

VALUE ENGINEERING REPORT

SR 83 Connector
Project No. STP00-0000-00(411), PI No 0000411
City of Monroe
Walton County

July 14, 2011

PROJECT SPONSOR:



City of Monroe
215 North Broad Street
Monroe, GA 30655

OWNER:



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

VALUE ENGINEERING CONSULTANT:



AMEC E&I, Inc.
3200 Town Point Drive NW, Suite 100
Kennesaw, GA 30144

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VALUE ENGINEERING STUDY

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City of Monroe, Georgia
Project No. STP00-0000-00(411)

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EXECUTIVE SUMMARY

Executive Summary

VALUE ENGINEERING STUDY

SR 83 Connector
City of Monroe, Georgia
Project No. STP00-0000-00(411)
June 27-30, 2011

Introduction

This report presents the results of a value engineering (VE) study conducted on the proposed design for the SR 83 Connector route in the City of Monroe, Georgia. This 4.7-mile road connecting SR 11 on the south side of the City with SR 83 on the east side of the City would provide an alternative route around the historic downtown City of Monroe. The purpose of this project is to remove trucks from the historic downtown area. The proposed 4.7-mile project would construct a limited access two-lane highway on new alignment starting at the SR 11 / Lower Industrial Park Road intersection and end just north of the SR 83 / Good Hope Road intersection. The proposed roadway typical section would consist of two 12-foot travel lanes with 10-foot shoulders (6.5 feet paved) and construct separate right and left turn lanes at all intersections.

Major contract work items include clearing and grubbing, roadway grading, asphalt pavement, fencing, and highway drainage facilities. This project also includes environmental mitigation costs for various stream and wetland impacts. The total estimated project cost including right-of-way (R/W) is \$17.3 million. The design is currently in the concept stage. The study took place June 27-30, 2011, at the Georgia DOT Headquarters Office in Atlanta using a three person VE team.

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

Considerations

The VE team was presented with several constraints to consider when developing their recommendations. The constraints were; avoid any additional impact to historic areas, minimize impacts to streams and wetlands, and maintain the proposed project termini. Current project status: A draft Project Concept Report has been prepared and is being revised to include only the south half of the original SR 11 to SR 11 bypass around the eastern half of the city. The environmental process should be completed in 2013 and the Section 404 Permit process should be completed in 2014. Right-of-way acquisition is scheduled for 2014 / 2015.

Results Obtained

The VE team focused their efforts on the high cost items of the project. Through the use of functional analysis and “brain storming” techniques, the team generated 25 ideas with 16 being identified for additional evaluation as possible recommendations or design considerations. The VE team developed 8 independent recommendations and 5 alternative recommendations. Implementation of the 8 independent recommendations has the potential to reduce the project cost by approximately \$3.7 - \$5.6 million. A detailed write-up of each recommendation is contained in the respective portion of this report. A summary of the recommendations follows.

Recommendation Highlights

Idea A-1: Buy only 100 feet of R/W and buy the remainder as Permanent Easement.

The original design proposes to acquire a 200-foot width of R/W throughout the corridor.

This recommendation would acquire a 100-foot width of R/W and a 100-foot width (50 feet on each side) of permanent easement. A 100-foot wide section of R/W should allow for construction of the proposed roadway and provide an acceptable clear zone area. The additional 100 feet of permanent easement would extend the construction area as needed for long slopes, drainage features, etc. This concept also reduces the amount of clearing and grubbing because GDOT policy only requires clearing & grubbing the R/W portion of the corridor.

The total potential savings if accepted is \$1,278,000.

Idea A-3: Revise the bypass alignment: Use the first 100 Stations of the original alignment, tie into Gene Bell Road, and shift back to SR 83 north of Good Hope Rd at the north terminus.

Construct a 4.7-mile 2-lane connector roadway on new alignment from the Industrial Park Road / SR 11 intersection to the Georgia Highway / Good Hope Road intersection.

This recommendation would revise the alignment of the 2-lane connector route. The revised alignment would follow the original SR 83 Connector alignment for the southern portion (Station 5+00 to Station 100+00), curve left and connect to Gene Bell Road just east of the J. N. Conner property, follow Gene Bell Road to approximately 1,000 feet north of Bell Trailer Park Road, and turn right through the Harriette Little property connecting back to SR 83 north of Good Hope Road. Using the existing roadway network for a portion of the SR 83 Connector will reduce R/W cost, shorten the project approximately 1,800 feet, reduce wetland / stream impacts, and reduce Environmental Mitigation cost. This revised alignment meets the project goals and objectives of removing trucks from the downtown area.

The total potential savings if accepted is \$1,151,000.

Idea A-3.1: Alternative to Idea A-3: Revise the bypass alignment: Use Dial Road, extend Dial Road northeast to Gene Bell Road, and following Gene Bell Road to SR 83.

Construct a 4.7-mile 2-lane connector roadway on new alignment from the Industrial Park Road / SR 11 intersection to the Georgia Highway / Good Hope Road intersection.

This recommendation would revise the alignment of the 2-lane connector route. The revised alignment would follow existing Dial Road extended along the existing property lines, past Poplar Street and connect to Gene Bell Road just north of Blasingame Road and follow Gene Bell Road to Good Hope Road and on to SR 83. Using the existing roadway network for most of the SR 83 Connector will reduce R/W cost, shorten the project approximately 4,400 feet, reduce wetland / stream impacts, and reduce Environmental Mitigation cost. This revised alignment meets the project goals and objectives of removing trucks from the downtown area.

The total potential savings if accepted is \$3,239,000.

Idea B-2: Revise Roundabout intersection to provide a direct right turn lane for NB SR 11 to NB SR 83 traffic.

The original concept proposes to construct a roundabout at the SR 11 / Lower Industrial Park Road / SR 83 Connector intersection with no right turn bypass lane in the southeast quadrant.

This recommendation would revise the proposed roundabout at the SR 11 / Lower Industrial Park Road / SR 83 Connector intersection to provide a separate NB SR 11 to NB SR 83 Connector right turn bypass lane in the southeast quadrant. The addition of a right turn bypass lane in the southeast quadrant of the intersection will improve the operation of the roundabout and reduce conflicts with truck going northbound on the bypass. This concept adds value to the project and results in a slight cost increase.

The total potential increase if accepted is (\$80,000).

Idea B-6: Reduce the paved shoulder width from 6.5 feet to 4 feet.

The current design proposes to construct a roadway typical section consisting of two 12-foot lanes with 6.5-foot paved shoulder, 3.5-foot grass shoulder and ditch. Shoulders will include a 16-inch rumble strip

This recommendation would reduce the paved shoulder width from 6.5 feet to 4 feet. This concept provides the same function as the original design. The total shoulder width would remain at 10 feet.

The total potential savings if accepted is \$209,000.

Idea B-6.1: Alternative to Idea B-6: Reduce the paved shoulder width from 6.5 feet to 2 feet.

The current design proposes to construct a roadway typical section consisting of two 12-foot lanes with 6.5-foot paved shoulder, 3.5-foot grass shoulder and ditch. Shoulders will include a 16-inch rumble strip.

This recommendation would reduce the paved shoulder width from 6.5 feet to 2 feet. This concept provides the same function as the original design. The total shoulder width would remain at 10 feet.

The total potential savings if accepted is \$376,000.

Idea B-6.2: Pave a full-depth roadway width of 24 feet with a 2-foot full depth paved shoulder and an 8-foot grass shoulder.

The current design proposes to construct a roadway typical section consisting of two 12-foot lanes with 6.5-foot paved shoulder, 3.5-foot grass shoulder and ditch. Shoulders will include a 16-inch rumble strip.

This recommendation revises the paved shoulder width from 6.5 feet to 2 feet and constructs the 2-foot shoulder the same thickness and the mainline roadway. This concept eliminates the standard joint along the edge of pavement and paved shoulder by constructing a uniform full-depth 28-foot roadway section. Removing this joint eliminates future paved shoulder maintenance. This concept provides the same function as the original design. The total shoulder width would remain at 10 feet.

The total potential savings if accepted is \$125,000.

Idea B-6.3: Alternative to Idea B-8: 26 feet with a 4-foot paved shoulder and a 5-foot grass shoulder.

The current design proposes to construct a roadway typical section consisting of two 12-foot lanes with 6.5-foot paved shoulder, 3.5-foot grass shoulder and ditch. Shoulders will include a 16-inch rumble strip

This recommendation would widen the roadway full-depth template by 1-foot on each side (lanes would be striped at 12 feet) and provide an additional 4 feet of paved shoulders per side. The VE concept shifts the standard joint along the edge of pavement and paved shoulder away from the outside wheel path. Shifting this joint further away from the wheel path will reduce future paved shoulder maintenance. This concept provides the same function as the original design. The total shoulder width would remain at 10 feet.

The total potential savings if accepted is \$0

Idea B-9: Revise the SR 83 / Monroe Madison Road intersection to reduce the skew angle and amount of side road reconstruction.

The original design proposes to realignment Old Monroe Madison Road to reduce the skew angle with SR 83 Connector and eliminate the need for a design variance. This realignment requires the reconstruction of approximately 2,000 feet of roadway.

This recommendation extends the SR 83 Connector tangents and reduces the radius of the SR 83 Connector curve thereby realigning the intersection skew angle to about 80 degrees. Improving the intersection skew angle will eliminate the need for a design exception or variance and shorten the amount of reconstruction required on Old Monroe Madison Road.

The total potential savings if accepted is \$217,000.

Idea B-10: Revise the horizontal alignment between Station 62 and Station 100 to eliminate displacing the Hardin residence.

The original design between Station 65 and Station 100 proposes a tangent alignment that causes one displacement just west of the SR 83 Connector / Pannell Road intersection.

This recommendation would revise the original tangent alignment and avoid the displacement west of the Pannell Road intersection. The revised alignment uses a series of minimum radius curves to shift the alignment between Station 62 and Station 100 and avoid the need to take the house.

The total potential savings if accepted is \$578,000.

Idea E-1: Clear R/W only to the construction limits.

The original concept proposes to perform clearing & grubbing for the entire 200' right-of-way corridor.

The revised concept proposes to perform clearing & grubbing only to the proposed construction limits. The project can be constructed as proposed if clearing & grubbing is performed only to the construction limits. The reduction in clearing and grubbing will save the unnecessary removal of trees and other vegetation.

The total potential savings if accepted is \$186,000.

Idea J-2: Use a 3-strand barbed wire fence in-lieu-of a woven wire fence.

The current design places woven wire fencing along both sides of the roadway for the entire length of the project.

This recommendation would use 3-strand barbed wire fence in-lieu-of woven wire fence to control access along the project. The new SR 83 Connector alignment lies primarily within undeveloped heavily wooded areas. Due to the uninhabited nature of the area, there is no need to use a more costly woven wire fence to control access and fence the project R/W.

The total potential savings if accepted is \$159,000.

Idea J-2.1: Alternative to Idea J-2: Use a 3-strand barbed wire fence in wooded areas and a woven wire fence in open farm areas.

The current design places woven wire fencing along both sides of the roadway for the entire length of the project.

This recommendation would use 3-strand barbed wire fence in-lieu-of woven wire fence in the heavily wooded areas and woven wire fence in the open farm areas to control access along the project. The new SR 83 Connector alignment lies primarily within undeveloped heavily wooded areas. Due to the uninhabited nature of the area, there is no need to use a more costly woven wire fence to control access in the heavily wooded areas.

The total potential savings if accepted is \$119,000.

Project – SR 83 Connector – City of Monroe
SUMMARY OF POTENTIAL COST SAVINGS

ITEM No.	CREATIVE IDEA DESCRIPTION	ORIGINAL INITIAL COST	PROPOSED INITIAL COST	INITIAL COST SAVINGS	FUTURE SAVINGS	TOTAL LIFE CYCLE SAVINGS
RECOMMENDATIONS						
A-1	Buy only 100 feet of R/W and buy the remainder as Permanent Easement.	\$5,601,000	\$4,323,000	\$1,278,000	N/A	\$1,278,000
A-3	Revise the bypass alignment: Use the first 100 Stations of the original alignment, tie into Gene Bell Road, and shifting back to SR 83 north of Good Hope Rd at the north terminus.	\$1,251,000	\$100,000	\$1,151,000	N/A	\$1,151,000
A-3.1	<u>Alternative to Idea A-3:</u> Revise the bypass alignment: Use Dial Road, extend Dial Road northeast to Gene Bell Road, and following Gene Bell Road to SR 83.	\$8,010,000	\$4,771,000	\$3,239,000	N/A	\$3,239,000
B-2	Revise Roundabout intersection to provide a direct right turn lane for NB SR 11 to NB SR 83 traffic.	\$0	(\$80,000)	(\$80,000)	N/A	(\$80,000)
B-6	Reduce the paved shoulder width from 6.5 feet to 4 feet.	\$209,000	\$0	\$209,000	N/A	\$209,000
B-6.1	<u>Alternative to Idea B-6:</u> Reduce the paved shoulder width from 6.5 feet to 2 feet.	\$376,000	\$0	\$376,000	N/A	\$376,000
B-6.2	<u>Alternative to Idea B-6:</u> Pave a full-depth roadway width of 24 feet with a 2-foot full depth paved shoulder and a 8-foot grass shoulder.	\$543,000	\$418,000	\$125,000	N/A	\$125,000
B-6.3	<u>Alternative to Idea B-8:</u> 26 feet with a 4-foot paved shoulder and a 5-foot grass shoulder.	\$543,000	\$543,000	\$0	N/A	\$0

Project – SR 83 Connector – City of Monroe
SUMMARY OF POTENTIAL COST SAVINGS

ITEM No.	CREATIVE IDEA DESCRIPTION	ORIGINAL INITIAL COST	PROPOSED INITIAL COST	INITIAL COST SAVINGS	FUTURE SAVINGS	TOTAL LIFE CYCLE SAVINGS
B-9	Revise the SR 83 / Monroe Madison Road intersection to reduce the skew angle and amount of side road reconstruction.	\$217,000	\$0	\$217,000	N/A	\$217,000
B-10	Revise the horizontal alignment between Station 62 and Station 100 to eliminate displacing the Hardin residence.	\$750,000	\$172,000	\$578,000	N/A	\$578,000
E-1	Clear R/W only to the construction limits	\$186,000	\$0	\$186,000	N/A	\$186,000
J-2	Use a 3-strand barbed wire fence in-lieu-of a woven wire fence.	\$325,000	\$166,000	\$159,000	N/A	\$159,000
J-2.1	<u>Alternative to Idea J-2:</u> Use a 3-strand barbed wire fence in wooded areas and a woven wire fence in open farm areas.	\$325,000	\$206,000	\$119,000	N/A	\$119,000

STUDY IDENTIFICATION

Study Identification

Project: SR 83 Connector	Date: June 27-30, 2011
Location: City of Monroe, GA	

VE Team Members

Name:	Title:	Organization:	Telephone:
George Obaranec, PE, AVS	Highway Design	MACTEC	770-421-3346
Steven Gaines, PE, AVS	Highway Construction	Wolverton & Associates	770-447-8999
Keith Borkenhagen, PE, CVS	VE Team Facilitator	MACTEC	623-556-1875

Project Description

This proposed project would construct a 4.7-mile connector road connecting SR 11 on the south side of the City of Monroe with SR 83 on the east side of the City of Monroe. It would provide an alternative route around the historic downtown City of Monroe. The proposed 4.7-mile project would construct a limited access two-lane highway on new alignment starting at the SR 11 / Lower Industrial Park Road intersection and end just north of the SR 83 / Good Hope Road intersection. The proposed roadway typical section would consist of two 12-foot travel lanes with 10-foot shoulders (6.5 feet paved) and construct separate right and left turn lanes at all intersections.

Major contract work items include clearing and grubbing, roadway grading, asphalt pavement, fencing, and highway drainage facilities. This project also includes environmental mitigation costs for various stream and wetland impacts. The total estimated project cost including right-of-way (R/W) is \$17.3 million.

Conditions / Constraints

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

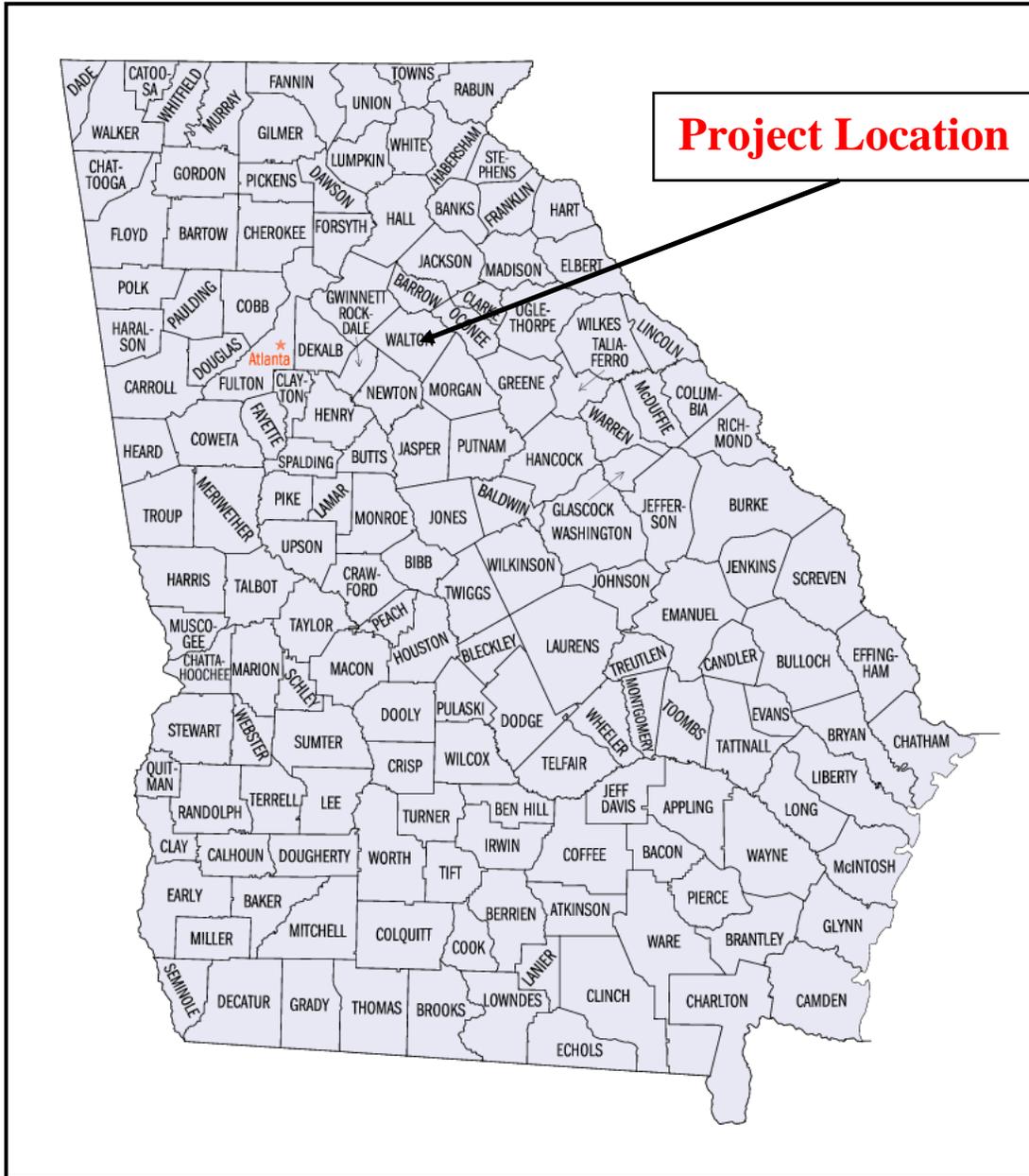
- avoid additional impacts to historic areas,
- buy only enough R/W for a two-lane facility,
- minimize impacts to streams and wetlands, and
- maintain the proposed project termini.

Project Briefing

The VE team received a project briefing by Douglas Tilt, PE of Arcadis and Timothy Matthews, PE, GDOT Project Manager. The following comments were presented:

- This project has been requested by the City of Monroe and Walton County. It has a high priority with both the City and County.
- This project is a smaller version of an original plan to construct a limited access 10-mile four-lane SR 11 bypass around the eastern side of the City of Monroe.
- The purpose of the project is to divert traffic, especially truck traffic from the historic downtown City of Monroe. The original SR 11 bypass project is being reprogrammed as a 4.7-mile SR 83 Connector route between SR 11 on the south side of the City and SR 83 on the east side of the City.
- It is anticipated that this facility will have heavy truck traffic. Use 15% for truck traffic.
- The SR 83 Connector is planned to be a limited access two-lane facility on new alignment. It will start at the SR 11 / Lower Industrial Park Road intersection and end just north of the SR 83 / Good Hope Road intersection.
- The project has a design speed of 55 MPH to insure and adequate time reduction from going through the city to entice trucks to use the new route.
- The project begins at a proposed roundabout intersection at SR 11 / Lower Industrial Park Road / SR 83 Connector. There is a major utility power line that crosses the route just east of the roundabout intersection.
- Several alternatives were considered for this route. Alternatives starting further south impacted additional historic properties and were rejected. The currently proposed alignment avoids historic properties and has only one displacement. There are historic properties along Old Monroe Madison Road lying to the north of the proposed alignment.
- There needs to be a vertical curve profile change made where the new SR 83 Connector ties into Good Hope Road on the north end of the project. The route will continue north on existing SR 83 to SR 78.
- None of the crossroad intersections meet warrants for signals.

County Map of Georgia



VE RECOMMENDATIONS

DEVELOPMENT AND RECOMMENDATION PHASE

Project: SR 83 Connector

IDEA No.:
A-1

Sheet No.:
1 of 3

CREATIVE IDEA: Reduce the width of the R/W to 100 feet and use Permanent Easements for the remainder of the area needed to build the project.

Comp By: S.G. Date: 6/30/2011 Checked By: K.B. Date: 7/5/2011

Original Concept:

The original design proposes to acquire a 200-foot width of R/W throughout the corridor.

Proposed Change:

This recommendation would acquire a 100-foot width of R/W and a 100-foot width (50 feet on each side) of permanent easement to provide the needed 200-foot width of land along the corridor.

Justification:

Acquiring a 100-foot wide section of R/W should allow for the construction of the proposed roadway and provide for an acceptable clear zone area for a design speed of 55 MPH. The additional 100 feet of permanent easement would extend the construction area as needed for slopes, drainage features, etc. This concept would place the limited access fence at the R/W lane thereby reducing the amount of clearing and grubbing since GDOT policy only requires clearing & grubbing the R/W portion of the corridor.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
Original	\$5,601,000		
Proposed	\$4,323,000		
Savings	\$1,278,000		\$1,278,000
FUTURE COST: – Savings		N/A	N/A
TOTAL PRESENT WORTH SAVINGS			\$1,278,000

CALCULATIONS

Project: SR 83 Connector

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

Assumptions

Total Length = 24,000-500 = 23,500 LF

Cost Required R/W = $(\$0.46)(1.55)(1.60) = \$1.14 / \text{SF}$

Cost Permanent Easement = $(\$0.46)(1.55)(1.60)(0.6) = \$0.68 / \text{SF}$

Clearing and Grubbing will be required for a 150 ft corridor (100 ft R/W + estimated 50-foot).
The lump sum savings will be $(200-150/200) = 25\%$.

Cost of Clearing & Grubbing Savings = $(0.25)(\$744,000) = \$186,000$

Original Concept

Area Required R/W = $(200 \text{ LF})(23,500 \text{ LF}) = 4,750,000 \text{ SF}$

Area Permanent Easement = 0 SF

VE Revised Concept

Area Required R/W = $(100 \text{ LF})(23,500 \text{ LF}) = 2,375,000 \text{ SF}$

Area Permanent Easement = $(100 \text{ LF})(23,500 \text{ LF}) = 2,375,000 \text{ SF}$

DEVELOPMENT AND RECOMMENDATION PHASE

Project: SR 83 Connector

IDEA No.: A-3	Sheet No.: 1 of 6	CREATIVE IDEA: Revise the bypass alignment: Use the first 100 Stations of the original alignment, tie into Gene Bell Road, and shifting back to SR 83 north of Good Hope Road at the north terminus.
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Comp By: G.O. Date: 6/28/2011 Checked By: K.B. Date: 7/5/2011

Original Concept:

Construct a 4.7-mile 2-lane connector roadway on new alignment from the Industrial Park Road / SR 11 intersection to the Georgia Highway / Good Hope Road intersection.

Proposed Change:

This recommendation would revise the alignment of the 2-lane connector route. The revised alignment would follow the original SR 83 Connector alignment for the southern portion (Station 5+00 to Station 100+00), curve left and connect to Gene Bell Road just east of the J. N. Conner property, follow Gene Bell Road to approximately 1,000 feet north of Bell Trailer Park Road, and turn right through the Harriette Little property connecting back to SR 83 north of Good Hope Road.

Justification:

Using the existing roadway network for a portion of the SR 83 Connector will reduce R/W costs, shorten the project approximately 1,800 feet, reduce wetland / stream impacts, and reduce Environmental Mitigation cost. This revised alignment meets the project goals and objectives of removing trucks from the downtown area. The original alignment has a b/c ratio of 7.99 providing room to modify the alignment and still provide significant time reduction. This ratio should be recalculated for the revised alignment to determine whether an acceptable time reduction is still achieved. It is recommended that both a 55 MPH and 45 MPH design speed be considered in the b/c ratio recalculation.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
Original	\$1,251,000		
Proposed	\$100,000		
Savings	\$1,151,000		\$1,151,000
FUTURE COST: – Savings		N/A	N/A
TOTAL PRESENT WORTH SAVINGS			\$1,151,000

CONTINUATION

Project: SR 83 Connector

Idea No.: A-3
Client: City of Monroe / GDOT
Sheet 2 of 6

The new alignment along Gene Bell Road goes through a small residential area. A review of this area on Google Maps indicates the abutting homes appear to be offset far enough to avoid any additional displacements and facilitate the necessary roadway and R/W improvements. Since the overall project will be slightly shorter, the VE team assumed that all project costs and impacts will be proportionately reduced including drainage, paving, grading, clearing, erosion control, wetlands effects and mitigation.

The VE team also assumed the existing roads would be completely reconstructed to match the original proposed typical section. Additional assumed traffic control costs and Blasingame Road intersection improvement costs have been added to this option. The northern end of Gene Bell Road could either end in a cul-de-sac or tie into SR 83 with a new intersection.

Note: This optional alignment could also be made using a different northern connection to Good Hope Road by staying on Gene Bell Road in-lieu-of going through the Harriette Little property. However, this connection would take the SR 83 traffic past the school on the west side of Gene Bell Road.

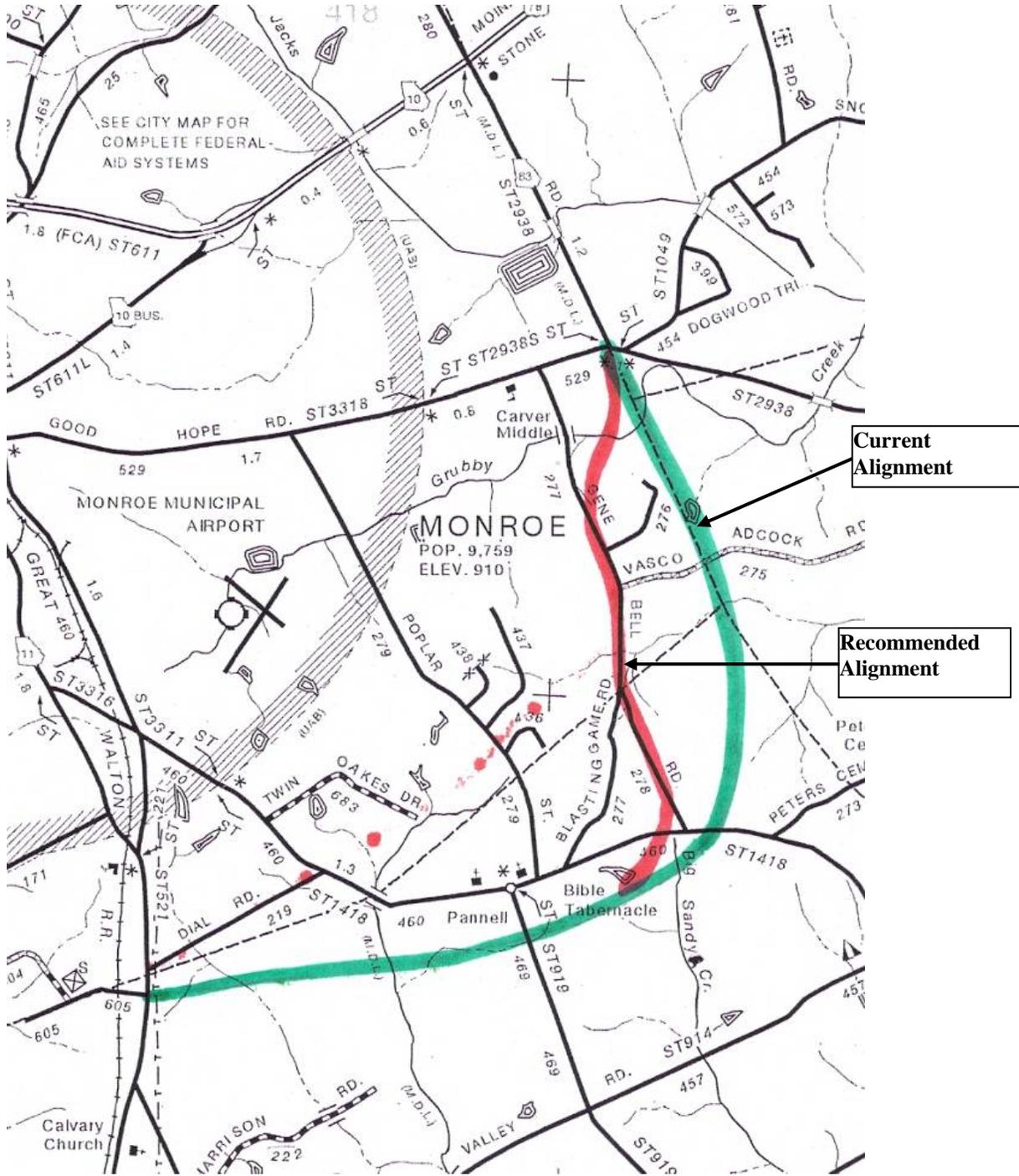
SKETCH

Project: SR 83 Connector

Idea No.: A-3

Client: City of Monroe / GDOT

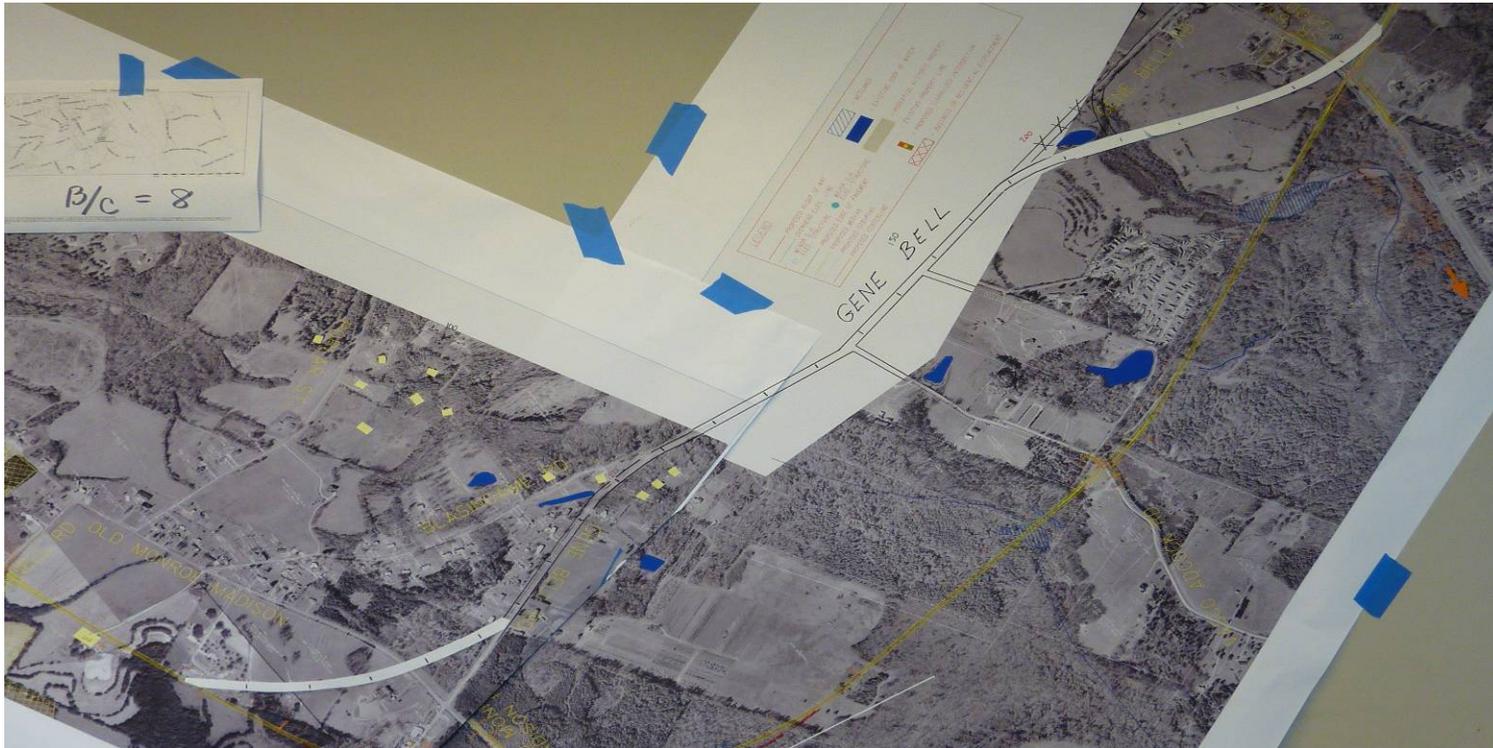
Sheet 3 of 6



SKETCH

Project: SR 83 Connector

Idea No.: A-3
Client: City of Monroe / GDOT
Sheet 4 of 6



Revise SR 83 Connector Alignment to use Gene Bell Road

CALCULATIONS

Project: SR 83 Connector

Idea No.: A-3
Client: City of Monroe / GDOT
Sheet 6 of 6

Alignments begin to deviate at Station 100+00 for about 10,000 ft; total re-alignment / new alignment will be through SR 83 intersection to Station 253+00

Total lengths: Original alignment – Station 100+00 to 253+00 = 15,300 ft
Recommended alignment – Station 100+00 to 235+00 = 13,500 ft
 $15,300 - 13,500 = 1,800$ ft; $1,800 / 23,500 = 7.7\%$

Assume no significant construction cost differences in using existing alignments vs. current, new alignment. Existing roadways to be completely reconstructed, however, project is 7.7 % shorter, reduced. All project items will be reduced at this rate excepting pavement and R/W.

Total project cost (without paving and R/W) is

$$\$17,299,000 - (\$6,076,000 + \$3,936,000) = \$7,287,000 \times 0.077 = \$561,099.$$

Pavement cost:

Asphalt pavement; SR-83 Connector: 9.5 in asphalt / 12 inch GAB

$$(9.5 / 12 \text{ ft}) (150 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.059375 \text{ ton} / \text{SF}$$

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

Cost per SY

$$(0.059375 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$58 / \text{ton}) + (0.0675 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$15.00 / \text{ton}) =$$
$$\$30.99 + \$9.11 = \$40.01 / \text{SY} \quad \text{USE: } \$40 \text{ per SY}$$

Asphalt shoulders: Assume 3.5 in asphalt / 6 inch GAB

$$(3.5 / 12 \text{ ft}) (150 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.021875 \text{ ton} / \text{SF}$$

$$(6 / 12 \text{ ft}) (135 \# / \text{CF}) (1 \text{ ton} / 2000\#) = 0.03375 \text{ ton} / \text{SF}$$

Cost per SY

$$(0.021875 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$58 / \text{ton}) + (0.03375 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$15.00 / \text{ton}) =$$
$$\$11.42 + \$4.56 = \$15.98 / \text{SY} \quad \text{USE: } \$16 \text{ per SY}$$

Mainline area - $(1,800 \text{ ft} \times 24 \text{ ft}) (1/9) = 4,800 \text{ SY}$

Shoulder area - $(1,800 \text{ ft} \times 13 \text{ ft}) (1/9) = 2,600 \text{ SY}$

Reduced Right of Way:

For about 5,000 LF of the recommended alignment using Gene Bell Road, the R/W width will be reduced by 80 ft (existing width) from 200 ft to 120 ft wide. The total length on Gene Bell Road is actually about 6,000 ft but is reduced by 1,000 ft for additional R/W required north of the SR 83 intersection for realignment.

R/W factor; $1.55 \times 1.6 = 2.48$

$$5,000\text{ft} \times 80 \text{ ft} = 400,000 \text{ SF}; \quad 400,000 \text{ SF} \times 0.46 \$ / \text{SF} (2.48) = \$456,320$$

Assume addition Traffic Control Cost of \$50,000 and Blasingame Road improvements of \$50,000

DEVELOPMENT AND RECOMMENDATION PHASE

Project: SR 83 Connector

IDEA No.: A-3.1	Sheet No.: 1 of 5	CREATIVE IDEA: <u>Alternative to Idea A-3</u> Revise the bypass alignment: Use Dial Road, extend Dial Road northeast to Gene Bell Road, and following Gene Bell Road to SR 83.
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Comp By: G.O. Date: 6/28/2011 Checked By: K.B. Date: 7/5/2011

Original Concept:

Construct a 4.7-mile 2-lane connector roadway on new alignment from the Industrial Park Road / SR 11 intersection to the Georgia Highway / Good Hope Road intersection.

Proposed Change:

This recommendation would revise the alignment of the 2-lane connector route. The revised alignment would follow the existing Dial Road and extend along the existing property lines, past Poplar Street and connect to Gene Bell Road just north of Blasingame Road and follow Gene Bell Road to Good Hope Road and on to SR 83.

Justification:

Using the existing roadway network for most of the SR 83 Connector will reduce R/W cost, shorten the project approximately 4,400 feet, reduce wetland / stream impacts, and reduce Environmental Mitigation cost. This revised alignment meets the project goals and objectives of removing trucks from the downtown area. The original alignment has a b/c ratio of 7.99 providing room to modify the alignment and still provide significant time reduction. This ratio should be recalculated for the revised alignment to determine whether an acceptable time reduction is still achieved. It is recommended that both a 55 MPH and 45 MPH design speed be considered in the b/c ratio recalculation.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
Original	\$8,010,000		
Proposed	\$4,771,000		
Savings	\$3,239,000		\$3,239,000
FUTURE COST: – Savings		N/A	N/A
TOTAL PRESENT WORTH SAVINGS			\$3,239,000

CONTINUATION

Project: SR 83 Connector

Idea No.: A-3.1

Client: City of Monroe / GDOT

Sheet 2 of 5

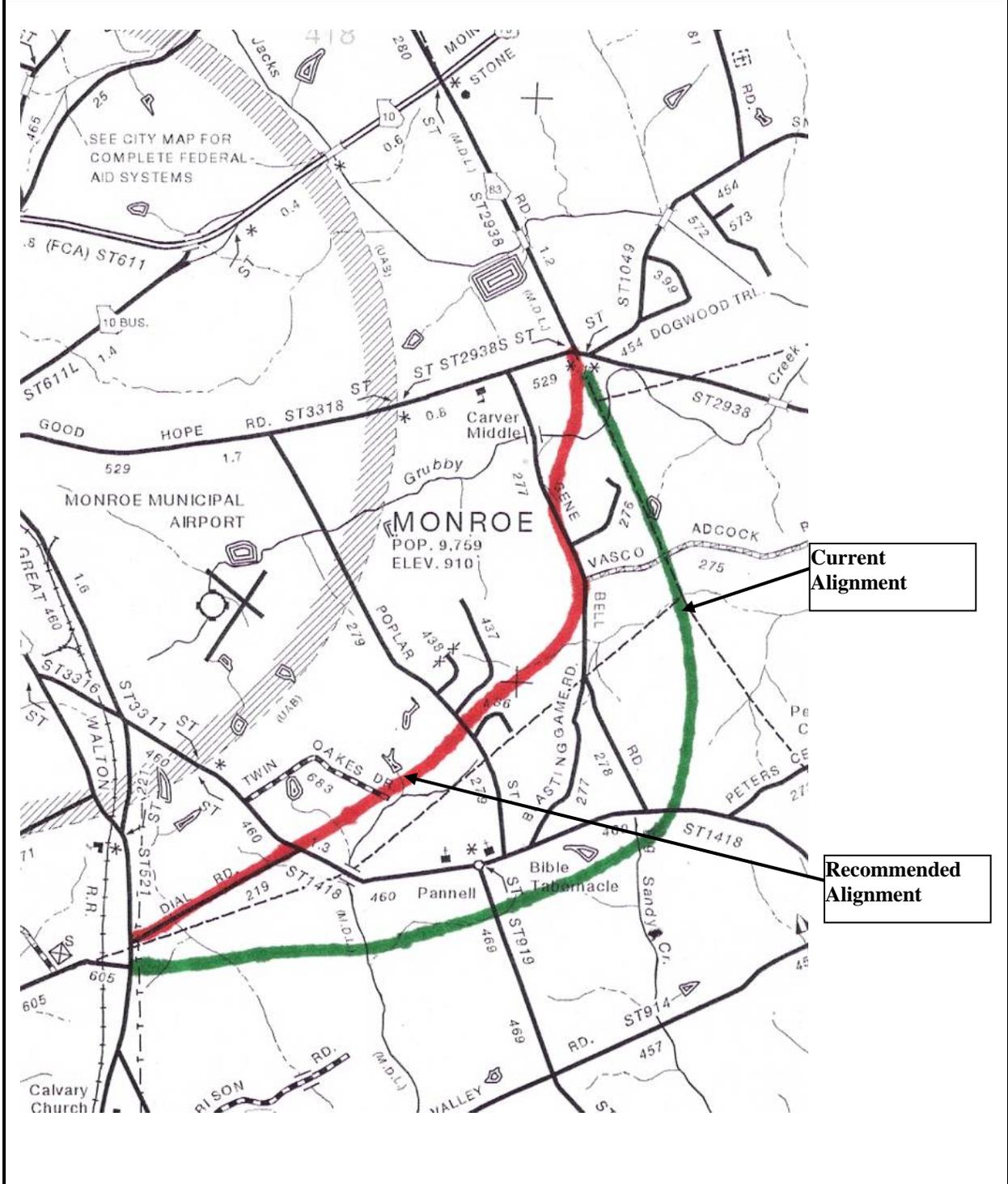
The new alignment along Gene Bell Road goes through a small residential area. A review of this area on Google Maps indicates the abutting homes appear to be offset far enough to avoid any additional displacements and facilitate the necessary roadway and R/W improvements. Since the overall project will be shorter by about 4,400 ft the VE team assumed that all project costs and impacts will be proportionately reduced including drainage, paving, grading, clearing, erosion control, wetlands effects and mitigation. We also assumed the existing roads would be completely reconstructed to match the original proposed typical section. Additional assumed traffic control costs and Blasingame Road intersection improvement costs have been added to this option.

Note: This optional alignment could also be made using a different northern connection to Good Hope Road by exiting Gene Bell Road approximately 1,000 feet north of Bell Trailer Park Road and going through the Harriette Little property connecting back to SR 83 north of Good Hope Road.

SKETCH

Project: SR 83 Connector

Idea No.: A-3.1
Client: City of Monroe / GDOT
Sheet 3 of 5



COST WORKSHEET

Project: SR 83 Connector

Idea No.: A-3.1
 Client: City of Monroe / GDOT
 Sheet 4 of 5

CONSTRUCTION ELEMENT		ORIGINAL ESTIMATE			NEW ESTIMATE		
Item	Unit	No. Units	Cost/Unit	Total Cost	No. Units	Cost/Unit	Total Cost
Original Design:							
Full-depth pavement reduction	SF	11,733	\$40.00	\$469,320			
Shoulder Pavement	SY	6,356	\$16.00	\$101,696			
R/W	LF	1	\$6,075,826	\$6,075,826			
Remaining Project Cost	LF	1	\$1,362,669	\$1,362,669			
VE Design:							
Full-depth pavement reduction	SF				0		\$0
Shoulder Pavement	SY				0		\$0
R/W	LF				1	\$4,671,273	\$4,671,273
Remaining Project Cost	LF				0		\$0
Additional Traffic Control	LS				1	\$50,000	\$50,000
Blasingame Road intersection	LS				1	\$50,000	\$50,000
SUBTOTAL				\$8,009,511			\$4,771,273
TOTAL ROUNDED				\$8,010,000			\$4,771,000

CALCULATIONS

Project: SR 83 Connector

Idea No.: A-3.1
Client: City of Monroe / GDOT
Sheet 5 of 5

Total lengths: Original alignment – Station 5+00 to 240+00 = 23,500 ft
Recommended alignment – Station 10+00 to 201+00 = 19,100 ft
 $23,500 \text{ ft} - 19,100 \text{ ft} = 4,400 \text{ ft}; \quad 4,400 / 23,500 = 18.7\%$

Assume no significant construction cost differences in using existing alignments vs. current, new alignment. Existing roadways to be completely reconstructed, however, project is 19 % shorter, reduced. All project items will be reduced at this rate excepting pavement and R/W.

Total project cost (without paving and R/W) is

$$\$17,299,000 - (\$6,076,000 + \$3,936,000) = \$7,287,000 \times 0.187 = \$1,362,669.$$

Pavement cost:

Asphalt pavement; SR-83 Connector: 9.5 in asphalt / 12 inch GAB

$$(9.5 / 12 \text{ ft}) (150 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.059375 \text{ ton} / \text{SF}$$

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

Cost per SY

$$(0.059375 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$58 / \text{ton}) + (0.0675 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$15.00 / \text{ton}) =$$
$$\$30.99 + \$9.11 = \$40.01 / \text{SY} \quad \text{USE: } \mathbf{\$40 \text{ per SY}}$$

Asphalt shoulders: Assume 3.5 in asphalt / 6 inch GAB

$$(3.5 / 12 \text{ ft}) (150 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.021875 \text{ ton} / \text{SF}$$

$$(6 / 12 \text{ ft}) (135 \# / \text{CF}) (1 \text{ ton} / 2000\#) = 0.03375 \text{ ton} / \text{SF}$$

Cost per SY

$$(0.021875 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$58 / \text{ton}) + (0.03375 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$15.00 / \text{ton}) =$$
$$\$11.42 + \$4.56 = \$15.98 / \text{SY} \quad \text{USE: } \mathbf{\$16 \text{ per SY}}$$

Mainline area - (4,400 ft x 24 ft) (1/9) = 11,733 SY

Shoulder area - (4,400 ft x 13 ft) (1/9) = 6,356 SY

Reduced Right of Way:

Original alignment – total area – 4,963,200 SF; 1 displacement; Total R/W cost – \$6,075,826

Recommended alignment:

Use existing alignment; Dial Rd; 4,000 ft + Gene Bell Rd; 8,100 ft; total length = 12,100 ft reduce R/W width by 80 ft (200 ft – 80 ft) x 12,100 ft = 1,452,000 SF

New alignment; 23,500 ft – (4,000 ft + 8,100 ft) = 11,400 ft x 200 ft = 2,280,000 SF

Total area required; 1,452,000 SF + 2,280,000 SF = 3,732,000 SF @ \$0.46 / SF = \$1,716,720

$$\$1,716,720 + \$126,858 + \$40,000 = [(\$1,883,578 \times 1.55)] \times 1.60 = \$4,671,273$$

Assume addition Traffic Control Cost of \$50,000 and Blasingame Road improvements of \$50,000

DEVELOPMENT AND RECOMMENDATION PHASE

Project: SR 83 Connector

IDEA No.:
B-2

Sheet No.:
1 of 4

CREATIVE IDEA:

Revise the roundabout intersection to provide a direct right turn lane for NB SR 11 to NB SR 83 traffic

Comp By: S.G. Date: 6/29/2011 Checked By: K.B. Date: 7/5/2011

Original Concept:

The original concept proposes to construct a roundabout at the SR 11 / Lower Industrial Park Road / SR 83 Connector intersection with no right turn bypass lane in the southeast quadrant.

Proposed Change:

This recommendation would revise the proposed roundabout at the SR 11 / Lower Industrial Park Road / SR 83 Connector intersection to provide a separate NB SR 11 to NB SR 83 Connector right turn bypass lane in the southeast quadrant.

Justification:

The percentage of trucks on the projects is high (15 %). The addition of a right turn bypass lane in the southeast quadrant of the intersection will improve the operation of the roundabout and reduce conflicts with truck going northbound on the bypass. This concept adds value to the project and results in a slight cost increase.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
Original	\$0		
Proposed	\$80,000		
Savings	(\$80,000)		(\$80,000)
FUTURE COST: – Savings		N/A	N/A
TOTAL PRESENT WORTH SAVINGS			(\$80,000)

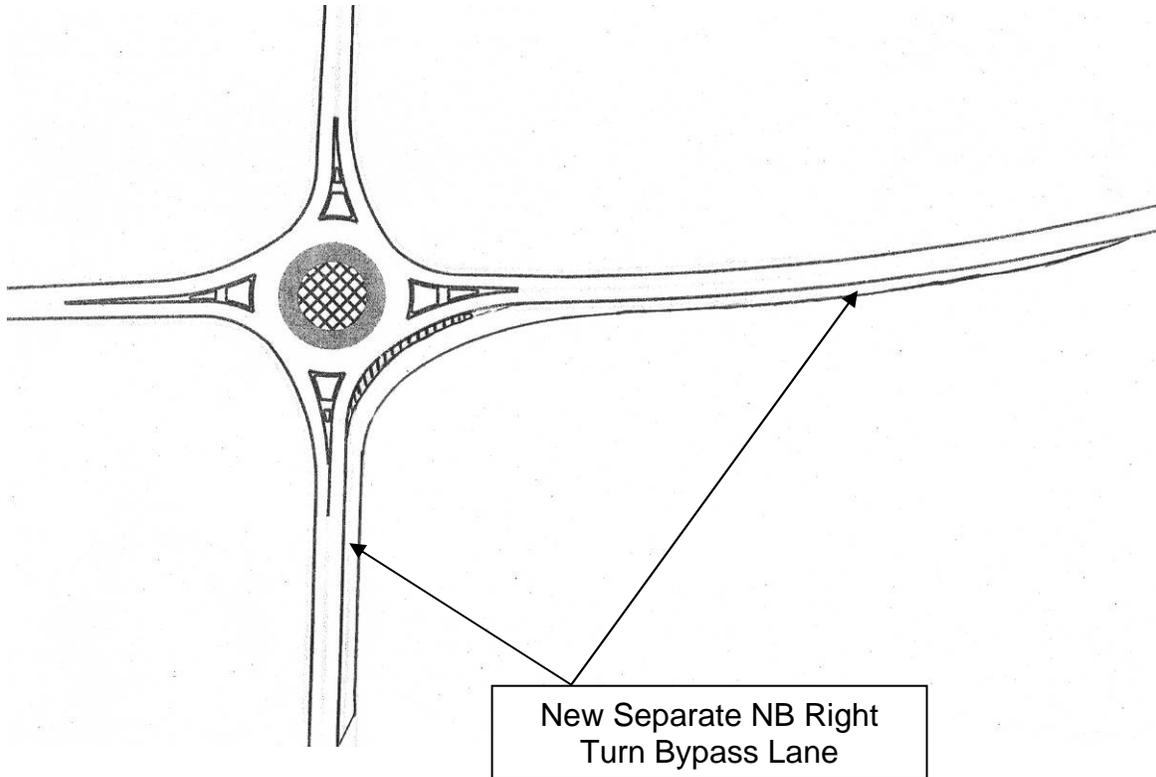
SKETCH

Project: SR 83 Connector

Idea No.: B-2

Client: City of Monroe / GDOT

Sheet 2 of 4



CALCULATIONS

Project: SR 83 Connector

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

Assumptions

Assume 1,000 ft length & 16 ft width required for bypass lane

Additional R/W only required on SR 11 NB (not on bypass) 500 lf

Asphalt Cost = \$40 / SY

R/W Cost = (\$0.46 / SF)(1.55)(1.60) = \$1.14 / SF

Original Concept

Area (Asphalt) = 0 SF

Additional RW = 0 SF

Revised Concept

Area (Asphalt) = (1000 LF)(16 LF)(1 SY / 9 SF) = 1,778 SY

Additional RW = (500 LF)(16 LF) = 8,000 SF

Raised concrete median between RT lane and roundabout

Assume 4 ft x 300 ft = 1,200 SF / 9 = 133 SY @ \$35 / SY = \$4,655

DEVELOPMENT AND RECOMMENDATION PHASE

Project: SR 83 Connector

IDEA No.:
B-6

Sheet No.:
1 of 4

CREATIVE IDEA:

Reduce the paved shoulder width from 6.5 feet to 4 feet

Comp By: G.O. Date: 6/28/2011 Checked By: K.B. Date: 7/5/2011

Original Concept:

The current design proposes to construct a roadway typical section consisting of two 12-foot lanes with 6.5-foot paved shoulder, 3.5-foot grass shoulder and ditch. Shoulders will include a 16-inch rumble strip

Proposed Change:

This recommendation would reduce the paved shoulder width from 6.5 feet to 4 feet.

Justification:

This concept provides the same function as the original design. The VE proposed design meets State policy and would reduce the project cost. The total width of the shoulder would remain at 10 feet, the same width as in the original design.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
Original	\$209,000		
Proposed	\$0		
Savings	\$209,000		\$209,000
FUTURE COST: – Savings		N/A	N/A
TOTAL PRESENT WORTH SAVINGS			\$209,000

SKETCH

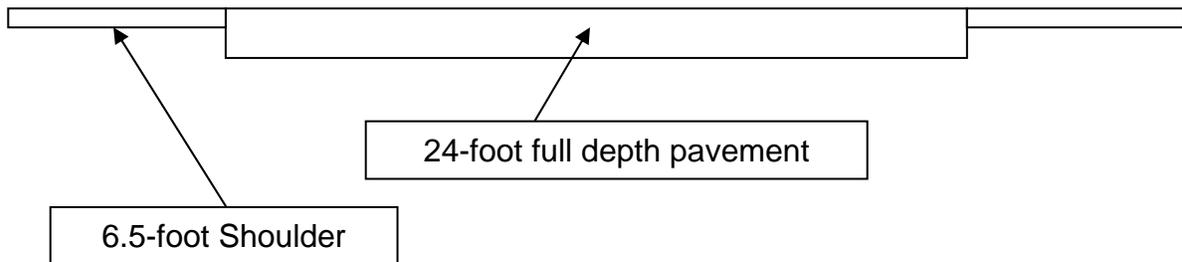
Project: SR 83 Connector

Idea No.: B-6

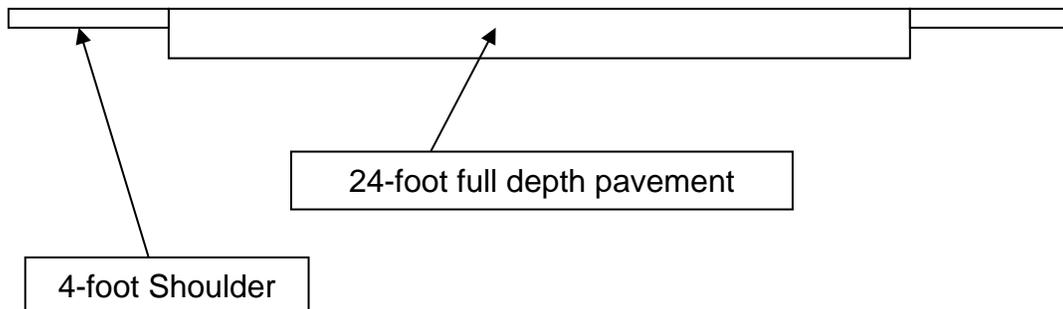
Client: City of Monroe / GDOT

Sheet 2 of 4

Original Design:



VE Design:



CALCULATIONS

Project: SR 83 Connector

Idea No.: B-6

Client: City of Monroe / GDOT

Sheet 4 of 4

Pavement cost:

Asphalt pavement; SR-83 Connector: Assume 9.5 in asphalt / 12 inch GAB

$$(9.5 / 12 \text{ ft}) (150 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.059375 \text{ ton} / \text{SF}$$

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

Cost per SY

$$(0.059375 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$58 / \text{ton}) + (0.0675 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$15.00 / \text{ton}) = \\ \$30.99 + \$9.11 = \$40.01 / \text{SY} \quad \text{USE: } \mathbf{\$40 \text{ per SY}}$$

Asphalt shoulders: Assume 3.5 in asphalt / 6 inch GAB

$$(3.5 / 12 \text{ ft}) (150 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.021875 \text{ ton} / \text{SF}$$

$$(6 / 12 \text{ ft}) (135 \# / \text{CF}) (1 \text{ ton} / 2000\#) = 0.03375 \text{ ton} / \text{SF}$$

Cost per SY

$$(0.021875 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$58 / \text{ton}) + (0.03375 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$15.00 / \text{ton}) = \\ \$11.42 + \$4.56 = \$15.98 / \text{SY} \quad \text{USE: } \mathbf{\$16 \text{ per SY}}$$

SR 83 Connector Roadway Length:

Station 5+00 to Station 240+00 = 23,500 feet = 4.451 miles

Reduced shoulder width area:

$$(23,500 \text{ ft} \times 2.5 \text{ ft}) \times 2 = 117,500 \text{ SF} / 9 = 13,056 \text{ SY}$$

DEVELOPMENT AND RECOMMENDATION PHASE

Project: SR 83 Connector

IDEA No.:
B-6.1

Sheet No.:
1 of 4

CREATIVE IDEA: Alternative to Idea B-6
Reduce the width of the paved shoulder from 6.5 feet to 2 feet.

Comp By: G.O. Date: 6/28/2011 Checked By: K.B. Date: 7/5/2011

Original Concept:

The current design proposes to construct a roadway typical section consisting of two 12-foot lanes with 6.5-foot paved shoulder, 3.5-foot grass shoulder and ditch. Shoulders will include a 16-inch rumble strip

Proposed Change:

This recommendation would reduce the paved shoulder width from 6.5 feet to 2 feet.

Justification:

This concept provides the same function as the original design. The VE proposed design meets State policy and would reduce the project cost. The total width of the shoulder would remain at 10 feet, the same width as in the original design.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
Original	\$376,000		
Proposed	\$0		
Savings	\$376,000		\$376,000
FUTURE COST: – Savings		N/A	N/A
TOTAL PRESENT WORTH SAVINGS			\$376,000

SKETCH

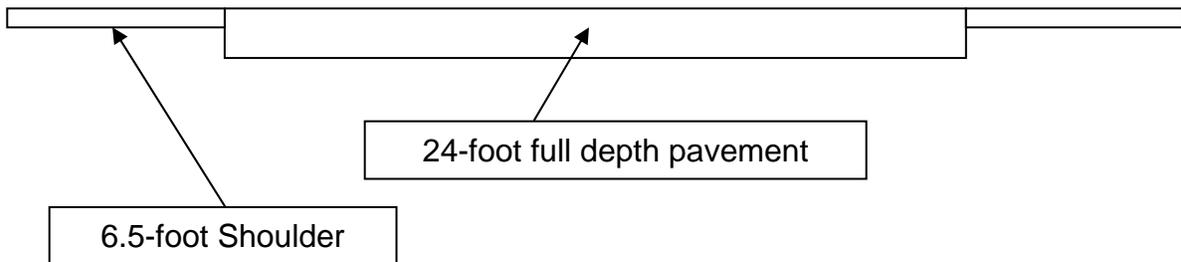
Project: SR 83 Connector

Idea No.: B-6.1

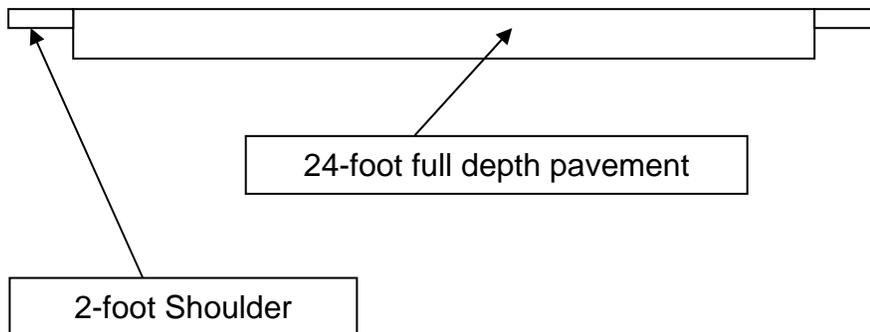
Client: City of Monroe / GDOT

Sheet 2 of 4

Original Design:



VE Design:



CALCULATIONS

Project: SR 83 Connector

Idea No.: B-6.1

Client: city of Monroe / GDOT

Sheet 4 of 4

Pavement cost:

Asphalt pavement; SR-83 Connector: 9.5 in asphalt / 12 inch GAB

$$(9.5 / 12 \text{ ft}) (150 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.059375 \text{ ton} / \text{SF}$$

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

Cost per SY

$$(0.059375 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$58 / \text{ton}) + (0.0675 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$15.00 / \text{ton}) = \\ \$30.99 + \$9.11 = \$40.01 / \text{SY} \quad \text{USE: } \mathbf{\$40 \text{ per SY}}$$

Asphalt shoulders: Assume 3.5 in asphalt / 6 inch GAB

$$(3.5 / 12 \text{ ft}) (150 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.021875 \text{ ton} / \text{SF}$$

$$(6 / 12 \text{ ft}) (135 \# / \text{CF}) (1 \text{ ton} / 2000\#) = 0.03375 \text{ ton} / \text{SF}$$

Cost per SY

$$(0.021875 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$58 / \text{ton}) + (0.03375 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$15.00 / \text{ton}) = \\ \$11.42 + \$4.56 = \$15.98 / \text{SY} \quad \text{USE: } \mathbf{\$16 \text{ per SY}}$$

SR 83 Connector Roadway Length:

Station 5+00 to Station 240+00 = 23,500 feet = 4.451 miles

Reduced shoulder width area:

$$(23,500 \text{ ft} \times 4.5 \text{ ft}) \times 2 = 211,500 \text{ SF} / 9 = 23,500 \text{ SY}$$

DEVELOPMENT AND RECOMMENDATION PHASE

Project: SR 83 Connector

IDEA No.:
B-6.2

Sheet No.:
1 of 4

CREATIVE IDEA: Alternative to Idea B-6

Pave a full-depth roadway width of 24 feet with 2-foot full-depth paved shoulders and 8-foot grass shoulders.

Comp By: G.O. Date: 6/28/2011 Checked By: K.B. Date: 7/5/2011

Original Concept:

The current design proposes to construct a roadway typical section consisting of two 12-foot lanes with 6.5-foot paved shoulder, 3.5-foot grass shoulder and ditch. Shoulders will include a 16-inch rumble strip

Proposed Change:

This recommendation revises the paved shoulder width from 6.5 feet to 2 feet and constructs the 2-foot shoulder the same thickness and the mainline roadway.

Justification:

This project is being constructed as part of a truck by-pass route around the City of Monroe. This concept eliminates the standard joint along the edge of pavement and paved shoulder by constructing a uniform full-depth 28-foot roadway section. Removing this joint eliminates future paved shoulder maintenance since the shoulder and roadway are the same full-depth section. This concept provides the same function as the original design. The VE design meets State policy and would reduce the project cost. The total width of the shoulder would remain at 10 feet, the same width as in the original design.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
Original	\$543,000		
Proposed	\$418,000		
Savings	\$125,000		\$125,000
FUTURE COST: – Savings		N/A	N/A
TOTAL PRESENT WORTH SAVINGS			\$125,000

SKETCH

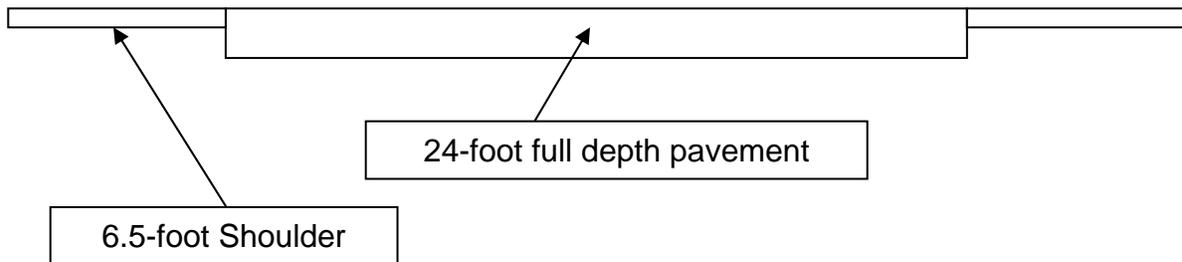
Project: SR 83 Connector

Idea No.: B-6.2

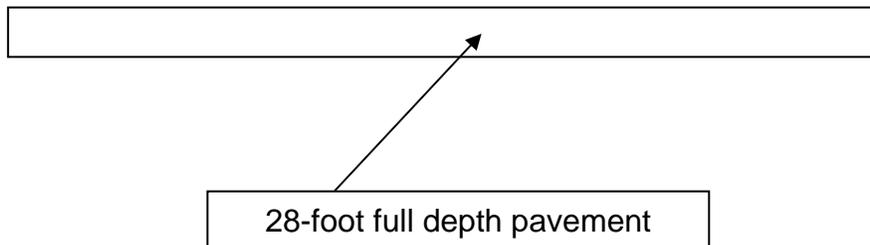
Client: City of Monroe / GDOT

Sheet 2 of 4

Original Design:



VE Design:



CALCULATIONS

Project: SR 83 Connector

Idea No.: B-6.2
Client: City of Monroe / GDOT
Sheet 4 of 4

Pavement cost:

Asphalt pavement; SR-83 Connector: 9.5 in asphalt / 12 inch GAB

$$(9.5 / 12 \text{ ft}) (150 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.059375 \text{ ton} / \text{SF}$$

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

Cost per SY

$$(0.059375 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$58 / \text{ton}) + (0.0675 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$15.00 / \text{ton}) = \\ \$30.99 + \$9.11 = \$40.01 / \text{SY} \quad \text{USE: } \mathbf{\$40 \text{ per SY}}$$

Asphalt shoulders: Assume 3.5 in asphalt / 6 inch GAB

$$(3.5 / 12 \text{ ft}) (150 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.021875 \text{ ton} / \text{SF}$$

$$(6 / 12 \text{ ft}) (135 \# / \text{CF}) (1 \text{ ton} / 2000\#) = 0.03375 \text{ ton} / \text{SF}$$

Cost per SY

$$(0.021875 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$58 / \text{ton}) + (0.03375 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$15.00 / \text{ton}) = \\ \$11.42 + \$4.56 = \$15.98 / \text{SY} \quad \text{USE: } \mathbf{\$16 \text{ per SY}}$$

SR 83 Connector Roadway Length:

$$\text{Station } 5+00 \text{ to Station } 240+00 = 23,500 \text{ feet} = 4.451 \text{ miles}$$

Standard Paved Shoulders

$$(23,500 \text{ ft} \times 6.5 \text{ ft}) \times 2 = 305,500 \text{ SF} / 9 = 33,945 \text{ SY}$$

VE Design:

Full depth Paved Shoulders

$$(2 \text{ ft} \times 23,500 \text{ ft}) \times 2 = 94,000 \text{ SF} / 9 = 10,445 \text{ SY}$$

DEVELOPMENT AND RECOMMENDATION PHASE

Project: SR 83 Connector

IDEA No.:
B-6.3

Sheet No.:
1 of 4

CREATIVE IDEA: Alternative to Idea B-6
Pave a full-depth roadway width of 26 feet with 4-foot paved shoulders and 5-foot grass shoulders

Comp By: G.O. Date: 6/28/2011 Checked By: K.B. Date: 7/5/2011

Original Concept:

The current design proposes to construct a roadway typical section consisting of two 12-foot lanes with 6.5-foot paved shoulder, 3.5-foot grass shoulder and ditch. Shoulders will include a 16-inch rumble strip

Proposed Change:

This recommendation would widen the roadway full-depth template by 1-foot on each side (lanes would be striped at 12 feet) and provide an additional 4 feet of paved shoulders per side.

Justification:

This project is being constructed as part of a truck by-pass route around the City of Monroe. The VE concept shifts the standard joint along the edge of pavement and paved shoulder away from the outside wheel path. Shifting this joint further away from the wheel path will reduce future paved shoulder maintenance. This concept provides the same function as the original design. The VE design meets State policy without impacting project cost. The total width of the shoulder would remain at 10 feet, the same width as in the original design.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
Original	\$543,000		
Proposed	\$543,000		
Savings	\$0		\$0
FUTURE COST: – Savings		N/A	N/A
TOTAL PRESENT WORTH SAVINGS			\$0

SKETCH

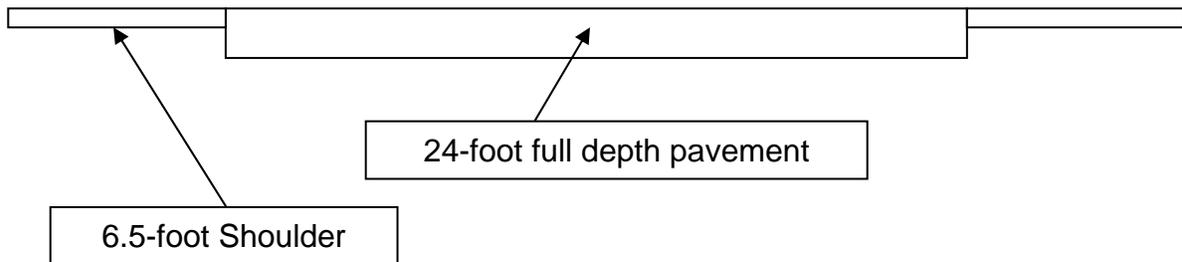
Project: SR 83 Connector

Idea No.: B-6.3

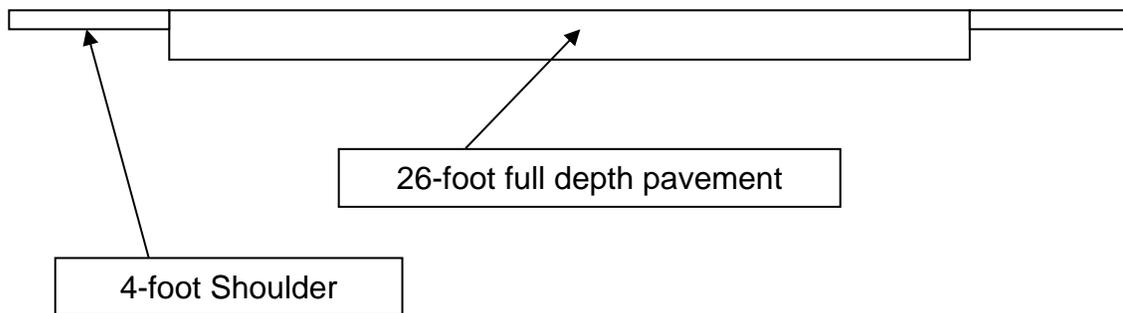
Client: City of Monroe / GDOT

Sheet 2 of 4

Original Design:



VE Design:



CALCULATIONS

Project: SR 83 Connector

Idea No.: B-6.3

Client: City of Monroe / GDOT

Sheet 4 of 4

Pavement cost:

Asphalt pavement; SR-83 Connector: 9.5 in asphalt / 12 inch GAB

$$(9.5 / 12 \text{ ft}) (150 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.059375 \text{ ton} / \text{SF}$$

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

Cost per SY

$$(0.059375 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$58 / \text{ton}) + (0.0675 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$15.00 / \text{ton}) = \\ \$30.99 + \$9.11 = \$40.01 / \text{SY} \quad \text{USE: } \mathbf{\$40 \text{ per SY}}$$

Asphalt shoulders: Assume 3.5 in asphalt / 6 inch GAB

$$(3.5 / 12 \text{ ft}) (150 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.021875 \text{ ton} / \text{SF}$$

$$(6 / 12 \text{ ft}) (135 \# / \text{CF}) (1 \text{ ton} / 2000\#) = 0.03375 \text{ ton} / \text{SF}$$

Cost per SY

$$(0.021875 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$58 / \text{ton}) + (0.03375 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$15.00 / \text{ton}) = \\ \$11.42 + \$4.56 = \$15.98 / \text{SY} \quad \text{USE: } \mathbf{\$16 \text{ per SY}}$$

SR 83 Connector Roadway Length:

Station 5+00 to Station 240+00 = 23,500 feet = 4.451 miles

Standard Paved Shoulders

$$(23,500 \text{ ft} \times 6.5 \text{ ft}) \times 2 = 305,500 \text{ SF} / 9 = 33,945 \text{ SY}$$

VE Design:

Full-depth Shoulder

$$(23,500 \text{ ft} \times 1 \text{ ft}) \times 2 = 47,000 \text{ SF} / 9 = 5,223 \text{ SY}$$

Standard Shoulder

$$(23,500 \text{ ft} \times 4 \text{ ft}) \times 2 = 188,000 \text{ SF} / 9 = 20,889 \text{ SY}$$

DEVELOPMENT AND RECOMMENDATION PHASE

Project: SR 83 Connector

IDEA No.:
B-9

Sheet No.:
1 of 4

CREATIVE IDEA: Revise the SR 83 / Monroe Madison Road intersection to reduce the skew angle and amount of side road reconstruction.

Comp By: G.O. Date: 6/28/2011 Checked By: K.B. Date: 7/5/2011

Original Concept:

The original design proposes a realignment of Old Monroe Madison Road to reduce the skew angle with SR 83 Connector and eliminate the need for a design variance. This realignment will require the reconstruction / realignment of approximately 2,000 feet of roadway.

Proposed Change:

This recommendation would extend the SR 83 Connector tangents and reduce the radius of the SR 83 Connector curve thereby realigning the intersection skew angle to about 80 degrees.

Justification:

Reducing the SR 83 Connector curve radius from 1,330 feet to the minimum allowable curve radius of 1,060 feet and extending the SR 83 Connector tangents will improve the skew angle of the intersection to about 80 degrees and eliminate the need for a design exception or variance. Improving the intersection skew angle will also shorten the amount of reconstruction and realignment required on Old Monroe Madison.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
Original	\$217,000		
Proposed	\$0		
Savings	\$217,000		\$217,000
FUTURE COST: – Savings		N/A	N/A
TOTAL PRESENT WORTH SAVINGS			\$217,000

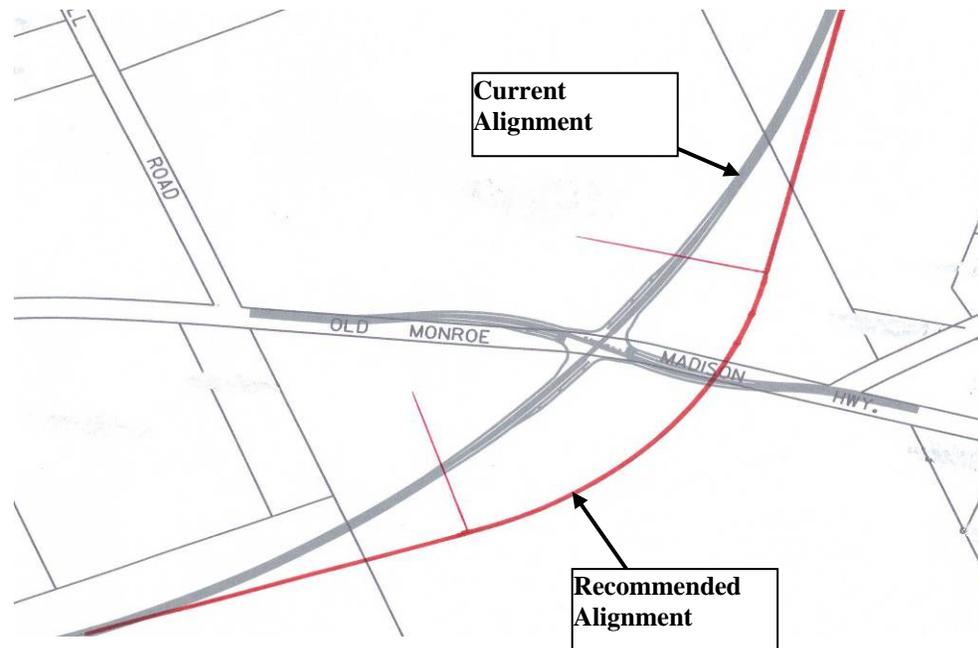
SKETCH

Project: SR 83 Connector

Idea No.: B-9

Client: City of Monroe / GDOT

Sheet 2 of 4



Revise the skew angle at the SR 83 Connector / Old Monroe Madison Road Intersection

CALCULATIONS

Project: SR 83 Connector

Idea No.: B-9

Client: City of Monroe / GDOT

Sheet 4 of 4

Total lengths: Slightly longer alignment but no significant change on SR 83.
Old Madison Monroe: current alignment requires about 2,000 ft of reconstruction; assume new alignment will require only 500 ft; 250 on each approach.

Pavement cost

Asphalt pavement; side road: 9.5 in asphalt / 12 inch GAB

$$(9.5 / 12 \text{ ft}) (150 \# / \text{CF}) (1 \text{ ton} / 2000 \#) = 0.059375 \text{ ton} / \text{SF}$$

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

Cost per SY

$$(0.059375 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$58 / \text{ton}) + (0.0675 \text{ ton} / \text{SF} \times 9 \text{ SF} / \text{SY} \times \$15.00 / \text{ton}) = \\ \$30.99 + \$9.11 = \$40.01 / \text{SY} \quad \text{USE: } \$40 \text{ per SY}$$

$$\text{Side road area} - (2,000 - 500 \text{ ft}) \times 24 \text{ ft} (1 / 9) = 4,000 \text{ SY}$$

Reduced Right of Way:

Assume about 500 ft by 50 ft wide at each approach

$$2 (500 \times 50) = 50,000 \text{ SF}$$

$$\text{R/W factor} = 1.55(1.6) = 2.48$$

$$50,000 \text{ SF} \times \$0.46 / \text{SF} \times 2.48 = \$57,040$$

DEVELOPMENT AND RECOMMENDATION PHASE

Project: SR 83 Connector

IDEA No.:
B-10

Sheet No.:
1 of 4

CREATIVE IDEA:

Revise the horizontal alignment between Station 62 and Station 100 to avoid displacing the Hardin residence.

Comp By: S.G. Date: 6/30/2011 Checked By: K.B. Date: 7/05/2011

Original Concept:

The original design between Station 65 and Station 100 proposes a tangent alignment that causes one displacement just west of the SR 83 Connector / Pannell Road intersection.

Proposed Change:

This recommendation would revise the original tangent alignment and avoid the displacement west of the Pannell Road intersection. The revised alignment uses a series of minimum radius (55 MPH) curves to shift the alignment between Station 62 and Station 100 and avoid the need to take the house. The proposed realignment shifts the roadway to the north (Station 62 – 79) before shifting to the south (crossing at Brush Creek Drive) to avoid the house and connecting back to the original alignment near Station 100.

Justification:

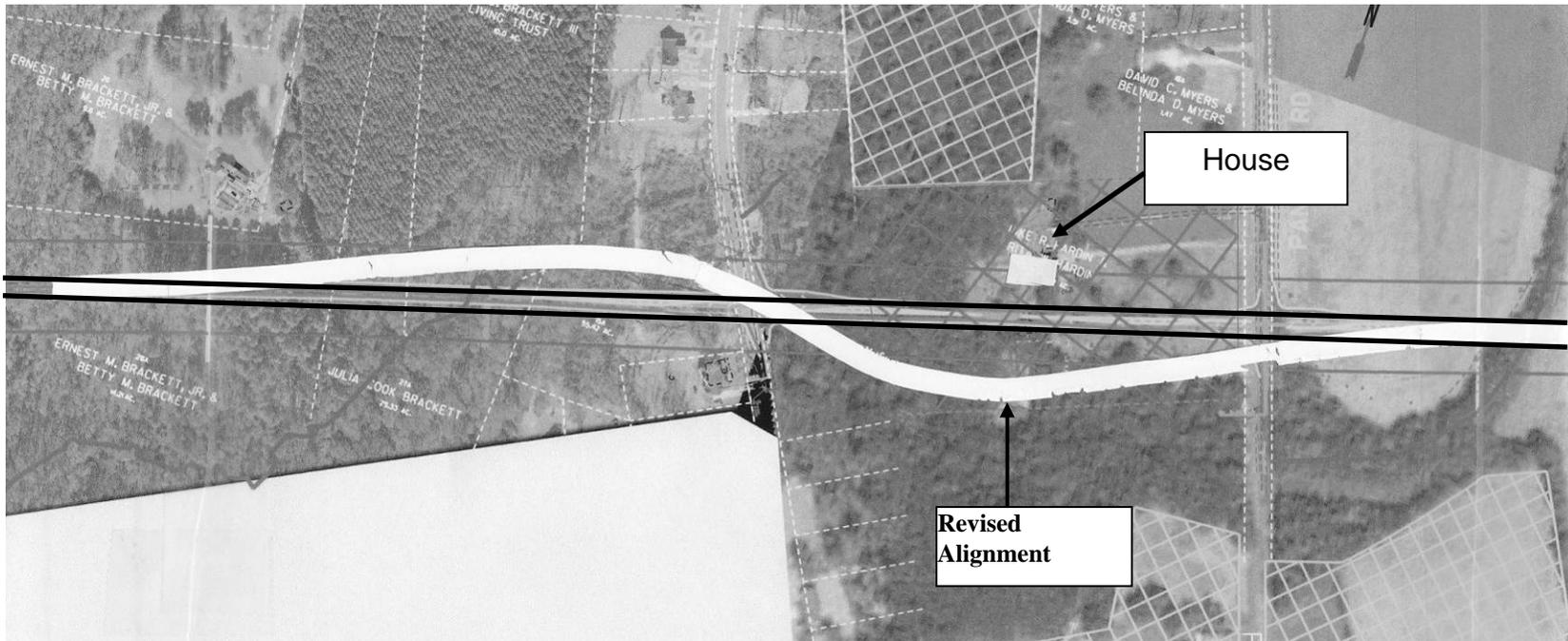
The purpose of the project is to provide a new roadway location for trucks to bypass around the City of Monroe. This concept would revise the proposed bypass alignment between Station 62 and Station 100 by inserting a minimum radius reverse curve through this area to avoid the original R/W displacement. This concept meets the original purpose of the project without causing any displacements.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
Original	\$750,000		
Proposed	\$172,000		
Savings	\$578,000		\$578,000
FUTURE COST: – Savings		N/A	N/A
TOTAL PRESENT WORTH SAVINGS			\$578,000

SKETCH

Project: SR 83 Connector

Idea No.: B-10
Client: City of Monroe / GDOT
Sheet 2 of 4



Revise Horizontal Alignment (Station 62 to Station 100) to Avoid Residential Take

CALCULATIONS

Project: SR 83 Connector

Idea No.: B-10
Client: City of Monroe / GDOT
Sheet 4 of 4

Original Concept:

Base Cost of Improvements (Residence) = \$106,858

Base Cost of Relocation (Residential) = \$40,000

Based Cost of Land (Agricultural) = (750 ft)(450 ft)(\$0.46 / SF) = \$155,250

Base Total Cost = \$106,858 + \$40,000 + \$155,250 = \$302,108

Adjusted Total Cost = (1.55)(1.60)(\$302,108) = \$749,228

VE Revised Concept:

Base Cost of Improvements (Residence) = \$ 0

Base Cost of Relocation (Residential) = \$ 0

Based Cost of Land (Agricultural) = (200 ft)(750 ft)(\$0.46 / SF) = \$69,000

Base Total Cost = \$0 + \$0 + \$69,000 = \$69,000

Adjusted Total Cost = (1.55)(1.60)(\$69,000) = \$171,120

DEVELOPMENT AND RECOMMENDATION PHASE

Project: SR 83 Connector

IDEA No.:
E-1

Sheet No.:
1 of 4

CREATIVE IDEA:
Perform clearing and grubbing only to the construction limits.

Comp By: S.G. Date: 6/30/2011 Checked By: K.B. Date: 7/5/2011

Original Concept:

The original concept proposes to perform clearing & grubbing for the entire 200' right-of-way corridor.

Proposed Change:

The revised concept proposes to perform clearing & grubbing only to the proposed construction limits.

Justification:

The project can be constructed as proposed if clearing & grubbing is performed only to the construction limits. The reduction in clearing and grubbing will save the unnecessary removal of trees and other vegetation.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
Original	\$186,000		
Proposed	\$0		
Savings	\$186,000		\$186,000
FUTURE COST: – Savings		N/A	N/A
TOTAL PRESENT WORTH SAVINGS			\$186,000

CALCULATIONS

Project: SR 83 Connector

Idea No.: E-1
Client: City of Monroe / GDOT
Sheet 4 of 4

Assumptions

Clearing and Grubbing will be required for a 150-foot corridor (100 feet R/W, 50 feet Easement). The lump sum savings will be 25% (200-150/200).

Cost of Additional Clearing & Grubbing = $(0.25)(\$744,000) = \$186,000$

Original Concept

Cost of Additional Clearing & Grubbing = $(0.25)(\$744,000) = \$186,000$

Revised Concept

Cost of Additional Clearing & Grubbing = \$0

DEVELOPMENT AND RECOMMENDATION PHASE

Project: SR 83 Connector

IDEA No.:
J-2

Sheet No.:
1 of 3

CREATIVE IDEA:

Use 3-Strand barbed wire fence in-lieu-of woven wire fence to stake the project R/W

Comp By: G.O. Date: 6/29/2011 Checked By: K.B. Date: 7/5/2011

Original Concept:

The current design places woven wire fencing along both sides of the roadway for the entire length of the project.

Proposed Change:

This recommendation would use 3-strand barbed wire fence in-lieu-of woven wire fence to control access along the project.

Justification:

This project will be constructed on new alignment that lies primarily within undeveloped heavily wooded areas. Due to the uninhabited nature of the area, there is no need to use a more costly woven wire fence to control access and fence the project R/W.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
Original	\$325,000		
Proposed	\$166,000		
Savings	\$159,000		\$159,000
FUTURE COST: – Savings		N/A	N/A
TOTAL PRESENT WORTH SAVINGS			\$159,000

CALCULATIONS

Project: SR 83 Connector

Idea No.: J-2
Client: City of Monroe / GDOT
Sheet 3 of 3

Current Design:

Woven wire fencing: Plan quantity = 50,582 ft

VE Design:

3-strand barbed wire fencing: Plan quantity = 50,582 ft

DEVELOPMENT AND RECOMMENDATION PHASE

Project: SR 83 Connector

IDEA No.:
J-2.1

Sheet No.:
1 of 3

CREATIVE IDEA: Alternative to Idea J-2

Use 3-strand barbed wire fence in-lieu-of woven wire fence in wooded areas and woven wire fence in open farm land.

Comp By: G.O. Date: 6/29/2011 Checked By: K.B. Date: 7/5/2011

Original Concept:

The current design places woven wire fencing along both sides of the roadway for the entire length of the project.

Proposed Change:

This recommendation would use 3-strand barbed wire fence in-lieu-of woven wire fence in the heavily wooded areas and woven wire fence in the open farm areas to control access along the project.

Justification:

This project will be constructed on new alignment that lies primarily within undeveloped heavily wooded areas. Due to the uninhabited nature of the area, there is no need to use a more costly woven wire fence to control access in the heavily wooded areas.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
Original	\$325,000		
Proposed	\$206,000		
Savings	\$119,000		\$119,000
FUTURE COST: – Savings		N/A	N/A
TOTAL PRESENT WORTH SAVINGS			\$119,000

CALCULATIONS

Project: SR 83 Connector

Idea No.: J-2.1

Client: City of Monroe / GDOT

Sheet 3 of 3

Current Design:

Woven wire fencing: Plan quantity = 50,582 ft

VE Design:

Barbed wire fence Station 5+00 to Station 80+00 = 7,500 ft

Barbed wire fence Station 112+00 to Station 155+00 = 4,300 ft

Barbed wire fence Station 165+00 to Station 190+00 = 2,500 ft

Barbed wire fence Station 194+00 to Station 240+00 = 4,600 ft

$(7,500 \text{ ft} + 4,300 \text{ ft} + 2,500 \text{ ft} + 4,600 \text{ ft}) \times 2 = \mathbf{37,800 \text{ ft}}$

Woven wire fence Station 0+00 to Station 5+00 = 500 ft

Woven wire fence Station 80+00 to Station 112+00 = 3,200 ft

Woven wire fence Station 155+00 to Station 165+00 = 1,000 ft

Woven wire fence Station 190+00 to Station 194+00 = 400 ft

Woven wire fence Station 240+00 to Station 253+00 = 1,300 ft

$(500 \text{ ft} + 3,200 \text{ ft} + 1,000 \text{ ft} + 400 \text{ ft} + 1,300 \text{ ft}) \times 2 = \mathbf{12,800 \text{ ft}}$

Sources

Approving / Authorizing Persons

Name:	Position:	Telephone:
Julian Jackson	City of Monroe	770-266-5110
Timothy Matthews	Project Manager	404-631-1568
Ron Wishon	Engineering Services	404-631-1753

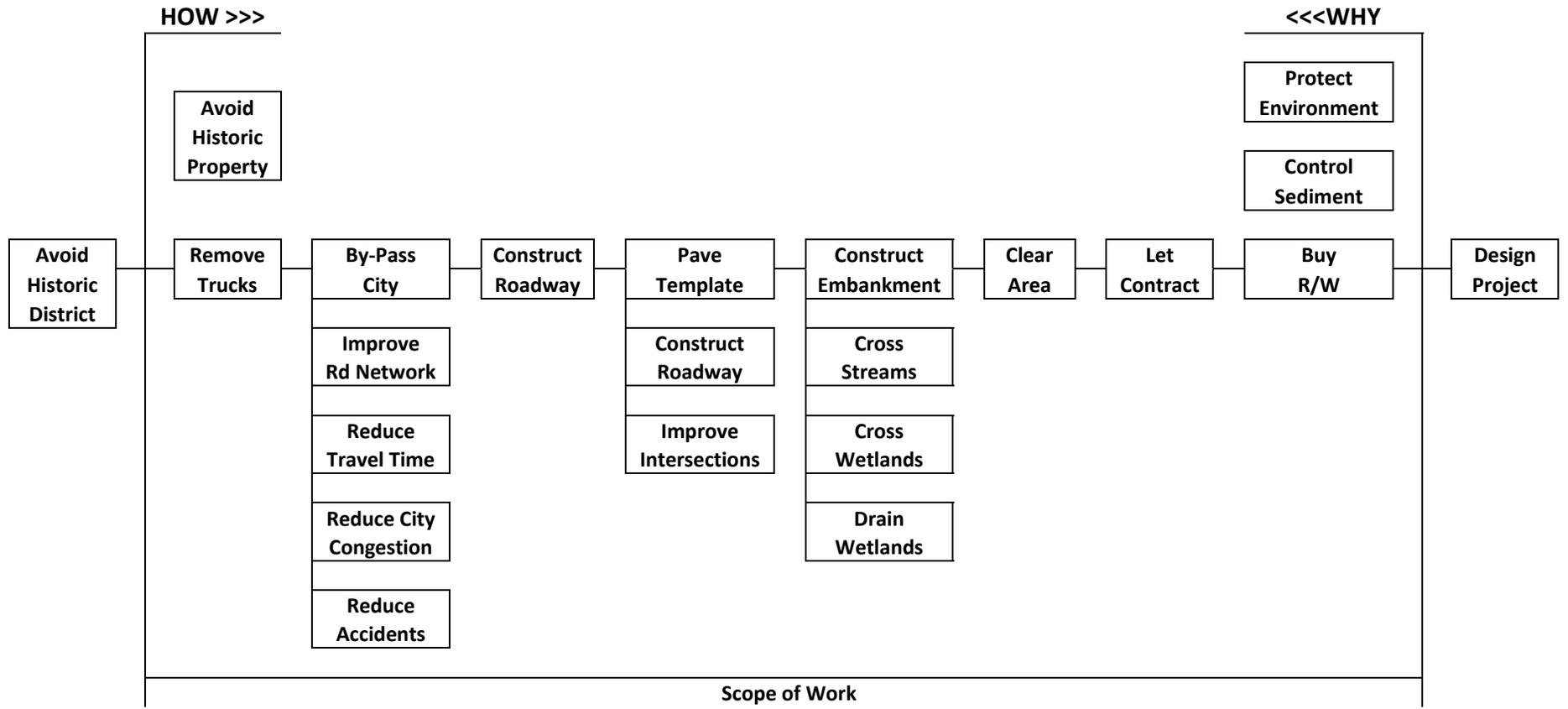
Personal Contacts

Name:	Telephone:	Notes:
Douglas Tilt	770-384-6605	Project briefing at the start of the study
Tim Matthews	404-631-1568	Project Briefing
Douglas Tilt	770-384-6605	Discussion of alternatives, elevation change at SR 83, condition of Glen Bell Road, need for fencing

Documents / Abstracts

Reference:	Reference:
1:200 Scale Layout Design	Proposed layout on US Quad Maps
Draft Project Concept Report	Proposed roadway typical Section
Preliminary Cost Estimate	Accident Data
Traffic Diagrams	Capacity Analysis Summary

FAST DIAGRAM



INFORMATION PHASE – FUNCTION ANALYSIS

Project: SR 83 Connector

Function: Remove Trucks

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	% of Total	Worth/Save
A	Right of Way	Relocate	SR 11 Rdwy	\$6,076,000	35.1	Yes
		Store	Project			
		Construct	Truck Route			
		Avoid	Historic Areas			
		Minimize	Impacts			
		Minimize	Displacements			
		Avoid	Road Impacts			
		Create	New Alignment			
B	Asphalt Pavement	Construct	Riding Surface	\$3,936,000	22.8	Yes
		Accommodate	Truck Traffic			
		Support	Truck Traffic			
		Construct	Roundabout			
		Reconstruct	Intersections			
		Construct	Turn Lanes			

INFORMATION PHASE – FUNCTION ANALYSIS

Project: SR 83 Connector

Function: Remove Trucks

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	% of Total	Worth/Save
C	Grading Complete	Construct	Embankment	\$2,218,000	12.8	Yes
		Support	Pavement			
		Drain	Roadway			
		Fill	Wet Lands			
		Reconstruct	Intersection			
		Construct	Turn Lanes			
D	Granular Aggregate Base	Support	Roadway	\$1,385,000	8.0	No
		Drain	Roadway			
		Support	Truck Traffic			
		Prepare	For Paving			
E	Clear & Grubbing	Remove	Material	\$744,000	4.3	Yes
		Enable	Construction			
		Clear	R/W			

INFORMATION PHASE – FUNCTION ANALYSIS

Project: SR 83 Connector

Function: Remove Trucks

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	% of Total	Worth/Save
F	Environmental Mitigation	Purchase	Wetland Credit	\$557,000	3.2	Yes
		Comply with	Regulations			
		Compensate	For Wetlands			
		Buy	Stream Credits			
		Allow	Construction			
G	Box Culvert	Convey	Water	\$546,000	3.2	No
		Support	Roadway			
		Carry	Aquatic Life			
H	Utilities	Construct	Services	\$500,000	2.9	Yes
		Connect	Existing			
		Relocate	Existing			
		Avoid	Power Lines			
I	Erosion Control	Control	Sediment	\$470,000	2.7	No
		Protect	Wetlands			
		Protect	Slopes			

INFORMATION PHASE – FUNCTION ANALYSIS

Project: SR 83 Connector

Function: Remove Trucks

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	% of Total	Worth/Save
J	Woven Wire Fence	Delineate	R/W	\$325,000	1.9	Yes
		Replace	Existing			
		Protect	Livestock			
K	Traffic Control	Direct	Traffic	\$300,000	1.7	No
		Protect	Worker			
		Allow	Construction			
		Maintain	Traffic			
		Protect	Motorists			
L	Miscellaneous	Construct	Project	\$242,000	1.4	No

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
No.	CREATIVE IDEA	COMMENTS	IDEA RATING
A	Right of Way		
A-1	Buy R/W only to the shoulder point and buy the remainder as Permanent Easement.	Reduce cost, Don't need to buy entire area to construct roadway	✓
A-2	Construct the new By Pass on an alternate alignment.	See Idea A3 and Idea A-4	X
A-3	Construct on new alignment using the proposed first 100 Station, crossing north to Gene Bell Road, and shifting back to SR 83 at the northern terminus	Shortens the proposed route, makes use of local roads, reduces construction	✓
A-4	Construct on new alignment using Dial Road, crossing east to Gene Bell Road, and following Gene Bell Road to SR 83.	Shortens the proposed route, makes use of local roads, reduces construction	✓
A-5	Realign Curve at Old Monroe / Madison Road to provide a more perpendicular crossing.	See Ides B-9	X
A-6	Do not realign Old Monroe / Madison Road and obtain a design variance.	See Idea B-9	X
A-7	Construct the SR 83 Bypass on a new alignment that abuts the existing power line easement at Station 36.	Reduces length of bypass, Displaces more homes	X
✓ = Will be considered further; X = will be dropped; DS = Design suggestion –written for consideration by design team			

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
No.	CREATIVE IDEA	COMMENTS	IDEA RATING
B	Asphalt Pavement		
B-1	Revise Roundabout location to have SR-11 to SR 83 Connector as a direct movement and tie SR 11 into revised SR-11 to SR 83 Connector direct connection	Provides more direct movement from SR 11 to the new SR 83 Connector	✓
B-1.1	Revise Roundabout to provide a direct NB SR 11 to NB SR 83 Connector right turn lane.	Removes the NB right turn movement from going through the roundabout	✓
B-3	Construct a Roundabout at the SR 83 Connector / Monroe / Madison Road intersection.	Allows free traffic movement	✓
B-4	Shift the roadway to the north at Station 74 to reduce impact to the house on the south side of the roadway.	Reduces impact on house immediately south of the roadway on Brush Creek Drive	✓
B-5	Construct a Roundabout at the SR 83 Connector / SR 83 intersection.	Reduce average truck speed on SR 83	X
B-6	Reduce the paved shoulder width from 6.5 feet to 4 feet.	Reduce cost, meets policy	✓
B-6.1	Reduce the paved shoulder width from 6.5 feet to 2 feet.	Reduce cost, meets policy	✓
B-8	Pave a full-depth roadway width of 24 feet with a 2-foot full depth paved shoulder and a 8-foot grass shoulder.	Eliminates joint at the edge of pavement and shoulder, strengthens shoulder	✓
B-8.1	Pave a full-depth roadway width of 26 feet with a 4-foot paved shoulder and a 5-foot grass shoulder.	Moves edge joint away from the right wheel path, wider lane to accommodate trucks	✓
✓ = Will be considered further; X = will be dropped; DS = Design suggestion –written for consideration by design team			

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
No.	CREATIVE IDEA	COMMENTS	IDEA RATING
B-9	Revise the SR 83 / Monroe / Madison Road intersection to reduce the angle of skew.	Provide better crossing	✓
B-10	Revise the horizontal alignment between Station 55 and Station 100 to eliminate displacing the Hardin residence.	Reduce project impact, eliminate one relocation	✓
C	Grading Complete		
C-1	Use Gene Bell Road for part of the truck bypass route.	See Idea A-3	X
E	Clearing and Grubbing		
E-1	Clear only to the construction limits	Reduce cost, Save trees	✓
F	Environmental Mitigation		
F-1	Use Gene Bell Road for part of the truck bypass to reduce / eliminate stream and wetland impacts.	See Idea A-1	X
H	Utilities		
H-1	Construct the SR 83 Bypass on a new alignment that abuts the existing power line easement at Station 36.	Significantly shortens the proposed route, Requires additional relocations.	X
✓ = Will be considered further; X = will be dropped; DS = Design suggestion –written for consideration by design team			

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
No.	CREATIVE IDEA	COMMENTS	IDEA RATING
J	Woven Wire fence		
J-1	Eliminate the fencing	Reduce Cost, State policy to fence controlled access roadways	X
J-2	Use a 3-strand barbed wire fence in-lieu-of a woven wire fence.	Define R/W, reduce cost, woven wire fence not needed in heavily wooded areas	✓
J-2.1	Use a 3-strand barbed wire fence in wooded areas and a woven wire fence in open farm areas.	Define R/W, reduce cost, woven wire fence not needed in heavily wooded areas	✓
✓ = Will be considered further; X = will be dropped; DS = Design suggestion –written for consideration by design team			

