	Proprietary item, high maintenance	x
<b>G</b>	<b>Utilities</b>		
<b>H</b>	<b>Drainage and Miscellaneous Items</b>		
<b>I</b>	<b>Signing and Striping</b>		

## VE ANALYSIS SIGN-IN SHEET

Project No.: CSMSL-0006-00(700)

County: Effingham/Chatham

PI No.: 0006700

Date: June 14-17, 2016

Days

FIRST	LAST	NAME	GDOT OFFICE OR COMPANY NAME	PHONE NUMBER	EMAIL ADDRESS
O	X	Erik Rohde	Engineering Services	404-631-1611	erohde@dot.ga.gov
X	X	Matt Sanders	Engineering Services	404-631-1752	msanders@dot.ga.gov
X	O	Richard O'Hara	Environmental Services	404-631-1169	rohara@dot.ga.gov
X	X	Steve Gaston	Bridge Design	404-631-1881	sgaston@dot.ga.gov
X	X	George Obaranec	Michael Baker Int'l (MBI)	404-694-0259	george.obaranec@mbakerintl.com
X	X	Ben Clopper	MBI	678-966-6607	ben.clopper@mbakerintl.com
X	X	Greg Mayo	MBI	404-804-4573	greg.mayo@mbakerintl.com
X	X	Greg Grant	RS&H	678-429-7501	greg.grant@rsandh.com
X	X	Steve Wyche	Moreland Altobelli	770-263-5945	swyche@maai.net
X	X	M.J. Sheehan	Moreland Altobelli	770-263-5745	mjsheehan@maai.net
X	X	L.N. Manchi	Moreland Altobelli	404-931-3792	lmanchi@maai.net
		<u>District #5 via Video</u>			
X	X	Michelle Wright	Program Delivery	912-271-7562	micwright@dot.ga.gov
X	O	Ron Nelson	D5/Area 4 Construction	912-424-9112	ronelson@dot.ga.gov
X	X	Toss Allen	Effingham County	912-754-8060	tallen@effinghamcounty.org
O	X	Bryan Czech	Asst. D5 Construction Eng.	912-530-4366	bczech@dot.ga.gov

Place an "X" by all who attended

"O" = Did Not Attend

13 Attended Project Overview (Day 1)

13 Attended Project Presentation (Day 4)