VALUE ENGINEERING STUDY
OF
HPP-NH-75-1(156) CT. 1
I-75 WIDENING from
SOUTH of the SR 300 INTERCHANGE
to the DOOLY COUNTY LINE

PI Number: 410260
CRISP COUNTY, GEORGIA
AUGUST 23-25, 2004

Prepared by:
Ventry Engineering, L.L.C.

In Association With:
Georgia Department of Transportation

VALUE ENGINEERING STUDY
TEAM LEADER

_____

William F. Ventry, P.E., C.V.S.
C.V.S. Registration No. 840603 (LIFE)

Date: _____

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I. EXECUTIVE SUMMARY

INTRODUCTION

This Value Engineering report summarizes the results of the Value Engineering study performed by Ventry Engineering for the Georgia Department of Transportation. The study was performed during the week of August 23-25, 2004.

The subject of the study was the widening of the existing I-75 from a four-lane facility to a six-lane facility.

PROJECT DESCRIPTION

The project is located on I-75 on Crisp County. It begins at the SR 300 Interchange and continues north to the Dooly County line. This project involves adding one 3.60 m wide through lane with a 4.30 m shoulder (3.60 m paved), in both directions, through the existing 12.20 m section at the beginning of the project. The widening will be 1.80 m in the median and 1.80 m outside in both directions. Median barrier will be added to the existing median. This section will continue to just North of the SR 257 interchange where the median transitions from 12.20 m to 19.50 m. Through the final 19.50 m wide section, the roadway will be widened 3.60 m in the median in both directions and double-faced guardrail will be added in the median. The project will also reconstruct the interchanges at SR 257 and SR 361. The bridge for CR 365/24th Avenue over I-75 will be reconstructed. Bridges on I-75 over US 280/SR 30, CSX Railroad, County Street 658, Georgia Southwestern Railroad and Gum Creek will also be widened. Also, Gum Creek Bridge on CR 361 will be widened. The total length of this project is 11.79 km.

METHODOLOGY

The Value Engineering Team followed the basic Value Engineering procedure for conducting this type of analysis.

This process included the following phases:
1. Investigation
2. Speculation
3. Evaluation
4. Development
5. Report Preparation

Evaluation criteria identified as a basis for the comparison of alternatives included the following:
- Traffic Control
- Impacts to local traffic
- Right of Way Impacts
- Traffic Operations
- Environmental Impacts
- Construction Time
- Constructability
- Future Maintenance Cost
- Life Cycle Cost
- Construction Cost

RESULTS

The following areas of focus were analyzed by the Value Engineering team and from these areas the following Value Engineering alternatives were developed and are recommended for Implementation:

RECOMMENDATION NUMBER 1A- I-75/CR 361 INTERCHANGE

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative proposes to utilize a Single Point Urban Interchange.

If this recommendation can be implemented, there is a possible savings of **$ 4,562,946.**

If the Value Engineering recommendation to change the design of the interchange cannot be implemented, then the Value Engineering team recommends implementing the following Value Engineering Alternative for the overpass bridge.

RECOMMENDATION NUMBER 1B- CR 361/FARMERS MARKET ROAD OVERPASS

This Value Engineering Alternative proposes to use a two span AASHTO girder bridge with MSE walls and vertical abutments.

If this recommendation can be implemented, there is a possible savings of **$ 295,084.**

RECOMMENDATION NUMBER 2A- I-75/SR 257 INTERCHANGE

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative proposes to utilize a Single Point Urban Interchange.

If this recommendation can be implemented, there is a possible savings of **$ 2,369,014**.

If the Value Engineering recommendation to change the design of the interchange cannot be implemented, then the Value Engineering team recommends implementing the following Value Engineering Alternative for the overpass bridge.

RECOMMENDATION NUMBER 2B- SR 257/8 TH AVENUE OVERPASS

This Value Engineering Alternative proposes to use a two span AASHTO girder bridge with MSE walls and vertical abutments.

If this recommendation can be implemented, there is a possible savings of **$ 277,809.**

RECOMMENDATION NUMBER 3- 24TH STREET OVERPASS

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative proposes a two span AASHTO girder bridge with MSE walls and vertical abutments.

If this recommendation can be implemented, there is a possible savings of **$ 241,741.**

RECOMMENDATION NUMBER 4- I-75/SR 30 BRIDGE

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative proposes to replace the existing bridge with a new two span AASHTO girder bridge with MSE walls and vertical abutments.

If this recommendation can be implemented, there is a possible savings of **$ 293,496.**

RECOMMENDATION NUMBER 5- I-75/CSX RAILROAD BRIDGE

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative proposes to replace the existing bridge with a new two span AASHTO girder bridge with MSE walls and vertical abutments.

If this recommendation can be implemented, there is a possible savings of **$ 852,312.**

RECOMMENDATION NUMBER 6- I-75/GEORGIA SOUTHWEST RAILROAD BRIDGE

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative proposes to replace the existing bridge with a new two span AASHTO girder bridge with MSE walls and vertical abutments.

If this recommendation can be implemented, there is a possible savings of **$ 592,106.**

RECOMMENDATION NUMBER 7 – I-75/GUM CREEK BRIDGE

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative proposes to square the bridge as much as possible and minimize the trapezoidal spans.

If this recommendation can be implemented, there is a possible savings of **$ 21,044.**

II. LOCATION OF PROJECT

DOOLY
End Project
75
257
41
Airport Rd
Crisp County-Cordele Airport
GEORGIA
257
CRISP
Cordele
280
280
11th St S
41
75
257
90
300
Rockhouse Rd
Begin Project
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III. TEAM MEMBERS AND PROJECT DESCRIPTION

TEAM MEMBERS

NAME	AFFILIATION	EXPERTISE	PHONE
William F. Ventry, P.E., C.V.S.	Ventry Engineering	Team Leader	850/627-3900
Tom Hartley	Ventry Engineering	Roadway Design/Traffic	850-627-3900
John Ledbetter	Ventry Engineering	Structures	850-627-3900
Bruce Nicholson	Ventry Engineering	Construction	850-627-3900
Vince Wilson	GADOT	Bridge Design	404/656-5302
Doug Franks	GADOT	Bridge Design	404/656-5284
Jerry Milligan	GADOT	Right-of-Way	404/463-2575
Lisa Myers	GADOT	Engineering Services	404/651-7468

PROJECT DESCRIPTION

The project is located on I-75 on Crisp County. It begins at the SR 300 Interchange and continues north to the Dooly County line. This project involves adding one 3.60 m wide through lane with a 4.30 m shoulder (3.60 m paved), in both directions, through the existing 12.20 m section at the beginning of the project. The widening will be 1.80 m in the median and 1.80 m outside in both directions. Median barrier will be added to the existing median. This section will continue to just North of the SR 257 interchange where the median transitions from 12.20 m to 19.50 m. Through the final 19.50 m wide section, the roadway will be widened 3.60 m in the median in both directions and double-faced guardrail will be added in the median. The project will also reconstruct the interchanges at SR 257 and SR 361. The bridge for CR 365/24th Avenue over I-75 will be reconstructed. Bridges on I-75 over US 280/SR 30, CSX Railroad, County Street 658, Georgia Southwestern Railroad and Gum Creek will also be widened. Also, Gum Creek Bridge on CR 361 will be widened. The total length of this project is 11.79 km.

IV. INVESTIGATION PHASE

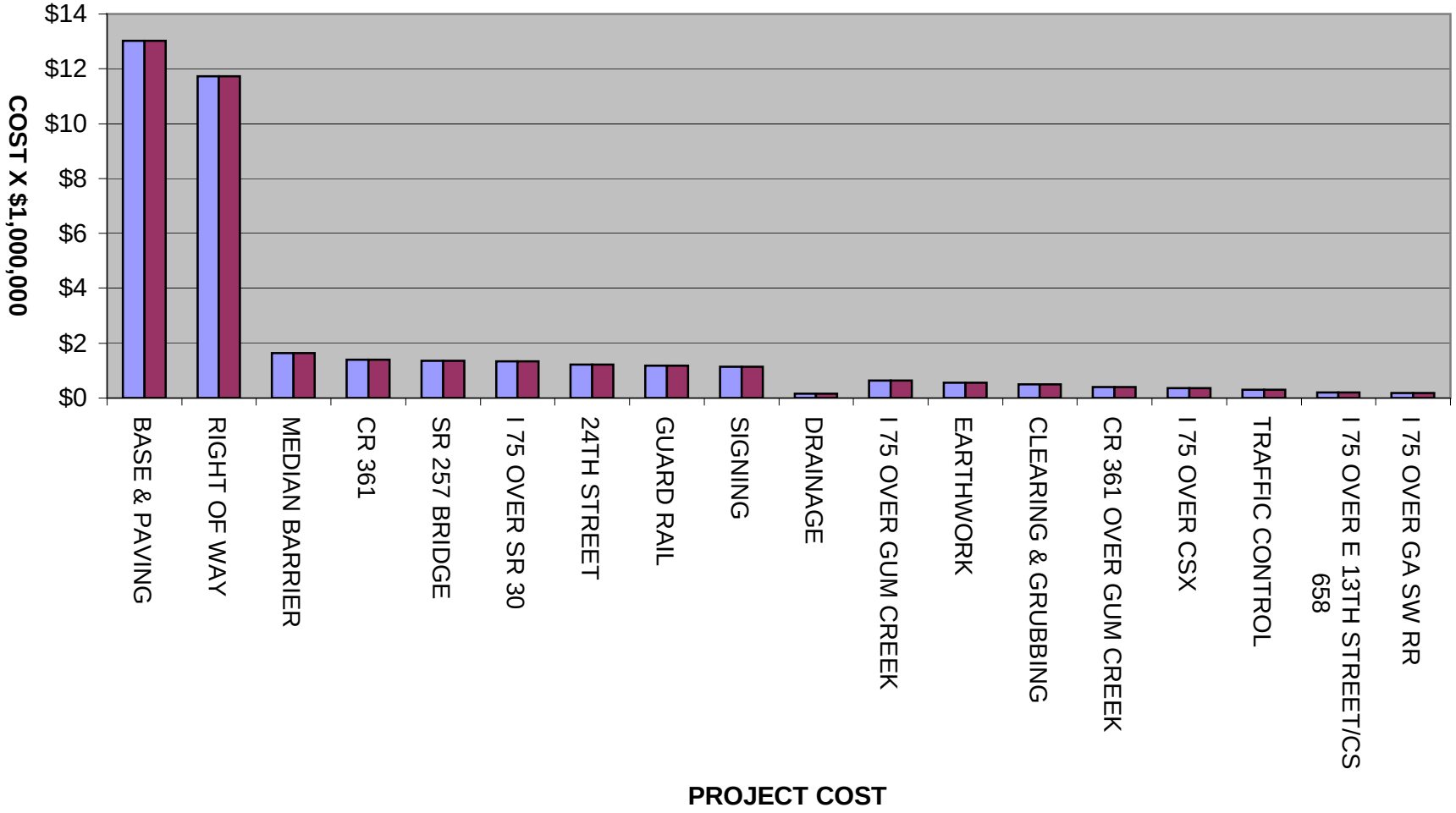
HPP-NH-75-1(156)CT. 1
VALUE ENGINEERING STUDY BRIEFING
AUGUST 23-25, 2004

NAME	AFFILIATION	PHONE
William F. Ventry	Ventry Engineering	850/627-3900
Tom Hartley	Ventry Engineering	850-627-3900
John Ledbetter	Ventry Engineering	850-627-3900
Bruce Nicholson	Ventry Engineering	850-627-3900
Stanley Hill	GADOT	404/656-5180
Calvin Harris	GADOT	404/656-5180
Mitch Pearson	GADOT	404/656-6849
Vince Wilson	GADOT	404/656-5302
Doug Franks	GADOT	404/656-5284
Kevin Stefanik	GADOT	404/635-8125
Corey Carter	GADOT	404/699-4441
Jerry Milligan	GADOT	404/463-2575
Scott Chambers	GADOT	229/556-9433
Joe Cowan	GADOT	229/386-3304
Floyd Moore	FHWA	404/562-3654
Lisa Myers	GADOT	404/651-7468
David Moyer	GADOT	404/651-7462
Joe Jabaley	GADOT	404/657-9756
Joe Sheffield	GADOT, Dist. Pre-construction	229/386-3300
Joe Cowan	GADOT, Dist. Construction	229/386-3304
Scott Chambers	GADOT, Dist. Area Engineer	229/556-9433
Roger Fowler	GADOT, Asst. Dist. Const. Eng.	229/386-3042

STUDY RESOURCES

NAME	AFFILIATION	PHONE
Stanley Hill	GADOT	404/656-5180
Ron Wishon	GADOT	404/651-7470
George Bradfield	GADOT	404/656-6845
Troy Patterson	GADOT	404/656-6846
Brian Summers	GADOT, Bridge Maintenance	404/635-8179
Cary Wood	GADOT, Bridge Maintenance	404/635-8189
Cale Durrence	GADOT, Bridge Maintenance	404/635-8727

PARETO CHART



FUNCTIONAL ANALYSIS WORKSHEET, INVESTIGATION PHASE
PROJECT: HPP-NH-75-1(156) CT. 1
DATE: AUGUST 23-25, 2004

ITEM	FUNCT. VERB	FUNCT. NOUN	* TYPE	COST	WORTH	VALUE INDEX	AREA OF FOCUS
Base and Pavement	Increase	Capacity	S	$ 13,000,000	$ 13,000,000	1.0	NO
I-75/CR 361 & I-75/SR257 Interchanges Right of Way	Acquire	Property	B	$ 11,700,000	$ 6,000,000	2.0	**YES**
CR 361 Bridge Replacement	Provide	Clearance	S	$ 1,400,000	$ 1,000,000	1.4	**YES**
SR 257 Bridge Replacement	Increase	Capacity	S	$ 1,300,000	$ 1,000,000	1.3	**YES**
I-75/SR 30 Bridge Widening	Increase	Capacity	S	$ 1,800,000 REHAB	$ 1,500,000 REPLACE	1.2	**YES**
24th Street Bridge Replacement	Provide	Clearance	S	$ 1,200,000	$ 1,000,000	1.2	**YES**
I-75/Gum Creek Bridge Widening	Increase	Capacity	S	$ 600,000	$ 485,000	1.2	**YES**
CR 361/Gum Creek Bridge Widening	Span	Creek	B	$ 400,000	$ 400,000	1.0	NO
I-75/CSX Railroad Bridge Widening	Increase	Capacity	S	$ 2,200,000 REHAB	$ 1,300,000 REPLACE	1.7	**YES**
I-75/13th Street Bridge Widening	Increase	Capacity	S	$ 200,000	$ 200,000	1.0	NO
I-75/Georgia Southwest Railroad Bridge Widening	Increase	Capacity	S	$ 1,800,000 REHAB	$ 1,200,000 REPLACE	1.5	**YES**
Earthwork	Establish	Grades	B	$ 550,000	$ 550,000	1.0	NO
Drainage	Convey	Water	B	$ 700,000	$ 700,000	1.0	NO
Clearing & Grubbing	Clear	Area	B	$ 500,000	$ 500,000	1.0	NO
Median Barrier	Redirect	Vehicles	B	$ 1,600,000	$ 1,600,000	1.0	NO
Guardrail	Redirect	Vehicles	B	$ 1,300,000	$ 1,300,000	1.0	NO

Signing	Advise	Motorist	B	$ 1,100,000	$ 1,100,000	1.0	NO
Traffic Control	Maintain	Traffic	B	$ 300,000	$ 300,000	1.0	NO

***B – Basic S - Secondary**

** Note: This worksheet is a tool of the Value Engineering process and is only used for determining the areas that the Value Engineering team should focus on for possible alternatives. The column for COST indicates the approximate amount of the cost as shown in the cost estimate. The column for WORTH is an estimated cost for the lowest possible alternative that would provide the FUNCTION shown. Many times the lowest cost alternatives are not considered implementable but are used only to establish a worth for a function. A value index greater than 1.00 indicates the Value Engineering team intends to focus on this area of the project.

INVESTIGATION

The following areas have a value index greater than 1.00 on the proceeding Functional Analysis Worksheet and therefore have been identified by the Value Engineering Team as areas of focus and investigation for the Value Engineering process:

A. I-75/CR 361 INTERCHANGE

B. I-75/SR 257 INTERCHANGE

C. CR 361/FARMERS MARKET ROAD OVERPASS

D. SR 257/8TH AVENUE OVERPASS

E. CR 365/24TH STREET OVERPASS

F. I-75/SR 30 BRIDGE

G. I-75/CSX RAILROAD BRIDGE

H. I-75/GEORGIA SOUTHWEST RAILROAD BRIDGE

I. I-75/GUM CREEK BRIDGE

V. SPECULATION PHASE

SPECULATION

Ideas generated, utilizing the brainstorming method, for performing the functions of previously identified areas of focus.

A. I-75/CR 361 Interchange
- Single point urban interchange
- Tight diamond

B. I-75/SR 257 Interchange
- Single point urban interchange
- Tight diamond

C. CR 361/Farmers Market Road Overpass
- Two span AASHTO girder bridge with MSE walls with vertical abutments
- Leave the existing bridge and widen underneath similar to the adjacent project to the south

D. SR 257/8th Avenue Overpass
- Two span AASHTO girder bridge with MSE walls with vertical abutments
- Leave the existing bridge and widen underneath similar to the adjacent project to the south

E. CR 365/24th Street Overpass
- Two span AASHTO girder bridge with MSE walls with vertical abutments
- Leave the existing bridge and widen underneath similar to the adjacent project to the south

F. I-75/SR 30 Bridge
- Eliminate the widening and replace the existing bridge with a two span AASHTO girder bridge with MSE walls and vertical abutments

G. I-75/CSX Railroad Bridge
- Eliminate the widening and replace the existing bridge with a two span AASHTO girder bridge with MSE walls and vertical abutments

H. I-75/Georgia Southwest Railroad Bridge
- Eliminate the widening and replace the existing bridge with a two span AASHTO girder bridge with MSE walls and vertical abutments

I. I-75/Gum Creek Bridge
- Square the bridge as much as possible and minimize the trapezoidal spans

VI. EVALUATION PHASE

VI.(A) ALTERNATIVES

ALTERNATIVES

The following alternatives were formulated during the "eliminate and combine" portion of the Evaluation Phase.

A. I-75/CR 361 Interchange
Value Engineering Alternative - Single point urban interchange

B. I-75/SR 257 Interchange
Value Engineering Alternative - Single point urban interchange

C. CR 361/Farmers Market Road Overpass
Value Engineering Alternative - Two span AASHTO girder bridge with MSE walls with vertical abutments

D. SR 257/8th Avenue Overpass
Value Engineering Alternative - Two span AASHTO girder bridge with MSE walls with vertical abutments

E. CR 365/24th Street Overpass
Value Engineering Alternative - Two span AASHTO girder bridge with MSE walls with vertical abutments

F. I-75/SR 30 Bridge
Value Engineering Alternative - Eliminate the widening and replace the existing bridge with a two span AASHTO girder bridge with MSE walls and vertical abutments

G. I-75/CSX Railroad Bridge
Value Engineering Alternative - Eliminate the widening and replace the existing bridge with a two span AASHTO girder bridge with MSE walls and vertical abutments

H. I-75/Georgia Southwest Railroad Bridge
Value Engineering Alternative - Eliminate the widening and replace the existing bridge with a two span AASHTO girder bridge with MSE walls and vertical abutments

I. I-75/ Gum Creek Bridge
Value Engineering Alternative - Square the bridge as much as possible and minimize the trapezoidal spans

VI.(B) ADVANTAGES AND DISADVANTAGES

EVALUATION

The following Advantages and Disadvantages were developed for the Value Engineering Alternatives previously generated during the speculation phase. It also includes the Advantages and Disadvantages for the As Proposed.

A. I-75/CR 361 INTERCHANGE

"As Proposed" – Conventional Diamond

Advantages

- Minimal bridge structure
- Easier traffic control
- No signals at intersections

Disadvantages

- High right of way cost
- Requires relocating local road

Conclusion

Carry forward for further evaluation

Value Engineering Alternative –Single Point Urban Interchange

Advantages

- Low right of way impacts/cost
- Better truck turning radius
- Will not have to relocate local road
- Better traffic operations
- May reduce impact to Gum Creek bridge
- Less environmental impacts/mitigation

Disadvantages

- Higher bridge cost
- May be longer construction time
- May be more traffic control

Conclusion

Carry forward for further evaluation

B. I-75/SR 257 INTERCHANGE

"As Proposed" – Conventional Diamond

Advantages

- Minimal bridge structure
- Easier traffic control
- No signals at intersections

Disadvantages

- High right of way cost

Conclusion

Carry forward for further evaluation

Value Engineering Alternative –Single Point Urban Interchange

Advantages

- Low right of way impacts/cost
- Better truck turning radius
- Better traffic operations
- Less impact to historical area
- Less wetland impacts/mitigation

Disadvantages

- Higher bridge cost
- May be longer construction time
- May be more traffic control

Conclusion

Carry forward for further evaluation

C. CR 361/FARMERS MARKET ROAD OVERPASS

"As Proposed" – Four span AASHTO girders with spill through abutments

Advantages

- May be easier construction

Disadvantages

- Higher construction cost
- Higher future maintenance because more bridge area
- Longer construction time

Conclusion

Carry forward for further evaluation

Value Engineering Alternative – Two span AASHTO girder with MSE walls and vertical abutments

Advantages

- Lower construction cost
- Less construction time
- Lower future bridge maintenance because less bridge area

Disadvantages

- None apparent

Conclusion

Carry forward for further evaluation

D. SR 257/8TH AVENUE OVERPASS

"As Proposed" – Four span AASHTO girders with spill through abutments

Advantages

- May be easier construction

Disadvantages

- Higher construction cost
- Higher future maintenance because more bridge area
- Longer construction time

Conclusion

Carry forward for further evaluation

Value Engineering Alternative – Two span AASHTO girder with MSE walls and vertical abutments

Advantages

- Lower construction cost
- Less construction time
- Lower future bridge maintenance because less bridge area

Disadvantages

- None apparent

Conclusion

Carry forward for further evaluation

E. CR 365/24TH STREET OVERPASS

"As Proposed" – Four span AASHTO girders with spill through abutments

Advantages

- May be easier construction

Disadvantages

- Higher construction cost
- Higher future maintenance because more bridge area
- Longer construction time

Conclusion

Carry forward for further evaluation

Value Engineering Alternative – Two span AASHTO girder with MSE walls and vertical abutments

Advantages

- Lower construction cost
- Less construction time
- Lower future bridge maintenance because less bridge area

Disadvantages

- None apparent

Conclusion

Carry forward for further evaluation

F. I-75/SR 30 BRIDGE

"As Proposed" – Milling, jacking, rotating and widening of the existing bridge

Advantages

- Utilizes the existing bridge
- Meets vertical clearance requirements

Disadvantages

- District is opposed to this approach because milling, jacking and rotating the existing bridge may require replacement of the entire bridge deck or the entire superstructure
- May be higher construction cost than a total replacement
- Requires complicated traffic control
- May be higher life cycle cost because of the age of the existing bridge
- Higher maintenance cost because of the age of the existing bridge

Conclusion

Carry forward for further evaluation

Value Engineering Alternative – replace the existing bridge with a two span AASHTO girder bridge with MSE walls and vertical abutments

Advantages

- May be lower construction cost
- May be lower life cycle cost
- Longer service life for bridge
- Lower future maintenance because new bridge
- Easier traffic control
- Can meet any vertical or horizontal clearances

Disadvantages

- May be longer construction time

Conclusion

Carry forward for further evaluation

G. I-75/CSX RAILROAD BRIDGE

"As Proposed" – Milling, jacking, rotating and widening of the existing bridge

Advantages

- Utilizes the existing bridge
- Meets vertical clearance requirements

Disadvantages

- District is opposed to this approach because milling, jacking and rotating the existing bridge may require replacement of the entire bridge deck or the entire superstructure
- May be higher construction cost than a total replacement
- Requires complicated traffic control
- May be higher life cycle cost because of the age of the existing bridge
- Higher maintenance cost because of the age of the existing bridge

Conclusion

Carry forward for further evaluation

Value Engineering Alternative – replace the existing bridge with a two span AASHTO girder bridge with MSE walls and vertical abutments

Advantages

- May be lower construction cost
- May be lower life cycle cost
- Longer service life for bridge
- Lower future maintenance because new bridge
- Easier traffic control
- Can meet any vertical or horizontal clearances

Disadvantages

- May be longer construction time

Conclusion

Carry forward for further evaluation

H. I-75/GEORGIA SOUTHWEST RAILROAD BRIDGE

"As Proposed" – Milling, jacking, rotating and widening of the existing bridge

Advantages

- Utilizes the existing bridge
- Meets vertical clearance requirements

Disadvantages

- District is opposed to this approach because milling, jacking and rotating the existing bridge may require replacement of the entire bridge deck or the entire superstructure
- May be higher construction cost than a total replacement
- Requires complicated traffic control
- May be higher life cycle cost because of the age of the existing bridge
- Higher maintenance cost because of the age of the existing bridge

Conclusion

Carry forward for further evaluation

Value Engineering Alternative – replace the existing bridge with a two span AASHTO girder bridge with MSE walls and vertical abutments

Advantages

- May be lower construction cost
- May be lower life cycle cost
- Longer service life for bridge
- Lower future maintenance because new bridge
- Easier traffic control
- Can meet any vertical or horizontal clearances

Disadvantages

- May be longer construction time

Conclusion

Carry forward for further evaluation

I. I-75/GUM CREEK BRIDGE

"As Proposed" – Trapezoidal shaped widening

Advantages

- May follow the creek alignment

Disadvantages

- Unconventional shape
- Difficult construction
- Shape may increase construction cost
- May be higher future maintenance because of the shape

Conclusion

Carry forward for further evaluation

Value Engineering Alternative – Square the bridge as much as possible and minimize trapezoidal shape

Advantages

- May be lower construction cost
- Could use typical girders

Disadvantages

- May produce widen bridge than needed

Conclusion

Carry forward for further evaluation

VII. DEVELOPMENT PHASE

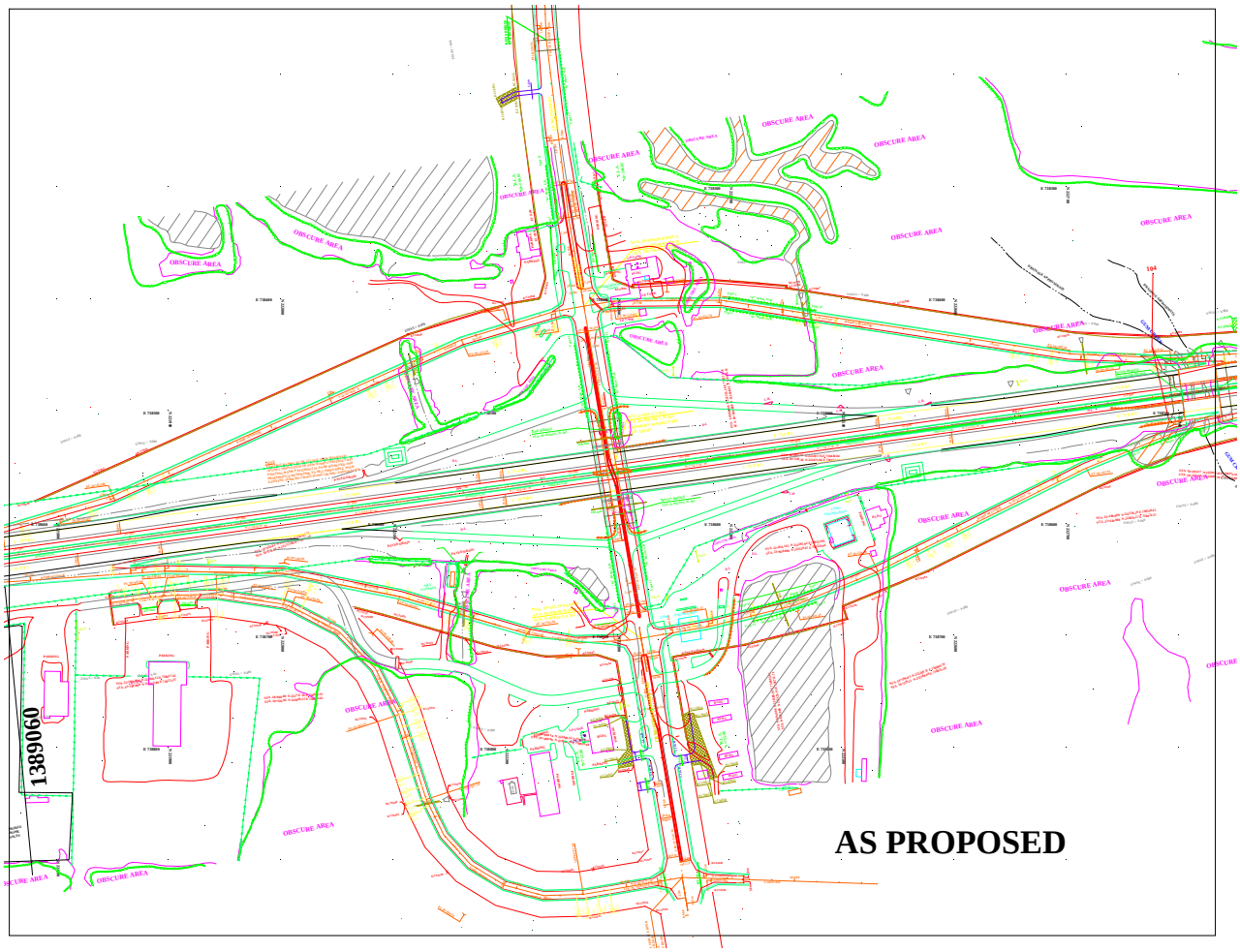
VII.(A) I-75/CR 361 INTERCHANGE

VII.(A)(1) AS PROPOSED

"As Proposed"

The "As Proposed" interchange configuration changes the existing Tight Diamond to a Diamond interchange to provide the desirable ramp termini separation. The realignment of the NB On Ramp and the SB Off Ramp will impact Wetland Sites 12 and 13. The Ramp Termini will be Stop Sign controlled. In addition to reconfiguring the interchange, a local access road to in the southeast quadrant of the interchange will have to be relocated because of the new location of the NB Off Ramp. The relocation of the Local Access will impact Wetland Site #10. The "As Proposed" plan view is shown below.

The structure over I 75 will be replaced to provide room for 2 through lanes and for overlapping left turn lanes to the On Ramps. The structure will be a 4 span open abutment structure.



TRAFFIC ANALYSIS

HCS2000: Unsignalized Intersections Release 4.1

TWO-WAY STOP CONTROL SUMMARY

Analyst: TOM HARTLEY
Agency/Co.: GaDOT
Date Performed: 8/25/2004
Analysis Time Period: AM PEAK
Intersection: NB OFF RAMP
Jurisdiction:
Analysis Year: 2020
Project ID: HHPP-NH-751(156)
East/West Street: CR361
North/South Street: I-75

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	90	45		69	110	
Peak-Hour Factor, PHF		1.00	1.00	1.00	1.00	
Hourly Flow Rate, HFR		90	45	69	110	
Percent Heavy Vehicles		--	--	0	--	--
Median Type	Undivided					
RT Channelized?						
Lanes	2	0		1	2	
Configuration		T	TR		L	T
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				65	65	
Peak Hour Factor, PHF				1.00	1.00	
Hourly Flow Rate, HFR				65	65	
Percent Heavy Vehicles				0	0	
Percent Grade (%)		0			0	
Median Storage						
Flared Approach: Exists?						
Storage						

RT Channelized?										No	
Lanes					1		1				
Configuration						L		R			

Delay, Queue Length, and Level of Service

Approach	EB	WB		Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12	
Lane Config		L			L		R		
v (vph)		69			65		65		
C(m) (vph)		1462			648		1007		
v/c		0.05			0.10		0.06		
95% queue length		0.15			0.33		0.21		
Control Delay		7.6			11.2		8.8		
LOS		A			B		A		
Approach Delay							10.0-		
Approach LOS							A		

HCS2000: Unsignalized Intersections Release 4.1

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TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: TOM HARTLEY
Agency/Co.: GaDOT
Date Performed: 8/25/2004
Analysis Time Period: AM PEAK
Intersection: NB OFF RAMP
Jurisdiction:
Analysis Year: 2020
Project ID: HHPP-NH-751(156)
East/West Street: CR361
North/South Street: I-75

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	90	45	69	110		
Peak-Hour Factor, PHF		1.00	1.00	1.00	1.00	
Peak-15 Minute Volume		22	11	17	28	
Hourly Flow Rate, HFR		90	45	69	110	
Percent Heavy Vehicles		--	--	0	--	--
Median Type	Undivided					
RT Channelized?						
Lanes	2	0		1	2	
Configuration		T	TR		L	T
Upstream Signal?		No			No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume			65		65	
Peak Hour Factor, PHF				1.00		1.00
Peak-15 Minute Volume				16		16
Hourly Flow Rate, HFR				65		65
Percent Heavy Vehicles				0		0
Percent Grade (%)		0			0	
Median Storage						
Flared Approach: Exists?						
Storage						
RT Channelized?						No
Lanes			1		1	
Configuration				L	R	

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
Percent Blockage	0	0	0	0

Upstream Signal Data

Prog.	Sat	Arrival	Green	Cycle	Prog.	Distance

	Flow vph	Flow vph	Type	Time sec	Length sec	Speed mph	to Signal feet
S2 Left-Turn							
Through							
S5 Left-Turn							
Through							

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5
Shared ln volume, major th vehicles:		
Shared ln volume, major rt vehicles:		
Sat flow rate, major th vehicles:		
Sat flow rate, major rt vehicles:		
Number of major street through lanes:		

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(c,base)	4.1				7.5		6.9	
t(c,hv)	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P(hv)	0				0		0	
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00				0.70		0.00	
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage	4.1				6.8		6.9	
2-stage								

Follow-Up Time Calculations

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(f,base)	2.20				3.50		3.30	
t(f,HV)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(HV)	0				0		0	
t(f)	2.2				3.5		3.3	

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
V prog				
Total Saturation Flow Rate, s (vph)				
Arrival Type				
Effective Green, g (sec)				
Cycle Length, C (sec)				
Rp (from table 9-2)				
Proportion vehicles arriving on green P				
g(q1)				
g(q2)				
g(q)				

Computation 2-Proportion of TWSC Intersection Time blocked

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
alpha				
beta				
Travel time, t(a) (sec)				
Smoothing Factor, F				
Proportion of conflicting flow, f				
Max platooned flow, V(c,max)				
Min platooned flow, V(c,min)				
Duration of blocked period, t(p)				
Proportion time blocked, p			0.000	0.000

Computation 3-Platoon Event Periods	Result
p(2)	0.000
p(5)	0.000
p(dom)	
p(subo)	
Constrained or unconstrained?	

Proportion unblocked for minor movements, p(x)	(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Two-Stage Process Stage II

p(1)									
p(4)									
p(7)									
p(8)									
p(9)									
p(10)									
p(11)									
p(12)									

Computation 4 and 5

Single-Stage Process

Movement		1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R	
V c,x		135				293		55	
s									
Px									
V c,u,x									
C r,x									
C plat,x									

Two-Stage Process

	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2
V(c,x)								
s				3400				
P(x)								
V(c,u,x)								
C(r,x)								
C(plat,x)								

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.	9	12
Conflicting Flows	55	
Potential Capacity	1007	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1007	
Probability of Queue free St.	1.00	0.94

Step 2: LT from Major St.	4	1
Conflicting Flows	135	
Potential Capacity	1462	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1462	
Probability of Queue free St.	0.95	1.00
Maj L-Shared Prob Q free St.		
Step 3: TH from Minor St.	8	11
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.95	0.95
Movement Capacity		
Probability of Queue free St.	1.00	1.00
Step 4: LT from Minor St.	7	10
Conflicting Flows	293	
Potential Capacity	680	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.95	
Maj. L, Min T Adj. Imp Factor.	0.96	
Cap. Adj. factor due to Impeding mvmnt	0.90	0.95
Movement Capacity	648	

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St.	8	11
Part 1 - First Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		
Probability of Queue free St.		
Part 2 - Second Stage		
Conflicting Flows		
Potential Capacity		

Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		

Part 3 - Single Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.95	0.95
Movement Capacity		

Result for 2 stage process:		
a		
y		
C t		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10

Part 1 - First Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		

Part 2 - Second Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		

Part 3 - Single Stage		
Conflicting Flows	293	
Potential Capacity	680	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.95	
Maj. L, Min T Adj. Imp Factor.	0.96	
Cap. Adj. factor due to Impeding mvmnt	0.90	0.95
Movement Capacity	648	

Results for Two-stage process:		
a		
y		

C t	648

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L T	R	L	T	R	
Volume (vph)				65	65	
Movement Capacity (vph)					648	1007
Shared Lane Capacity (vph)						

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7	8	9	10	11	12
	L T	R	L	T	R	
C sep			648		1007	
Volume			65		65	
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh						
SUM C sep						
n						
C act						

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config		L				L	R	
v (vph)	69				65		65	
C(m) (vph)		1462				648		1007
v/c	0.05				0.10		0.06	
95% queue length		0.15				0.33		0.21
Control Delay		7.6				11.2		8.8
LOS	A				B		A	
Approach Delay						10.0-		
Approach LOS						A		

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.95
v(il), Volume for stream 2 or 5		
v(i2), Volume for stream 3 or 6		
s(il), Saturation flow rate for stream 2 or 5		
s(i2), Saturation flow rate for stream 3 or 6		
P*(oj)		
d(M,LT), Delay for stream 1 or 4		7.6
N, Number of major street through lanes		
d(rank,1) Delay for stream 2 or 5		

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TWO-WAY STOP CONTROL SUMMARY

Analyst: TOM HARTLEY
Agency/Co.: GaDOT
Date Performed: 8/25/2004
Analysis Time Period: AM PEAK
Intersection: NB OFF RAMP
Jurisdiction:
Analysis Year: 2020
Project ID: HHPP-NH-751(156)
East/West Street: CR361
North/South Street: I-75

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	45	110			105	45
Peak-Hour Factor, PHF		1.00	1.00		1.00	1.00
Hourly Flow Rate, HFR		45	110		105	45
Percent Heavy Vehicles		0	-- --		--	--
Median Type	Undivided					
RT Channelized?						
Lanes	1	2		2	0	
Configuration		L	T		T	TR
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	65		90			
Peak Hour Factor, PHF		1.00		1.00		
Hourly Flow Rate, HFR		65		90		
Percent Heavy Vehicles		0		0		
Percent Grade (%)		0			0	
Median Storage						
Flared Approach: Exists?						
Storage						

RT Channelized?		No
Lanes	1	1
Configuration	L	R

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L		L		R			
v (vph)	45		65		90			
C(m) (vph)	1444		698		1007			
v/c	0.03		0.09		0.09			
95% queue length	0.10		0.31		0.29			
Control Delay	7.6		10.7		8.9			
LOS	A		B		A			
Approach Delay				9.7				
Approach LOS				A				

HCS2000: Unsignalized Intersections Release 4.1

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TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: TOM HARTLEY
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Date Performed: 8/25/2004
Analysis Time Period: AM PEAK
Intersection: NB OFF RAMP
Jurisdiction:
Analysis Year: 2020
Project ID: HHPP-NH-751(156)
East/West Street: CR361
North/South Street: I-75

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	45	110		105	45	
Peak-Hour Factor, PHF	1.00	1.00			1.00	1.00
Peak-15 Minute Volume	11	28			26	11
Hourly Flow Rate, HFR	45	110			105	45
Percent Heavy Vehicles	0	--	--		--	--
Median Type	Undivided					
RT Channelized?						
Lanes	1	2		2	0	
Configuration		L	T		T	TR
Upstream Signal?			No		No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	65		90			
Peak Hour Factor, PHF	1.00		1.00			
Peak-15 Minute Volume	16		22			
Hourly Flow Rate, HFR	65		90			
Percent Heavy Vehicles	0		0			
Percent Grade (%)		0		0		
Median Storage						
Flared Approach: Exists?						
Storage						
RT Channelized?			No			
Lanes	1		1			
Configuration		L	R			

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
Percent Blockage	0	0	0	0

Upstream Signal Data

Prog.	Sat	Arrival	Green	Cycle	Prog.	Distance

	Flow vph	Flow vph	Type	Time sec	Length sec	Speed mph	to Signal feet
S2 Left-Turn							
Through							
S5 Left-Turn							
Through							

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5
Shared ln volume, major th vehicles:		
Shared ln volume, major rt vehicles:		
Sat flow rate, major th vehicles:		
Sat flow rate, major rt vehicles:		
Number of major street through lanes:		

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(c,base)	4.1		7.5		6.9			
t(c,hv)	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P(hv)	0		0		0			
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00		0.70		0.00			
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage	4.1		6.8		6.9			
2-stage								

Follow-Up Time Calculations

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(f,base)	2.20		3.50		3.30			
t(f,HV)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(HV)	0		0		0			
t(f)	2.2		3.5		3.3			

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
V prog				
Total Saturation Flow Rate, s (vph)				
Arrival Type				
Effective Green, g (sec)				
Cycle Length, C (sec)				
Rp (from table 9-2)				
Proportion vehicles arriving on green P				
g(q1)				
g(q2)				
g(q)				

Computation 2-Proportion of TWSC Intersection Time blocked

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
alpha				
beta				
Travel time, t(a) (sec)				
Smoothing Factor, F				
Proportion of conflicting flow, f				
Max platooned flow, V(c,max)				
Min platooned flow, V(c,min)				
Duration of blocked period, t(p)				
Proportion time blocked, p			0.000	0.000

Computation 3-Platoon Event Periods	Result
p(2)	0.000
p(5)	0.000
p(dom)	
p(subo)	
Constrained or unconstrained?	

Proportion unblocked for minor movements, p(x)	(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Two-Stage Process Stage II

p(1)									
p(4)									
p(7)									
p(8)									
p(9)									
p(10)									
p(11)									
p(12)									

Computation 4 and 5
Single-Stage Process

Movement		1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R	
V c,x	150		252		55				
s									
Px									
V c,u,x									
C r,x									
C plat,x									

Two-Stage Process

	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2
V(c,x)								
s	3400							
P(x)								
V(c,u,x)								
C(r,x)								
C(plat,x)								

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.	9	12
Conflicting Flows	55	
Potential Capacity	1007	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1007	
Probability of Queue free St.	0.91	1.00

Step 2: LT from Major St.	4	1
Conflicting Flows	150	
Potential Capacity	1444	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1444	
Probability of Queue free St.	1.00	0.97
Maj L-Shared Prob Q free St.		

Step 3: TH from Minor St.	8	11
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.97	0.97
Movement Capacity		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10
Conflicting Flows	252	
Potential Capacity	720	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.97	
Maj. L, Min T Adj. Imp Factor.	0.98	
Cap. Adj. factor due to Impeding mvmnt	0.97	0.89
Movement Capacity	698	

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St.	8	11
Part 1 - First Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		
Probability of Queue free St.		
Part 2 - Second Stage		
Conflicting Flows		
Potential Capacity		

Pedestrian Impedance Factor				
Cap. Adj. factor due to Impeding mvmnt				
Movement Capacity				
Part 3 - Single Stage				
Conflicting Flows				
Potential Capacity				
Pedestrian Impedance Factor		1.00	1.00	
Cap. Adj. factor due to Impeding mvmnt		0.97	0.97	
Movement Capacity				
Result for 2 stage process:				
a				
y				
C t				
Probability of Queue free St.		1.00	1.00	
Step 4: LT from Minor St.		7	10	
Part 1 - First Stage				
Conflicting Flows				
Potential Capacity				
Pedestrian Impedance Factor				
Cap. Adj. factor due to Impeding mvmnt				
Movement Capacity				
Part 2 - Second Stage				
Conflicting Flows				
Potential Capacity				
Pedestrian Impedance Factor				
Cap. Adj. factor due to Impeding mvmnt				
Movement Capacity				
Part 3 - Single Stage				
Conflicting Flows	252			
Potential Capacity	720			
Pedestrian Impedance Factor		1.00	1.00	
Maj. L, Min T Impedance factor			0.97	
Maj. L, Min T Adj. Imp Factor.			0.98	
Cap. Adj. factor due to Impeding mvmnt		0.97	0.89	
Movement Capacity	698			
Results for Two-stage process:				
a				
y				

C t	698

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L T	R	L	T	R	
Volume (vph)	65		90			
Movement Capacity (vph)		698			1007	
Shared Lane Capacity (vph)						

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7	8	9	10	11	12
	L T	R	L	T	R	
C sep	698		1007			
Volume	65		90			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh						
SUM C sep						
n						
C act						

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config	L		L		R			
v (vph)	45		65		90			
C(m) (vph)	1444		698		1007			
v/c	0.03		0.09		0.09			
95% queue length	0.10		0.31		0.29			
Control Delay	7.6		10.7		8.9			
LOS	A		B		A			
Approach Delay				9.7				
Approach LOS				A				

Worksheet 11-Shared Major LT Impedance and Delay

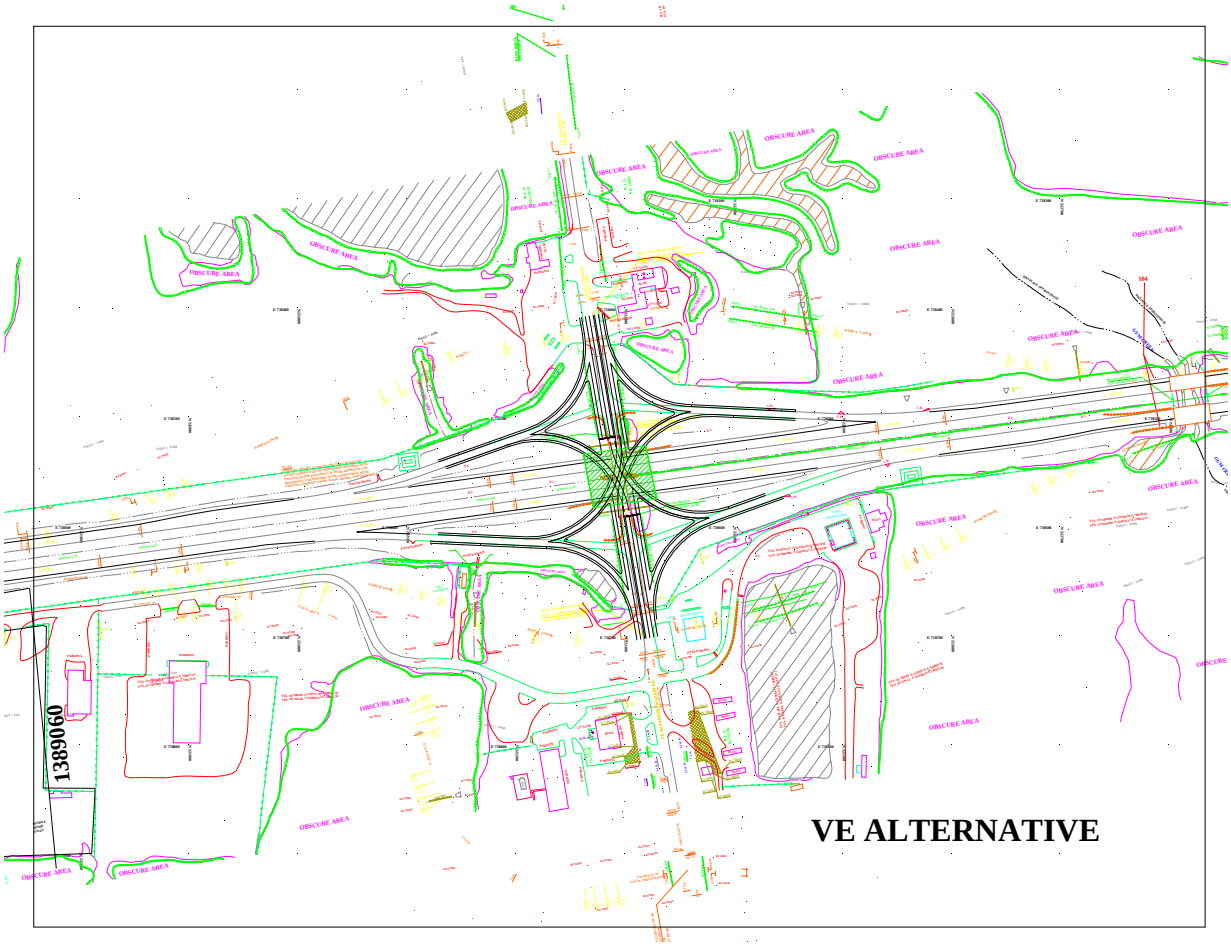
	Movement 2	Movement 5
p(oj)	0.97	1.00
v(il), Volume for stream 2 or 5		
v(i2), Volume for stream 3 or 6		
s(il), Saturation flow rate for stream 2 or 5		
s(i2), Saturation flow rate for stream 3 or 6		
P*(oj)		
d(M,LT), Delay for stream 1 or 4		7.6
N, Number of major street through lanes		
d(rank,1) Delay for stream 2 or 5		

VII.(A)(2) VALUE ENGINEERING ALTERNATIVE

Value Engineering Alternative

The Value Engineering Team recommends constructing a Single Point Interchange at this interchange as shown below. A Single Point interchange was selected not for its capacity improvements over a Diamond Interchange, but because of the smaller footprint and the associated Right of Way savings. Constructing this configuration creates a single signalized intersection on CS 361. The necessity of placing the left turn ramps on the structure causes the bridge to have a very large deck – 57.8 m X 50.1 m. The major advantages of this recommendation:

- No need to acquire additional Right of Way
- Eliminate the need to relocate the local access road in the southeast quadrant
- Does not impact wetlands.
- Trucks operate better with the large turning radii



The National Cooperative Highway Research Program Report 345, *Single Point Urban Interchange Design and Operations Analysis* contains more information on the comparison between the Diamond and the Single Point Interchanges.

The major cost savings for this alternative is the Right of Way acquisition cost associated with the construction of a Diamond Interchange. Detailed Right of Way costs are not presently available. Jerry Milligan of the GaDOT Right of Way Office estimated the cost savings for the VE Team. The approach he used was to eliminate Right of Way that is required from the total and split the remaining costs between the interchange at SR 361 (60%) and the interchange at CR 257 (40%). SR 361 has more Right of Way because of the relocation of the local service road.

View of typical signalization for a Single Point
(view from left turn off)

TRAFFIC ANALYSIS

HCS2000: Signalized Intersections Release 4.1

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PLANNING ANALYSIS

Analyst:	TOM HARTLEY
Intersection:	SPUI
Agency/Co.:	GaDOT
Area Type:	All other areas
Date Performed:	8/25/2004
Jurisdiction:	
Analysis Time Period:	AM PEAK
Analysis Year:	2020
Project ID:	HPP-NH-75-1(156)

East/West Street	North/South Street
CR 361	I 75 ON OFF RAMPS

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Num. Lanes	1	2	1	1	2	1	1	0	1	1	0	1
Volume	60	45	45	45	45	45	65		90	65		65
Parking		N			N			N			N	
Coord.		N			N			N			N	
LT Treat.	P			P			P			P		

Peak hour factor: 0.90 Area Type: All other areas

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LANE VOLUME WORKSHEET

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
LEFT TURN MOVEMENT				
1. LT volume	60	45	65	65
2. Opposing mainline volume	90	90	65	90
3. Number of exclusive LT lanes	1	1	1	1
Cross Product [2] * [1]	5400	4050	4225	5850
Left Lane Configuration (E=Excl, S=Shrd):	E	E	E	E
Left Turn Treatment Type:	P	P	P	P
4. LT adjustment factor	0.950	0.950	0.950	0.950
5. LT lane vol	63	47	68	68
RIGHT TURN MOVEMENT				
Right Lane Configuration (E=Excl, S=Shrd)	E	E	E	E
6. RT volume	45	45	90	65
7. Exclusive lanes	1	1	1	1
8. RT adjustment factor	0.850	0.850	0.850	0.850
9. Exclusive RT lane volume	53	53	106	76
10. Shared lane vol				
THROUGH MOVEMENT				
11. Thru volume	45	45	0	0
12. Parking adjustment factor	1.00	1.00	1.00	1.00
13. No. of thru lanes including shared	2	2	0	0
14. Total approach volume	45	45	0	0
15. Prop. of left turns in lane group	0.00	0.00	0.00	0.00
16. Left turn equivalence				
17. LT adj. factor:				
18. Through lane volume	22	22	0	0
19. Critical lane volume	53	53	106	76

Left Turn Check (if [16] > 3.5)

20. Permitted left turn sneaker capacity:

7200/Cmax

SIGNAL OPERATIONS WORKSHEET

Phase Plan Selection from Lane Volume Worksheet	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
Critical through-RT vol: [19]	53	53	106	76
LT lane vol: [5]	63	47	68	68
Left turn protection: (P/U/N)	P	P	P	P
Dominant left turn: (Indicate by '<')	<			<

Selection Criteria based on the specified left turn protection

< Indicates the dominant left turn for each opposing pair

Plan 1:	U	U	U	U
Plan 2a:	U	P	U	P
Plan 2b:	P	U	P	U
Plan 3a:	<P	P	<P	P
Plan 3b:	P	<P	P	<P
Plan 4:	N	N	N	N

Phase plan selected (1 to 4) 3a 3b

Min. cycle (Cmin) 60 Max. cycle (Cmax) 120

Timing Plan	Value	EAST-WEST Ph 1	EAST-WEST Ph 2	EAST-WEST Ph 3	NORTH-SOUTH Ph 1	NORTH-SOUTH Ph 2	NORTH-SOUTH Ph 3
Movement codes		EWL	ETL	EWT	NSL	STL	NST
Critical phase vol [CV]		47	16	53	68	0	106
Critical sum [CS]	290						
CBD adjustment [CBD]	1.00						
Reference sum [RS]	1539						
Lost time/phase [PL]		4	0	4	4	0	4
Lost time/cycle [TL]	16						
Cycle length [CYC]	60.0						
Phase time		11.1	2.4	12.0	14.3	0.0	20.1
Critical v/c Ratio [Xcm]	0.26						
Status	Under capacity						

I-75/CR 361 INTERCHANGE
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
BRIDGE	SM	$700.00	1927.2	$1,349,040	2895.8	$2,027,046
RETAINING WALL (MSE/SOIL NAIL)	SF	$40.00	0.0	$0	23475.0	$939,000
LOCAL ROAD	SM	$46.33	5040.0	$233,503	0.0	$0
SIGNAL	EA	$100,000.00	0.0	$0	1.0	$100,000
EARTHWORK (RAMPS)	CM	$5.00	34080.0	$170,400	16800.0	$84,000
SUBTOTAL				$1,752,943		$3,150,046
CONSTRUCTION ENGINEERING			10.0%	$175,294	10.0%	$315,005
INFLATION	2	5%	10.3%	$179,677	10.3%	$322,880
WETLAND MITIGATION	CR	$19,400.00	8	$155,200	0	$0
RIGHT OF WAY	LS	$1.00	6087762.0	$6,087,762	0.0	$0
GRAND TOTAL				**$8,350,762**		**$3,787,930**

POSSIBLE SAVINGS
$4,562,946

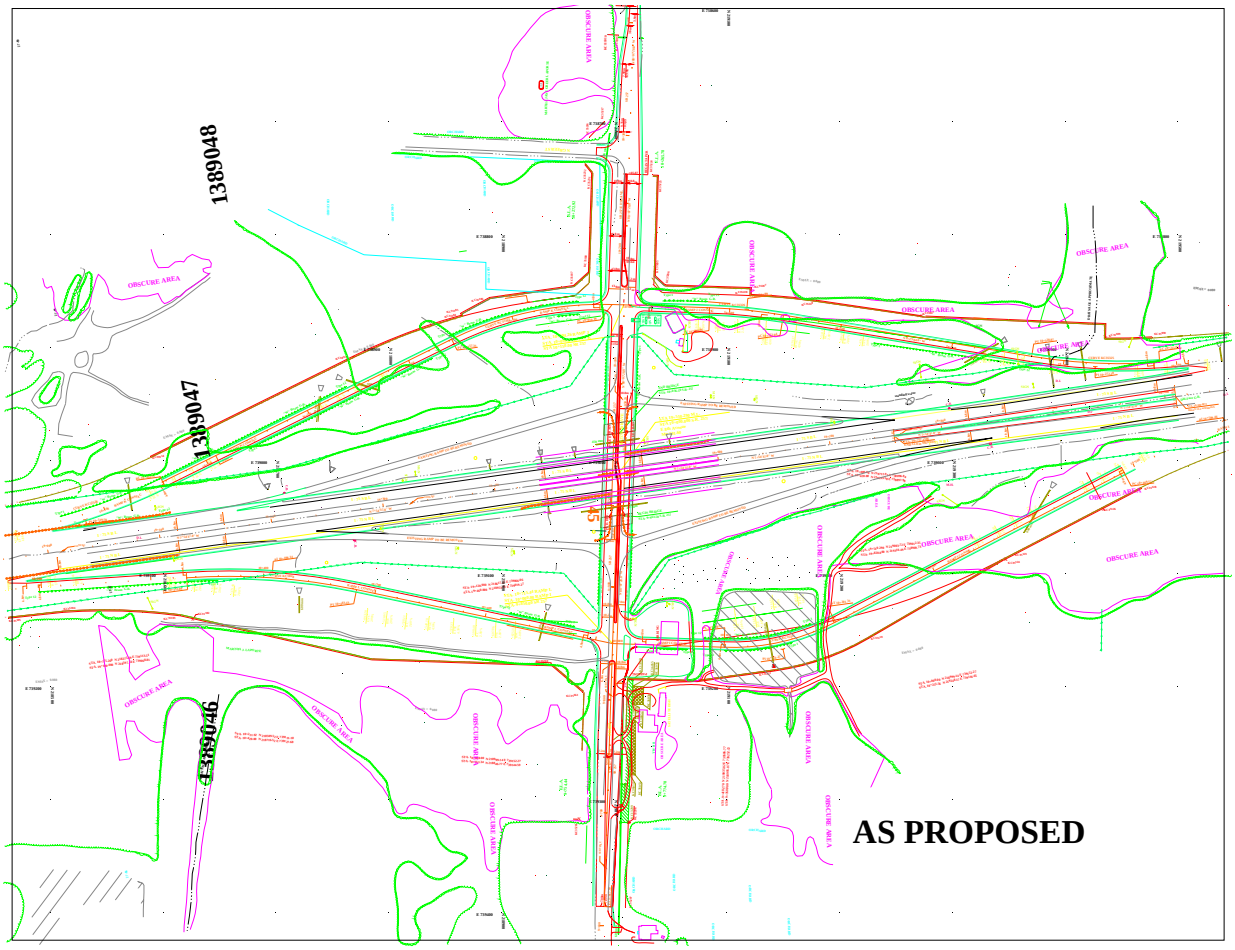
VII.(B) I-75/SR 257 INTERCHANGE

VII.(B)(1) AS PROPOSED

"As Proposed"

The "As Proposed" interchange configuration changes the existing Tight Diamond to a Diamond interchange to provide the desirable ramp termini separation. The Ramp Termini will be Stop Sign controlled. The spreading out of the ramps will move the NB On Ramp into wetland site #7 and abut a Historical Boundary. The "As Proposed" plan view is shown below.

The structure over I-75 will be replaced to provide room for 2 through lanes and for overlapping left turn lanes to the On Ramps. The structure will be a 4 span open abutment structure.



TRAFFIC ANALYSIS

HCS2000: Unsignalized Intersections Release 4.1

TWO-WAY STOP CONTROL SUMMARY

Analyst: TOM HARTLEY
Agency/Co.: GaDOT
Date Performed: 8/25/2004
Analysis Time Period: AM PEAK
Intersection: SB OFF RAMP
Jurisdiction:
Analysis Year: 2020
Project ID: HPP-NH-1(156)
East/West Street: SR 257
North/South Street: I-75 OFF RAMP

Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	95	480			355	80
Peak-Hour Factor, PHF		1.00	1.00		1.00	1.00
Hourly Flow Rate, HFR		95	480		355	80
Percent Heavy Vehicles		0	--	--	--	--
Median Type	Undivided					
RT Channelized?						
Lanes	1	2		2	0	
Configuration		L	T		T	TR
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				75		50
Peak Hour Factor, PHF				1.00		1.00
Hourly Flow Rate, HFR				75		50
Percent Heavy Vehicles				0		0
Percent Grade (%)		0			0	
Median Storage						
Flared Approach: Exists?						
Storage						

RT Channelized?			No
Lanes	1	1	
Configuration	L	R	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L				L		R	
v (vph)	95				75		50	
C(m) (vph)	1135				289		792	
v/c	0.08				0.26		0.06	
95% queue length	0.27				1.04		0.20	
Control Delay	8.5				21.8		9.9	
LOS	A				C		A	
Approach Delay					17.0			
Approach LOS					C			

HCS2000: Unsignalized Intersections Release 4.1

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TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: TOM HARTLEY
Agency/Co.: GaDOT
Date Performed: 8/25/2004
Analysis Time Period: AM PEAK
Intersection: SB OFF RAMP
Jurisdiction:
Analysis Year: 2020
Project ID: HPP-NH-1(156)
East/West Street: SR 257
North/South Street: I-75 OFF RAMP

Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	95	480		355	80	
Peak-Hour Factor, PHF	1.00	1.00			1.00	1.00
Peak-15 Minute Volume	24	120			89	20
Hourly Flow Rate, HFR	95	480			355	80
Percent Heavy Vehicles	0	--	--		--	--
Median Type	Undivided					
RT Channelized?						
Lanes	1	2		2	0	
Configuration		L	T		T	TR
Upstream Signal?			No		No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				75		50
Peak Hour Factor, PHF					1.00	1.00
Peak-15 Minute Volume					19	12
Hourly Flow Rate, HFR					75	50
Percent Heavy Vehicles					0	0
Percent Grade (%)			0			0
Median Storage						
Flared Approach: Exists?						
Storage						
RT Channelized?						No
Lanes				1		1
Configuration					L	R

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
Percent Blockage	0	0	0	0

Upstream Signal Data

Prog.	Sat	Arrival	Green	Cycle	Prog.	Distance

	Flow vph	Flow vph	Type	Time sec	Length sec	Speed mph	to Signal feet
S2 Left-Turn							
Through							
S5 Left-Turn							
Through							

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5
Shared ln volume, major th vehicles:		
Shared ln volume, major rt vehicles:		
Sat flow rate, major th vehicles:		
Sat flow rate, major rt vehicles:		
Number of major street through lanes:		

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(c,base)	4.1				7.5		6.9	
t(c,hv)	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P(hv)	0				0		0	
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00				0.70		0.00	
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage	4.1				6.8		6.9	
2-stage								

Follow-Up Time Calculations

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(f,base)	2.20				3.50		3.30	
t(f,HV)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(HV)	0				0		0	
t(f)	2.2				3.5		3.3	

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
V prog				
Total Saturation Flow Rate, s (vph)				
Arrival Type				
Effective Green, g (sec)				
Cycle Length, C (sec)				
Rp (from table 9-2)				
Proportion vehicles arriving on green P				
g(q1)				
g(q2)				
g(q)				

Computation 2-Proportion of TWSC Intersection Time blocked

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
alpha				
beta				
Travel time, t(a) (sec)				
Smoothing Factor, F				
Proportion of conflicting flow, f				
Max platooned flow, V(c,max)				
Min platooned flow, V(c,min)				
Duration of blocked period, t(p)				
Proportion time blocked, p			0.000	0.000

Computation 3-Platoon Event Periods	Result
p(2)	0.000
p(5)	0.000
p(dom)	
p(subo)	
Constrained or unconstrained?	

Proportion unblocked for minor movements, p(x)	(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Two-Stage Process Stage II

p(1)												
p(4)												
p(7)												
p(8)												
p(9)												
p(10)												
p(11)												
p(12)												

Computation 4 and 5

Single-Stage Process

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
V c,x	435				825		218	
s								
Px								
V c,u,x								
C r,x								
C plat,x								

Two-Stage Process

	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2
V(c,x)								
s				3400				
P(x)								
V(c,u,x)								
C(r,x)								
C(plat,x)								

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.	9	12
Conflicting Flows	218	
Potential Capacity	792	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	792	
Probability of Queue free St.	1.00	0.94

Step 2: LT from Major St.	4		1	
Conflicting Flows		435		
Potential Capacity		1135		
Pedestrian Impedance Factor	1.00		1.00	
Movement Capacity		1135		
Probability of Queue free St.	1.00		0.92	
Maj L-Shared Prob Q free St.				
Step 3: TH from Minor St.	8		11	
Conflicting Flows				
Potential Capacity				
Pedestrian Impedance Factor	1.00		1.00	
Cap. Adj. factor due to Impeding mvmnt		0.92		0.92
Movement Capacity				
Probability of Queue free St.	1.00		1.00	
Step 4: LT from Minor St.	7		10	
Conflicting Flows		825		
Potential Capacity		315		
Pedestrian Impedance Factor	1.00		1.00	
Maj. L, Min T Impedance factor	0.92			
Maj. L, Min T Adj. Imp Factor.	0.94			
Cap. Adj. factor due to Impeding mvmnt		0.88		0.92
Movement Capacity		289		

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St.	8		11	
Part 1 - First Stage				
Conflicting Flows				
Potential Capacity				
Pedestrian Impedance Factor				
Cap. Adj. factor due to Impeding mvmnt				
Movement Capacity				
Probability of Queue free St.				
Part 2 - Second Stage				
Conflicting Flows				
Potential Capacity				

Pedestrian Impedance Factor				
Cap. Adj. factor due to Impeding mvmnt				
Movement Capacity				
Part 3 - Single Stage				
Conflicting Flows				
Potential Capacity				
Pedestrian Impedance Factor	1.00	1.00		
Cap. Adj. factor due to Impeding mvmnt	0.92	0.92		
Movement Capacity				
Result for 2 stage process:				
a				
y				
C t				
Probability of Queue free St.	1.00	1.00		
Step 4: LT from Minor St.	7	10		
Part 1 - First Stage				
Conflicting Flows				
Potential Capacity				
Pedestrian Impedance Factor				
Cap. Adj. factor due to Impeding mvmnt				
Movement Capacity				
Part 2 - Second Stage				
Conflicting Flows				
Potential Capacity				
Pedestrian Impedance Factor				
Cap. Adj. factor due to Impeding mvmnt				
Movement Capacity				
Part 3 - Single Stage				
Conflicting Flows	825			
Potential Capacity	315			
Pedestrian Impedance Factor	1.00	1.00		
Maj. L, Min T Impedance factor	0.92			
Maj. L, Min T Adj. Imp Factor.	0.94			
Cap. Adj. factor due to Impeding mvmnt	0.88	0.92		
Movement Capacity	289			
Results for Two-stage process:				
a				
y				

Ct				289				

Worksheet 8-Shared Lane Calculations

Movement		7	8	9	10	11	12
	L	T	R	L	T	R	
Volume (vph)					75		50
Movement Capacity (vph)						289	792
Shared Lane Capacity (vph)							

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement		7	8	9	10	11	12
	L	T	R	L	T	R	
C sep				289		792	
Volume				75		50	
Delay							
Q sep							
Q sep +1							
round (Qsep +1)							
n max							
C sh							
SUM C sep							
n							
C act							

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config	L					L	R	
v (vph)	95				75		50	
C(m) (vph)	1135					289		792
v/c	0.08				0.26		0.06	
95% queue length	0.27					1.04		0.20
Control Delay	8.5					21.8		9.9
LOS	A				C		A	
Approach Delay						17.0		
Approach LOS						C		

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.92	1.00
v(il), Volume for stream 2 or 5		
v(i2), Volume for stream 3 or 6		
s(il), Saturation flow rate for stream 2 or 5		
s(i2), Saturation flow rate for stream 3 or 6		
P*(oj)		
d(M,LT), Delay for stream 1 or 4		8.5
N, Number of major street through lanes		
d(rank,1) Delay for stream 2 or 5		

HCS2000: Unsignalized Intersections Release 4.1

TWO-WAY STOP CONTROL SUMMARY

Analyst: TOM HARTLEY
Agency/Co.: GaDOT
Date Performed: 8/25/2004
Analysis Time Period: AM PEAK
Intersection: NB OFF RAMP
Jurisdiction:
Analysis Year: 2020
Project ID: HPP-NH-1(156)
East/West Street: SR 257
North/South Street: I-75 OFF RAMP

Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	50	430			400	75
Peak-Hour Factor, PHF		1.00	1.00		1.00	1.00
Hourly Flow Rate, HFR		50	430		400	75
Percent Heavy Vehicles		0	--	--	--	--
Median Type	Undivided					
RT Channelized?						
Lanes	1	1			2	0
Configuration		L	T		T	TR
Upstream Signal?			No			No

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	80		95			
Peak Hour Factor, PHF		1.00		1.00		
Hourly Flow Rate, HFR		80		95		
Percent Heavy Vehicles		0		0		
Percent Grade (%)			0			0
Median Storage						
Flared Approach: Exists?						
Storage						

RT Channelized?		No
Lanes	1	1
Configuration	L	R

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L		L		R			
v (vph)	50		80		95			
C(m) (vph)	1098		346		579			
v/c	0.05		0.23		0.16			
95% queue length	0.14		0.90		0.59			
Control Delay	8.4		18.5		12.4			
LOS	A		C		B			
Approach Delay				15.2				
Approach LOS				C				

HCS2000: Unsignalized Intersections Release 4.1

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TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: TOM HARTLEY
Agency/Co.: GaDOT
Date Performed: 8/25/2004
Analysis Time Period: AM PEAK
Intersection: NB OFF RAMP
Jurisdiction:
Analysis Year: 2020
Project ID: HPP-NH-1(156)
East/West Street: SR 257
North/South Street: I-75 OFF RAMP

Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	50	430		400	75	
Peak-Hour Factor, PHF	1.00	1.00			1.00	1.00
Peak-15 Minute Volume	12	108			100	19
Hourly Flow Rate, HFR	50	430			400	75
Percent Heavy Vehicles	0	--	--		--	--
Median Type	Undivided					
RT Channelized?						
Lanes	1	1		2	0	
Configuration		L	T		T	TR
Upstream Signal?			No		No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	80		95			
Peak Hour Factor, PHF	1.00		1.00			
Peak-15 Minute Volume	20		24			
Hourly Flow Rate, HFR	80		95			
Percent Heavy Vehicles	0		0			
Percent Grade (%)		0			0	
Median Storage						
Flared Approach: Exists?						
Storage						
RT Channelized?				No		
Lanes	1		1			
Configuration		L		R		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
Percent Blockage	0	0	0	0

Upstream Signal Data

Prog.	Sat	Arrival	Green	Cycle	Prog.	Distance

	Flow vph	Flow vph	Type	Time sec	Length sec	Speed mph	to Signal feet
S2 Left-Turn							
Through							
S5 Left-Turn							
Through							

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5
Shared ln volume, major th vehicles:		
Shared ln volume, major rt vehicles:		
Sat flow rate, major th vehicles:		
Sat flow rate, major rt vehicles:		
Number of major street through lanes:		

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(c,base)	4.1		7.5		6.9			
t(c,hv)	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P(hv)	0		0		0			
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00		0.70		0.00			
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage	4.1		6.8		6.9			
2-stage								

Follow-Up Time Calculations

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(f,base)	2.20		3.50		3.30			
t(f,HV)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(HV)	0		0		0			
t(f)	2.2		3.5		3.3			

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
V prog				
Total Saturation Flow Rate, s (vph)				
Arrival Type				
Effective Green, g (sec)				
Cycle Length, C (sec)				
Rp (from table 9-2)				
Proportion vehicles arriving on green P				
g(q1)				
g(q2)				
g(q)				

Computation 2-Proportion of TWSC Intersection Time blocked

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
alpha				
beta				
Travel time, t(a) (sec)				
Smoothing Factor, F				
Proportion of conflicting flow, f				
Max platooned flow, V(c,max)				
Min platooned flow, V(c,min)				
Duration of blocked period, t(p)				
Proportion time blocked, p			0.000	0.000

Computation 3-Platoon Event Periods	Result
p(2)	0.000
p(5)	0.000
p(dom)	
p(subo)	
Constrained or unconstrained?	

Proportion unblocked for minor movements, p(x)	(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Two-Stage Process Stage II

p(1)									
p(4)									
p(7)									
p(8)									
p(9)									
p(10)									
p(11)									
p(12)									

Computation 4 and 5

Single-Stage Process

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
V c,x	475		730		430			
s								
Px								
V c,u,x								
C r,x								
C plat,x								

Two-Stage Process

	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2
V(c,x)								
s	3400							
P(x)								
V(c,u,x)								
C(r,x)								
C(plat,x)								

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.	9	12
Conflicting Flows	430	
Potential Capacity	579	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	579	
Probability of Queue free St.	0.84	1.00

Step 2: LT from Major St.		4		1		
Conflicting Flows			475			
Potential Capacity			1098			
Pedestrian Impedance Factor		1.00		1.00		
Movement Capacity			1098			
Probability of Queue free St.		1.00		0.95		
Maj L-Shared Prob Q free St.						
Step 3: TH from Minor St.		8		11		
Conflicting Flows						
Potential Capacity						
Pedestrian Impedance Factor		1.00		1.00		
Cap. Adj. factor due to Impeding mvmnt			0.95		0.95	
Movement Capacity						
Probability of Queue free St.		1.00		1.00		
Step 4: LT from Minor St.		7		10		
Conflicting Flows	730					
Potential Capacity	362					
Pedestrian Impedance Factor		1.00		1.00		
Maj. L, Min T Impedance factor				0.95		
Maj. L, Min T Adj. Imp Factor.				0.97		
Cap. Adj. factor due to Impeding mvmnt			0.95		0.81	
Movement Capacity	346					

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St.		8		11		
Part 1 - First Stage						
Conflicting Flows						
Potential Capacity						
Pedestrian Impedance Factor						
Cap. Adj. factor due to Impeding mvmnt						
Movement Capacity						
Probability of Queue free St.						
Part 2 - Second Stage						
Conflicting Flows						
Potential Capacity						

Pedestrian Impedance Factor				
Cap. Adj. factor due to Impeding mvmnt				
Movement Capacity				
Part 3 - Single Stage				
Conflicting Flows				
Potential Capacity				
Pedestrian Impedance Factor		1.00	1.00	
Cap. Adj. factor due to Impeding mvmnt		0.95	0.95	
Movement Capacity				
Result for 2 stage process:				
a				
y				
C t				
Probability of Queue free St.		1.00	1.00	
Step 4: LT from Minor St.		7	10	
Part 1 - First Stage				
Conflicting Flows				
Potential Capacity				
Pedestrian Impedance Factor				
Cap. Adj. factor due to Impeding mvmnt				
Movement Capacity				
Part 2 - Second Stage				
Conflicting Flows				
Potential Capacity				
Pedestrian Impedance Factor				
Cap. Adj. factor due to Impeding mvmnt				
Movement Capacity				
Part 3 - Single Stage				
Conflicting Flows	730			
Potential Capacity	362			
Pedestrian Impedance Factor		1.00	1.00	
Maj. L, Min T Impedance factor			0.95	
Maj. L, Min T Adj. Imp Factor.			0.97	
Cap. Adj. factor due to Impeding mvmnt		0.95	0.81	
Movement Capacity	346			
Results for Two-stage process:				
a				
y				

C t 346

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L T	R	L	T	R	
Volume (vph)	80		95			
Movement Capacity (vph)		346		579		
Shared Lane Capacity (vph)						

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7	8	9	10	11	12
	L T	R	L	T	R	
C sep	346		579			
Volume	80		95			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh						
SUM C sep						
n						
C act						

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config	L		L		R			
v (vph)	50		80		95			
C(m) (vph)	1098		346		579			
v/c	0.05		0.23		0.16			
95% queue length	0.14		0.90		0.59			
Control Delay	8.4		18.5		12.4			
LOS	A		C		B			
Approach Delay				15.2				
Approach LOS				C				

Worksheet 11-Shared Major LT Impedance and Delay

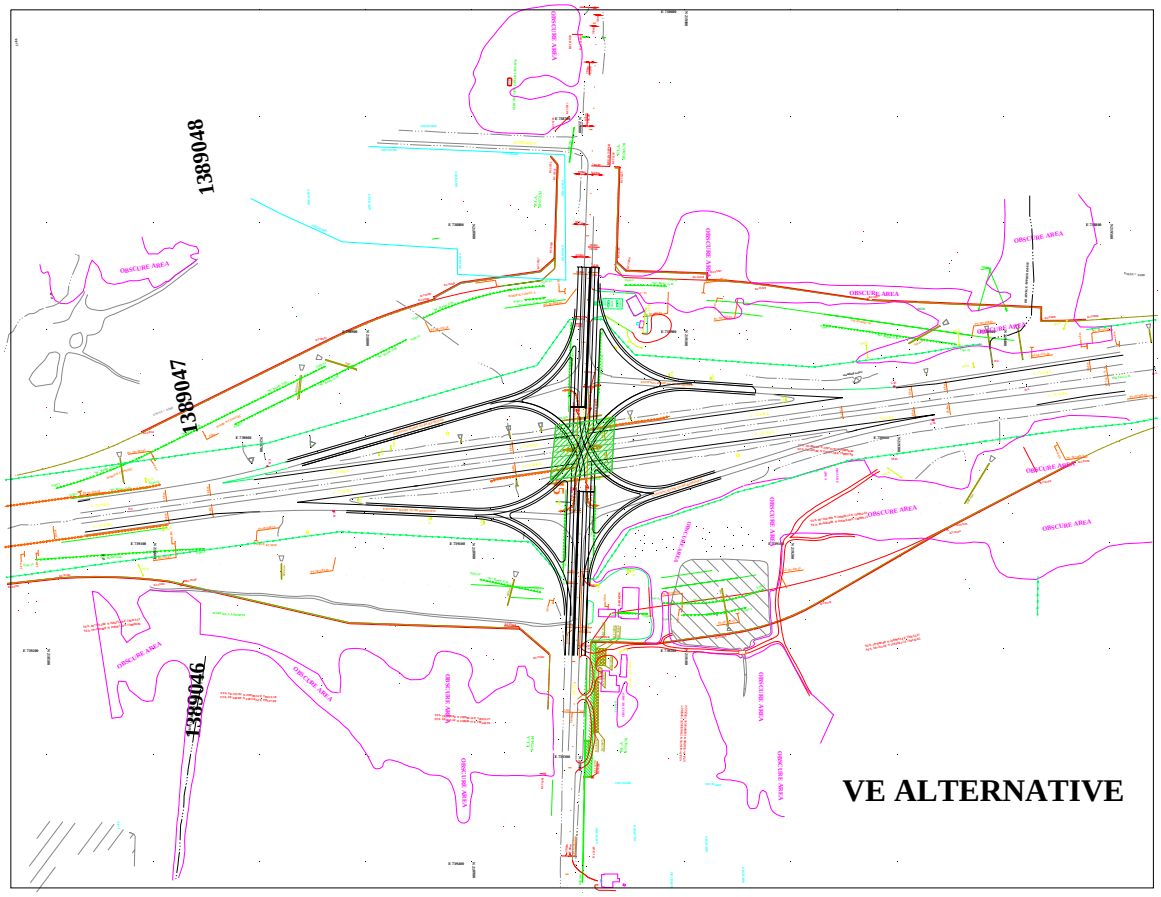
	Movement 2	Movement 5
p(oj)	0.95	1.00
v(il), Volume for stream 2 or 5		
v(i2), Volume for stream 3 or 6		
s(il), Saturation flow rate for stream 2 or 5		
s(i2), Saturation flow rate for stream 3 or 6		
P*(oj)		
d(M,LT), Delay for stream 1 or 4		8.4
N, Number of major street through lanes		
d(rank,1) Delay for stream 2 or 5		

VII.(B)(2) VALUE ENGINEERING ALTERNATIVE

Value Engineering Alternative

The Value Engineering Team recommends constructing a Single Point Interchange at this interchange as shown below. Constructing this configuration creates a single signalized intersection on SR 257. The necessity of placing the left turn ramps on the structure causes the bridge to have a very large deck – 57.3 m X 51.1 m. A Single Point interchange was selected not for its capacity improvements over a Diamond Interchange, but because of the smaller footprint and the associated Right of Way savings. The major advantages of this recommendation:

- No need to acquire additional Right of Way
- Does not impact wetlands.
- Trucks operate better with the large turning radii
- Reduces the widening required to the Gum Creek Bridge



The National Cooperative Highway Research Program Report 345, *Single Point Urban Interchange Design and Operations Analysis* contains more information on the comparison between the Diamond and the Single Point Interchanges.

The major cost savings for this alternative is the Right of Way acquisition cost associated with the construction of a Diamond Interchange. Detailed Right of Way costs are not presently available. Jerry Milligan of the GaDOT Right of Way Office estimated the cost savings for the Value Engineering Team. The approach he used was to eliminate Right of Way that is required from the total and split the remaining costs between the interchange at SR 361 (60%) and the interchange at CR 257 (40%). SR 361 has more Right of Way because of the relocation of the local service road.

View of typical signalization for a Single Point
(view from left turn off)

TRAFFIC ANALYSIS

HCS2000: Signalized Intersections Release 4.1

Thomas Hartley
Ventry Engineering
2066 Luten Road
Quincy
Florida 32352
Phone: 850-627-3900 Fax: 850-875-1330
E-Mail: ventryengineering@aol

PLANNING ANALYSIS

Analyst:	TOM HARTLEY
Intersection:	SPUI
Agency/Co.:	GaDOT
Area Type:	All other areas
Date Performed:	8/25/2004
Jurisdiction:	
Analysis Time Period:	AM PEAK
Analysis Year:	2020

Project ID: HPP-NH-75-1(156)

East/West Street	North/South Street
SR 257	I 75 ON OFF RAMPS

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Num. Lanes	1	2	1	1	2	1	1	0	1	1	0	1
Volume	50	315	80	95	305	75	80		95	75		50
Parking		N			N			N			N	
Coord.		N			N			N			N	
LT Treat.	P			P			P			P		

Peak hour factor: 0.90 Area Type: All other areas

LANE VOLUME WORKSHEET

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
LEFT TURN MOVEMENT				
1. LT volume	50	95	80	75
2. Opposing mainline volume	380	395	50	95
3. Number of exclusive LT lanes	1	1	1	1
Cross Product [2] * [1]	19000	37525	4000	7125
Left Lane Configuration (E=Excl, S=Shrd):	E	E	E	E
Left Turn Treatment Type:	P	P	P	P
4. LT adjustment factor	0.950	0.950	0.950	0.950
5. LT lane vol	53	100	84	79
RIGHT TURN MOVEMENT				
Right Lane Configuration (E=Excl, S=Shrd)	E	E	E	E
6. RT volume	80	75	95	50
7. Exclusive lanes	1	1	1	1
8. RT adjustment factor	0.850	0.850	0.850	0.850
9. Exclusive RT lane volume	94	88	112	59
10. Shared lane vol				
THROUGH MOVEMENT				
11. Thru volume	315	305	0	0
12. Parking adjustment factor	1.00	1.00	1.00	1.00
13. No. of thru lanes including shared	2	2	0	0
14. Total approach volume	315	305	0	0
15. Prop. of left turns in lane group	0.00	0.00	0.00	0.00
16. Left turn equivalence				
17. LT adj. factor:				
18. Through lane volume	158	152	0	0
19. Critical lane volume	158	152	112	59

Left Turn Check (if [16] > 3.5)

20. Permitted left turn sneaker capacity:

7200/Cmax

SIGNAL OPERATIONS WORKSHEET

Phase Plan Selection from Lane Volume Worksheet	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
Critical through-RT vol: [19]	158	152	112	59
LT lane vol: [5]	53	100	84	79
Left turn protection: (P/U/N)	P	P	P	P
Dominant left turn: (Indicate by '<')		<	<	

Selection Criteria based on the specified left turn protection

< Indicates the dominant left turn for each opposing pair

Plan 1:	U	U	U	U
Plan 2a:	U	P	U	P
Plan 2b:	P	U	P	U
Plan 3a:	<P	P	<P	P
Plan 3b:	P	<P	P	<P
Plan 4:	N	N	N	N

Phase plan selected (1 to 4) 3b 3a

Min. cycle (Cmin) 60 Max. cycle (Cmax) 120

Timing Plan	Value	EAST-WEST Ph 1	EAST-WEST Ph 2	EAST-WEST Ph 3	NORTH-SOUTH Ph 1	NORTH-SOUTH Ph 2	NORTH-SOUTH Ph 3
Movement codes		EWL	WTL	EWT	NSL	NTL	NST
Critical phase vol [CV]		53	47	158	79	5	107
Critical sum [CS]	449						
CBD adjustment [CBD]	1.00						
Reference sum [RS]	1539						
Lost time/phase [PL]		4	0	4	4	0	4
Lost time/cycle [TL]	16						
Cycle length [CYC]	60.0						
Phase time		9.2	4.6	19.5	11.7	0.5	14.5
Critical v/c Ratio [Xcm]	0.40						
Status	Under capacity						

I-75/SR 257 INTERCHANGE
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
BRIDGE	SM	$700.00	1927.2	$1,349,040	2928.0	$2,049,621
RETAINING WALL	SF	$40.00	0.0	$0	23475.0	$939,000
SIGNAL	EA	$100,000.00	0.0	$0	1.0	$100,000
EARTHWORK (RAMPS)	CM	$5.00	34080.0	$170,400	16800.0	$84,000
GUM CREEK BRIDGE WIDENING	SM	$700.00	78.0	$54,600	0.0	$0
SUBTOTAL				$1,574,040		$3,172,621
CONSTRUCTION ENGINEERING			10.0%	$157,404	10.0%	$317,262
INFLATION	2	5%	10.3%	$161,339	10.3%	$325,194
WETLAND MITIGATION	AC	$19,400.00	12	$232,800	0	$0
RIGHT OF WAY	LS	$1.00	4058508.0	$4,058,508	0.0	$0
GRAND TOTAL				**$6,184,091**		**$3,815,077**

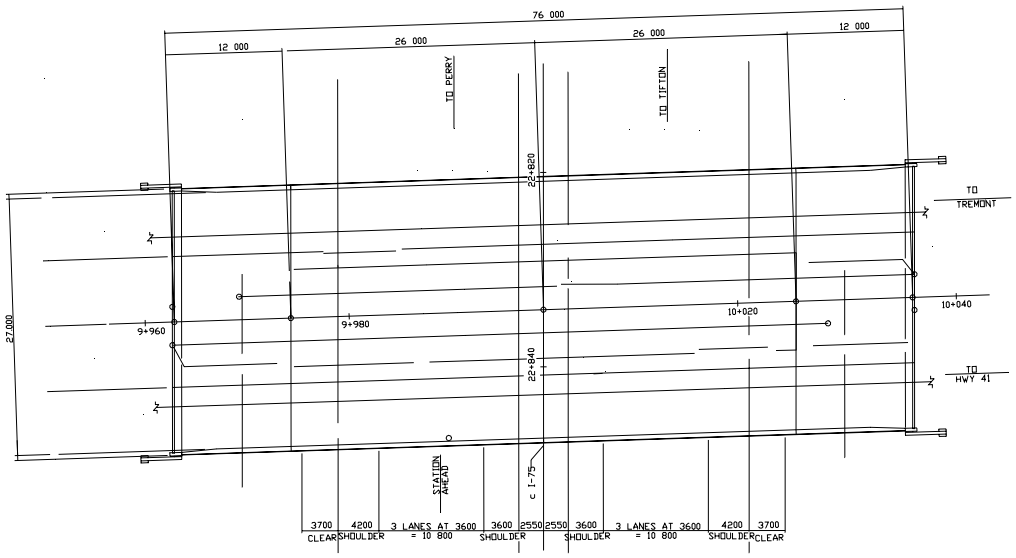
POSSIBLE SAVINGS
$2,369,014

VII.(C) CR 361/FARMERS MARKET ROAD OVERPASS

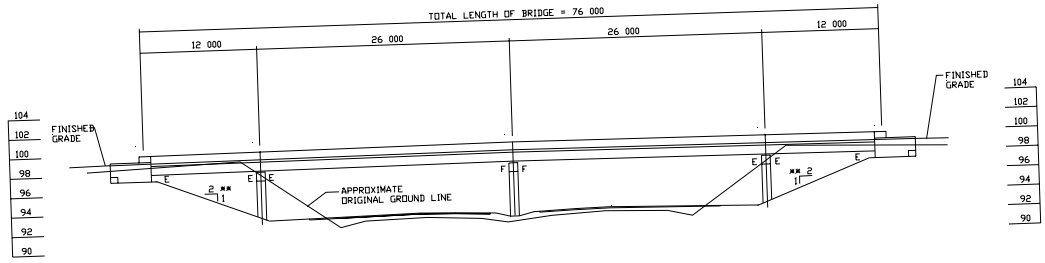
VII.(C)(1) AS PROPOSED

"As Proposed"

The proposed bridge is a 4 span, AASHTO girder, spill through abutment structure. The proposed bridge is 76 m in length and 26.4 m wide. The end slopes are 2(H) to 1(V) and the bridge is located on approximately the same site as the existing bridge. The bridge will be constructed in stages in order to maintain traffic. The approaches are existing embankments.



PLAN



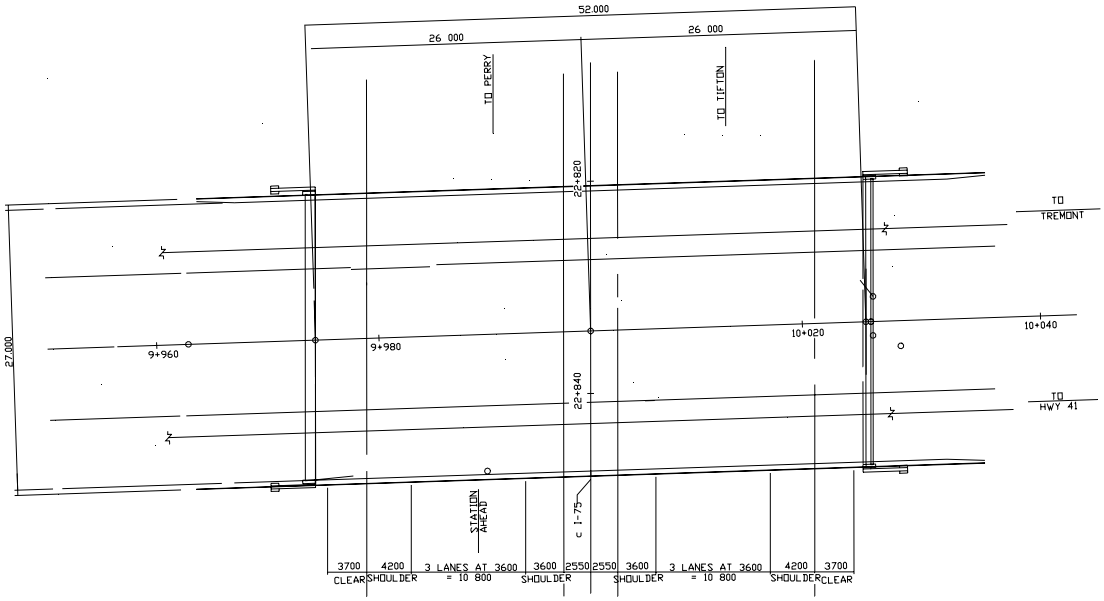
ELEVATION

1

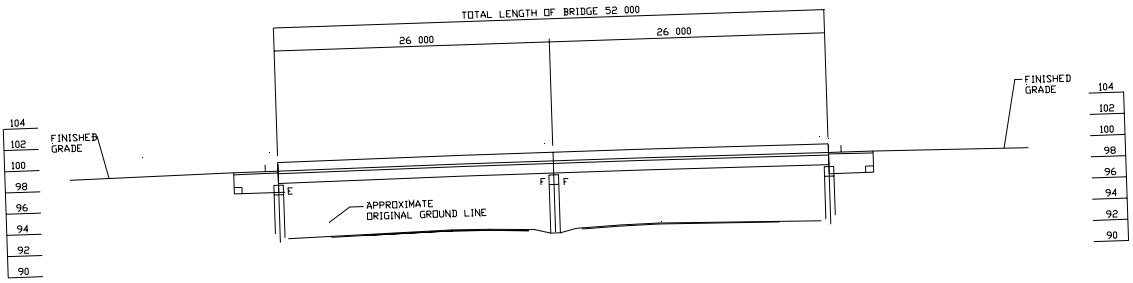
VII. (C)(2) VALUE ENGINEERING ALTERNATIVE

Value Engineering Alternative

The Value Engineering Alternate consists of a 2 span AASHTO girder bridge with MSE wall vertical abutments. The Value Engineering alternate is 52 m in length and 26.4 m wide. This bridge is located on the same site as the existing bridge, and will also be constructed in stages in order to maintain traffic.



PLAN



ELEVATION

CR 361 FARMER'S MKT OVERPASS
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
4 SPAN AASHTO GIRDER BRIDGE W/SPILL THRU ABUTS	SM	$700.00	2082.0	$1,457,400		$0
2 SPAN AASHTO GIRDER BRIDGE	SM	$700.00		$0	1425.0	$997,500
MSE VERTICAL ABUTS	SM	$430.00		$0	422.0	$181,460
BASE AND PAVING	SM	$51.00		$0	648.0	$33,048
SUBTOTAL				$1,457,400		$1,212,008
E & C (10%)				$145,740		$121,201
INFLATION (2YRS @ 5% PER YR)				$149,384		$124,231
GRAND TOTAL				**$1,752,524**		**$1,457,440**

POSSIBLE SAVINGS

$295,084

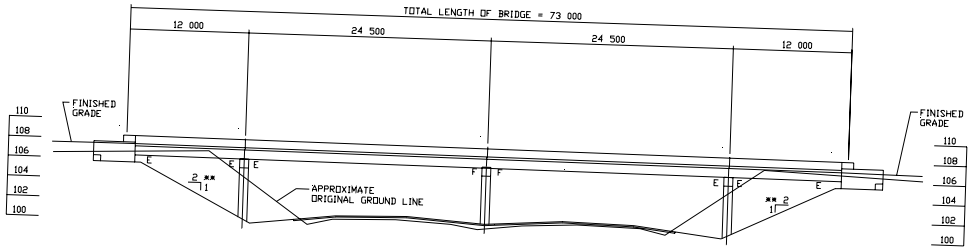
VII.(D) SR 257/8TH AVENUE OVERPASS

VII.(D)(1) AS PROPOSED

"As Proposed"

The proposed bridge is a 4 span, AASHTO girder, spill through abutment structure. The bridge is 73 m in length and 26.4 m wide. The end slopes are 2(H) to 1(V) and the bridge is located on approximately the same site as the existing bridge. The proposed bridge will be constructed in stages in order to maintain traffic. The approaches are existing embankments.

PLAN

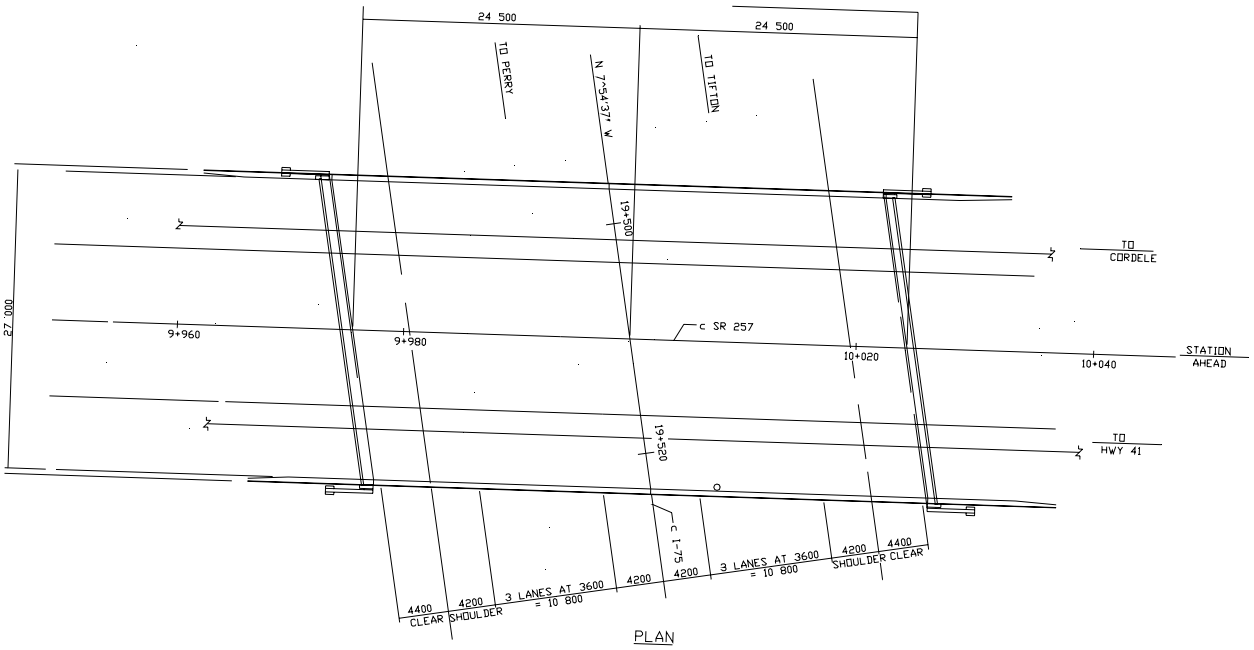


ELEVATION

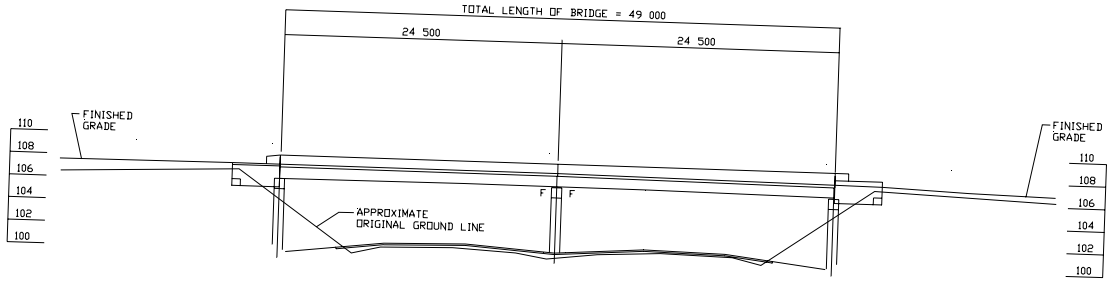
VII. (D)(2) VALUE ENGINEERING ALTERNATIVE

Value Engineering Alternative

The Value Engineering alternate consists of a 2 span, AASHTO girder bridge with MSE wall vertical abutments. The length of this bridge is 49 m and the width is 26.4 m. This bridge is located on the same site as the existing bridge, and it will be constructed in stages.



PLAN



ELEVATION

SR 257/8TH AVE OVERPASS
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
4 SPAN AASHTO GIRDER BRIDGE W/SPILL THRU ABUTS	SM	$700.00	1927.0	$1,348,900		$0
2 SPAN AASHTO GIRDER BRIDGE	SM	$700.00		$0	1294.0	$905,800
MSE VERTICAL ABUTS	SM	$430.00		$0	418.0	$179,740
BASE AND PAVING	SM	$51.00		$0	634.0	$32,334
SUBTOTAL				$1,348,900		$1,117,874
E & C (10%)				$134,890		$111,787
INFLATION(2YRS@5% PER YR)				$138,262		$114,582
GRAND TOTAL				**$1,622,052**		**$1,344,243**

POSSIBLE SAVINGS

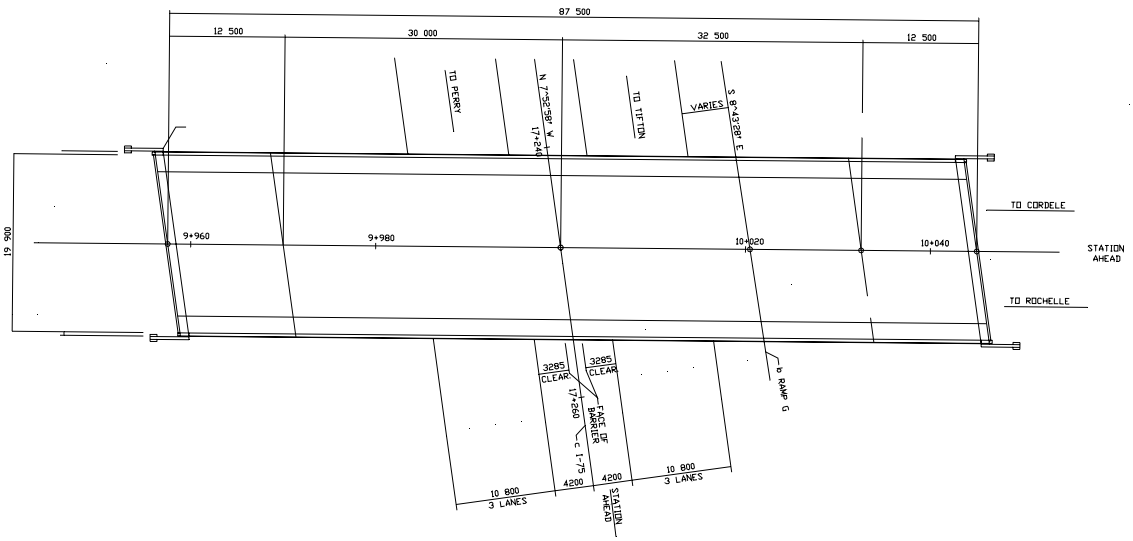
$277,809

VII.(E) CR 361/24TH STREET OVERPASS

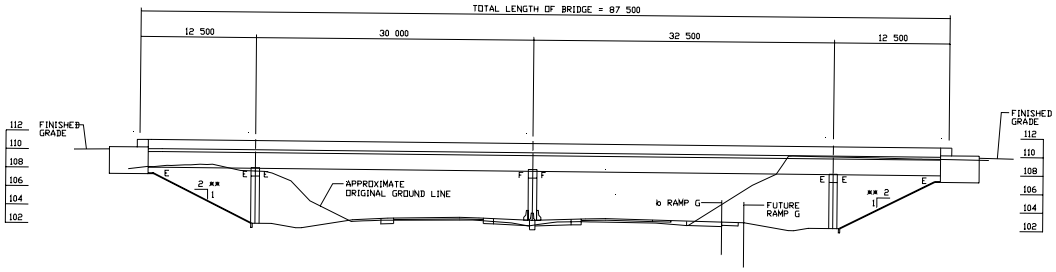
VII.(E)(1) AS PROPOSED

"As Proposed"

The proposed bridge is a 4 span, AASHTO girder, spill through abutment structure. The length is 87.5 m and the width is 19.9 m. The end slopes are 2(H) to 1(V) and the bridge is located on the same site as the existing bridge. 24th Street will be closed to traffic during construction; so stage construction is not required. The approaches are existing embankments.



PLAN

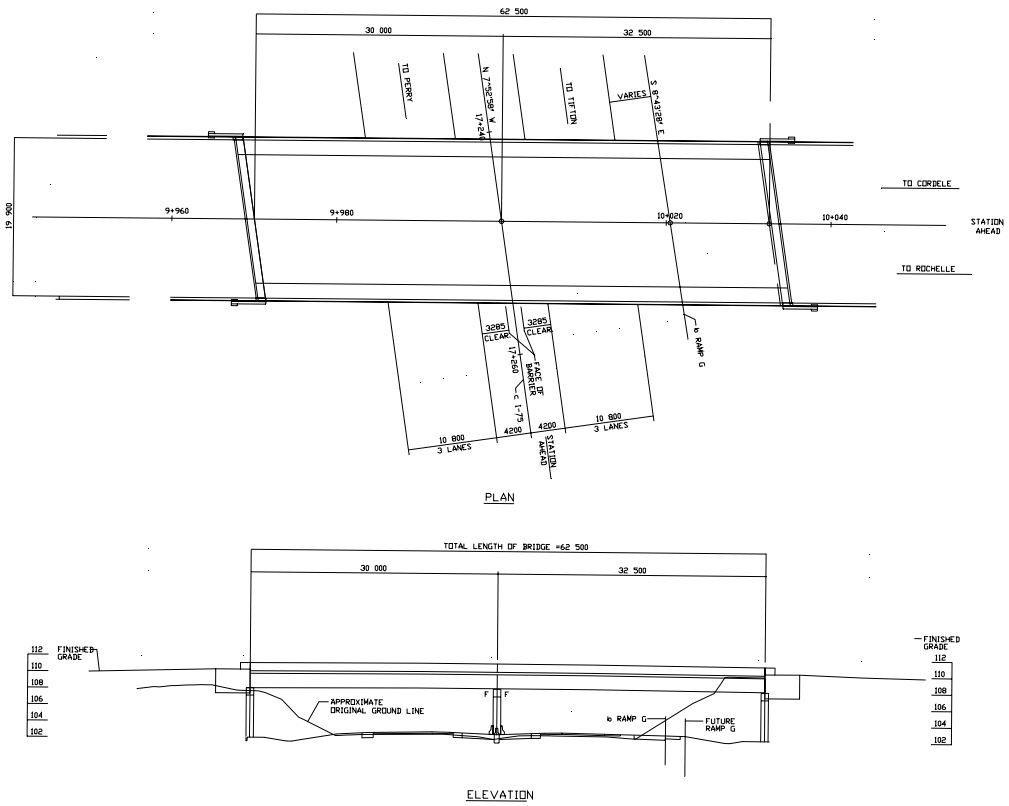


ELEVATION

VII.(E)(2) VALUE ENGINEERING ALTERNATIVE

Value Engineering Alternative

The Value Engineering alternate consists of a 2 span AASHTO girder bridge with MSE wall vertical abutments. The length is 62.5 m and the width is 19.9 m. This bridge is also on the site of the existing bridge, and since 24St will be closed to traffic, stage construction is not required.



CR 361-24TH ST OVERPASS
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
4 SPAN AASHTO GIRDER BRIDGE W/SPILL THRU ABUTS	SM	$700.00	1745.0	1221500		$0
2 SPAN AASHTO GIRDER BRIDGE	SM	$700.00		$0	1244.0	$870,800
MSE VERTICAL ABUTS	SM	$430.00		$0	289.0	$124,270
BASE AND PAVING	SM	$51.00		$0	498.0	$25,398
SUBTOTAL				$1,221,500		$1,020,468
E & C (10%)				$122,150		$102,047
INFLATION (2YRS@5%PER YR)				$125,204		$104,598
GRAND TOTAL				**$1,468,854**		**$1,227,113**

POSSIBLE SAVINGS

$241,741

VII.(F) I-75/SR 30 BRIDGE

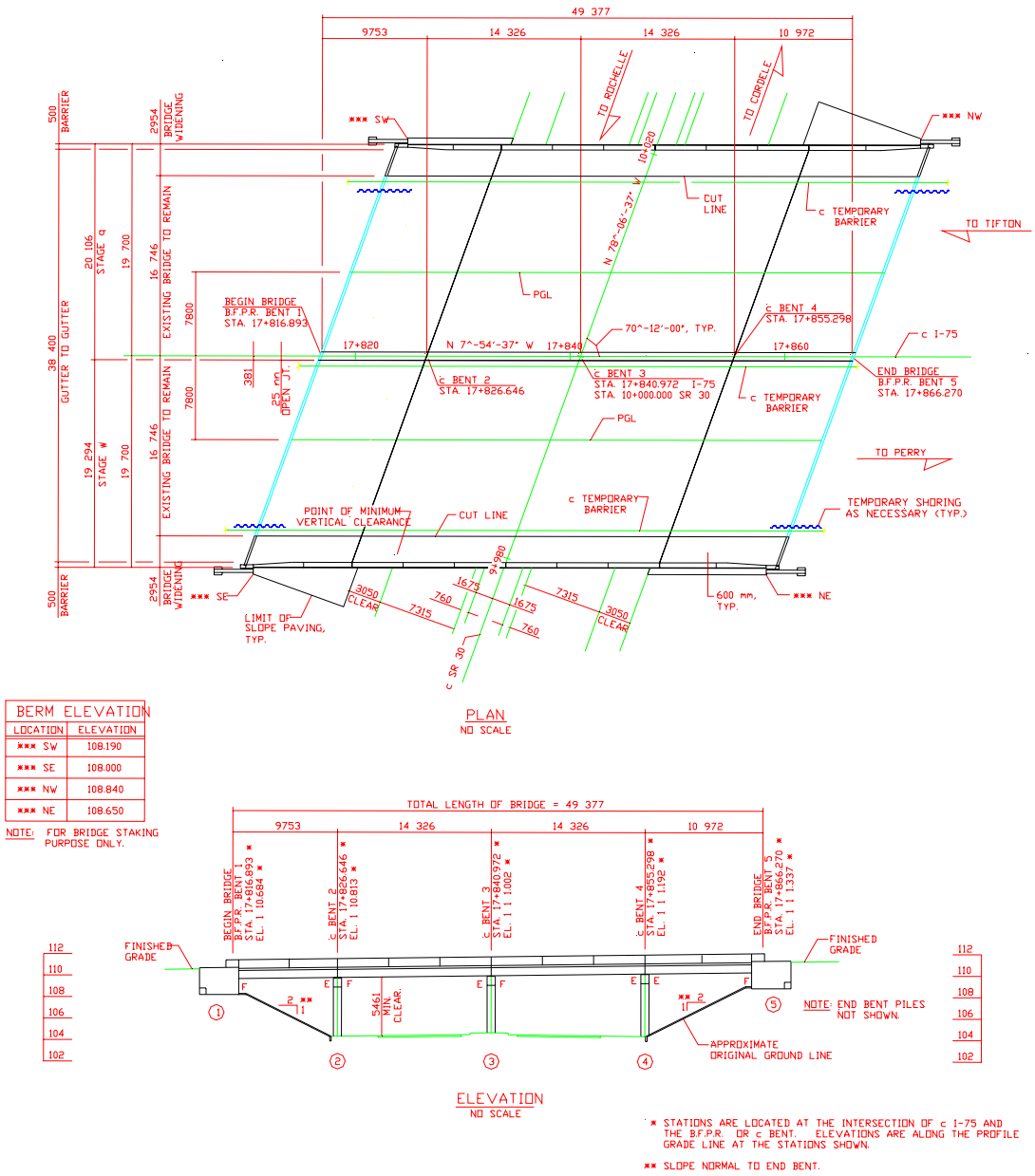
VII.(F)(1) AS PROPOSED

"As Proposed"

Interstate 75 in Crisp County can be considered as a rural interstate system, even though the ADT is approaching 50,000 VPD. The design ADT for this area exceeds 70,000 VPD. SR 30 / US 280 is a major local roadway, with almost 20,000 VPD.

Project HPP-NH-75-1(156) proposes to widen I-75 in the study area from two 3.6m lanes to three 3.6m lanes in each direction. SR 30 / US 280 exists as a divided four-lane facility at the interchange with I-75 and there are no improvements included in this project for the SR 30 corridor except for a traffic signal at the southbound exit ramp.

Interstate 75 crosses over SR 30 on two parallel four-span plate girder bridges. These bridges were constructed in 1960 during the original construction of the interstate. They have been previously widened in 1985 to the median side and have been overlayed with asphalt. The existing bridges total 49.377m in length and 33.524m in width. The sufficiency rating for these bridges is 78.



The project proposes to jack these bridges ranging from 725mm to 878mm. The bridges will also be rotated to improve the cross slope from 1.04% to 2%. After the jacking and rotation, the bridges will be widened to the outside to provide the additional width to accommodate two new 3.6m lanes. The widening will use plate girders to match the existing structures. Steel bridge work is currently very high priced with a square meter of bridge construction using steel girders costing $1620 per square meter.

During the presentation of the project, the Value Engineering Team was advised that the existing decks will be overlayed. District personnel shared that in similar projects the existing decks required extensive work to repair. In discussions with GDOT personnel, the existing deck may need extensive removal and repair (25% or more) of unsound concrete. *Special Provision 519* establishes a price of $312 per square meter for this work. The personnel from the District requested that the bridges be replaced rather than widened due to the problems being experienced.

The estimated cost of widening the parallel bridges on I-75 over SR 30 is $1,765,702.

VII.(F)(2) VALUE ENGINEERING ALTERNATIVE

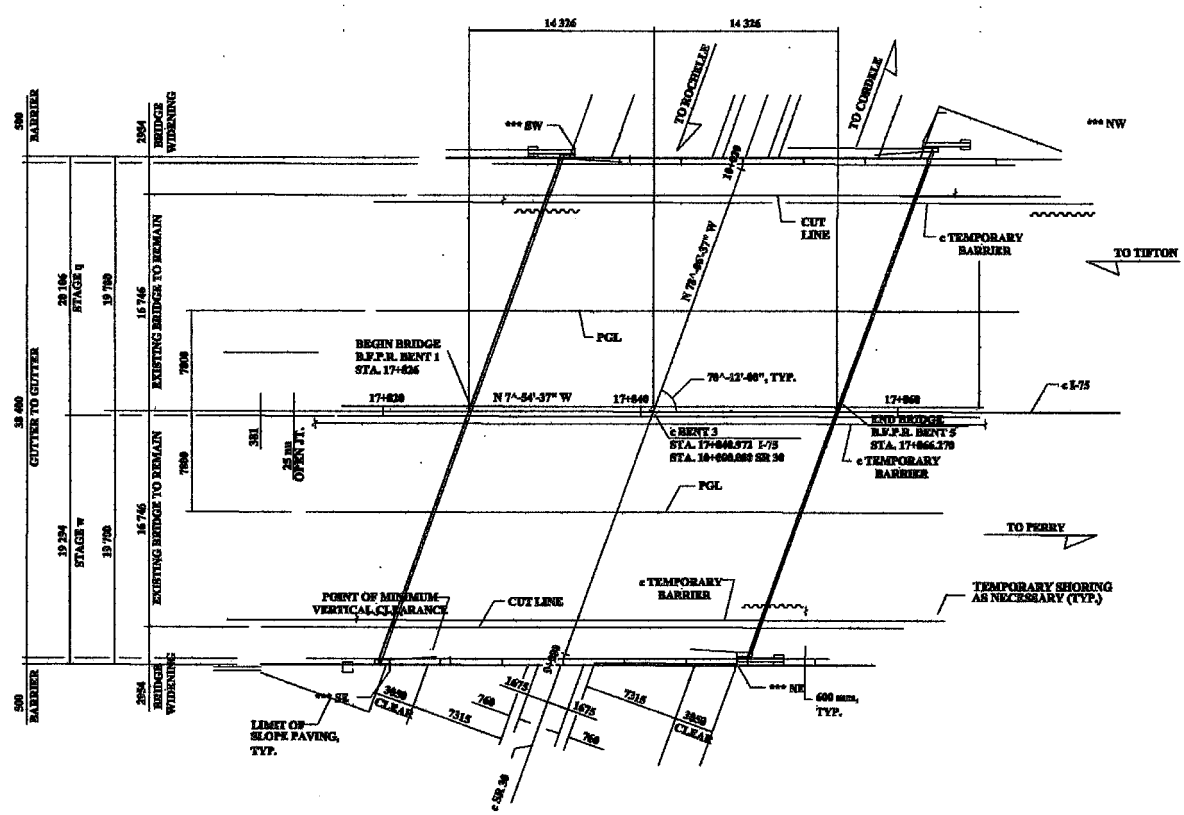
Value Engineering Alternative

The main portions of the I-75 bridges over State Route 30 were constructed in 1960. The normal life expectancy of bridges constructed during this time was 50-years. Therefore, it was the conclusion of the Value Engineering Team that the bridges should not be widened, but replaced. This would provide new structures with a new full life expectancy of 75 years.

The Value Engineering Alternative is therefore to replace these structures completely. The new bridges could use concrete AASHTO beams. By using MSE walls, the spans could be reduced from four to two. Also, the need for jacking and rotating of existing structures would be eliminated as new structures could be built to the required elevations. The cost to widen a bridge using steel is $1620 per square meter, while the construction of a new bridge using AASHTO beams is $720 per square meter. By constructing new bridges, the very expensive concrete bridge deck overlay and unsound concrete replacement work would not be needed. The staging would be modified by shifting the existing two lanes to the inside and building new structures to the outside to accommodate two travel lanes. Traffic could then be shifted to the new bridges and the remaining portions of the new bridges could be built to the inside.

These resultant Value Engineering bridges would be 28.652m in length and 39.400m in width. In addition to the MSE walls, some additional embankment and roadway would be required due the reduced bridge lengths.

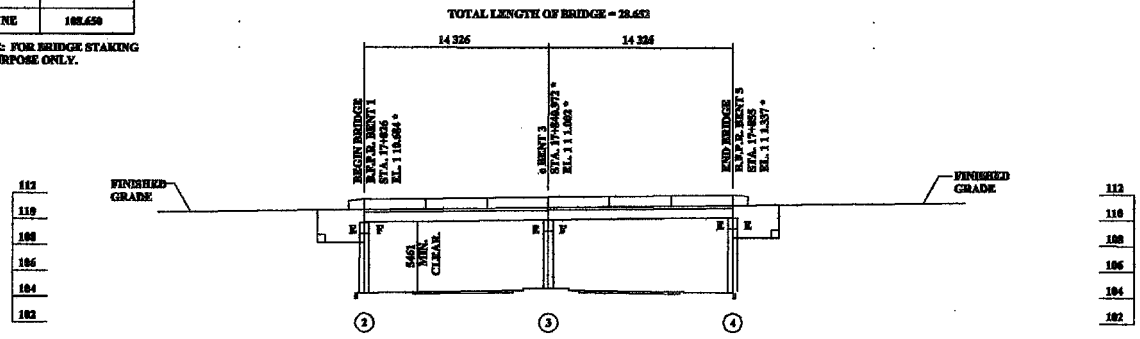
The estimated cost of constructing new bridges on I-75 over SR 30 is $1,472,206. The savings of almost $300,000 is minimal in comparison to the fact that these would be new structures. A life cycle cost analysis follows and it was determined that a Life Cycle Cost savings of almost $1.2 million could be realized by constructing new bridges.



PLAN
NO SCALE

BERM ELEVATION	
LOCATION	ELEVATION
*** SW	102.190
*** SE	102.000
*** NW	102.240
*** NE	102.650

NOTE: FOR BRIDGE STAKING PURPOSE ONLY.



ELEVATION
NO SCALE

* STATIONS ARE LOCATED AT THE INTERSECTION OF c I-75 AND THE B.F.P.R. OR c BENT. ELEVATIONS ARE ALONG THE PROFILE GRADE LINE AT THE STATIONS SHOWN.

** SLOPE NORMAL TO END BENT.

VE ALTERNATIVE

LIFE CYCLE COST ANALYSIS

A life cycle cost analysis was performed on the I-75 bridges over SR 30. This table is shown on the following sheet and resulted in a Life Cycle Cost savings of almost $1.2 million. The following is an outline of the assumptions that were used in performing this analysis:

- From information supplied by the Bridge Maintenance Office, a cost of $110,000 for painting the steel girders every 20 years was applied.
- Further, a cost of $25 per linear foot was used to reseal the joints every 5 years.
- The original bridges were built in 1960. With a 50-year life expectancy, the original bridges would require replacing some 5 years after this project is complete.
- The first widening of these bridges was accomplished in 1985. Therefore, this work would need replacing in the year 2035 or 30 years from now.
- With any widening, the cost of repainting the steel girders was included.
- At the end of the analysis period, a salvage was determined based on the percentage of the life that had been expended after the replacement of the various parts for the steel bridges.
-

The replacement bridges as proposed by this report would still retain 25 years of life expectancy since current bridges are designed for a 75-year life expectancy.

F. INTERSTATE 75 OVER STATE ROUTE 30
COMPARISON
50 Year Life Cycle Cost Comparison
Enter the Interest Rate = 5%

		AS PROPOSED		VE	
Year		**Total**	**Present Worth**	**Total**	**Worth**
0	INITIAL COST	$1,472,000	-$1,472,000	$1,225,000	-$1,225,000
1					
2					
3					
4					
5	REPLACE ORIGINAL	$1,500,000	-$1,175,289	$6,600	-$5,171
6					
7					
8					
9					
10	SEAL JOINTS	$16,000	-$9,823	$6,600	-$4,052
11					
12					
13					
14					
15	SEAL JOINTS	$16,000	-$7,696	$6,600	-$3,175
16					
17					
18					
19					
20	SEAL JOINTS	$16,000	-$6,030	$6,600	-$2,487
21					
22					
23					
24					
25	PAINT BEAMS	$110,000	-$32,483		
26	SEAL JOINTS		$0	$6,600	-$1,856
27					
28					
29					
30	SEAL JOINTS	$16,000	-$3,702	$6,600	-$1,527
31					
32					
33					
34					
35	REPLACE WIDENING	$1,850,000	-$335,387	$6,600	-$1,197
36					
37					
38					

39					
40	SEAL JOINTS	$16,000	-$2,273	$6,600	-$938
41					
42					
43					
44					
45	SEAL JOINTS	$16,000	-$1,781	$6,600	-$735
46					
47					
48					
49					
50	SALVAGE	$1,445,000	$1,445,000		$820,000
			-$1,601,464		**-$426,137**

Life Cycle Cost Savings Summary

$1,601,464 - $426,137= $1,175,327

INTERSTATE 75 OVER STATE ROUTE 30
VALUE ENGINEERING ALTERNATIVE
CONSTRUCTION COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
BRIDGE WIDENING (STEEL BEAMS)	SM	$1,620.00	290.1	$470,027		
JACK EXISTING BRIDGE	SM	$216.00	1655.3	$357,547		
CONCRETE OVERLAY	SM	$300.00	1655.3	$496,590		
UNSOUND CONCRETE REPLACEMENT	SM	$312.00	331.0	$103,272		
CONSTRUCT NEW TWO SPAN BRIDGE	SM	$702.00			1128.9	$792,481
REMOVE EXISTING BRIDGE	SM	$162.00			1655.3	$268,160
BORROW EXCAVATION	CM	$4.27			2574.0	$10,991
MSE WALLS	SM	$432.00			277.2	$119,750
ROADWAY	SM	$50.98			660.0	$33,647
SUBTOTAL				$1,427,436		$1,225,029
E. & C. (10%)	10%			$142,744		$122,503
INFLATION (2YRS @ 5% PER YR.)	5%			$195,523		$124,674
GRAND TOTAL				**$1,765,702**		**$1,472,206**

POSSIBLE CONSTRUCTION COST SAVINGS $293,496

VII.(G) I-75/CSX RAILROAD BRIDGE

VII.(G)(1) AS PROPOSED

"As Proposed"

Project HPP-NH-75-1(156) proposes to widen I-75 in the study area from two 3.6m lanes to three 3.6m lanes in each direction. Interstate 75 crosses over the CSX Railroad on two parallel three-span plate girder bridges. These bridges were constructed during the original construction of the interstate in 1960. They were previously widened in 1984 to the median side and have been overlayed with asphalt. The sufficiency rating for these bridges is 87.66.

The existing bridges total 44.5m in length and 42.4m in width. The project proposes to jack these bridges from 698mm to 895mm. The jacking is necessary to obtain the required vertical clearance over the railroad. The bridges will also be rotated to improve the cross slope from 1.04% to 2%. After the jacking and rotation, the bridges will be widened to the outside to provide the additional width to accommodate one new 3.6m lane in each direction. Some additional width is required due to the entrance and exit ramps from SR 30. The widening will use plate girders to match the existing structures.

During this reconstruction, the existing decks will be overlayed. District personnel shared that in similar projects the existing decks required extensive work to repair and they requested that if at all possible that the bridges be replaced rather than widened.

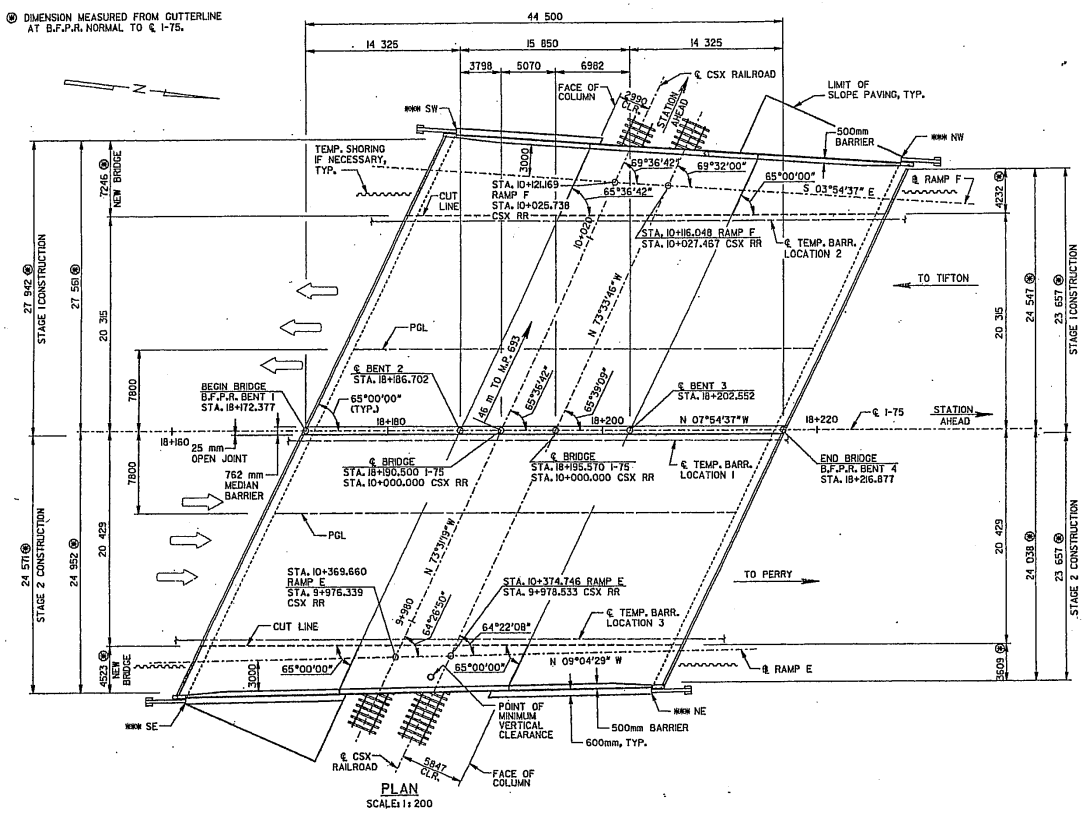
The estimated cost of widening the parallel bridges on I-75 over the CSX Railroad is $2,174,691.

STATE	PROJECT NUMBER	SHEET NO.
GA.	HPP-NH-75-1(156)Ct.1	720

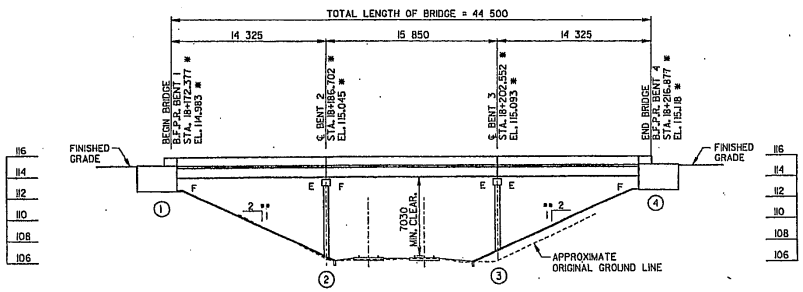
Metric

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS, UNLESS OTHERWISE NOTE ELEVATIONS ARE IN METERS.



PLAN
SCALE: 1:200



ELEVATION
SCALE: 1:200

* STATIONS ARE LOCATED AT THE INTERSECTION OF ℄ I-75 AND THE B.F.P.R. OR ℄ BENT. ELEVATIONS ARE ALONG THE PROFILE GRADE LINE AT THE STATIONS SHOWN.

** SLOPE NORMAL TO END BENT

AS PROPOSED

GEORGIA
DEPARTMENT OF TRANSPORTATION
PRECONSTRUCTION DIVISION-OFFICE OF BRIDGE DESIGN

PRELIMINARY LAYOUT
WIDENING I-75 OVER CSX RAILROAD

CRISP COUNTY — HPP-NH-75-1(156)

SCALE: AS SHOWN

GEORGIA REGISTERED No. 14408 PROFESSIONAL ENGINEER WILLIAM G. JORDAN

BRIDGE SHEET	DATE	REVISIONS	DESIGNED JL	CHECKED TLS	REVIEWED JPT

PLOT DRIVER: #Lustm.Jk70
Filename: p:\tr-0\6251-59\bridge3\preliminary\6251b3pa.dgn
Date: 06/28/02 Time: 08:43 PM
Name: SIG

VII.(G)(2) VALUE ENGINEERING ALTERNATIVE

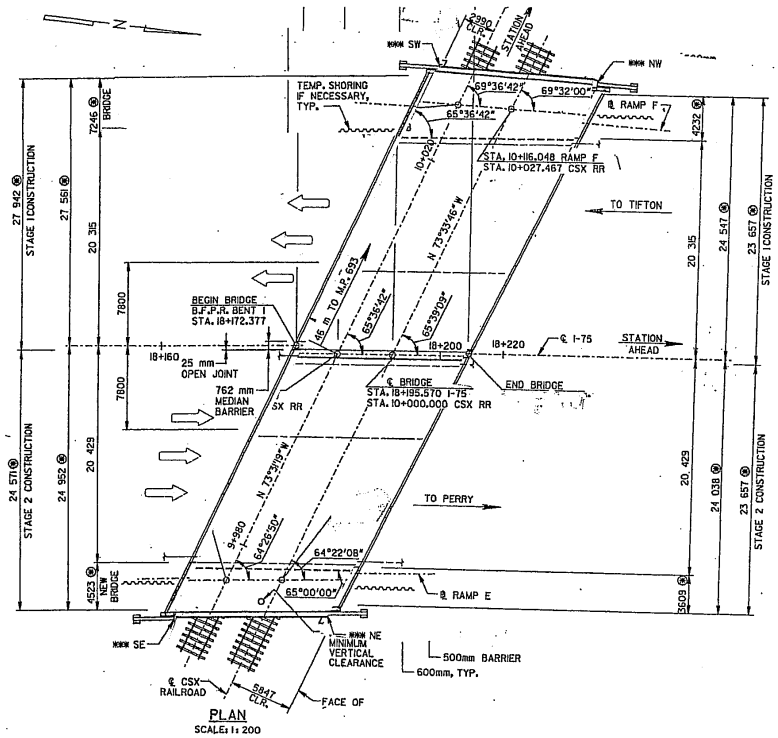
Value Engineering Alternative

With the original construction of the I-75 bridges being 45 years ago and the subsequent reconstruction being almost 20 years ago, a significant portion of the expectant life of these bridges has been used. Therefore, it was the conclusion of the VE Team that the bridges should not be widened, but replaced. This would provide complete new structures with a new full life expectancy of 75 years.

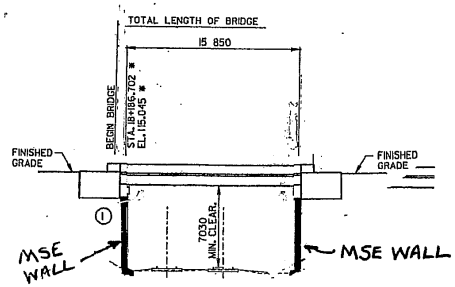
The Value Engineering Alternative is therefore to replace these structures completely. The new bridges could use concrete AASHTO beams. By using MSE walls, the spans could be reduced from three to one. Also, the need for jacking and rotating of the existing structures would be eliminated as new structures could be built to the required elevations. The cost to widen a bridge using steel is $1620 per square meter, while the construction of a new bridge using AASHTO beams is $720 per square meter. The staging would be modified by shifting the existing two lanes to the inside and building new structures to the outside to accommodate two travel lanes. Traffic could then be shifted to the new bridges and the remaining portions of the new bridges could be built to the inside.

These resultant Value Engineering bridges would be 15.850m in length with a width of 52.513m on the south end and a width of 48.586m on the north end. (The width differences are due to the SR 30 interchange ramps.) In addition to the MSE walls, some additional embankment and roadway would be required due the reduced bridge lengths.

The estimated cost of constructing new bridges on I-75 over the CSX Railroad is $1,322,379. This provides a significant savings of over $850,000. Also, a life cycle cost analysis was performed for the SR 30 overpass just to the south of this location. Comparable life cycle cost savings could also be realized at this location.



PLAN
SCALE: 1:200



ELEVATION
SCALE: 1:200

VE ALTERNATIVE

GEORGIA
DEPARTMENT OF TRANSPORTATION
PRECONSTRUCTION DIVISION-OFFICE OF BRIDGE DESIGN

PRELIMINARY LAYOUT
WIDENING I-75 OVER CSX RAILROAD

CRISP COUNTY — HPP-NH-75-1(156) Ct. 1

SCALE: AS SHOWN

BRIDGE SHEET — DESIGNED JL — CHECKED TLS — REVIEWED JPT / MCD

INTERSTATE 75 OVER THE CSX RAILROAD
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
BRIDGE WIDENING (STEEL BEAMS)	SM	$1,620.00	436.3	$706,838		
JACK EXISTING BRIDGE	SM	$216.00	1888.7	$407,953		
CONCRETE OVERLAY	SM	$300.00	1888.7	$566,610		
UNSOUND CONCRETE REPLACEMENT	SM	$312.00	377.7	$117,842		
CONSTRUCT NEW SINGLE SPAN BRIDGE	SM	$702.00			801.2	$562,442
REMOVE EXISTING BRIDGE	SM	$162.00			1888.7	$305,969
BORROW EXCAVATION	CM	$4.27			2000.0	$8,540
MSE WALLS	SM	$432.00			457.4	$197,597
ROADWAY	SM	$50.98			280.0	$14,274
SUBTOTAL				$1,799,244		$1,088,823
E. & C. (10%)	10%			$179,924		$108,882
INFLATION (2YRS @ 5% PER YR.)	5%			$195,523		$124,674
GRAND TOTAL				**$2,174,691**		**$1,322,379**

POSSIBLE SAVINGS $852,312

VII.(H) I-75/GEORGIA SOUTHWEST RAILROAD BRIDGE

VII.(H)(1) AS PROPOSED

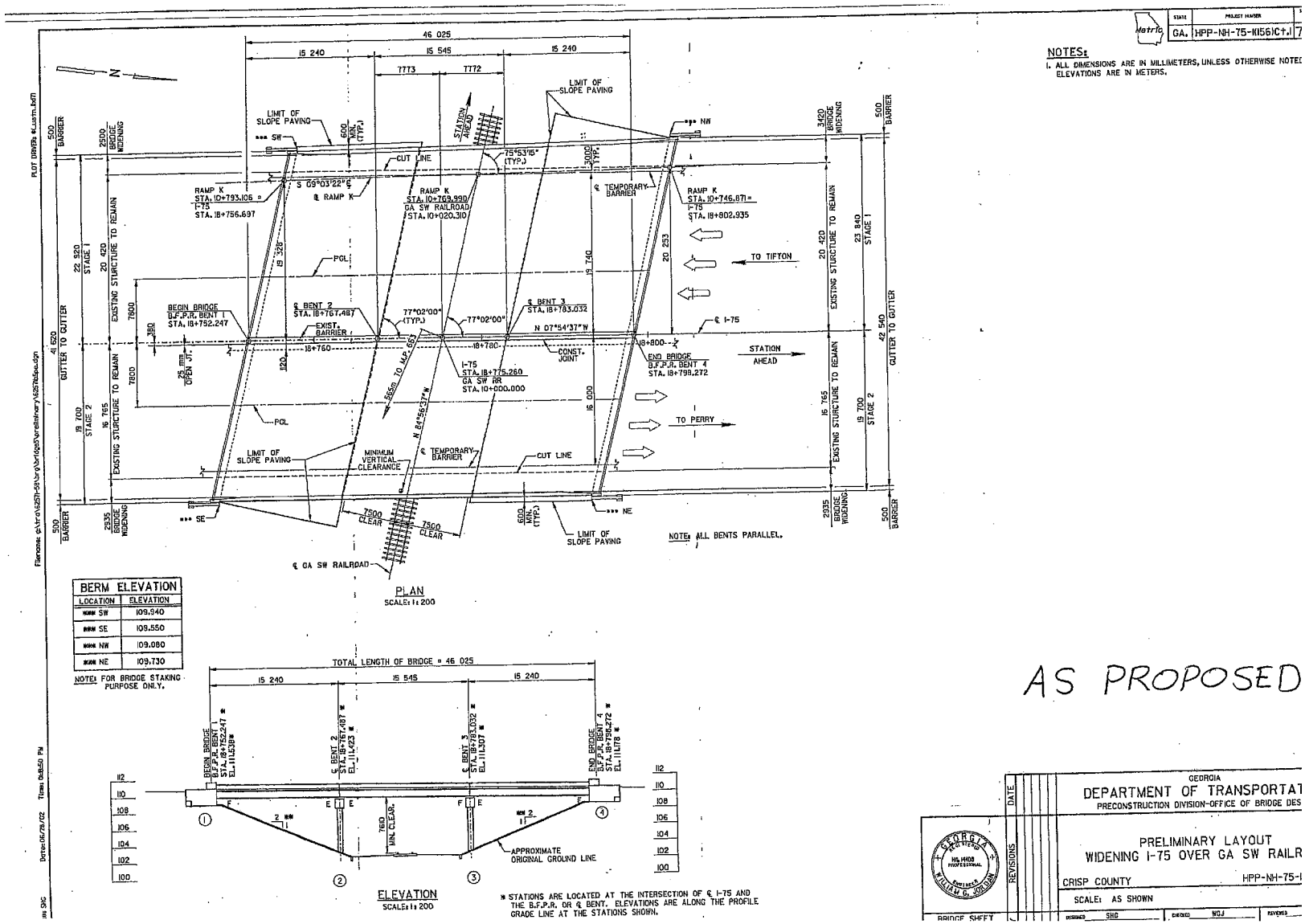
"As Proposed"

Project HPP-NH-75-1(156) proposes to widen I-75 in the study area from two 3.6m lanes to three 3.6m lanes in each direction. Interstate 75 crosses over the GA SW Railroad on two parallel three-span plate girder bridges. These bridges were constructed during the original construction of the interstate in 1960. They were previously widened in 1984 to the median side and have been overlayed with asphalt. The sufficiency rating for these bridges was listed in the Concept Report as being 74.8.

The existing bridges are approximately 46m in length and 37m in width. The project proposes to jack and rotate these bridges to improve the cross slope from 1.04% to 2%. After the jacking and rotation, the bridges will be widened to the outside to provide the additional width to accommodate one new 3.6m lane in each direction. Minor additional width is required due to the entrance and exit ramps for the SR 257 interchange. The widening will use plate girders to match the existing structures.

During this reconstruction, the existing decks will be overlayed. District personnel shared that in similar projects the existing decks required extensive work to repair. They requested bridge replacement rather than widening of the existing structures.

The estimated cost of the proposed widening of the parallel bridges on I-75 over the GA SW Railroad is $1,767,893.



BERM ELEVATION	
LOCATION	ELEVATION
SW	109.940
SE	109.550
NW	109.080
NE	109.730

NOTE: FOR BRIDGE STAKING PURPOSE ONLY.

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS, UNLESS OTHERWISE NOTED ELEVATIONS ARE IN METERS.

STATE	PROJECT NUMBER
GA.	HPP-NH-75-K(156)Ct.1

AS PROPOSED

GEORGIA
DEPARTMENT OF TRANSPORTAT
PRECONSTRUCTION DIVISION-OFFICE OF BRIDGE DES

PRELIMINARY LAYOUT
WIDENING I-75 OVER GA SW RAILR

CRISP COUNTY HPP-NH-75-I

SCALE: AS SHOWN

DESIGNED SHG CHECKED WGJ REVIEWED

BRIDGE SHEET

VII.(H)(2) VALUE ENGINEERING ALTERNATIVE

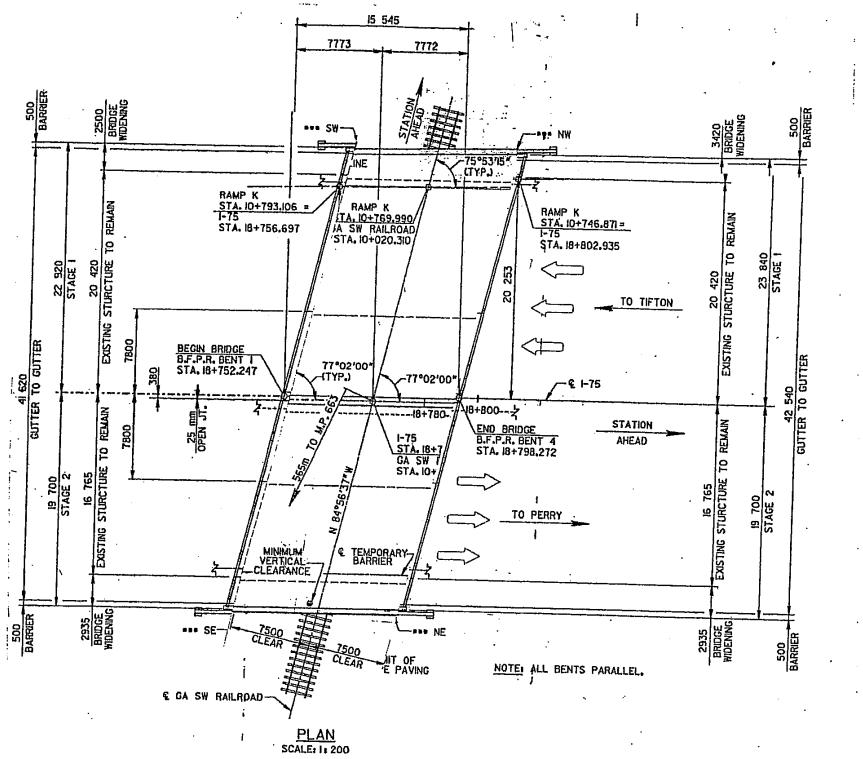
Value Engineering Alternative

With the original construction of the I-75 bridges being 45 years ago and the subsequent reconstruction being almost 20 years ago, a significant portion of the expectant life of these bridges has been used. Therefore, it was the conclusion of the VE Team that the bridges should not be widened, but replaced. This would provide complete new structures with a new full life expectancy of 75 years.

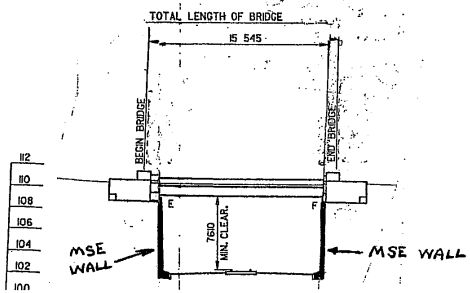
The Value Engineering Alternative is therefore to replace these structures completely. The new bridges could use concrete AASHTO beams. By using MSE walls, the spans could be reduced from three to one. Also, the need for jacking and rotating of the existing structures would be eliminated as new structures could be built to the required elevations. The cost to widen a bridge using steel is $1620 per square meter, while the construction of a new bridge using AASHTO beams is $720 per square meter. The staging would be modified by shifting the existing two lanes to the inside and building new structures to the outside to accommodate two travel lanes. Traffic could then be shifted to the new bridges and the remaining portions of the new bridges could be built to the inside.

These resultant VE bridges would be approximately 15.545m in length with an average width of approximately 43.2m. (The widths vary on both ends of the bridges due to the SR 257 interchange ramps.) In addition to the MSE walls, some additional embankment and roadway would be required due the reduced bridge lengths.

The estimated cost of constructing new bridges on I-75 over the GA SW Railroad is $1,175,786. This provides a significant savings of over $590,000. Also, a life cycle cost analysis was performed for the SR 30 overpass just to the south of this location. Comparable life cycle cost savings could be realized at this location.



PLAN
SCALE: 1: 200



VE ALTERNATIVE

GEORGIA
DEPARTMENT OF TRANSPORTATION
PRECONSTRUCTION DIVISION-OFFICE OF BRIDGE DESIGN

PRELIMINARY LAYOUT
WIDENING I-75 OVER GA SW RAILROAD

DATE
REVISIONS

GEORGIA REGISTERED No. 14408 PROFESSIONAL

INTERSTATE 75 OVER THE GA SW RAILROAD
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
BRIDGE WIDENING (STEEL BEAMS)	SM	$1,620.00	271.3	$439,538		
JACK EXISTING BRIDGE	SM	$216.00	1711.4	$369,671		
CONCRETE OVERLAY	SM	$300.00	1711.4	$513,420		
UNSOUND CONCRETE REPLACEMENT	SM	$312.00	342.3	$106,798		
CONSTRUCT NEW SINGLE SPAN BRIDGE	SM	$702.00			671.3	$471,260
REMOVE EXISTING BRIDGE	SM	$162.00			1711.4	$277,247
BORROW EXCAVATION	CM	$4.27			1370.0	$5,850
MSE WALLS	SM	$432.00			444.5	$192,024
ROADWAY	SM	$50.98			180.0	$9,176
SUBTOTAL				$1,429,427		$955,557
E. & C. (10%)	10%			$142,943		$95,556
INFLATION (2YRS @ 5% PER YR.)	5%			$195,523		$124,674
GRAND TOTAL				**$1,767,893**		**$1,175,786**

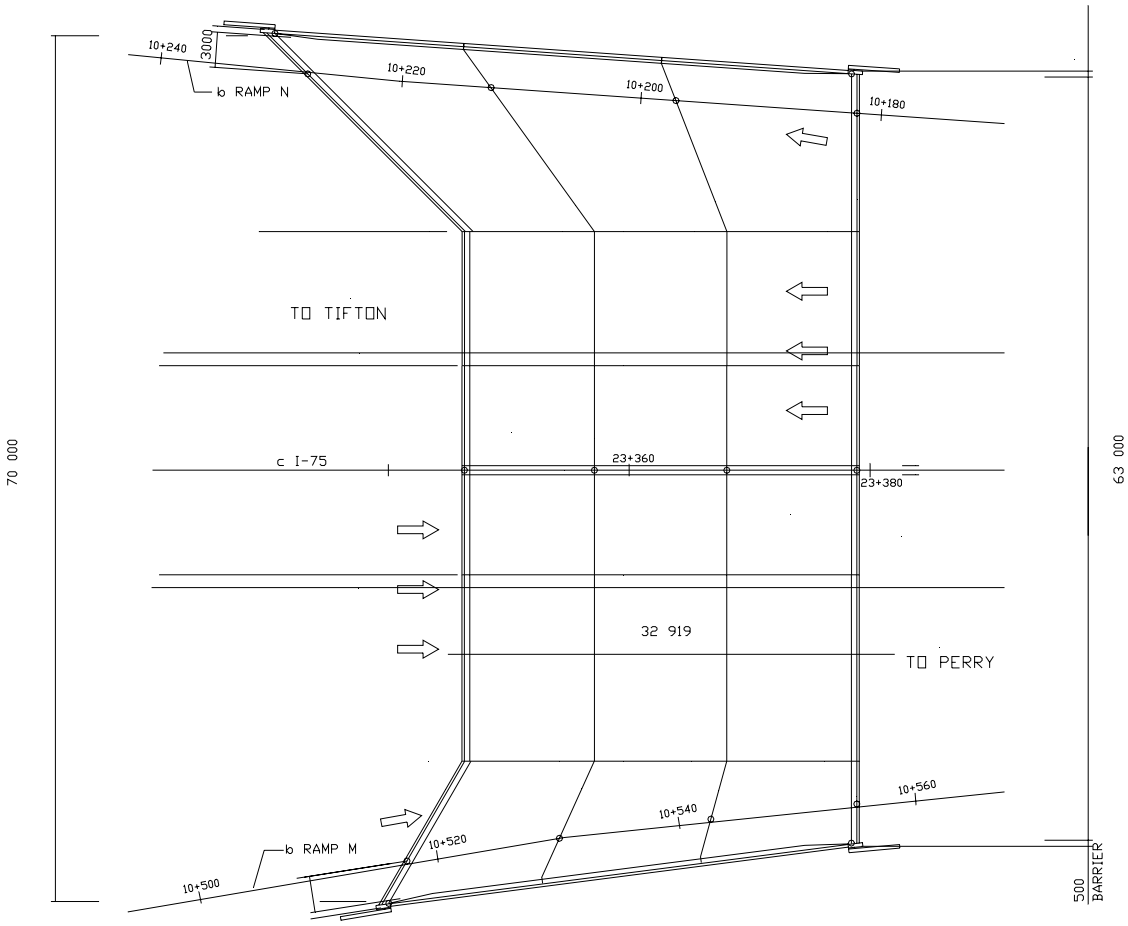
POSSIBLE SAVINGS $592,106

VII.(I) I-75/GUM CREEK BRIDGE

VII.(I)(1) AS PROPOSED

"As Proposed"

The proposed structure consists of widening the existing dual bridges on the outside and joining them in the median to form one structure. The outside widenings are flared trapezoidal sections. The flare is the result of Ramps N and M approaching the bridge. The trapezoidal shape is exacerbated by the shaping of the bridge substructure to correspond with the stream channel of Gum Creek at Bent #1. The length of the completed bridge along the centerline is 32.92 m while the length of the left gutter is approximately 50 m and the length of the right gutter is approximately 40 m. The width of the completed bridge varies from approximately 63 m to 70 m. The existing bridge is a reinforced concrete girder structure. The widening will consist of AASHTO girders. In order to maintain traffic, the construction will be staged.

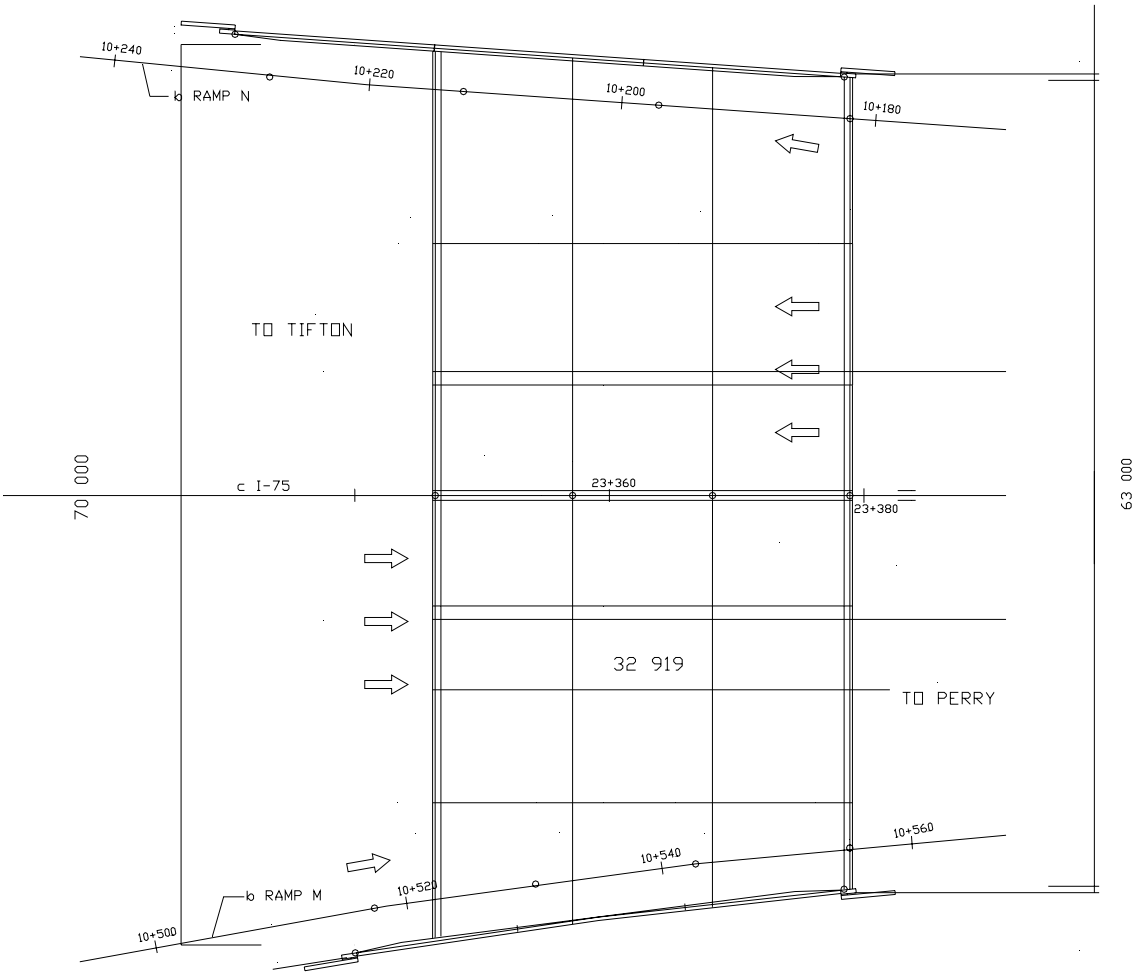


PLAN

VII.(I)(2) VALUE ENGINEERING ALTERNATIVE

Value Engineering Alternative

The Value Engineering alternate consists of using a uniform bridge length across its entire width, and widening on the outside by the use of rectangle sections. The length of the completed bridge will be 32.92 and the width will be approximately 70 m. The widening will utilize AASHTO girders, and the bridge will be constructed in stages in order to maintain traffic.



PLAN

I-75 BRIDGE WIDENING OVER GUM CREEK
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
TRAPAZOIDAL WIDENING	SM	$700.00	1552.0	$1,086,400		$0
RECTANGLE WIDENING	SM	$700.00		$0	1527.0	$1,068,900
SUBTOTAL				$1,086,400		$1,068,900
E & C(10%)				$108,640		$106,890
INFLATION (2YRS @ 5% PER YR)				$111,356		$109,562
GRAND TOTAL				**$1,306,396**		**$1,285,352**

POSSIBLE SAVINGS

$21,044

VII.(J) DESIGN COMMENTS

DESIGN COMMENTS

- The project limits should extend for an appropriate distance on both ends to eliminate conflicting pavement markings.

- A *SPECIAL PROVISION* needs to be included regarding traffic control by limiting lane closures to 7:00 PM to 6:00 AM. This item can be added to the proposed Section 150.11 presented to the study team.

VIII. SUMMARY OF RECOMMENDATIONS

SUMMARY OF RECOMMENDATIONS

It is the recommendation of the Value Engineering Team that the following Value Engineering Alternatives be carried into the Project Development process for further development.

RECOMMENDATION NUMBER 1A- I-75/CR 361 INTERCHANGE

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative proposes to utilize a Single Point Urban Interchange.

If this recommendation can be implemented, there is a possible savings of **$ 4,562,946.**

If the Value Engineering recommendation to change the design of the interchange cannot be implemented, then the Value Engineering team recommends implementing the following Value Engineering Alternative for the overpass bridge.

RECOMMENDATION NUMBER 1B- CR 361/FARMERS MARKET ROAD OVERPASS

This Value Engineering Alternative proposes to use a two span AASHTO girder bridge with MSE walls and vertical abutments.

If this recommendation can be implemented, there is a possible savings of **$ 295,084.**

RECOMMENDATION NUMBER 2A- I-75/SR 257 INTERCHANGE

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative proposes to utilize a Single Point Urban Interchange.

If this recommendation can be implemented, there is a possible savings of **$ 2,369,014**.

If the Value Engineering recommendation to change the design of the interchange cannot be implemented, then the Value Engineering team recommends implementing the following Value Engineering Alternative for the overpass bridge.

RECOMMENDATION NUMBER 2B- SR 257/8 TH AVENUE OVERPASS

This Value Engineering Alternative proposes to use a two span AASHTO girder bridge with MSE walls and vertical abutments.

If this recommendation can be implemented, there is a possible savings of **$ 277,809.**

RECOMMENDATION NUMBER 3- 24TH STREET OVERPASS

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative proposes a two span AASHTO girder bridge with MSE walls and vertical abutments.

If this recommendation can be implemented, there is a possible savings of **$ 241,741.**

RECOMMENDATION NUMBER 4- I-75/SR 30 BRIDGE

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative proposes to replace the existing bridge with a new two span AASHTO girder bridge with MSE walls and vertical abutments.

If this recommendation can be implemented, there is a possible savings of **$ 293,496.**

RECOMMENDATION NUMBER 5- I-75/CSX RAILROAD BRIDGE

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative proposes to replace the existing bridge with a new two span AASHTO girder bridge with MSE walls and vertical abutments.

If this recommendation can be implemented, there is a possible savings of **$ 852,312.**

RECOMMENDATION NUMBER 6- I-75/GEORGIA SOUTHWEST RAILROAD BRIDGE

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative proposes to replace the existing bridge with a new two span AASHTO girder bridge with MSE walls and vertical abutments.

If this recommendation can be implemented, there is a possible savings of **$ 592,106.**

RECOMMENDATION NUMBER 7 – I-75/GUM CREEK BRIDGE

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative proposes to square the bridge as much as possible and minimize the trapezoidal spans.

If this recommendation can be implemented, there is a possible savings of **$ 21,044.**