

VALUE ENGINEERING REPORT

Widening of SR 56/Mike Padgett Highway CR17/Bennock Mill Road to CR 1516/Old Waynesboro Road

Project Number STP-0006-00(431)

Richmond County

P.I. No. 0006431

August 11, 2009

OWNER AND DESIGN TEAM:



Georgia Department of Transportation
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VALUE ENGINEERING CONSULTANT:



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EXECUTIVE SUMMARY

Executive Summary

VALUE ENGINEERING STUDY

**Widening of SR 56
Richmond County
Project No. STP-0006-00(421) P.I. No. 0006431**

Introduction

This report presents the results of a value engineering (VE) study conducted on SR 56, located in Richmond County, from CR 17/Bennock Mill Road to CR 1516/Old Waynesboro Road, a distance of 4.68 miles. The project consists of constructing a 24' raised median, upgrading shoulders, improving drainage, widening of two bridges and constructing traffic signals. The estimated construction cost including Right of Way is \$35M. The design is currently in the preliminary stage, and the estimated let date has not been determined. The project is being designed by URS for GDOT. The VE study was conducted on July 27-30, 2009, at the Georgia DOT General Office in Atlanta by a four-person VE team.

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

Considerations

No formal constraints to the VE study were identified prior to the study or during the kick-off meeting. The Team concentrated its efforts on the following elements of the proposed project, based on their respective cost and functionality:

- R/W (\$13.4M; 38% of project cost)
- Pavement (\$7.0M; 20% of project cost)
- Median (\$2.4M; 7% of project cost)
- Bridges (\$1.5M; 4% of project cost)

Results Obtained

The VE Team developed 10 recommendations for consideration by GDOT. These recommendations involved the median type and width, pavement design, bridges, and R/W. They are summarized as follows.

Recommendation Highlights

P-4 Use 2-11' Lanes and 2-12' Lanes

This change would continue to provide the required functionality of the divided four-lane roadway, including accommodating a high truck volume. It would reduce construction and R/W costs significantly.

The total potential savings if accepted is \$590,000.

P-5 Different Pavement Thickness for Different Sections of SR 56

The truck volumes vary significantly throughout the corridor. A thinner pavement section would provide the required functionality in sections with lower truck volumes.

The total potential savings if accepted is \$300,000.

M-1 Five-Lane Section throughout the Project

The existing SR 56 has a five-lane typical section with flush median north and south of this project plus a significant length of five-lane section within the limits of the project. Using a five-lane section for the entire project would maintain consistency and driver expectation while reducing construction and R/W costs significantly.

The total potential savings if accepted is \$3,175,000.

M-8 Five-Lane Section – South End of the Project

If Recommendation M-1 cannot be implemented, the VE Team recommends the use of a five-lane section in the southern portion of the project, which would incorporate the existing five-lane section within the project limits. This change would eliminate the throwaway of the existing five-lane section and maintain consistency and driver expectation.

The total potential savings if accepted is \$1,500,000.

M-10 Use a 22' Raised Median

If Recommendation M-1 cannot be implemented, the VE Team recommends the use of a narrower raised median, which would continue to provide the required functionality while reducing construction and R/W costs. This recommendation could be implemented in conjunction with Recommendation M-8.

The total potential savings if accepted is \$38,000.

R-2 Convert R/W to Slope Easement

This change would continue to provide for the maintenance of slopes and drainage facilities, while significantly reducing R/W cost.

The total potential savings if accepted is \$2,470,000.

R-4 Retain Existing Shoulder at Historic Properties

This change would eliminate the need to displace 6 properties across from the historic properties while continuing to avoid impacts to the historic resources. .

The total potential savings if accepted is \$1,720,000.

B-1 Use Shoulder for Right Turn Lane on Brown Road

The right turn volume at this intersection is currently low and projected to remain low in the design year. Using a widened shoulder as the turn lane would reduce the amount of bridge widening.

The total potential savings if accepted is \$210,000.

B-6 Widen One Side of Little Spirit Creek Bridge

Widening to one side rather than symmetrically would reduce construction cost modestly but also avoid potential impacts on the creek.

The total potential savings if accepted is \$65,000.

B-7 Reduce Shoulder Widths on Bridges

An 8' shoulder is acceptable under current GDOT policy.

The total potential savings if accepted is \$155,000.

Widening of SR 56 Project No. STP-0006-00(431)
SUMMARY OF VALUE ENGINEERING RECOMMENDATIONS

ITEM No.	RECOMMENDATION DESCRIPTION	BASELINE INITIAL COST	PROPOSED INITIAL COST	INITIAL COST SAVINGS	FUTURE SAVINGS	TOTAL LIFE CYCLE SAVINGS	COMMENTS
	Pavement						
P-4	Use 2-11' and 2-12' Lanes	\$3,655,000	\$3,065,000	\$590,000	\$0	\$590,000	11' Inside Lanes
P-5	Different Pavement Thicknesses Per Truck Volumes	\$300,000	\$0	\$300,000	\$0	\$300,000	Truck Volumes Vary Significantly
	Median						
M-1	5-Lane Section Throughout	\$4,640,000	\$1,465,000	\$3,175,000	\$0	\$3,175,000	Match Existing
M-8	5-Lane Section - South End Mutually Exclusive with M-1	\$1,830,000	\$330,000	\$1,500,000	\$0	\$1,500,000	More Rural, Fewer Turns
M-10	22' Raised Median Mutually exclusive with M-8, M-1	\$380,000	\$0	\$380,000	0	\$380,000	Meets AASHTO

Widening of SR 56 Project No. STP-0006-00(431)
SUMMARY OF VALUE ENGINEERING RECOMMENDATIONS

ITEM No.	RECOMMENDATION DESCRIPTION	BASELINE INITIAL COST	PROPOSED INITIAL COST	INITIAL COST SAVINGS	FUTURE SAVINGS	TOTAL LIFE CYCLE SAVINGS	COMMENTS
	Right of Way						
R-2	Convert R/W to Slope Easement	\$6,170,000	\$3,700,000	\$2,470,000	\$0	\$2,470,000	Slopes Maintained
R-4	Retain Existing Shoulder @ Historic Properties	\$1,720,000	\$0	\$1,720,000	\$0	\$1,720,000	Reduces Displacements
	Bridge						
B-1	Use Shoulder for Right Turn Lane at Brown Road	\$1,025,000	\$815,000	\$210,000	\$0	\$210,000	Right turn volume low
B-6	Widen One Side of Little Spirit Creek Bridge Only	\$365,000	\$300,000	\$65,000	\$0	\$65,000	Works better with stream channel
B-7	Reduce Shoulder Widths Per MOG	\$1,390,000	\$1,235,000	\$155,000	\$0	\$155,000	Meets Policy

STUDY IDENTIFICATION

Study Identification

Project: Widening of SR 56	Dates: July 27-30, 2009
Location: Atlanta – GDOT Headquarters	

VE Team Members

Name:	Discipline:	Organization:	Contact:
Alex Wiley, PE	Highway Design	MACTEC	770-421-3481 awiley@mactec.com
Greg Grant, PE	Structures Design	Wolverton	770-447-8999 greg.grant@wolverton- assoc.com
Steven Gaines, PE	Highway Construction	Wolverton	770-447-8999 steven.gaines@wolver- ton-assoc.com
Rod Curtis, PE CVS	Value Engineering Team Leader	MACTEC	602-770-1062 rhcurtis@mactec.com

Project Description

This project proposes to widen and reconstruct SR56 from CR17/Bennock Hill Road to CR 1516/Old Waynesboro Road for a total of 4.68 miles. Most of this section of SR 56 consists of a four-lane undivided section, but there are short sections with a 14' flush median within. The existing speed limit is 55 mph. 2006 AADT varied from approximately 12,000 to 27,000, with higher volumes in the northern end of the corridor. Truck volume was as high as 27%. Traffic volumes are forecast to increase to as high as 35,000 AADT in 2032. Recent four-year crash data (2003-2006) include a total of 295 incidents, with 10 fatalities. The fatality rate is significantly higher than the statewide average.

This project will add a 24' raised median in order to increase safety and enhance operation by restricting left turns. Bridges over Spirit Creek and Little Spirit Creek, will be widened to accommodate the proposed median, shoulders and a right-turn lane at Brown Road. Geometric deficiencies will be eliminated in some sections. Where feasible, the existing pavement will be retained. Right of Way requirements will impact 121 parcels. The estimated total project cost is \$35.4M, as shown in the Cost Model that follows.

The purpose of the project is to improve operational conditions on SR56 and restrict left turn movements. An Environmental Assessment was in progress at the time of the VE study. There

are three historic properties along the corridor which must be avoided. This project is not yet programmed for construction (long range).

Cost Model

Element	Cost	Percent of Total
Right of Way	\$13,422,600	38%
Pavement	6,951,732	20
Earthwork	3,004,406	8
Median	2,370,000	7
Bridge	1,461,666	4
MOT	1,012,160	3
		80%
Drainage	783,355	2
Traffic Engineering	376,842	1
Miscellaneous	5,975,968	17
TOTAL	\$35,358,729	100%

Based on Estimate Report dated 7/21/09

Kickoff Meeting

A brief kickoff meeting was conducted on the first morning of the VE study, with the attendees shown below. Mike Connor of URS and Robert Murphy of GDOT gave an overview of the project. The VE Team appreciated the assistance given by the meeting attendees.

Attendees:

Lisa Myers	GDOT	Engineering Services
Matt Sanders	GDOT	Engineering Services
James Magnus	GDOT	Construction
Nabil Raad	GDOT	Traffic Operations
Robert Murphy	GDOT	Project Manager
Jennifer Harris-Dunham	GDOT	Bridge Design
Mike Connor	URS	Design Team
George Obaranec	MACTEC	Value Engineering PM
Alex Wiley	MACTEC	Value Engineering- Design
Greg Grant	Wolverton	Value Engineering- Structures
Steven Gaines	Wolverton	Value Engineering-Design/Con.
Rod Curtis	MACTEC	Value Engineering

Items Noted During Meeting:

- This project has had several termini before settling on the proposed 4.68 mile section.
- Three historic properties must be avoided which necessitates some alignment shifts.
- 4 residential and 4 commercial displacements were noted (Latest estimate indicates 7 Commercial and 0 Residential)

- Bike lanes have been added but will be accommodated on the 6.5 paved shoulders.
- The two bridges do not have sufficient freeboard (3' deficiency on one, 2' on the other). The Design Team is waiting for a decision as to whether to replace or widen and jack the bridge. The current estimate includes only widening cost.
- The bridges were constructed in 1968 and widened in 1986. Both have Sufficiency Ratings above 90.
- The intersection with Old Waynesboro has superelevation deficiencies; up to 8' fill will be required to correct.
- New traffic signal will be added to Doug Bernard Parkway; two existing signals will be modified.
- A drainage issue exists at Santa Rosa Drive. Design Team will resolve.
- Retaining walls may be included, but not yet designed. No information provided.
- Existing pavement will be retained where possible, consistent with elimination of geometric deficiencies.
- The EA was sent to GDOT last July, and will not be finalized until the decision is made on the bridge concept.
- Hazardous waste sites are not anticipated to be a significant concern on this project.
- A hydraulic study is currently in progress.

V.E. Team Presentation

At the conclusion of the VE Study on July 30, 2009, the VE Team gave a brief overview of its recommendations. The following personnel were present:

- | | |
|--------------------------|---------------------------|
| • Ron Wishon | GDOT Engineering Services |
| • Lisa Myers | GDOT Engineering Services |
| • Matt Sanders | GDOT Engineering Services |
| • Robert Murphy | GDOT Project Manager |
| • Jennifer Harris-Dunham | GDOT Bridge Design |
| • George Obaranec | MACTEC Project Manager |
| • Alex Wiley | MACTEC - VE Team |
| • Greg Grant | Wolverton – VE Team |
| • Steven Gaines | Wolverton – VE Team |

The Value Engineering Team appreciated the attendance by GDOT staff and the feedback received during the meeting.

Figure 1
Project Vicinity Map



County Map of Georgia

VE RECOMMENDATIONS

DEVELOPMENT AND RECOMMENDATION PHASE

SR 56 Widening

IDEA No.:

P-4

PAGE No.:

1 of 3

CREATIVE IDEA:

Reduce Inside Lane Width from 12' to 11'

Comp By: SG Date: 7-30-09 Checked By: RHC Date: 7-30-09

Baseline Concept: The baseline concept proposes 12' lane widths for all through lanes.

Proposed Change: The revised concept proposes to reduce the inside lane widths to 11'.

Justification: The need and purpose of the project can be accomplished with reduced lane widths for the inside lanes. The outside lane width of 12' would be retained due to the high volume of truck traffic. The proposed change would result in cost savings for pavement and right-of-way.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	PRESENT WORTH
INITIAL COST - Original	\$ 3,655,000		
- Proposed	\$ 3,065,000		
- Savings	\$ 590,000		\$590,000
FUTURE COST - Savings			
TOTAL PRESENT WORTH SAVINGS			\$ 590,000

ASSUMPTIONS/CALCULATIONS/CONTACTS MADE

Project Name: SR 56 Widening

ITEM No: P-4

Sheet 3 of 3

Original Concept

Roadway

Length = (35647-10700) - (96+180) = 24,671 lf

Pavement Area = (2)(12 lf)(24,671 lf) = 592,104 sf

Pavement Rates:

12.5mm => 0.0092 tons/sf

19mm => 0.018 tons/sf

25mm => 0.024 tons/sf

GAB => 0.061 tons/sf

Pavement

Wt(12.5 mm) = (592,104 sf)(0.0092 tons/sf) = 5,448 tons

Wt (19 mm) = (592,104 sf)(0.018 tons/sf) = 10,658 tons

Wt (25 mm) = (592,104 sf)(0.024 tons/sf) = 14,211 tons

Wt (GAB) = (592,104 sf)(0.061 tons/sf) = 36,118 tons

R/W Area (Additional 1lf) = (2)(1lf)(24,671 lf) = 49,342 sf

Revised Concept

Roadway

Length = (35647-10700) - (96+180) = 24,671 lf

Pavement Area = 2(11 lf)(24,671 lf) = 542,762 sf

Pavement

Wt(12.5 mm) = (542,762 sf)(0.0092 tons/sf) = 4,994 tons

Wt (19 mm) = (542,762 sf)(0.018 tons/sf) = 9,770 tons

Wt (25 mm) = (542,762 sf)(0.024 tons/sf) = 13,027 tons

Wt (GAB) = (542,762 sf)(0.061 tons/sf) = 33,109 tons

R/W Area = 0 sf

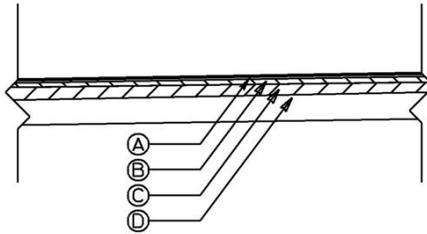
DEVELOPMENT AND RECOMMENDATION PHASE			
Project Name <i>SR 56/Mike Padgett Hwy. From Bennock Mill Rd. to Tobacco Rd.</i>			
IDEA No.: P5	Sheet No.: 1 of 7	CREATIVE IDEA: Use Different Pavement Thickness for Different Sections of SR 56	
Prepared By: AW		Date: 07/28/09	Checked By: RHC Date: 7/29/09
<p>Baseline Concept:</p> <p>For the full depth sections of SR 56, it appears the same pavement section will be used throughout the length of the project.</p> <p>Proposed Change:</p> <p>Reduce the thickness of 25mm Superpave by 1” from the beginning of the project to Goshen Industrial Blvd. and from Old Waynesboro Rd. to the end of the project.</p> <p>Justification:</p> <p>The volume of traffic and the truck percentages vary at 3 different sections within the 4.7 mile corridor. By performing a separate pavement analysis for these sections, it appears the pavement thickness can be reduced for over half of the project length.</p>			
LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
INITIAL COST - Baseline	\$300,000		
- Proposed	\$0		
- Savings	\$300,000		\$300,000
FUTURE COST – Savings			\$0
TOTAL PRESENT WORTH SAVINGS			\$300,000

SKETCH

Project Name: SR 56/Mike Padgett Hwy. From Bennock Mill Rd. to Tobacco Rd.

IDEA No:
P5

Sheet 2 of 7



CURRENT

(BASED ON PRELIMINARY PLANS RECEIVED):

PAVING SECTION THROUGHOUT PROJECT LENGTH

- (A) ASPHALTIC CONCRETE 12.5 MM SUPERPAVE, GP 1 ONLY, INCL BITUM MATL 165 LB/SY
- (B) ASPHALTIC CONCRETE 19 MM SUPERPAVE, GP 1 OR 2 INCL BITUM MATL 330 LB/SY
- (C) ASPHALTIC CONCRETE 25 MM SUPERPAVE, GP 1 OR 2, INCL MATL 440 LB/SY
- (D) GRADED AGGREGATE BASE, 10 INCH INCL MATL

(BASED ON ATTACHED PAVEMENT DESIGNS, USE FOR PURPOSE OF COMPARISON):

PAVING SECTION THROUGHOUT PROJECT LENGTH

- (A) ASPHALTIC CONCRETE 12.5 MM SUPERPAVE, GP 1 ONLY, INCL BITUM MATL 165 LB/SY
- (B) ASPHALTIC CONCRETE 19 MM SUPERPAVE, GP 1 OR 2 INCL BITUM MATL 220 LB/SY
- (C) ASPHALTIC CONCRETE 25 MM SUPERPAVE, GP 1 OR 2, INCL MATL 880 LB/SY
- (D) GRADED AGGREGATE BASE, 10 INCH INCL MATL

PROPOSED

(BASED ON ATTACHED PAVEMENT DESIGNS):

PAVING SECTION FROM BEGINNING OF PROJECT TO GOSHEN INDUSTRIAL BLVD. & FROM OLD WAYNESBORO RD. TO THE PROJECT END

- (A) ASPHALTIC CONCRETE 12.5 MM SUPERPAVE, GP 1 ONLY, INCL BITUM MATL 165 LB/SY
- (B) ASPHALTIC CONCRETE 19 MM SUPERPAVE, GP 1 OR 2 INCL BITUM MATL 220 LB/SY
- (C) ASPHALTIC CONCRETE 25 MM SUPERPAVE, GP 1 OR 2, INCL MATL 770 LB/SY
- (D) GRADED AGGREGATE BASE, 10 INCH INCL MATL

PAVING SECTION FROM GOSHEN INDUSTRIAL BLVD. TO OLD WAYNESBORO RD.

- (A) ASPHALTIC CONCRETE 12.5 MM SUPERPAVE, GP 1 ONLY, INCL BITUM MATL 165 LB/SY
- (B) ASPHALTIC CONCRETE 19 MM SUPERPAVE, GP 1 OR 2 INCL BITUM MATL 220 LB/SY
- (C) ASPHALTIC CONCRETE 25 MM SUPERPAVE, GP 1 OR 2, INCL MATL 880 LB/SY
- (D) GRADED AGGREGATE BASE, 10 INCH INCL MATL

ASSUMPTIONS/CALCULATIONS/CONTACTS MADE

Project Name: SR 56/Mike Padgett Hwy. From Bennock Mill Rd. to Tobacco Rd.

IDEA No:
P5

Sheet 6 of 7

FLEXIBLE PAVEMENT DESIGN ANALYSIS

Project: STD 0006 00(421) **County:** Richmond
P.I. no.: 0006431
Description: SR 56/Mike Padgett Hwy.

Traffic Data (NOTE: AADTs are one-way)

24-hour Truck Percentage: 26.83%
 AADI initial year of design period: 9,450 vpd (2012)
 AADI final year of design period: 17,530 vpd (2032)
 Mean AADI (one-way): 10,490 vpd

Design Loading

Mean AADT	TRF	Trucks	18-K ESAL	Total Daily Loads
10,490	* 0.85	* 3.268	* 1.06	= 2,534

Total predicted design period loading = 2534 * 20 * 365 = 18,498,200

Design Data

Terminal Serviceability Index: 2.50
 Soil Support: 3.50
 Regional Factor: 1.50

PROPOSED FLEXIBLE PAVEMENT STRUCTURE

Material	Thickness Inches	Thickness (mm)	Structural Coefficient	Structural Value
12.5 mm Superpave	1.50	(38)	0.44	0.66
18 mm Superpave	2.00	(51)	0.44	0.88
25 mm Superpave	1.00	(25)	0.44	0.44
	7.00	(178)	0.30	2.10
Graded Aggregate Base	10.00	(254)	0.18	1.60
Required SN = 5.98			Proposed SN = 5.68	

>>> Proposed pavement is 5.0% Underdesign <<<

Remarks: From Goshen Industrial Blvd. to Old Waynesboro Rd.

Prepared by Alex Wiley July 28, 2009
Date

Recommended _____
Date
State Consultant Design Engineer

Approved _____
Date
State Pavement Engineer

ASSUMPTIONS/CALCULATIONS/CONTACTS MADE

Project Name: SR 56/Mike Padgett Hwy. From Bennock Mill Rd. to Tobacco Rd.

IDEA No:
P5

Sheet 7 of 7

FLEXIBLE PAVEMENT DESIGN ANALYSIS

Project: STP-0006-00(431)
P.I. no.: 0006431
Description: SR 56/Mike Padgett Hwy.

County: Richmond

Traffic Data (NOTE: AADTs are one-way)

24-hour Truck Percentage: 10.40%
AADT initial year of design period: 17,440 vpd (2012)
AADT final year of design period: 17,615 vpd (2032)
Mean AADT (one-way): 16,028 vpd

Design Loading

Mean AADT	LDI	Trucks	10-K ESAL	Total Daily Loads
16,028	0.95	0.104	1.06	1,503

Total predicted design period loading = 1503 * 20 * 365 = 10,971,900

Design Data

Terminal Serviceability Index: 2.50
Soil Support: 3.50
Regional Factor: 1.30

PROPOSED FLEXIBLE PAVEMENT STRUCTURE

Material	Thickness Inches	(mm)	Structural Coefficient	Structural Value
12.5 mm Superpave	1.50	(38)	0.44	0.66
19 mm Superpave	2.00	(51)	0.44	0.98
25 mm Superpave	1.00	(25)	0.44	0.44
Graded Aggregate Base	5.00	(127)	0.30	1.80
Graded Aggregate Base	10.00	(254)	0.16	1.60

Required SN = 5.58

Proposed SN = 5.38

>>> Proposed pavement is 3.6% Underdesign <<<

Remarks: From Old Waynesboro Rd. to the end of the project.

Prepared by Alex Wiley Date July 28, 2009

Recommended _____
State Consultant Design Engineer Date

Approved _____
State Pavement Engineer Date

DEVELOPMENT AND RECOMMENDATION PHASE

SR 56 Widening

IDEA No.: M-1	PAGE No.: 1 of 3	CREATIVE IDEA: Reduce Median Width from 24' to 14'
-------------------------	----------------------------	-----------------------------------------------------------

Comp By: SWG Date: 7-30-09 Checked By: RHC Date: 7-30-09

Baseline Concept: The baseline concept proposes a typical section with 4 travel lanes and a 24' raised median.

Proposed Change: The revised concept proposes a typical section with 4 travel lanes and a 14' flush median.

Justification: The need and purpose of the project is to improve safety. This function can be maintained with a change in the median type from a 24' raised median to a 14' flush median. The proposed change would provide significant savings in right-of-way, median paving, curb & gutter, closed drainage and bridges. The installation of a 14' flush median will also match the existing SR 56 roadway systems typical section both north and south of the project limits.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	PRESENT WORTH
INITIAL COST - Baseline	\$ 4,640,000		
- Proposed	\$ 1,465,000		
- Savings	\$ 3,175,000		\$3,175,000
FUTURE COST - Savings			
TOTAL PRESENT WORTH SAVINGS			\$ 3,175,000

SR 56 Widening

ITEM N^o: M-1
CLIENT: GDOT
Sheet 3 of 3

Baseline Concept

R/W

Additional 10' width throughout project

Assume composite RW unit cost of \$6.25/sf as calculated in R-2

Total Length = 24,671 lf (from P-4)

Total Area = (24,671 lf)(10 lf) = 246,710 sf

Earthwork

Assumption: 30 sf earthwork reduction per cross section

Volume = (24,671 lf)(30 sf)/27 = 27,412 cy

Curb & Gutter (Type 7)

Length = 32,640 lf (from 7-21-09 Cost Estimate)

Concrete Median (4 in)

Area = 42,000 sy (from 7-21-09 Cost Estimate)

Closed Drainage System

Assume Closed Drainage System is 50% of total drainage cost in 7-21-09 estimate

Closed Drainage Cost = (0.5)(\$438,794) = \$219,397

Bridges

Bridge #1 Area = (96 lf)(10 lf) = 960 lf

Bridge #2 Area = (180 lf)(10 lf) = 1,800 lf

Revised Concept

Assume required additional paving for 14' flush median is equal to 75% of total for entire project.

This 25% reduction accounts for the turn lanes and tapers provided in the 24' raised median.

Area = (24,671 lf)(14 lf)(0.75) = 259,046 sf

Pavement

Wt(12.5 mm) = (259,046 sf)(0.0092 tons/sf) = 2,384 tons

Wt (19 mm) = (259,046 sf)(0.018 tons/sf) = 4,663 tons

Wt (25 mm) = (259,046 sf)(0.024 tons/sf) = 6,218 tons

Wt (GAB) = (259,046 sf)(0.061 tons/sf) = 15,802 tons

DEVELOPMENT AND RECOMMENDATION PHASE

SR 56 Widening

IDEA No.:
M-8

PAGE No.:
1 of 3

**CREATIVE IDEA: Reduce Median Width from 24' to 14'
(Begin Project to Doug Bernard Pkwy)**

Comp By: SWG Date: 7-30-09 Checked By: RHC Date: 7-29-09

Baseline Concept: The baseline concept proposes a typical section with 4 travel lanes and a 24' raised median.

Proposed Change: The revised concept proposes a typical section with 4 travel lanes and a 14' flush median for a portion of the project only.

Justification: The need and purpose of the project is to improve safety. This function can be maintained with a change in the median type from a 24' raised median to a 14' flush median. The existing roadway typical section includes a 14' raised median from 2300' North of Brown Road to Doug Bernard Pkwy and from the beginning of the project to the south. The proposed change will provide significant savings in right-of-way, median paving, curb & gutter, closed drainage and bridges. The installation of a 14' flush median will also match the existing SR 56 typical section south of the project limits.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	PRESENT WORTH
INITIAL COST - Original	\$ 1,830,000		
- Proposed	\$ 330,000		
- Savings	\$ 1,500,000		\$1,500,000
FUTURE COST - Savings			0
TOTAL PRESENT WORTH SAVINGS			\$ 1,500,000

**SR 56 Widening
Assumptions and Calculations**

ITEM N^o: M-8
CLIENT: GDOT
Sheet 3 of 3

Baseline Concept

R/W

Additional 10' width throughout project

Assume composite RW unit cost of \$6.25/sf as calculated in R-2

Total Length = (190+00 – 107+00) = 8,300 lf (34% of Total Project Length)

Total Area = (8,300 lf)(10 lf) = 83,000 sf

Earthwork

Assumption: 30 sf earthwork reduction per cross section

Volume = (8,300 lf)(30 sf)/27 = 9,223 cy

Curb & Gutter (Type 7)

Total Project Length = 32,640 lf (from 7-21-09 Cost Estimate)

Length = (32,640 lf)(0.34) = 11,098 lf

Concrete Median (4 in)

Total Project Area = 42,000 sy (from 7-21-09 Cost Estimate)

Area = (42,000 sy)(0.34) = 14,280 sy

Closed Drainage System

Assume Closed Drainage System is 83% of total drainage cost in 7-21-09 estimate

Closed Drainage Cost Eliminated = (\$438,794)(0.17) = \$74,595

Bridges

Bridge #1 Area = (96 lf)(10 lf) = 960 lf

Bridge #2 Area = (180 lf)(10 lf) = 1,800 lf

Revised Concept

Assume required additional paving for 14' flush median is equal to 50% of project length between the beginning of the project and Doug Bernard Parkway. This 50% reduction accounts for the turn lanes and tapers provided in the 24' raised median and the section with the existing 14' flush median.

Area = (8,300 lf)(14 lf)(0.50) = 58,100 sf

Pavement

Wt(12.5 mm) = (58,100 sf)(0.0092 tons/sf) = 535 tons

Wt (19 mm) = (58,100 sf)(0.018 tons/sf) = 1,046 tons

Wt (25 mm) = (58,100 sf)(0.024 tons/sf) = 1,395 tons

Wt (GAB) = (58,100 sf)(0.061 tons/sf) = 3,545 tons

DEVELOPMENT AND RECOMMENDATION PHASE

Project Name

SR 56/Mike Padgett Hwy. From Bennock Mill Rd. to Tobacco Rd.

IDEA No.: M10	Sheet No.: 1 of 4	CREATIVE IDEA: Change Raised Median Width from 24' to 22'
-------------------------	-----------------------------	---------------------------------------------------------------------

Prepared By: AW Date: 07/28/09 Checked By: RHC Date: 8/4/09

Baseline Concept:

The current concept calls for a 24' raised median. 2' on each side of the median are full depth asphalt paving and are being used for a shoulder.

Proposed Change:

Reduce the median width from a 24' to a 22' raised median and keep the 2' full depth asphalt paving on each side of the median. Reduce the 2' width from the area between the backs of the curbs in the median.

Justification:

It is assumed that the 24' median is related to AASHTO clear zone distance. AASHTO Roadside Design Guide allows for the use of a minimum of 22' to 24' for clear zone for 55 mph for slopes 6:1 or flatter and AADT traffic greater than 6000 vpd. By reducing the median width to 22', the construction and right-of-way costs will be reduced while meeting the minimum AASHTO standard for clear zone.

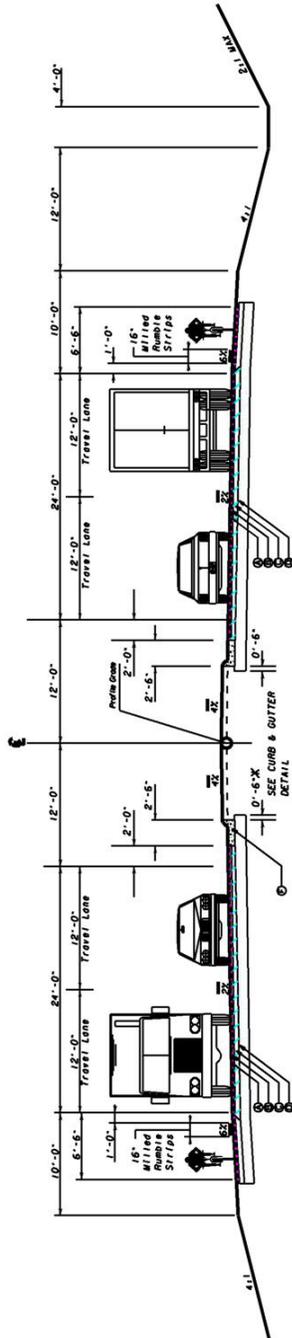
LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
INITIAL COST - Baseline	\$380,000		
- Proposed	\$0		
- Savings	\$380,000		\$380,000
FUTURE COST – Savings			\$0
TOTAL PRESENT WORTH SAVINGS			\$380,000

SKETCH

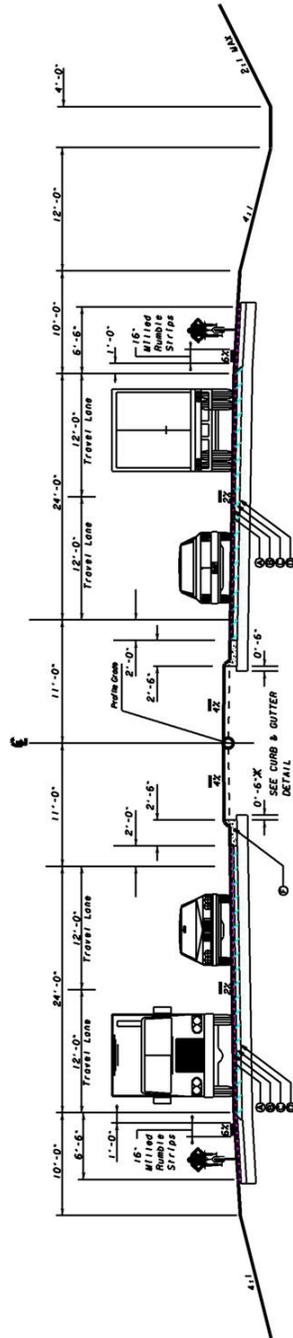
Project Name: SR 56/Mike Padgett Hwy. From Bennock Mill Rd. to Tobacco Rd.

IDEA No:
M10

Sheet 2 of 4



CURRENT SECTION



PROPOSED SECTION

ASSUMPTIONS/CALCULATIONS/CONTACTS MADE

Project Name: SR 56/Mike Padgett Hwy. From Bennock Mill Rd. to Tobacco Rd.

ITEM No:
M10

Sheet 4 of 4

Right-of-way:

Assume the 2' median reduction will affect the right-of-way from approximately Sta. 111+31.86 to Sta. 356+67.16 (minus the length across intersections).

$$111+31.86 - 356+67.16 = 24,535.3' - (140+70+150+150+130+70+70+50+90+90+100+170) = 23,255' \times 2' = 46,510 \text{ SF}$$

Construction:

Assume 2' reduction in median width for the raised median, Sta.112+70 Sta. 346+45 = 23,375'

Earthwork:

$$23,375 \times 2' \times 2' \text{ (Assume Ht.)} / 27 \text{ CF/CY} = 3463 \text{ CY Use 3500 CY}$$

Conc. Doweled Integral Curb:

$$12 \text{ median cross-overs} \times 2 \text{ sides} \times 2' = 48 \text{ LF}$$

Asphalt - Assume 1.5" of 12.5 mm Superpave and 1" of Asphalt Leveling at the median Cross-overs:

$$120'+120'+100'+120'+140'+95'+90'+130'+105'+110'+115' = 1245' \times 2' / 9 \text{ SF/SY} = 277 \text{ SY Use 300 SY}$$

$$12.5 \text{ mm Superpave} - 300 \text{ SY} \times 165 \text{ LB/SY} / 2000 \text{ LB/TN} = 24.75 \text{ TN Use 25 TN}$$

$$\text{Asphalt Leveling} - 300 \text{ SY} \times 110 \text{ LB/SY} / 2000 \text{ LB/TN} = 17 \text{ TN Use 20 TN}$$

Conc. Median:

$$425'+400+400+400+400+400+400+400+400+400+400+400+400+400+400+400+400+400 = 7225 \text{ LF} \times 2' / 9 \text{ SF/SY} = 1606 \text{ SY Use 1650 SY}$$

DEVELOPMENT AND RECOMMENDATION PHASE

SR 56 Widening

IDEA No.: R-2	PAGE No.: 1 of 3	CREATIVE IDEA: Convert R/W to Permanent Easement beyond Shoulder Breakpoint
-------------------------	----------------------------	------------------------------------------------------------------------------------

Comp By: SWG Date: 7-29-09 Checked By: RHC Date: 7-29-09

Baseline Concept: The original concept proposes to acquire R/W and no easements.

Proposed Change: The revised concept proposes to acquire R/W to the shoulder breakpoint and permanent easement beyond the shoulder breakpoint as necessary.

Justification: Permanent easement will allow for construction and maintenance of slopes and drainage along the project corridor. The conversion of R/W to permanent easement will result in significant savings in R/W Cost.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	PRESENT WORTH
INITIAL COST - Baseline	\$ 6,170,000		
- Proposed	\$ 3,700,000		
- Savings	\$ 2,470,000		\$2,470,000
FUTURE COST - Savings		0	0
TOTAL PRESENT WORTH SAVINGS			\$ 2,470,000

ASSUMPTIONS/CALCULATIONS/CONTACTS MADE

Project Name: SR 56 Widening

ITEM No: R-2

Sheet 3 of 3

Baseline Concept

Assume an average width of 40 lf of R/W can be converted to Permanent Easement along the entire corridor. Assume cost of Permanent Easement is 60% of R/W.

Adjusted R/W Cost (Composite using markups) = $(\$2.52)(1.55)(1.60) = \$6.25/\text{sf}$

Total Project Length = $(35647-10700) - (96+180) = 24,671 \text{ lf}$

Total Affected Area R/W = $(40 \text{ lf})(24,671 \text{ lf}) = 986,840 \text{ sf}$

Proposed Change

Permanent Easement Cost = $(0.6)(\$6.25) = \3.75

Total Area Permanent Easement = 986,840 sf

DEVELOPMENT AND RECOMMENDATION PHASE

Project Name:
Widening of SR 56 from CR 17/Bennock Mill Road To CR 1516/Old Waynesboro Road

IDEA No.: R4	Sheet No.: 1 of 3	CREATIVE IDEA: Retain Existing Shoulders in front of Lovett House, Historic Farm House and Sharecropper Community
------------------------	-----------------------------	-----------------------------------------------------------------------------------------------------------------------------

Prepared By: G Grant Date: 07-28-2009 Checked By: RHC Date: 07/29/09

Baseline Concept:

Original concept shifts alignment to clear historic boundaries and installs roadway typical section with full shoulders and fill slopes and reconstructs side ditches.

Proposed Change:

The proposed concept would hold the existing shoulder breakpoint in front of these three separate historic properties and construct the proposed shoulder and roadway template away from the historic resources. The profile would appear to need to be raised to eliminate full depth pavement replacement.

Justification:

This approach would save the required displacement of 4 of the 5 properties on the right side of the alignment beyond the Lovett property, but prior to the historic ranch house.

This approach would also save the required displacement of the 2 properties on the left side of the alignment across from the Sharecropper Community.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
INITIAL COST - Baseline	\$1,720,000		
- Proposed	\$0		
- Savings	\$1,720,000		\$1,720,000
FUTURE COST – Savings			0
TOTAL PRESENT WORTH SAVINGS			\$1,720,000

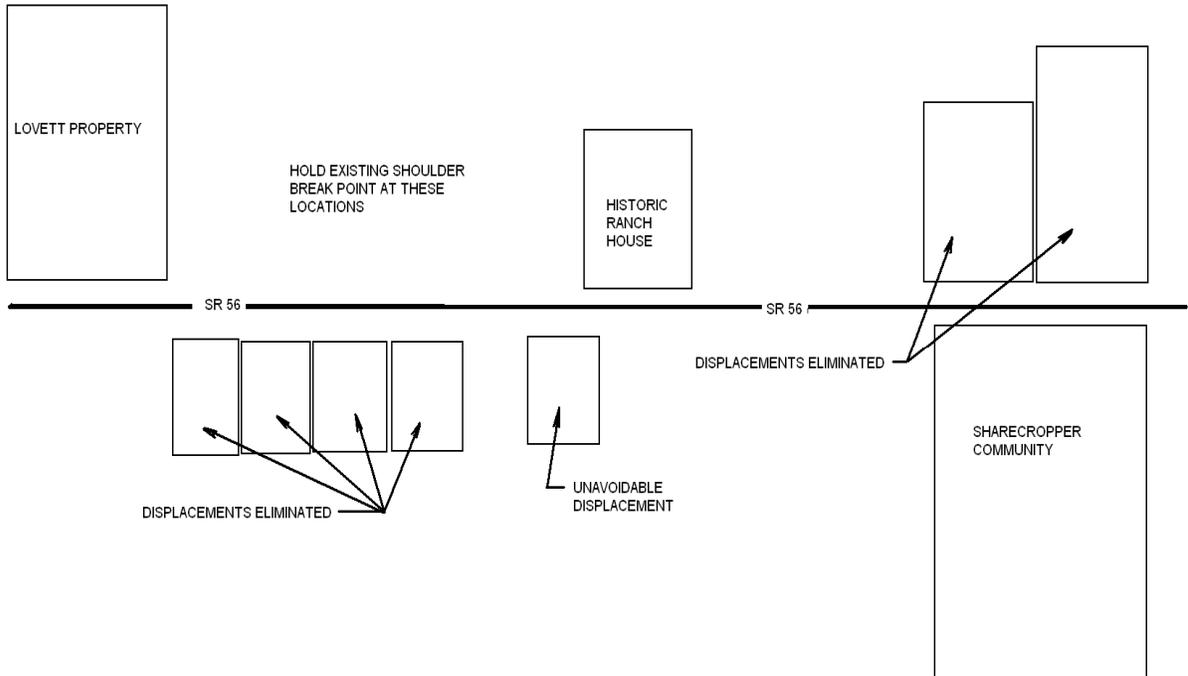
SKETCH

Project Name:
Widening of SR 56 from CR 17/Bennock Mill Road To CR 1516/Old Waynesboro Road

IDEA No:
R4

CREATIVE IDEA:
Leave the existing shoulders "as is" in front of Lovett House, Historic Farm House and Sharecropper Community

Sheet 2 of 3



Recommended Condition

ASSUMPTIONS/CALCULATIONS/CONTACTS MADE

Project Name: Widening of SR 56 from CR 17/Bennock Mill Road To CR 1516/Old Waynesboro Road	IDEA No: R4
CREATIVE IDEA: Leave the existing shoulders “as is” in front of Lovett House, Historic Farm House and Sharecropper Community	Sheet 3 of 3

Baseline Concept

Total Unadjusted Displacement Cost for Project (8 Displacements) = \$750,000 (*Improvements*) + \$175,000 (*Relocation*) = \$925,000

(Approximate Based on 7-21-09 R/W Estimate)

Assume 8 total displacements will be reduced to 2 displacements (Savings of 6 displacements)

Unadjusted Displacement Cost = (6/8)(\$925,000) = \$693,750

Adjusted Cost (Including Factors) = (\$693,750)(1.55)(1.60) = \$1,720,500

Proposed Change

Displacement Cost = \$0

DEVELOPMENT AND RECOMMENDATION PHASE

Project Name:
Widening of SR 56 from CR 17/Bennock Mill Road To CR 1516/Old Waynesboro Road

IDEA No.: B-1	Sheet No.: 1 of 4	CREATIVE IDEA: Use Bridge Shoulder as Right Turn Lane onto Brown Road
-------------------------	-----------------------------	---------------------------------------------------------------------------------

Prepared By: G Grant Date: 07-28-2009 Checked By: RHC Date: 7/29/07

Baseline Concept:

The baseline concept calls for widening the existing bridge to accommodate the construction of a 24 foot center median and a 12 foot right turn lane onto Brown Road while maintaining four - 12 foot lanes and two- 10 foot shoulders.

Proposed Change:

The proposed change would eliminate the additional width for the right turn lane and widen the proposed shoulder from 10 feet to 14 feet. A 12 foot right turn lane with 2 foot shy distance to the barrier face would be striped out on the bridge.

Justification:

The right turn volume at Brown Road is listed as 75 for the PM peak in 2006 and 79 for the PM peak in 2032. This is a relatively small volume that is not projected to increase for the next 25 years. This idea would provide a right turn lane for a small number of movements while minimizing the widening of the bridge.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
INITIAL COST - Baseline	\$1,025,000		
- Proposed	\$815,000		
- Savings	\$210,000		\$210,000
FUTURE COST – Savings			
TOTAL PRESENT WORTH SAVINGS			\$210,000

SKETCH

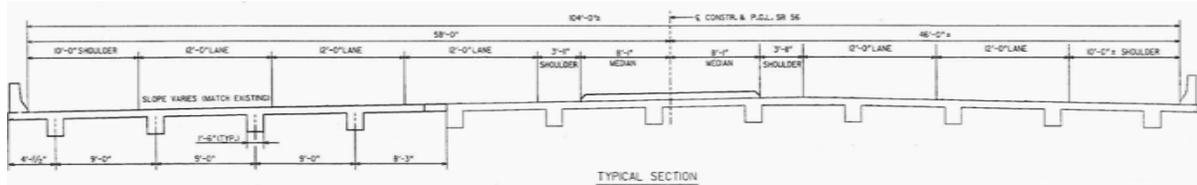
Project Name:
Widening of SR 56 from CR 17/Bennock Mill Road To CR 1516/Old Waynesboro Road

IDEA No: B-1

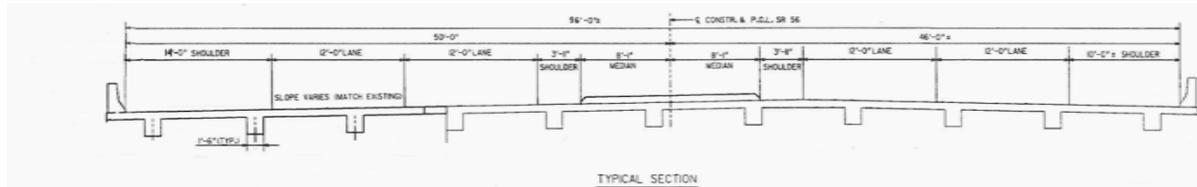
CREATIVE IDEA:

Use Bridge Shoulder as right turn lane onto Brown Road instead of providing a shoulder and a right turn lane for Bridge No. 2.

Sheet 2 of 4



Baseline Concept



Proposed Concept

COST WORKSHEET

Project Name: Widening of SR 56 from CR 17/Bennock Mill Road To CR 1516/Old Waynesboro Road					IDEA No: B-1		
CREATIVE IDEA: Use Bridge Shoulder as right turn lane onto Brown Road instead of providing a shoulder and a right turn lane for Bridge No. 2.					Sheet 3 of 4		
CONSTRUCTION ELEMENT		ORIGINAL ESTIMATE			NEW ESTIMATE		
ITEM	UNITS	Nº UNITS	COST/UNIT	TOTAL COST	Nº UNITS	COST/UNIT	TOTAL COST
Construction of Bridge Complete - Bridge 2	Lump Sum (Sq. ft.)	1 (7088)	(\$127.99)	\$907,200	1 (5648)	(\$127.99)	\$722,888
SUBTOTAL				907,200			722,888
MARK-UP (13%)				117,936			93,975
TOTAL				1,025,136			816,863
TOTAL ROUNDED				1,025,000			815,000

ASSUMPTIONS/CALCULATIONS/CONTACTS MADE

<p>Project Name: Widening of SR 56 from CR 17/Bennock Mill Road To CR 1516/Old Waynesboro Road</p>	<p>IDEA No: B-1</p>
<p>CREATIVE IDEA: Use Bridge Shoulder as right turn lane onto Brown Road instead of providing a shoulder and a right turn for Bridge No. 2.</p>	<p>Sheet 4 of 4</p>
<p>Baseline Concept:</p> <p>Existing bridge width = 68 ft (gutter to gutter) = 4 x 12 ft lanes + 2 x 10 ft shoulders Add 24 ft of median (1) - 12 ft right turn lane = 36 ft Proposed Bridge Width = 68 ft + 36 ft = 104 ft (gutter to gutter)</p> <p>Width actually added = 39'-4 1/2" (see Stage II width)</p> <p>39.375 ft wide x 180 ft long = 7088 sq. ft.</p> <p>Proposed Concept:</p> <p>Existing bridge width = 68 ft (gutter to gutter) = 4 x 12 ft lanes + 2 x 10 ft shoulders Add 24 ft of median + 4 ft of additional shoulder = 28 ft Proposed Bridge Width = 68 ft + 28 ft = 96 ft (gutter to gutter)</p> <p>Savings = 8 ft less width</p> <p>Width actually added = 39'-4 1/2" - 8 ft = 31'-4 1/2" (see sketch)</p> <p>31.375 ft wide x 180 ft long = 5648 sq ft</p> <p>Savings = 1,440 sq ft</p>	

DEVELOPMENT AND RECOMMENDATION PHASE

Project Name:
Widening of SR 56 from CR 17/Bennock Mill Road To CR 1516/Old Waynesboro Road

IDEA No.: B-6	Sheet No.: 1 of 5	CREATIVE IDEA: Widen Bridge 1 on One Side Only.
-------------------------	-----------------------------	-----------------------------------------------------------

Prepared By: G Grant Date: 07-28-2009 Checked By: RHC Date: 7/29/09

Baseline Concept:

The original concept is to widen Bridge No. 1 (SR 56 over Little Spirit Creek) symmetrically on both sides to accommodate the addition of the 24 foot median. Due to the width of the existing bridge side barrier and cantilever slab, the width of stage constriction is 14'-4 1/2" (See Stage I or II width).

Proposed Change:

The proposed change would widen the bridge on the east side to accommodate the necessary increase in width.

Justification:

Widening on one side would eliminate work on one side of the bridge and only require one side of the bridge's side barrier to be removed. This approach is also more conducive with the stream channel alignment. (See Assumptions)

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
INITIAL COST - Baseline	\$365,000		
- Proposed	\$300,000		
- Savings	65,000		\$65,000
FUTURE COST – Savings			0
TOTAL PRESENT WORTH SAVINGS			\$65,000

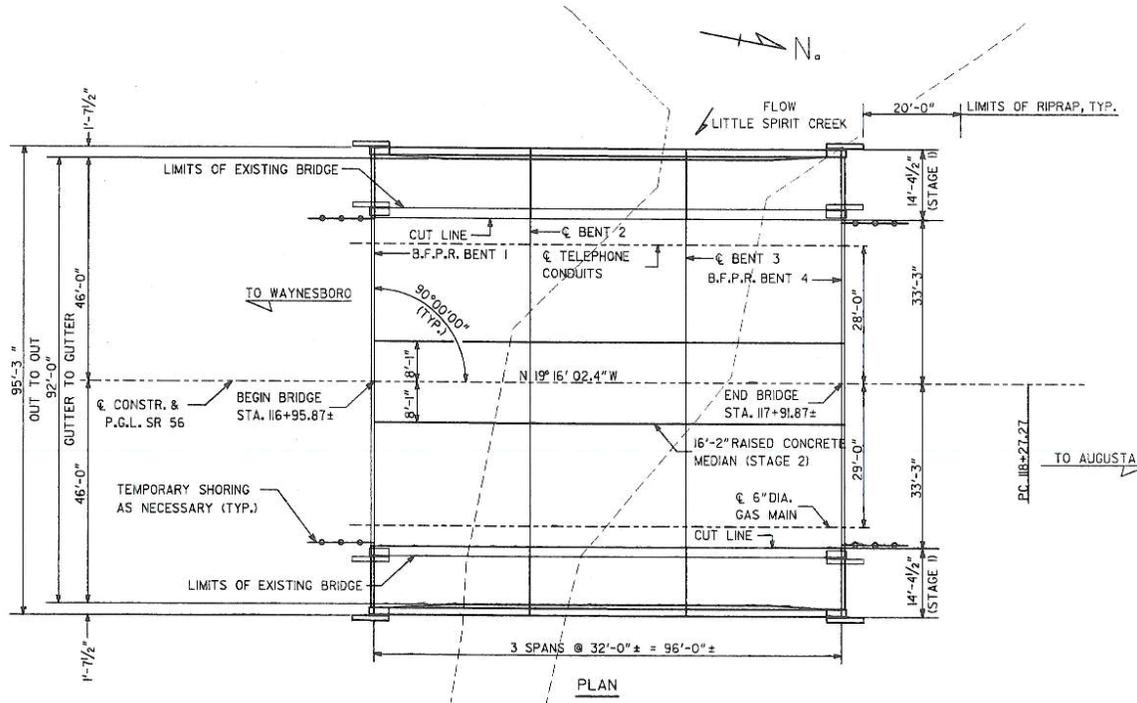
SKETCH

Project Name:
Widening of SR 56 from CR 17/Bennock Mill Road To CR 1516/Old Waynesboro Road

IDEA No:
 B-6

CREATIVE IDEA:
 Widen Bridge 1 on one side only.

Sheet 2 of 5



Baseline Concept

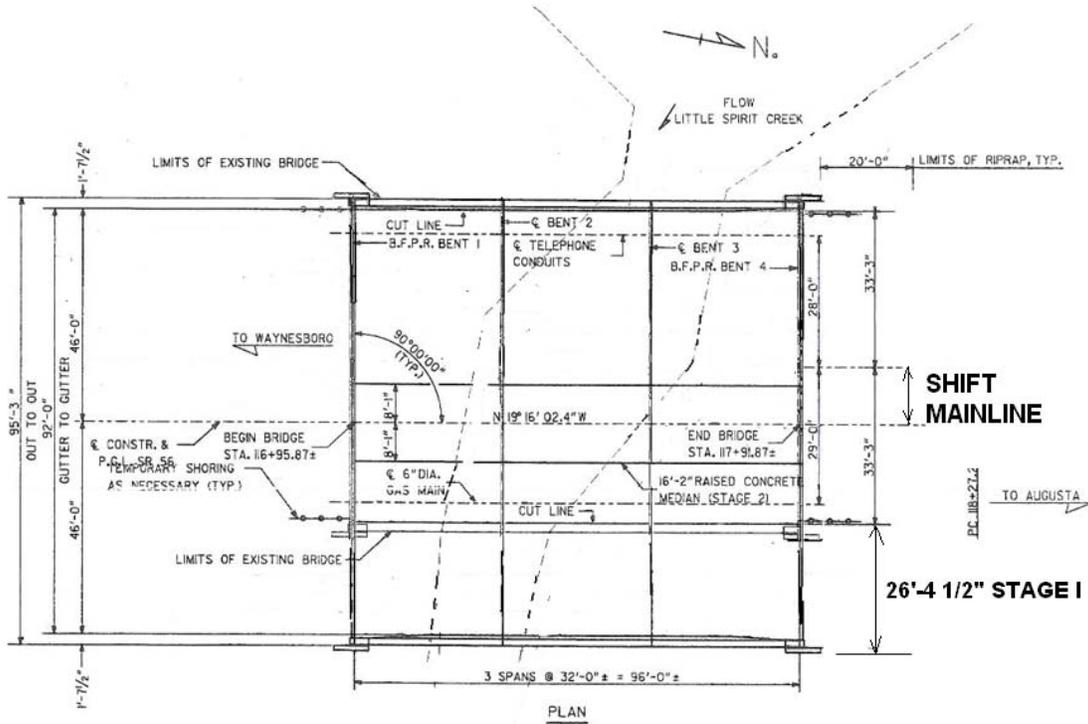
SKETCH

Project Name:
Widening of SR 56 from CR 17/Bennock Mill Road To CR 1516/Old Waynesboro Road

IDEA No:
 B-6

CREATIVE IDEA:
 Widen Bridge 1 on one side only.

Sheet 3 of 5



Proposed Concept

COST WORKSHEET

Project Name: Widening of SR 56 from CR 17/Bennock Mill Road To CR 1516/Old Waynesboro Road					IDEA No: B-6		
CREATIVE IDEA: Widen Bridge 1 on one side only.					Sheet 4 of 5		
CONSTRUCTION ELEMENT		ORIGINAL ESTIMATE			NEW ESTIMATE		
ITEM	UNITS	Nº UNITS	COST/ UNIT	TOTAL COST	Nº UNITS	COST/ UNIT	TOTAL COST
Construction of Bridge Complete - Bridge 1	Lump Sum (Sq. ft.)	(2760)	\$116.87	\$322,560	(2532)	\$116.87	\$295,915
Intangible reduction by not working on one side	Lump				1	-\$30,000	-\$30,000
SUBTOTAL				322,560			265,915
MARK-UP (13%)				41,933			34,569
TOTAL				364,493			300,484
TOTAL ROUNDED				365,000			300,000

ASSUMPTIONS/CALCULATIONS/CONTACTS MADE

Project Name: Widening of SR 56 from CR 17/Bennock Mill Road To CR 1516/Old Waynesboro Road	IDEA No: B-6
CREATIVE IDEA: Widen Bridge 1 on one side only.	Sheet 5 of 5
<p>Assumptions:</p> <p>Original Concept:</p> <p>The original concept is to widen Bridge No. 1 (SR 56 over Little Spirit Creek) symmetrically on both sides to accommodate the addition of the 24 foot median. Due to the width of the existing bridge side barrier and cantilever slab, the width of stage constriction is 14'-4 1/2" (See Stage I or II width).</p> <p>Width of bridge to be removed on each side = 2'-4 1/2"</p> <p>Total width to add each side = 12 ft (half of 24 ft median) + 2'-4 1/2" = 14'-4 1/2" (See Sketch)</p> <p>Total width = 2 x 14'-4 1/2" = 28'-9"</p> <p>Total sq ft = 28.75 ft x 96 ft = 2760 sqft</p> <p>Proposed Change:</p> <p>The proposed change would widen the bridge on the east side to accommodate the necessary increase in width.</p> <p>Based on the top of bank lines shown on the Preliminary Layout, there appears to be a challenge in widening this bridge symmetrically. The intersection of the edge of proposed Deck and front of end post at end bent 4 appears to be at the same location as the top of bank. If this layout and top of bank location is correct and were to proceed to final design, a vertical abutment would be required at this corner of a severely skewed (> 45 degrees) widening portion would be required.</p> <p>Width of bridge to be removed on one side = 2'-4 1/2"</p> <p>Total width to add = 24 ft (half of 24 ft median) + 2'-4 1/2" = 26'-4 1/2" (See Sketch)</p> <p>Total sq ft = 26.375 x 96 = 2532 sq ft</p>	

DEVELOPMENT AND RECOMMENDATION PHASE

Project Name:
Widening of SR 56 from CR 17/Bennock Mill Road To CR 1516/Old Waynesboro Road

IDEA No.: B-7	Sheet No.: 1 of 4	CREATIVE IDEA: Reduce Shoulder Widths per Manual of Guidance
-------------------------	-----------------------------	------------------------------------------------------------------------

Prepared By: G Grant Date: 07-28-2009 Checked By: RHC Date: 7/29/09

Baseline Concept:
 The proposed concept maintains the existing 10 foot outside shoulders on the two bridges in the original concept.

Proposed Change:
 Use 8 foot outside shoulders

Justification:
 Consistent with accepted policy as of August 2009

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
INITIAL COST - Original	\$1,390,000		
- Proposed	\$1,235,000		
- Savings	\$155,000		\$155,000
FUTURE COST – Savings			
TOTAL PRESENT WORTH SAVINGS			\$155,000

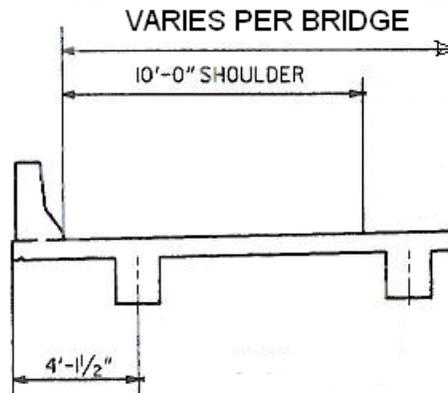
SKETCH

Project Name:
Widening of SR 56 from CR 17/Bennock Mill Road To CR
1516/Old Waynesboro Road

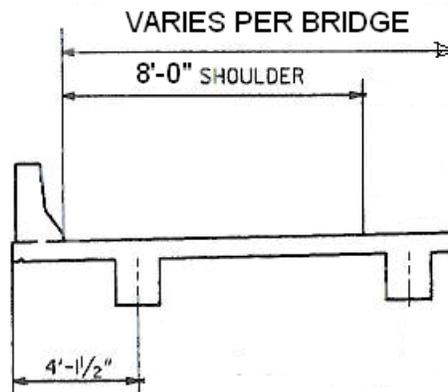
IDEA No:
B-7

CREATIVE IDEA:
Reduce shoulder widths per Manual of Guidance

Sheet 2 of 4



Baseline Concept



Proposed Concept

COST WORKSHEET

Project Name: Widening of SR 56 from CR 17/Bennock Mill Road To CR 1516/Old Waynesboro Road					IDEA No: B-7		
CREATIVE IDEA: Reduce shoulder widths per Manual of Guidance					Sheet 3 of 4		
CONSTRUCTION ELEMENT		ORIGINAL ESTIMATE			NEW ESTIMATE		
ITEM	UNITS	Nº UNITS	COST/UNIT	TOTAL COST	Nº UNITS	COST/UNIT	TOTAL COST
Construction of Bridge Complete - Bridge 1	Lump Sum (Sq. ft.)	(2760)	\$116.87	\$322,560	(2376)	\$116.87	\$277,683
Construction of Bridge Complete - Bridge 2	Lump Sum (Sq. ft.)	1 (7088)	\$127.99	\$907,200	1 (6368)	\$127.99	\$815,066
SUBTOTAL				1,229,760			1,092,749
MARK-UP (13%)				159,869			142,057
TOTAL				1,389,629			1,234,806
TOTAL ROUNDED				1,390,000			1,235,000

ASSUMPTIONS/CALCULATIONS/CONTACTS MADE

Project Name: Widening of SR 56 from CR 17/Bennock Mill Road To CR 1516/Old Waynesboro Road	IDEA No: B-7
CREATIVE IDEA: Reduce shoulder widths per Manual of Guidance	Sheet 4 of 4

According to GDOT Bridge and Structures Design Policy Manual dated October 2005 with revisions through May 2009:

Section 2.9.1 Bridge Width

For Bridges on the State and Federal System:

Rural Multi-lane divided (outside shoulder) = 8 feet (Section 2.9.1.1)

Original Square footage of Bridge Widening

Bridge No. 1: 2760

Bridge No. 2: 7088

Proposed Square footage of Bridge Widening

Bridge No. 1: 2760 - 2 sides x 2 ft wide x 96 ft long = 2376 sq ft

Bridge No. 2: 7088 - 2 sides x 2 ft wide x 180 ft long = 6368 sq ft

APPENDIX

Sources

Approving/Authorizing Persons

Name:	Position:	Telephone:
Gerald Ross	Chief Engineer	
Ron Wishon	Director, Engineering Services	

Personal Contacts

Name:	Telephone:	Notes:
Peng Zhang, MACTEC	770-421-7053	Traffic Analysis for Doug Bernhard Road

Documents Used During Study

Document:	Source:
Approved Project Concept Report	GDOT, April 21, 2008
Preliminary Plans	URS/Washington Group – undated
SR 56 Traffic Study	URS/Washington/Kimley Horn 10/07
Preliminary Construction Cost Estimate	URS/Washington 7/09
Preliminary R/W Cost Estimate	GDOT 7/2009
Hydraulic Study Review and Prelim Layout Spirit Creek and Little Spirit Creek Bridges	Kimley-Horn 2/09
Traffic Projections, 2006, 2012, and 2032	Kimley-Horn 7/09
Aerial Maps showing project concept	URS/Washington

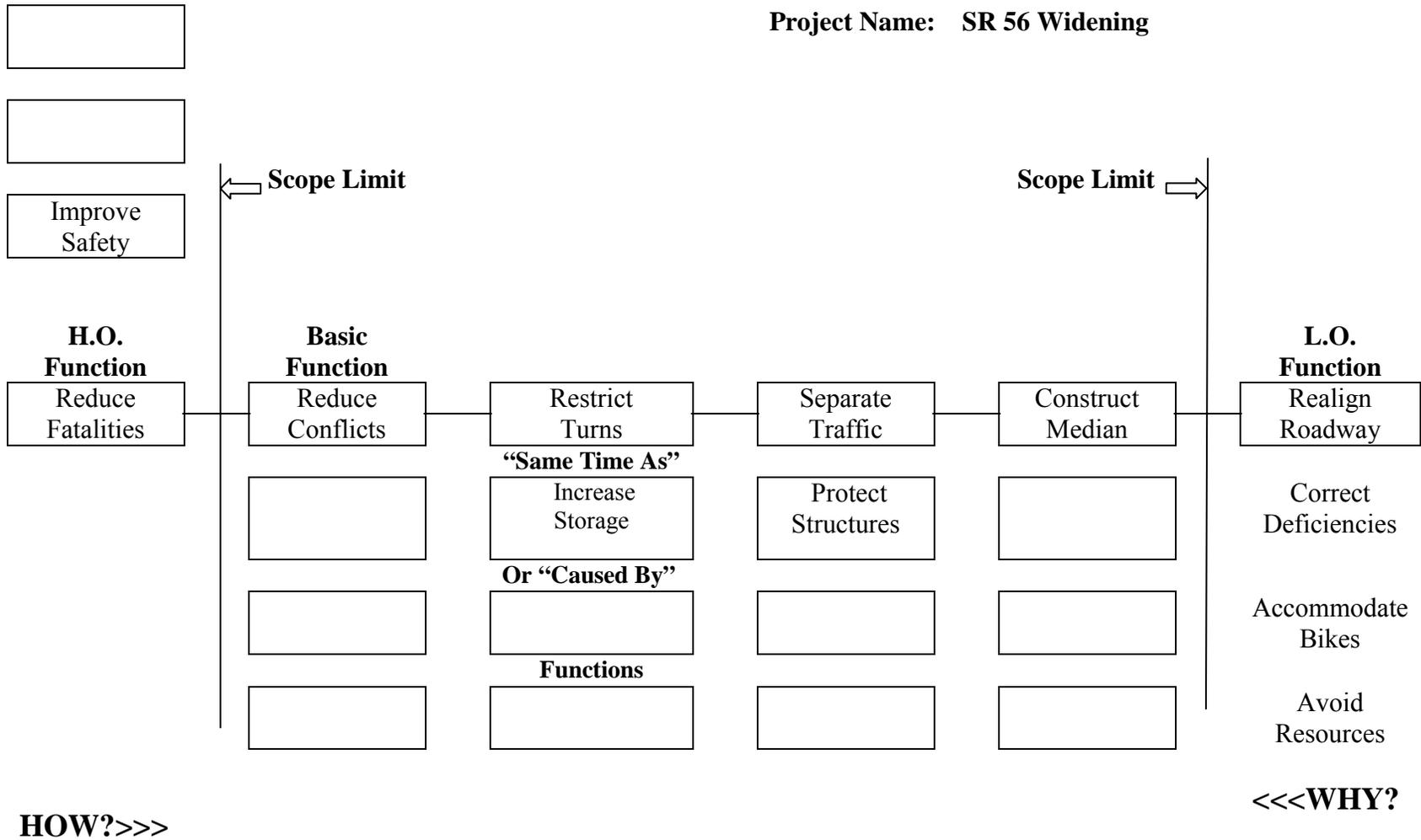
SR 56 Widening

Cost Model / Distribution

Item	Description	\$ Amount	% of Total Project
	Right of Way	13,422,600	38
	Pavement	6,951,732	20
	Earthwork	3,004,406	8
	Median, including curb and gutter	2,370,000	7
	Bridge Widening	1,461,666	4
	80%		
	MOT	1,012,160	3
	Drainage	783,355	2
	Traffic Engineering	376,842	1
	Miscellaneous (incl.E&C, Inflation)	5,975,968	17
	Based on Cost Estimate Report dated 7/21/09		
	Estimate does not include mobilization or contingencies		
	TOTAL	\$35,358,729	100

F.A.S.T. DIAGRAM

Project Name: SR 56 Widening



INFORMATION PHASE – FUNCTION ANALYSIS

Project: SR 56 Widening

Basic Function: Reduce Conflicts

ITEM No.	ELEMENT DESCRIPTION	FUNCTION		COST/COMPLEXITY		
		Verb	Noun	Const. Cost	O&M Imp.	Complexity
P	Pavement	Accommodate	Median	\$7.0M	High	Low
M	Median	Separate	Traffic	\$2.4M	Medium	Low
		Restrict	Turns			
D	Drainage	Upgrade	Facilities	\$0.8M	Low	Low
		Accommodate	Median			
B	Bridge	Accommodate	Median	\$1.5M	Low	Medium
		Protect	Structures			
R	R/W	Accommodate	Median	\$13.4M	Low	Medium
		Avoid	Resources			
E	Earthwork	Correct	Deficiencies	\$3.0M	Medium	Low
		Accommodate	Median			
MO	MOT	Maintain	Traffic	\$1.0M	N/A	Medium
		Maintain	Safety			
T	Traffic Engineering	Upgrade	Facilities	\$0.4M	Medium	Low
		Control	Traffic			
	Bold = Selected for further analysis					

CREATIVE PHASE Creative Ideas Surviving First Cut		EVALUATION PHASE Idea Evaluation	
No.	CREATIVE IDEA	ADVANTAGES/DISADVANTAGES	IDEA RATING
P	Pavement		
1.	Accept deficiencies; keep more existing pavement	A – reduced construction cost	X
		A – meets main need and purpose	
		A – with separated traffic, deficiencies less concern	
		D – requires design exception	
		A – easier and faster to construct	
2	Jack bridge to avoid change in vertical alignment	A – reduced construction cost	X
		A – easiest solution to hydraulic deficiency	
		D – none perceived	
		D – possibly causes more grade work on the north side	
√ = Recommendation; X = will be dropped; DS = Design suggestion A = Advantage D = Disadvantage			

CREATIVE PHASE Creative Ideas Surviving First Cut		EVALUATION PHASE Idea Evaluation	
No.	CREATIVE IDEA	ADVANTAGES/DISADVANTAGES	IDEA RATING
4	2-11' lanes and 2-12' lanes	A – reduced cost and R/W impact	√
		D – does not meet standard desirable lane widths	
		A – maintains traffic capacity	
		A – 2' shy distance enhances lane width	
5	Differing pavement designs for differing truck volumes	A – reduce cost	√
		A – accounts for significant variance in trucks	
		D – requires additional design effort	
M	Median		
1	5-lane section throughout; 14' median	A- significant cost and R/W reduction	√
		A – matches both ends	
		A- driver expectation retained	
		A – addresses local concerns	
√ = Recommendation; X = will be dropped; DS = Design suggestion A = Advantage D = Disadvantage			

CREATIVE PHASE Creative Ideas Surviving First Cut		EVALUATION PHASE Idea Evaluation	
No.	CREATIVE IDEA	ADVANTAGES/DISADVANTAGES	IDEA RATING
M	Median		
1 con't	Five lane section through out; 14' median	D – does not provide positive barrier	
		D – does not provide required clear zone for 55	
		A – matches recent project on south side,	
		including speed limit.	
		A – accommodates left turns	
		A – avoids possible problem with truck u-turns	
		A – avoids potential for vehicles jumping curb	
		A – reduces drainage costs in super sections	
2	4-11' lanes with a 4' median; left turn pockets where	A – significant savings in cost and R/W impact	X
	needed; retain existing shoulders	D – does not meet standards	
		D – would require many turn bays	
9	Same as No. 2 but for only a portion of the project	A- savings in cost and R/W	X
	where left turns are not a prevalent	D – does not meet standard	
√ = Recommendation; X = will be dropped; DS = Design suggestion A = Advantage D = Disadvantage			

CREATIVE PHASE Creative Ideas Surviving First Cut		EVALUATION PHASE Idea Evaluation	
No.	CREATIVE IDEA	ADVANTAGES/DISADVANTAGES	IDEA RATING
4	20' raised median w/o 2' extra width	A – reduced construction and R/W cost	X
		D – does not meet standard for 55 mph speed	
7	24' raised median gutter to gutter.	D – does not reduce construction cost	X
		A- eliminates some full-depth pavement	
		A – meets minimum standard clear zone	
		D- eliminates shy distance	
10	22' median	D – meet minimum AASHTO standard	√
		A – reduces construction cost and R/W impact	
		D – does not meet GDOT policy	
8	Extend 14' median from south end to 2300' N of Brown	A – reduces cost	Combine
		A – retains raised median in developed area	With #1
R	Right of Way		
1	More wall, less slope	A – reduces RW impact and cost	√
		D – adds construction cost	
		D – topography does not lend itself to walls.	
√ = Recommendation; X = will be dropped; DS = Design suggestion A = Advantage D = Disadvantage			

CREATIVE PHASE Creative Ideas Surviving First Cut		EVALUATION PHASE Idea Evaluation	
No.	CREATIVE IDEA	ADVANTAGES/DISADVANTAGES	IDEA RATING
		D – adds to design cost	
		D – does not work well with rural shoulder	
2	Set R/W at shoulder break and use perm easements	A –reduced R/W cost	√
4	Hold existing edge of pavement adjacent to historic properties and use 5-lane section	A – reduce displacements across from historic A – works with NRHP boundary	√
		D – unusual approach	
B	Bridges		
1	Don't widen for Brown Road turn lane; use shoulder	A – reduce construction cost A – turning movement is low A – use shoulder for right turn in this area	√
		D – does not meet standards	
6	Widen Little Spirit Bridge on one side only	A – Avoid impact on the North side of channel A – only remove one barrier; mobilize easier	√
7	Reduce shoulder widths per MOG	A – meets new standard A – reduces costs	√
√ = Recommendation; X = will be dropped; DS = Design suggestion A = Advantage D = Disadvantage			

CREATIVE PHASE Creative Ideas Surviving First Cut		EVALUATION PHASE Idea Evaluation	
No.	CREATIVE IDEA	ADVANTAGES/DISADVANTAGES	IDEA RATING
T	Traffic		
1	No signal at Doug Bernard Road	A – reduced construction cost	X
		A – reduced impact on through traffic	
		A – reduces O&M cost	
		A – only one of three warrants met.	
		D – does not resolve peak hour warrant	
		D – reduces LOS	
√ = Recommendation; X = will be dropped; DS = Design suggestion A = Advantage D = Disadvantage			