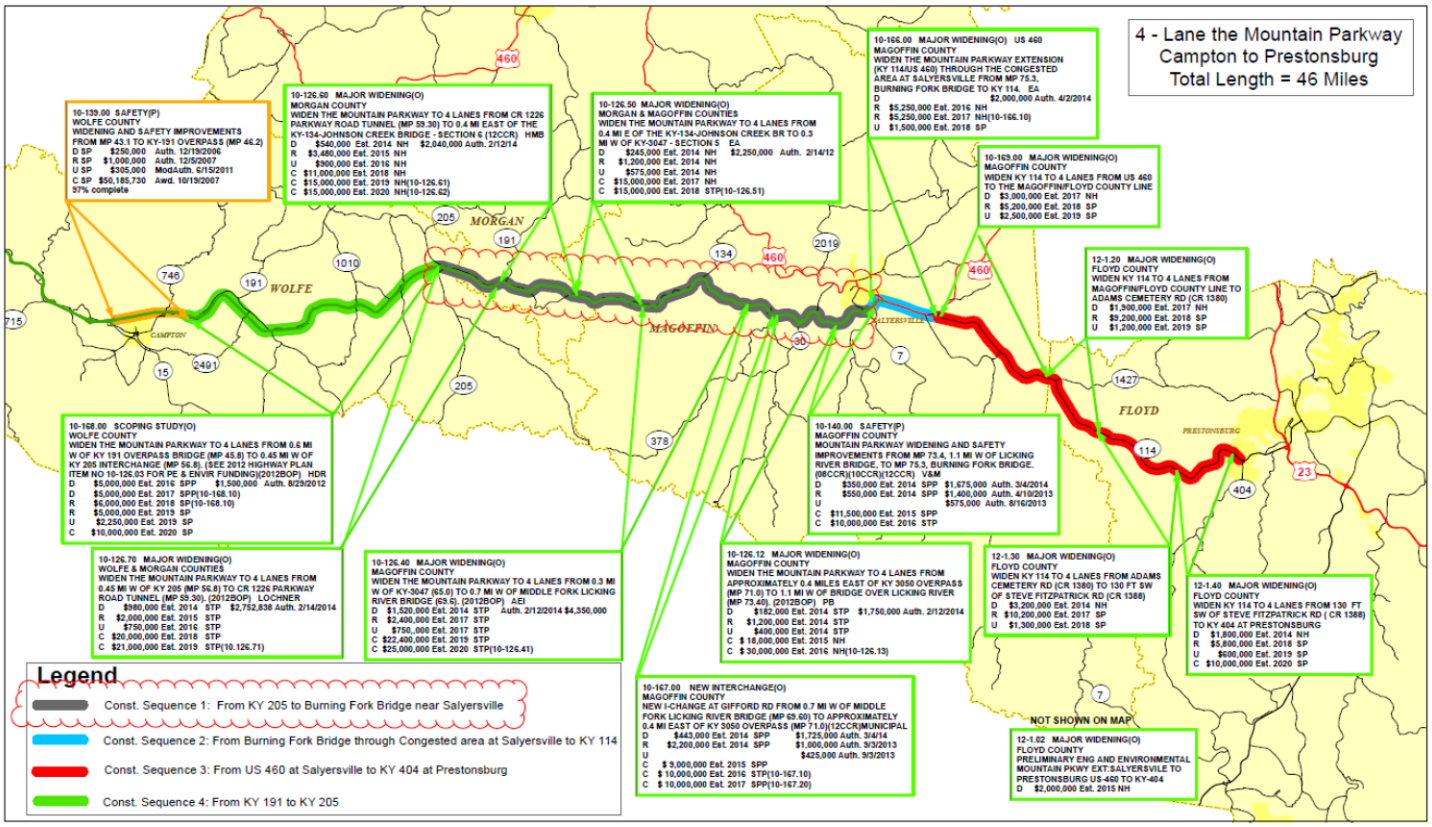
Kentucky Transportation Cabinet Value Engineering Study

Mountain Parkway Corridor – Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

Final Value Engineering Study Report



Study Dates: May 12-16, 2014

Kentucky Transportation Cabinet
Division of Highway Design
200 Mero Street
Frankfort, KY 40622

Contact: Renee L. Hoekstra, CVS
(602) 493-1947

Draft: May 2014
Final: November 2014

Guiding Teams – Building Success

November 14, 2014

Mr. Marshall Carrier
Project Manager
Kentucky Transportation Cabinet
Division of Highway Design
200 Mero Street
Franfort, KY 40622
Marshall.Carrier@ky.gov

Re: Mountain Parkway Corridor – Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties
FINAL Value Engineering Study Report

Dear Mr. Carrier:

Transmitted herewith is the pdf copy of the Final Value Engineering Study Report for the above referenced project.

RHA appreciates your assistance and cooperation. Should you have any questions please contact us at (602) 493-1947.

Sincerely,

RHA, LLC

Renee L. Hoekstra, CVS
Managing Partner
Renee@TeamRHA.com

Patrice M. Miller, CVS
Managing Partner
Patrice@TeamRHA.com

Value Engineering Study
Kentucky Transportation Cabinet
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Introduction

The value methodology (Synonyms: value analysis, value engineering and value management) is a function-oriented, systematic, team approach to add customer value to a program, facility, system, or service. Improvements like performance, quality, initial and life cycle cost are paramount in the value methodology. The value engineering workshop was conducted in accordance with the methodology as established by SAVE International, "The Value Society," and was structured using the Job Plan as outlined below:

Value Methodology

- **Pre-Study**
  - Identify team members
  - Define workshop location
  - Review project documentation
  - Prepare for the study (workshop)
- **Value Study (Workshop) Job Plan**
  - *Information Phase*
    - Gather, organize and analyze data,
    - Define costs and cost models,
    - Define the problem/purpose of the study,
    - Define study scope, define project goals and workshop goals
    - Complete a risk analysis
  - *Function Analysis Phase*
    - Define and evaluate functions
    - Define needs versus wants
  - *Creative Phase*
    - What else will perform the functions?
    - Is this function required?
  - *Evaluation Phase*
    - Rank and rate the ideas to select
    - Refine the best ideas for further development
  - *Development Phase*
    - Develop the best ideas into VE Alternatives with support and justification
  - *Presentation/Implementation*
    - VE team presents results
    - Prepare and issue the report
    - Report implementation ideas
- **Post Study**
  - Implement approved alternatives
  - Monitor status

Report Contents

The report provides the outcomes associated with this VE workshop and includes the following sections:

Introduction – This section outlines the VE process and explains the content of the report.

Executive Summary – This section is an overview that includes project background, summary of results, a list of the VE study team members, and the VE punch list.

VE Recommendations and Design Suggestions – Each completed alternative and design suggestion has a separate workbook and is divided by function and project section, where applicable. Each workbook contains the following information:

- Baseline Assumption
- Proposed Alternative
- Benefits and Risks/Challenges of the Proposed Alternative
- Discussion and Justification
- Implementation Requirements
- Detailed Cost Estimate
- Life Cycle Cost Analysis, as needed
- Drawings and/or Sketches for the Baseline and the Proposed Alternative, as needed

Appendices

A – Study Participants
B – Pareto Cost Models
C – Function Analysis
D - Creative List and Evaluation
E – Supporting Data
    i. Team Observations
    ii. Risk Registry
    iii. List of Standard KYTC VE Report Abbreviations

EXECUTIVE SUMMARY

Value Engineering Study
Kentucky Transportation Cabinet
Mountain Parkway Corridor – Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
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Executive Summary

Background
A Value Engineering (VE) study was conducted during May 12-16, 2014 for the Kentucky Transportation Cabinet (KYTC) for the Mountain Parkway Corridor – Construction Sequence 1 project. This study encompassed seven separate and contiguous designs—10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, and 10-140.00—as shown in the diagram on the following page.

The decision makers identified the project goals as:

- Achieve Level of Service "A"
- Limit right-of-way impacts
- Stay within the footprint identified in the current environmental documents
- Build an Interstate-type facility, which was defined as—
  - Controlled access
  - Inside shoulders – 4-foot paved, 2-foot unpaved
  - Outside shoulders – 10-foot paved, 2-foot unpaved
  - Lighting
  - Four lanes
  - Maximum 6% grade
  - 40-foot wide median
- Accommodate adjacent sections on both ends
- Meet two-year time constraints to maximize funding available, purchase property/ROW, and move utilities
- Try to accomplish as much as possible with less money
- Create an economically viable corridor

The workshop objectives were identified at the start of the workshop; to assure the efficient use of funds, both capital and life cycle costs, and to ensure the best value is attained while meeting the project goals and performance attributes. The VE team identified the following goals and opportunities for the workshop:

- Apply a corridor-wide approach wherever possible
- Check potential for waste site areas
- Identify opportunities for expediting the project
- Utilize salvageable materials where appropriate
- Focus on 60 MPH design speed with the opportunity to reduce it to 55 MPH design speed in certain areas, when appropriate

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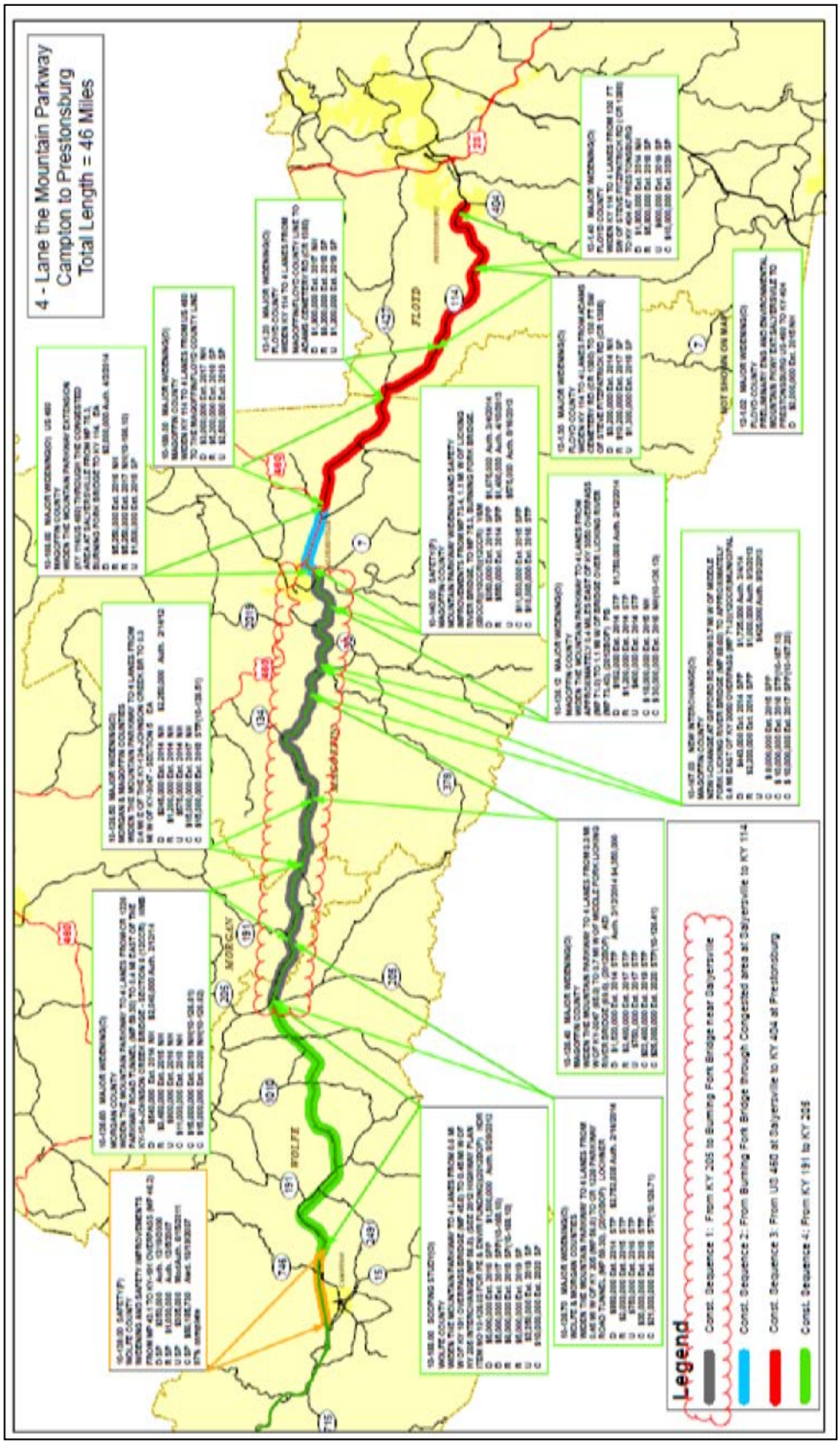

Project Constraints

The decision makers/stakeholders identified the project constraints for the VE team at the start of the VE study as:

- Four-lane design
- Time that it takes to permit
- Right-of-way completion (10-167.00 and 10-140.00 complete, with 10-126.12 not far behind)
- Politics

Project Description

The VE study includes seven separate and contiguous designs. The overall purpose of this corridor project is to provide a safer and more efficient roadway and to contribute to the transportation infrastructure improvements needed to support travel in the Eastern Kentucky region. This project should also address the lack of sufficient transportation infrastructure and major highway system linkage in an economically disadvantaged region of the state by constructing an interstate-type, access controlled highway facility that will provide for the safe, cost-effective, and efficient movement of people and goods.

Summary of Results

The VE team brainstormed a total of 78 ideas. The alternatives were generated by function for the seven design sections, when applicable. The seven design sections are:

Item No.	County	Designer
10-126.70	Wolfe & Morgan	Lochner
10-126.60	Morgan	HMB
10-126.50	Morgan & Magoffin	EA
10-126.40	Magoffin	AEI
10-167.00	Magoffin	Municipal
10-126.12	Magoffin	PB
10-140.00	Magoffin	V&M

Many of the ideas were more general in nature that could apply to any or all of the seven sections.

Of the 78 ideas, twenty-seven (27) ideas were identified for further development into VE proposed alternatives, including cost impacts. Twenty-five (25) Design Suggestions, without any cost impact, were identified with five (5) Design Suggestions written to provide additional information for KYTC and the designers to consider. The description and further discussion of these are included in the VE workbooks section of this report. The following table shows the proposed alternatives developed and the cost impacts. The costs shown in parenthesis represent an additional cost to the project. Those shown as positive numbers represent a savings.

Summary of Proposed Alternatives

No.	Description	Initial Cost Savings / (Add)	O&M	Total Life Cycle Cost
SS	**SPAN SPACE**			
	10-126.70 (1)			
SS-04	Use an arch-bridge for Mountain Parkway, KY 205 and ramps	$4,630,000	$0	$4,630,000
SS-05	Use an arch bridge in lieu of box culvert - three opportunities	$261,150	$0	$261,150
	10-126.60 (2)			
SS-06	Use single-span bridge at Sta. 3072+55 in lieu of three-span bridge	$637,727	$0	$637,727
SS-08	Use single-span bridge with MSE walls at Sta. 3224+88 in lieu of three-span bridge	$492,275	$0	$492,275
	10-126.50 (3)			
SS-12	Reduce bridge at Sta. 3350+00 from 4-span to 3-span	$284,760	$0	$284,760
SS-13	Reduce the 8% superelevation on the bridge at Johnson Creek Road	($900,000)	$0	($900,000)
	10-126.40 (4)			
SS-16	Shift the alignment south to eliminate five twin bridges	$32,206,808	$0	$32,206,808
SS-19	Eliminate the interchange on both sides of Section 10-126.40	$4,746,350	$0	$4,746,350
SS-22	Use con-span at Sta. 3506+00 in lieu of a 3-span box	($113,225)	$0	($113,225)
	10-126.12 (6)			
SS-25	Use SPUI in lieu of a full diamond interchange	$1,500,000	$0	$1,500,000
CR	**CLEAR RIGHT OF WAY**			
	10-126.12 (6)			
CR-01	Use median barrier to reduce the footprint through the cuts	$17,447,525	$0	$17,447,525
CR-04	Bifurcate the road on one side at a higher elevation to reduce cuts	$278,669	$0	$278,669
CR-05	At Sta. 3705+00 to 3765+00 raise the grade to balance earthwork and reduce cuts	$1,775,000	$0	$1,775,000
CR-06	Flatten fill slopes to balance earthwork from Sta. 3705+00 to 3765+00	$48,552	$0	$48,552

Summary of Proposed Alternatives

No.	Description	Initial Cost Savings / (Add)	O&M	Total Life Cycle Cost
CR-08	Introduce false cuts to reduce fill area footprint and waste site needs	$4,650,917	$0	$4,650,917
CR-09	Use MSE walls for retaining walls to reduce cuts	($743,927)	$0	($743,927)
	10-126.40 (4)			
CR-14	Move alignment from Sta. 3595+00 to 3615+00, shift back to the existing alignment	$947,916	$0	$947,916
CR-15	Move alignment from Sta. 3530+00 to 3550+00	$213,500	$0	$213,500
	10-126.70 (1)			
CR-21	Use a jug handle interchange in lieu of a diamond interchange	$898,085	$0	$898,085
C	**CONSTRUCTABILITY**			
C-02	Complete early construction package to construct roadway portions that are off the existing alignment	$0	$0	$0
C-03	Detour traffic in 10-126.70 onto KY 191/KY 134 to close parkway during construction	$712,005	$0	$712,005
C-04	Detour traffic in 10-126.60 onto KY 134/KY 191 to close parkway during construction	$1,553,930	$0	$1,553,930
AV	**ACCOMMODATE VEHICLES**			
AV-01	Pavement thickness should change based on usage (ADT)	$1,164,020	$0	$1,164,020
AV-02	Maintain current median 36 LF width in lieu of 40 LF	$1,331,094	$0	$1,331,094
AV-03	Reduce outside paved shoulder width	$3,545,594	$143,000	$3,688,594
DS	**ADDITIONAL IDEAS BASED ON DESIGN SPEED**			
DS-01	Change design speed from 65 mph to 60 mph to reduce earthwork	$25,440,000	$0	$25,440,000
DS-02	Change design speed from 65 mph to 55 mph to reduce earthwork	$33,080,000	$0	$33,080,000

Summary of Design Suggestion (DS* Workbook Prepared)

No.	Description	Score
SS	**SPAN SPACE**	
	10-126.60 (2)	
SS-11	Use concrete piles in lieu of H-piles or spread footings	DS*
CR	**CLEAR RIGHT OF WAY**	
	10-126.12 (6)	
CR-07	Use the existing area between the ramps as fill areas	DS*
C	**CONSTRUCTABILITY**	
C-05	Package construction bids to have bridges built separately	DS*
C-07	Package construction bids to have pavement bid/built separately	DS*
C-08	Establish blast windows to provide longer work windows	DS*

Risk Analysis

A formal risk analysis was completed on this project to identify any potential risks that might negatively or positively impact the project. The VE team identified five potential risks. A risk register was completed and is included in Appendix E, the support data section of this report.

Team Observations

Upon completion of the project presentation, the team discussed the various elements of the project including the project information they had reviewed prior to the workshop and the information provided during the presentation. These observations can be found in Appendix E.

Function Analysis

Function definition and analysis is the heart of Value Engineering. It is the primary activity that separates VE from all other “improvement” programs. The objective of this phase is to ensure the entire team agrees upon the purposes for the project elements. Furthermore, this phase assists with development of the most beneficial areas for continuing the study. The data supporting the function analysis can be found in Appendix C.

The VE team identified the functions using active verbs and measurable nouns. This process allowed the team to truly understand all of the functions associated with the project. The basic function was defined as *Increase Capacity*. A Function Analysis Systems Technique (FAST) diagram was completed and is included in Appendix C.

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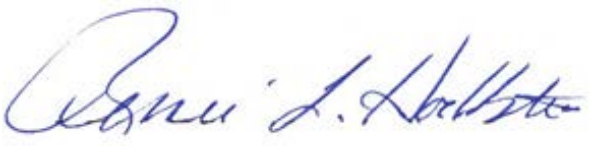
Wolfe, Morgan and Magoffin Counties

VE Study Team

Name	Organization	Role
Renee Hoekstra	RHA, LLC	Team Leader
Patrice Miller	RHA, LLC	Assistant Team Leader
Darren Back	KYTC	Roadway
Travis Carrico	KYTC	Construction / Constructability
Shawn Russell	KYTC	Construction / Constructability
Bill Morris	Stantec	Roadway
Christopher Jenkins	Qk4	Construction
Danny Woods	Stantec	Structures
Adam Crace	Stantec	Geotechnical
Harsha Wijesiri	Integrated Engineering	Drainage

Certification

This is to verify that the Value Engineering Study was conducted in accordance with standard value engineering principles and practices.



Renee L. Hoekstra, CVS®
RHA, LLC

VALUE ENGINEERING PUNCH LIST

ITEM NO. **10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00** PROJECT COUNTIES: **Wolfe, Morgan and Magoffin** DATE OF STUDY: **May 12-16, 2014**

VE Alternative Number	VE Team Top Pick	Description	Activity (Y,N,UC-Date)	Implemented Life Cycle Cost Savings	Original Cost	Alternative Cost	Initial Cost Saving	Life Cycle Cost Savings (Total Present Worth)	FHWA Categories	Remarks
Item No. 10-126.70										
Wolfe & Morgan Counties (Designer: Lochner)										
SS-04		Use an arch-bridge for Mountain Parkway, KY 205 and ramps			$10,867,500	$6,237,500	$4,630,000	$0		
SS-05		Use an arch bridge in-lieu of box culvert - three opportunities			$917,150	$656,000	$261,150	$0		
CR-21		Use a jug handle interchange in lieu of a diamond interchange			$1,704,535	$806,450	$898,085	$0		
C-03		Detour traffic in 10.126.70 onto KY 191/KY 134 to close parkway during construction			$4,773,421	$4,061,416	$712,005	$0		
Item No. 10-126.60										
Morgan County (Designer: HMB)										
SS-06		Use single-span bridge at Sta. 3072+55 in lieu of three-span bridge			$1,161,365	$523,639	$637,726	$0		
SS-08		Use single-span bridge with MSE walls at Sta. 3224+88 in lieu of three-span bridge			$1,640,182	$1,147,907	$492,275	$0		
C-04		Detour traffic in 10.126.60 onto KY 191/KY 134 to close parkway during construction			$9,873,106	$8,319,176	$1,553,930	$0		
Item No. 10-126.50										
Morgan and Magoffin Counties (Designer: EA)										
SS-12		Reduce bridge at Sta. 3350+00 from 4-span to 3-span			$451,260	$166,500	$284,760	$0		
SS-13		Reduce the 8% superelevation on the bridge at Johnson Creek Road			$0	$900,000	($900,000)	$0		
Item No. 10-126.40										
Magoffin County (Designer: AEI)										
SS-16		Shift the alignment south to eliminate five twin bridges			$66,306,808	$34,100,000	$32,206,808	$0		
SS-19		Eliminate the interchange of Section 10-126.40 at KY 134			$4,746,350	$0	$4,746,350	$0		
SS-22		Use con-span at Sta. 3506+00 in lieu of a 3-span box			$674,275	$787,500	($113,225)	$0		
CR-14		Move alignment from Sta. 3595+00 to 3615+00, shift back to the existing alignment			$3,047,916	$2,100,000	$947,916	$0		
CR-15		Move alignment from Sta. 3530+00 to 3550+00			$1,078,000	$864,500	$213,500	$0		

VE Alternative Number	VE Team Top Pick	Description	Activity (Y,N,UC-Date)	Implemented Life Cycle Cost Savings	Original Cost	Alternative Cost	Initial Cost Saving	Life Cycle Cost Savings (Total Present Worth)	FHWA Categories	Remarks
Item No. 10-126.12										
Magoffin County (Designer: PB)										
SS-25		Use SPUI in lieu of a full diamond interchange			$15,000,000	$13,500,000	$1,500,000	$0		
CR-01		Use median barrier to reduce foot print through cuts			$154,499,450	$137,051,925	$17,447,525	$0		
CR-04		Bifurcate the road on one at a higher elevation to reduce cuts			$819,255	$540,586	$278,669	$0		
CR-05		At Sta. 3705+00 to 3765+00 raise the grade to balance earthwork and reduce cuts			$18,500,000	$16,725,000	$1,775,000	$0		
CR-06		Flatten fill slopes to balance earthwork at Sta. 3705+00 to 3765+00			$48,552	$0	$48,552	$0		
CR-08		Introduce false cuts to reduce fill area footprint and waste site needs			$85,192,826	$80,541,908	$4,650,918	$0		
CR-09		Use MSE walls for retaining walls to reduce cuts			$206,374	$950,300	($743,926)	$0		
ALL Item Nos.										
C-02		Complete early construction package to construct roadway portions that are off the existing alignment			$25,731,300	$25,731,300	$0	$0		
AV-01		Pavement thickness should change based on usage (ADT)			$17,693,130	$16,529,110	$1,164,020	$0		
AV-02		Maintain current median 36 LF width in lieu of 40 LF			$82,231,684	$80,900,590	$1,331,094	$0		
AV-03		Reduce outside paved shoulder width			$93,286,184	$89,740,590	$3,545,594	$143,000		
DS-01		Change design speed from 65 mph to 60 mph to reduce earthwork			$25,440,000	$0	$25,440,000	$0		
DS-02		Change design speed from 65 mph to 55 mph to reduce earthwork			$33,080,000	$0	$33,080,000	$0		
Design Suggestions - Item No. 10-126.60										
Morgan County (Designer: HMB)										
SS-11DS		Use concrete piles in lieu of H-pile or spread footings								
Design Suggestion - Item No. 10-126.12										
Magoffin County (Designer: PB)										
CR-07DS		Use the existing area between the ramps as fill areas								
Design Suggestions - ALL Item Nos.										
C-05DS		Package construction bids to have bridges built separately								
C-07DS		Package construction bids to have pavement bid/built separately								
C-08DS		Establish blast windows to provide longer work windows								

VE RECOMMENDATIONS & DESIGN SUGGESTIONS

VE Proposed Alternatives & Design Suggestions

Introduction

The VE study evaluated the 78 ideas that were brainstormed during the Creative Phase for Item Nos. 10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, and 10-126.40. The twenty-seven (27) completed Alternatives are located in this section of the report. The alternatives developed included, as needed, the following information:

- Baseline Assumption
- Proposed Alternative
- Benefits and Risks/Challenges of the Proposed Alternative
- Discussion and Justification
- Implementation Requirements
- Detailed Cost Estimate
- Life Cycle Cost Analysis
- Drawings and/or Sketches for the Baseline and the Proposed Alternative

Additionally, five (5) Design Suggestions were developed to provide some additional design direction to the design team. These are also included in this section of the report.

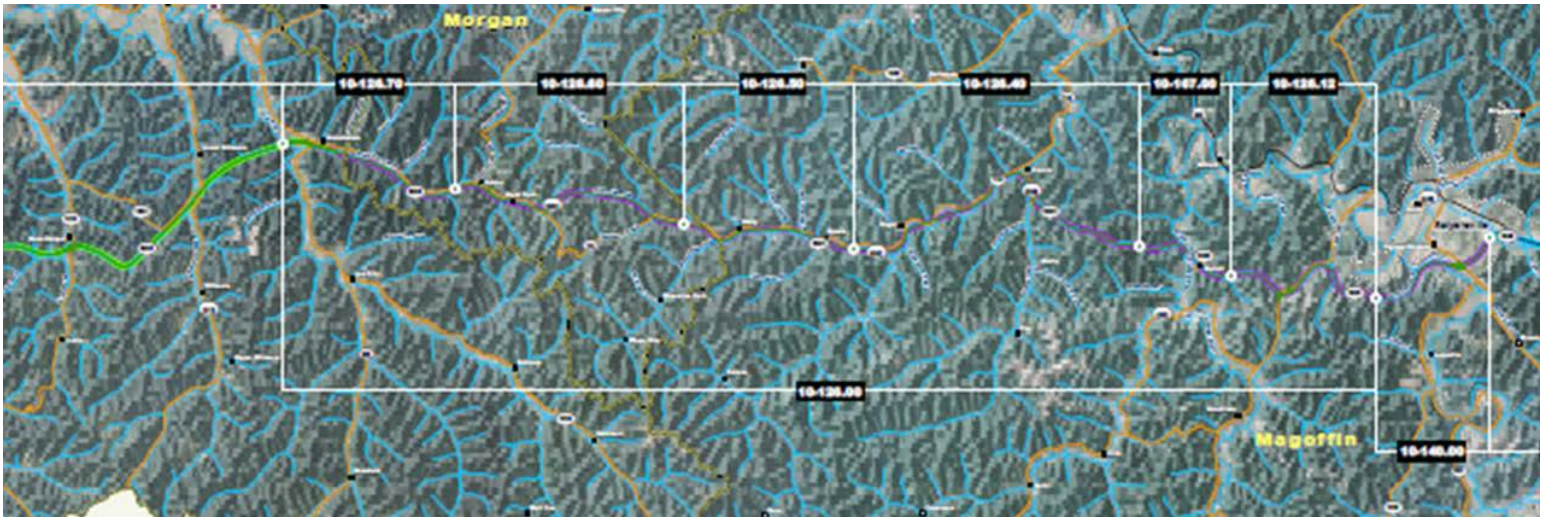
Results of the Study

The team developed the Alternatives based on the seven design sections; however, some of the Alternatives may be able to be applied to other design sections. In some cases, an Alternative was developed for the complete Construction Sequence 1.

Each design section is listed separately with the Alternatives and the corresponding design suggestions which include:

- **10-126.70** (Wolfe & Morgan Counties; Designer – Lochner): widen the Mountain Parkway to four lanes from 0.45 mile west of KY 205 (MP 56.80) to CR 1226 Parkway Road Tunnel (MP 59.30)
- **10-126.60** (Morgan County; Designer – HMB): widen the Mountain Parkway to 4 lanes from CR 1226 Parkway Road Tunnel (MP 59.30) to 0.4 mile east of KY 134 – Johnson Creek Bridge
- **10-126.50** (Morgan & Magoffin Counties; Designer – EA): widen the Mountain Parkway to four lanes from 0.4 mile east of the KY 134 – Johnson Creek Bridge (MP 65.00) to 0.3 mile west of KY 3047
- **10-126.40** (Magoffin County; Designer – AEI): widen the Mountain Parkway to 4 lanes from 0.3 mile west of KY 3047 (MP 65.00) to 0.7 mile west of Middle Fork Licking River Bridge (MP 69.60)

- **10-167.00** (Magoffin County; Designer – Municipal): new interchange at Gifford Road from 0.7 mile west of Middle Fork Licking River Bridge (MP 69.60) to approximately 0.4 mile east of KY 3050 Overpass (MP 71.00) - *No Alternatives developed for this design section*
- **10-126.12** (Magoffin County; Designer – PB): widen the Mountain Parkway to four lanes from approximately 0.4 mile east of KY 3050 Overpass (MP 71.0) to 1.1 mile west of Bridge over Licking River (MP 73.40)
- **10-140.00** (Magoffin County; Designer – V&M): Mountain Parkway widening and safety improvements from MP 73.4, 1.1 mile west of Licking Bridge to MP 75.3, Burning Fork Bridge - *No Alternatives developed for this design section*
- **Other:** Not specific to a particular design section



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10-126.70

VALUE ENGINEERING PROPOSAL SS-04
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
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Wolfe, Morgan and Magoffin Counties

TITLE:	Use an arch-bridge for Mountain Parkway, KY 205 and ramps
FUNCTION:	**Span Space**

BASELINE ASSUMPTION:

A mainline bridge is proposed on the Mountain Parkway (Station 130+00) and the two adjoining ramps (Ramp A & Ramp D) over the Red River. Another bridge is proposed on KY 205 over Red River.

PROPOSED ALTERNATIVE:

Replace all the bridges over Red River with precast arch bridges.

BENEFITS	RISKS/CHALLENGES
• Minimal impact to the streams	• Evaluate the floodplain
• Can be constructed with minimal impact to MOT	• Evaluate the hydraulics of Red River
• Faster construction	• Perform scour analysis for the structures
• Cost savings	• Evaluate the height clearance on KY 205
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 10,867,500	$ -	$ 10,867,500
PROPOSED ALTERNATIVE:	$ 6,237,500	$ -	$ 6,237,500
TOTAL (Baseline less Proposed)	$ 4,630,000	$ -	**$ 4,630,000**
			SAVINGS

VALUE ENGINEERING PROPOSAL SS-04

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

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Wolfe, Morgan and Magoffin Counties

TITLE: Use an arch-bridge for Mountain Parkway, KY 205 and ramps

DISCUSSION/JUSTIFICATION:

Precast arches can be used in lieu of bridges. These typically offer a considerable cost savings over bridges. MSE walls/taller headwalls could be utilized to minimize the length of the culverts. The interchange configuration could be changed (ramps closer to the mainline - similar to SPUI) to minimize the length of the culvert and improve hydraulics by having one structure instead of three structures. Based on preliminary analysis, a 100ft arch is utilized over Red River and the length of the culvert is assumed to be 200ft long. The cost of this arc culvert is estimated at $22,000/LF. A 30ft wide and 15ft tall arch is proposed for KY 207 over the tributary over Red River and replace the bridge on Mountain Parkway with the same culvert where KY 204 goes under the parkway. The cost for the bridges are estimated at $150/sqft. Relocating the interchange could reduce the amount of bridges needed. The interchange configuration could be changed to a SPUI to minimize right-of-way and stream impacts.

IMPLEMENTATION CONSIDERATIONS:

Evaluate the hydraulics and impacts to the floodplain.

VALUE ENGINEERING PROPOSAL SS-04

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Use an arch-bridge for Mountain Parkway, KY 205 and ramps

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Mainline Sta 130+00 (300' Long x 50' Wide) 2-Bridges		SF	30,000	150.00	4,500,000			
Ramp A Sta. 23+00		SF	7,200	150.00	1,080,000	200	22,000.00	4,400,000
Ramp D Sta. 59+00		SF	5,250	150.00	787,500			
KY 205 Sta. 339+00		SF	5,000	150.00	750,000	50	8,750.00	437,500
Mainline Sta 148+32 (250' Long x 50' Wide) 2- Bridges		SF	25,000	150.00	3,750,000	160	8,750.00	1,400,000
					10,867,500			**6,237,500**
							(BASELINE LESS PROPOSED)	**4,630,000**

*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL SS-04

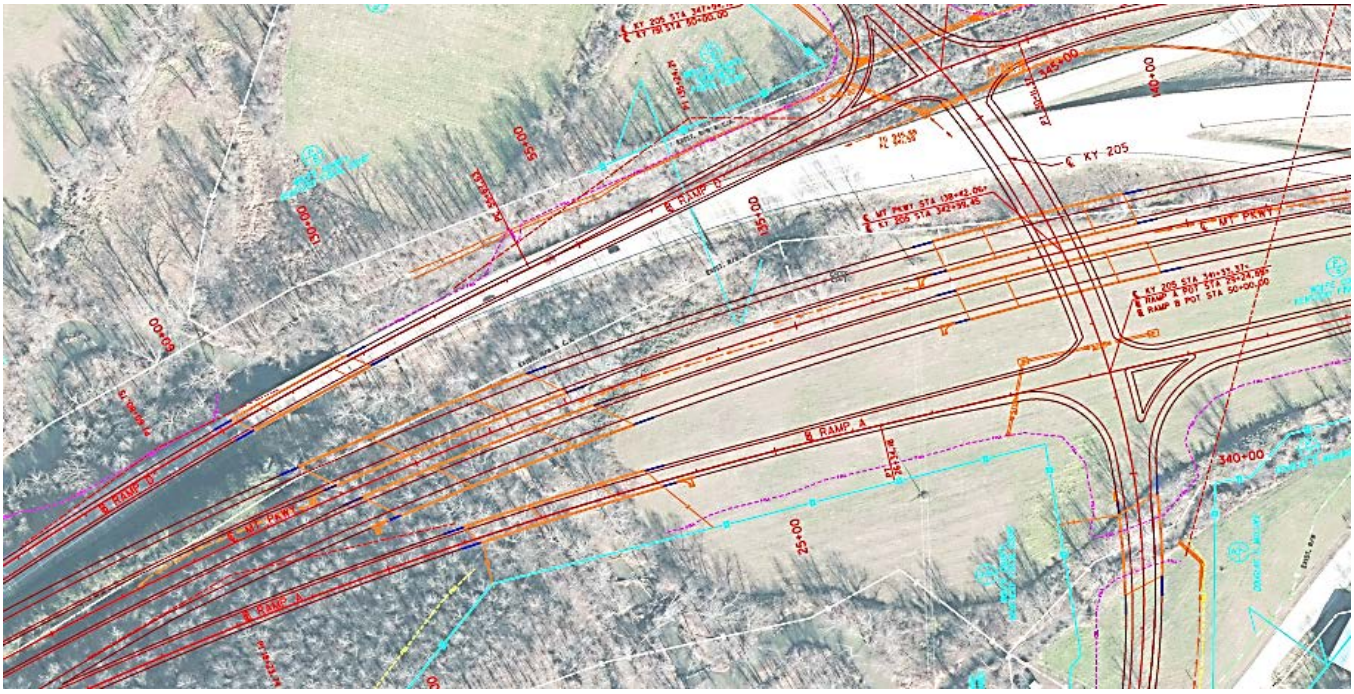
Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Use an arch-bridge for Mountain Parkway, KY 205 and ramps

SKETCH OF BASELINE ASSUMPTION



VALUE ENGINEERING PROPOSAL SS-04

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Use an arch-bridge for Mountain Parkway, KY 205 and ramps

SKETCH OF PROPOSED ALTERNATIVE

VALUE ENGINEERING PROPOSAL SS-05
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE: Use arch bridge in-lieu of box culvert - three opportunities

FUNCTION: **Span Space**

BASELINE ASSUMPTION:

Three box culvert (Double 12 LF X 7 LF Sta. 163+00, 6 LF X 5 LF Sta. 117+40, and 6 LF X 5 LF Sta. 248+00) extensions are proposed.

PROPOSED ALTERNATIVE:

Use arch-culverts in lieu of box culverts. Replace the Double 12 LF X 7 LF with a 24 LF X 8 LF arch-culvert. Replace the 6 LF X 5 LF with a 12 LF X 4 LF arch culvert.

BENEFITS	RISKS/CHALLENGES
• Reduces cost	• Connecting to the existing box culverts
• Achieves better hydraulic capacities versus double box culvert	•
• Reduces the chances of silting on the double box culvert	•
• Reduces the in-lieu fees associated with culverts	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 917,150	$ -	$ 917,150
PROPOSED ALTERNATIVE:	$ 656,000	$ -	$ 656,000
TOTAL (Baseline less Proposed)	$ 261,150	$ -	**$ 261,150**

SAVINGS

VALUE ENGINEERING PROPOSAL SS-05

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Use arch bridge in-lieu of box culvert - three opportunities

DISCUSSION/JUSTIFICATION:

The existing culverts should be evaluated to determine the structural integrity of the existing box culverts. These structures may be at the end of their life cycle. By utilizing arch-culverts, stream impacts are reduced and the stream in-lieu fees could be saved. In-lieu fees are estimated at $625/LF.

IMPLEMENTATION CONSIDERATIONS:

Hydraulic analysis to determine there are no adverse effects with connecting to the existing box culverts.

VALUE ENGINEERING PROPOSAL SS-05

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Use arch bridge in-lieu of box culvert - three opportunities

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Station 163+00 (Double 12 LF x 7 LF)			100	3,880.00	388,000	100	3,500.00	350,000
Station 117+40 (6 LF x 5 LF)			130	900.00	117,000	130	1,000.00	130,000
Station 248+00 (6 LF x 5 LF)			176	900.00	158,400	176	1,000.00	176,000
In-lieu Fees channel mitigation			406	625.00	253,750			
					917,150			**656,000**
							(BASELINE LESS PROPOSED)	**261,150**

*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL SS-05

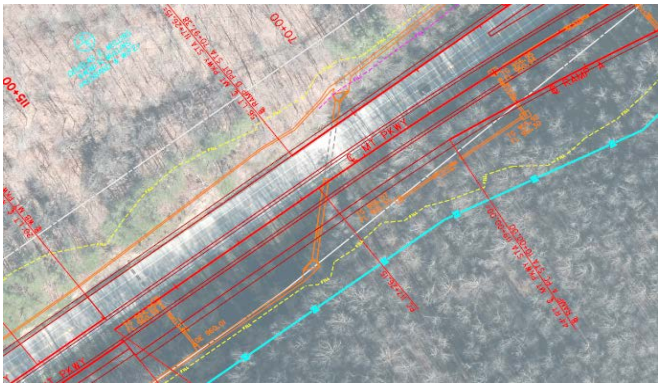
Kentucky Transportation Cabinet

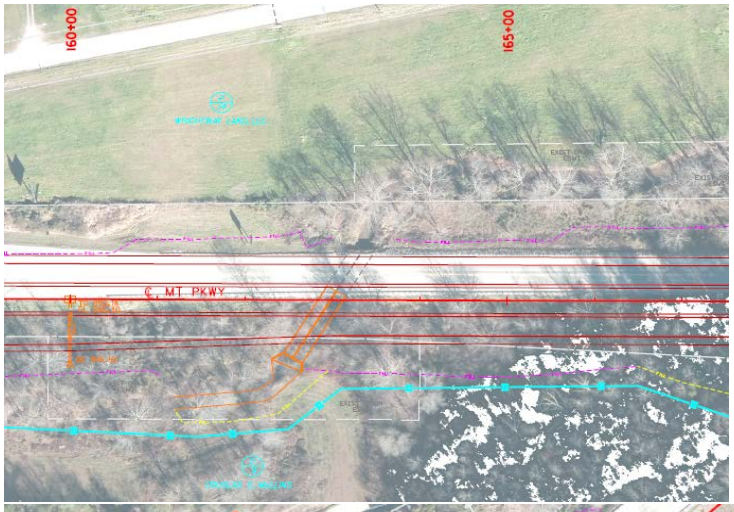
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

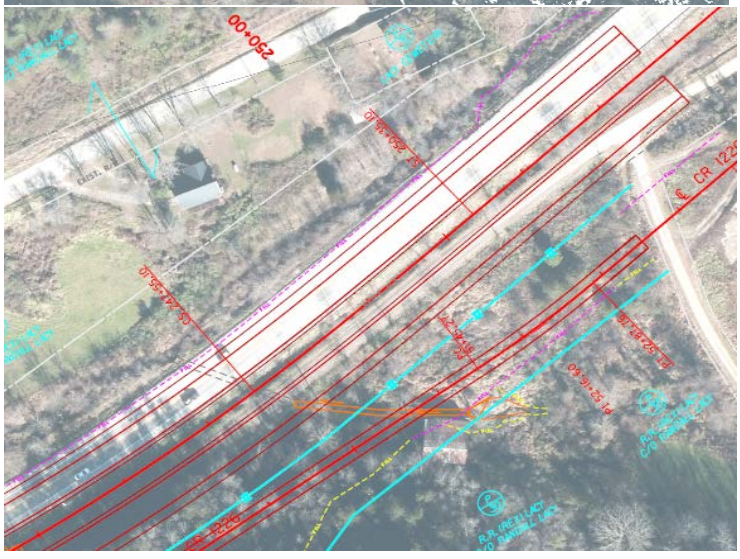
Wolfe, Morgan and Magoffin Counties

TITLE: Use arch bridge in-lieu of box culvert - three opportunities

SKETCH OF BASELINE ASSUMPTION







VALUE ENGINEERING PROPOSAL SS-05

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Use arch bridge in-lieu of box culvert - three opportunities

SKETCH OF PROPOSED ALTERNATIVE

VALUE ENGINEERING PROPOSAL CR-21
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE: Use a jug handle interchange in lieu of a diamond interchange at KY 191

FUNCTION: **Clear Right-of-way**

BASELINE ASSUMPTION:

There is full diamond interchange at KY 191.

PROPOSED ALTERNATIVE:

Replace Ramp D with a jug handle ramp.

BENEFITS	RISKS/CHALLENGES
• Eliminates need for bridge on Ramp D	• Making room for ramp
• Reduces roadway excavation	• Will likely require widening Mountain Parkway bridge at interchange to accommodate acceleration lane and taper
• Reduces ramp length	•
• Reduces bridge need	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 1,704,535	$ -	$ 1,704,535
PROPOSED ALTERNATIVE:	$ 806,450	$ -	$ 806,450
TOTAL (Baseline less Proposed)	$ 898,085	$ -	**$ 898,085**
			SAVINGS

VALUE ENGINEERING PROPOSAL CR-21

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Use a jug handle interchange in lieu of a diamond interchange at KY 191

DISCUSSION/JUSTIFICATION:

The bridge on Ramp D is eliminated and Mountain Parkway interchange bridge widened enough to accommodate an acceleration lane. Ramp length is reduced from 2000 LF to about 800 LF with jug handle design.

IMPLEMENTATION CONSIDERATIONS:

Must examine the ramp curve radius to determine if this proposal is feasible based on available right-of-way.

VALUE ENGINEERING PROPOSAL CR-21

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Use a jug handle interchange in lieu of a diamond interchange at KY 191

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Asphalt surface		TON	260	95.00	24,700			
Asphalt base		TON	1,974	85.00	167,790			
Crushed stone base		TON	566	30.00	16,980			
Rock road bed		CY	2,519	30.00	75,570			
Asphalt surface (shoulder)		TON	100	95.00	9,500			
Asphalt base (shoulder)		TON	235	85.00	19,975			
Crushed stone base (shoulder)		TON	214	30.00	6,420			
Rock road bed (shoulder)		CY	2,370	30.00	71,100			
Bridge		EA	8,750	150.00	1,312,500			
Asphalt surface		TON				104	95.00	9,880
Asphalt base		TON				790	85.00	67,150
Crushed stone base		TON				266	30.00	7,980
Rock road bed		CY				1,007	30.00	30,210
Asphalt surface (shoulder)		TON				245	95.00	23,275
Asphalt base (shoulder)		TON				587	85.00	49,895
Crushed stone base (shoulder)		TON				214	30.00	6,420
Rock road bed (shoulder)		CY				948	30.00	28,440
Bridge		EA				3,888	150.00	583,200
					1,704,535			**806,450**
							(BASELINE LESS PROPOSED)	**898,085**

*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL CR-21

Kentucky Transportation Cabinet

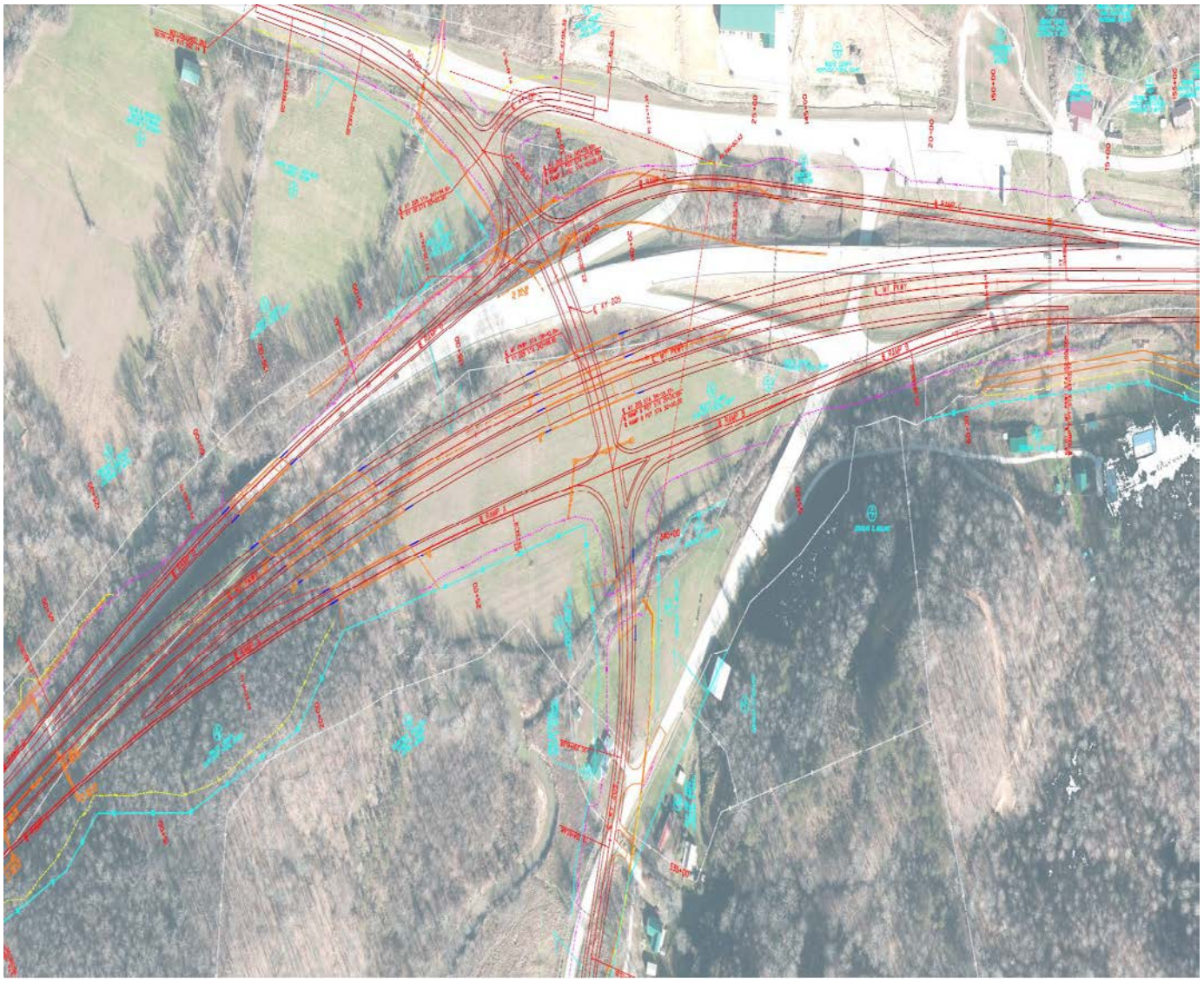
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Use a jug handle interchange in lieu of a diamond interchange at KY 191

SKETCH OF BASELINE ASSUMPTION

Baseline bridge on Ramp D is 175 LF by 50 LF. Ramp is 2000 LF long.



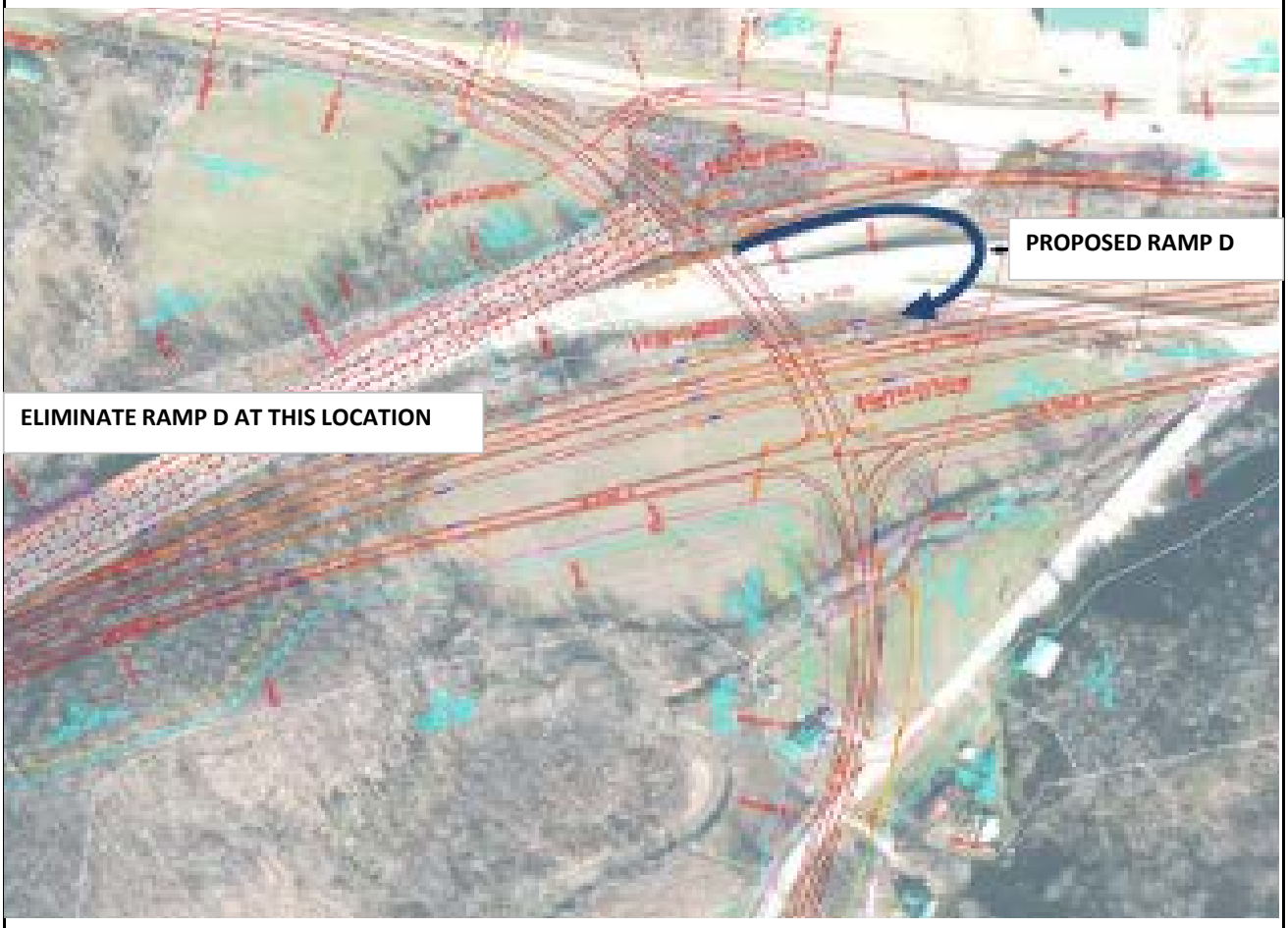
VALUE ENGINEERING PROPOSAL CR-21

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Use a jug handle interchange in lieu of a diamond interchange at KY 191

SKETCH OF PROPOSED ALTERNATIVE

Proposed bridge widening adds an additional 16 LF in width to the 243 LF long bridge. Jug handle ramp length is 800 LF.



VALUE ENGINEERING PROPOSAL C-03
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE: Detour traffic in 10.126.70 onto KY 191/KY 134 to close parkway during construction

FUNCTION: **Constructability**

BASELINE ASSUMPTION:

The original design of project 10-126.70 calls for widening the existing Mountain Parkway section "under traffic," thus causing the contractor to try to balance the tasks of maintaining production levels, while safely accommodating traffic through the work site. It would require flagging operation with allowing short duration closures for blasting.

PROPOSED ALTERNATIVE:

If traffic is allowed to "By-Pass" the majority work site via a parallel state road (KY 191/KY 134), the construction contractor would be able to increase excavation production rates and complete the job faster, while the traveling public is provided a reasonable By-Pass of the active work site which improves safety. An interchange is already in place at KY 205 and on/off ramps are in place just beyond the east end of the project (from KY 134) to accommodate accessing these routes. The majority of the widening could be accommodated by this detouring of traffic; however, construction of the interchange at KY 205 would still need to follow the MOT plan already developed.

BENEFITS	RISKS/CHALLENGES
• Shortens overall construction schedule by allowing longer work hours (improving production)	• May require maintenance of KY 191/KY 134 during construction
• Decreases construction costs by improving production rates for contractor	• Public perception of the residents along KY 191; likely won't appreciate the additional traffic
• Decreases traffic control costs	• Expect having to resurface KY 191 and a portion of KY 134 at the completion of project
• Improves safety - eliminates random/irregular timing of traffic cues in mountainous/curvy terrain	• Substandard facility for parkway traffic
• Provides additional space (safety buffer) between work site and motorists	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 4,773,421	$ -	$ 4,773,421
PROPOSED ALTERNATIVE:	$ 4,061,416	$ -	$ 4,061,416
TOTAL (Baseline less Proposed)	$ 712,005	$ -	**$ 712,005**
			SAVINGS

VALUE ENGINEERING PROPOSAL C-03

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE: Detour traffic in 10.126.70 onto KY 191/KY 134 to close parkway during construction

DISCUSSION/JUSTIFICATION:

The proposed alternative of utilizing KY 191/KY 134 as a means to detour Mountain Parkway traffic during construction will allow for a reduced construction schedule, which will reduce cost (i.e., associated with improved production rates and less traffic control expenses) while reducing the amount of time the contractor and KYTC is subjected to the potential risk of vehicle crashes occurring related to the project traffic cues. The existing on and off ramps at KY 134 provide access on the eastern end just beyond the project, without incurring any additional costs associated with temporary ties to Mountain Parkway.

IMPLEMENTATION CONSIDERATIONS:

Using the existing parallel routes (KY 134 and KY 191) will likely require resurfacing these routes after the Mountain Parkway project is complete. Additionally, there may be some resistance from local residents for using these routes as detours, due to the additional traffic during construction.

IMPORTANT NOTE:

All pricing comparisons are based on original unit prices generated by design consultant for use during the VE Review. However, the VE team determined more "in-line" pricing to be as follows:

Asphalt Surface Mix = $95/TON
Asphalt Base Mix = $85/TON
Excavation = $4.00/CY

VALUE ENGINEERING PROPOSAL C-03

Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Detour traffic in 10.126.70 onto KY 191/KY 134 to close parkway during construction

DESIGN ELEMENT	**Markup**	**BASELINE ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Excavation		CY	845063	5.00	4,225,315	845,063	4.25	3,591,518
MOT Flagging Costs		LS	1	145,200.00	145,200			
MOT Temp ties to maintain traffic during construction		EA	6	27,151.00	162,906			
Uniform Officer		LS	1	240,000.00	240,000	1	120,000.00	120,000
Surface Mix Asphalt for KY 191 and KY 134		TON				4,414	79.27	349,898
					4,773,421			**4,061,416**
							(BASELINE LESS PROPOSED)	**712,005**

*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL C-03

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Detour traffic in 10.126.70 onto KY 191/KY 134 to close parkway during construction

SKETCH OF PROPOSED ALTERNATIVE

Since this proposed alternate does not involve a design change, **NO SKETCH** is included. However, due to the limited information available from the project estimate, some assumptions had to be made for cost comparison purposes.

ASSUMPTIONS:
1. Duration of Flagging Operations = 2 years
2. Improvement of 30% for excavation production rate
3. Assume 15% decrease in unit price of excavation item
4. Assume 6 "temporary ties" during construction to maintain traffic on existing route during phases of construction
5. Existing KY 191/KY 134 would require resurfacing after completion of project

COST ASSUMPTIONS:
Flagging Operations:
2 years X 50 weeks/year X 5 days/week X 8 hours/day X $15/hour (X1.10 OH X 1.10 PROFIT) X 2 Flaggers = $145,000

Uniformed Officer
1 years X 50 weeks/year X 5 days/week X 8 hours/day X $60/hour = 120,000.00
(Only assumed savings of 1 year for uniformed officer costs because they will likely be used if backups occur or at the KY 205 Interchange reconstruction location)

Temporary ties Include:
500 TON Stone @ $28.41/CY X 6 Locations = $85,230.00
200 TON Asphalt Base @ $49.73/TON X 6 Locations = $59,676.00
Striping/Signage @ $3000 X 6 Locations = 18,000.00
$85,230 + $59,676 + $18,000 = $162,906/6 Locations = $27,151/location

Resurface Existing Routes at completion of Project:
KY 191: (14,500 LF X 24 FT)/9 X (1.5" Asphalt Surface X 112 LB/IN)/2000 LB/TON = 3,428 TON Surface Mix Asphalt
KY 134: (4,400 LF X 24 FT)/9 X (1.5" Asphalt Surface X 112 LB/IN)/2000 LB/TON = 986 TON Surface Mix Asphalt
TOTAL Resurface Asphalt = 4,414 TON

Value Engineering Study
Kentucky Transportation Cabinet
Mountain Parkway Corridor – Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

10-126.60

VALUE ENGINEERING PROPOSAL SS-06
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE:	Use single-span bridge at Sta. 3072+55 in lieu of three-span bridge
FUNCTION:	**Span Space**

BASELINE ASSUMPTION:

Baseline design provides twin three-span bridge, spans 46 FT, 50 FT, 46 FT PCIB TYPE II, bridge width 43 FT out-to-out.

PROPOSED ALTERNATIVE:

Proposed alternative provides a single-span 15 FT height x 22 FT width x 135 FT length concrete bridge.

BENEFITS	RISKS/CHALLENGES
• Reduces Cost	• Staged construction requires temporary retaining wall
•	•
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•	•
•	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 1,161,365	$ -	$ 1,161,365
PROPOSED ALTERNATIVE:	$ 523,639	$ -	$ 523,639
TOTAL (Baseline less Proposed)	$ 637,727	$ -	**$ 637,727**
			SAVINGS

VALUE ENGINEERING PROPOSAL SS-06

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Use single-span bridge at Sta. 3072+55 in lieu of three-span bridge

DISCUSSION/JUSTIFICATION:

In an effort to reduce costs, use a single-span bridge using MSE walls at Sta. 3072+55. This will simplify the construction from a three-span to a single-span. The use of MSE walls eliminates spill through abutments which allows the elimination of both end spans of the bridge. The use of MSE walls is discussed further in SS-08.

IMPLEMENTATION CONSIDERATIONS:

None apparent.

VALUE ENGINEERING PROPOSAL SS-06

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Use single-span bridge at Sta. 3072+55 in lieu of three-span bridge

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Concrete Class A		CY	370	473.73	175,280	820	473.73	388,459
Concrete Class AA		CY	504	506.49	255,271			
Steel Reinforcement		LB	55,500	1.07	59,385	123,000	1.07	131,610
Steel Rein Epoxy Coated		LB	75,600	1.17	88,452			
Str Excav Common		CY	502	14.28	7,169	250	14.28	3,570
Str Excav Solid Rock		CY	134	37.59	5,037			
Crushed Aggregate Slope Protection		TON	1,766	31.25	55,188			
Piles - Steel HP 14 x 73		LF	880	87.38	76,894			
Test Piles		LF	120	71.62	8,594			
Pile Points 14"		EA	44	92.72	4,080			
Precast Box Beam SB21-48		LF	1,420	235.00	333,700			
Rail System Type III		LF	580	92.96	53,917			
Aromored Edge for Concrete		LF	208	114.50	23,816			
Masonry Coating		SY	1,558	9.36	14,583			
					1,161,365			**523,639**
							(BASELINE LESS PROPOSED)	**637,727**

*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL SS-06

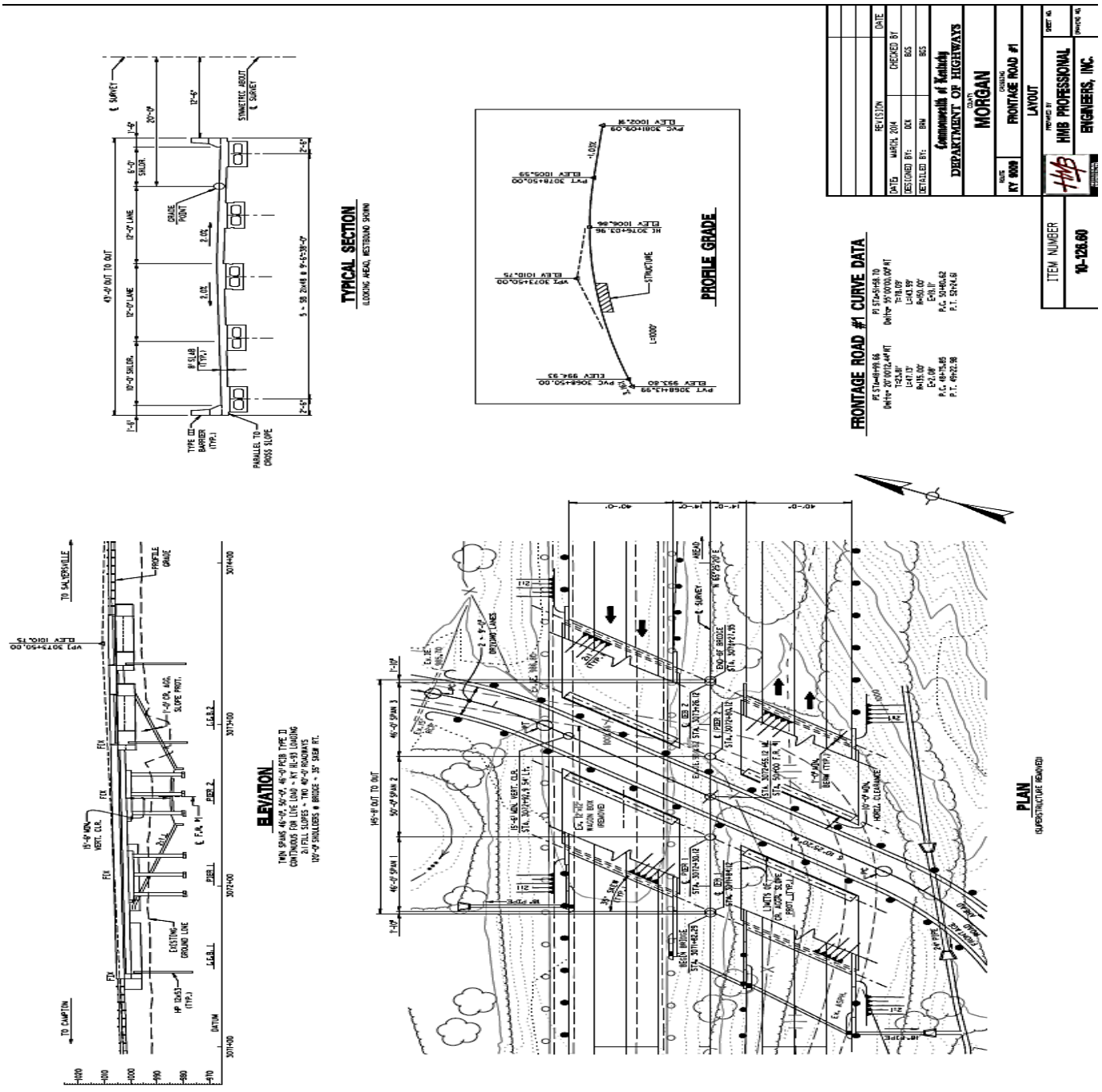
Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Use single-span bridge at Sta. 3072+55 in lieu of three-span bridge

SKETCH OF BASELINE ASSUMPTION

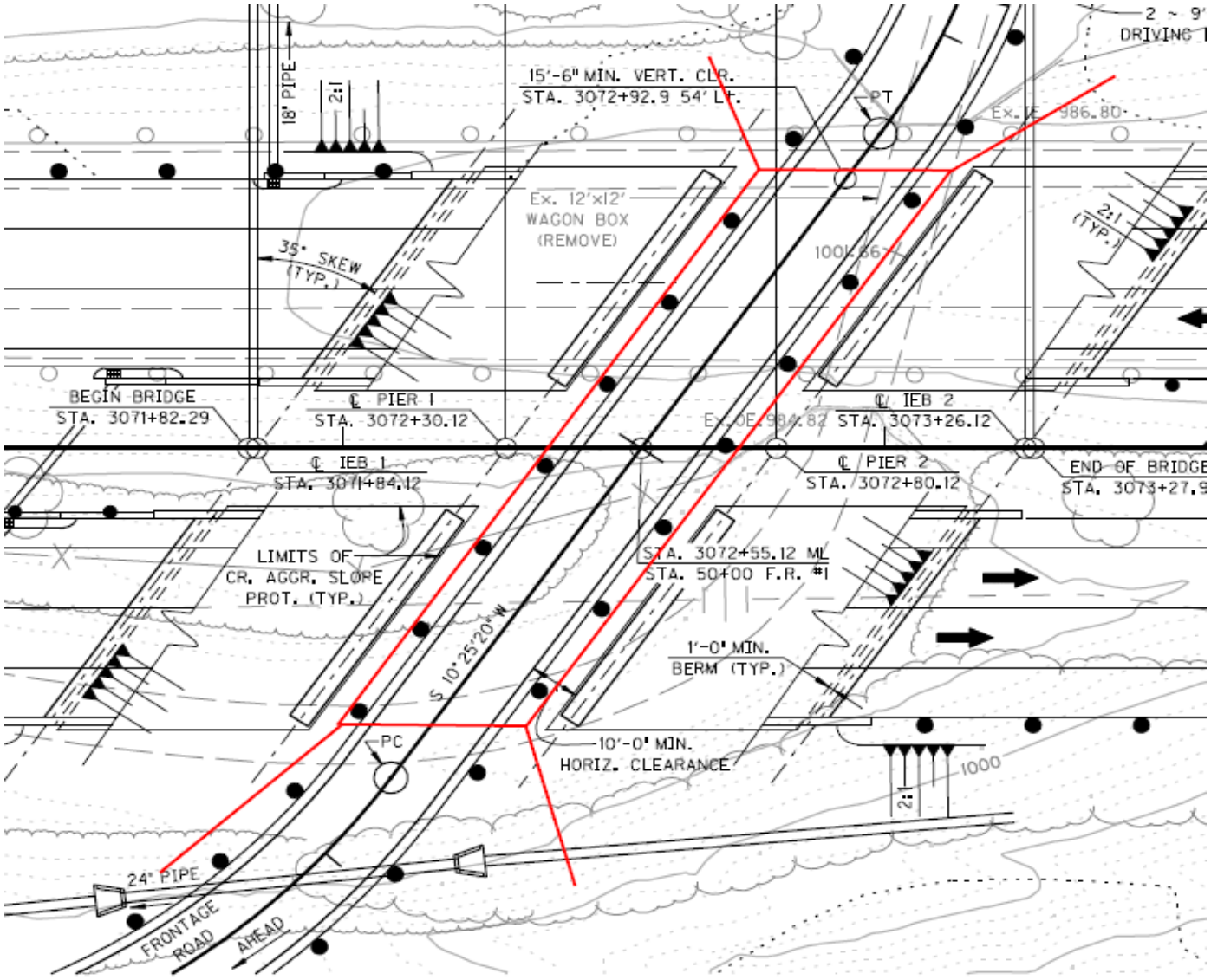


VALUE ENGINEERING PROPOSAL SS-06

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Use single-span bridge at Sta. 3072+55 in lieu of three-span bridge

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL SS-08
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE: Use single-span bridge with MSE walls at Sta. 3224+88 in lieu of three-span bridge

FUNCTION: **Span Space**

BASELINE ASSUMPTION:

Baseline Assumption provides twin curved bridges: eastbound three-span 60 FT, 95 FT, 70 FT Type IV PCIB; westbound three-span 50 FT, 70 FT, 60 FT Type II PCIB.

PROPOSED ALTERNATIVE:

Proposed Alternative provides twin curved bridges, single-span Type III with Mechanically Stabilized Earth (MSE) abutments.

BENEFITS	RISKS/CHALLENGES
• Reduces Costs	• Temporary sheet pile walls between bridges required during staged construction
•	•
•	•
•	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 1,640,182	$ -	$ 1,640,182
PROPOSED ALTERNATIVE:	$ 1,147,907	$ -	$ 1,147,907
TOTAL (Baseline less Proposed)	$ 492,275	$ -	**$ 492,275**
			SAVINGS

VALUE ENGINEERING PROPOSAL SS-08

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE: Use single-span bridge with MSE walls at Sta. 3224+88 in lieu of three-span bridge

DISCUSSION/JUSTIFICATION:

Use of MSE walls eliminates spill through abutments which allows the elimination of both end spans of the bridge resulting in a single-span bridge. For final design the MSE wall can be aligned parallel to the roadway in order to minimize the span length. There are approximately eight (8) locations where the reduction to a single-span bridge utilizing MSE walls occurs throughout the Mountain Parkway Corridor.

NOTE: Total potential savings are estimated at four (4) million dollars.

IMPLEMENTATION CONSIDERATIONS:

None apparent

VALUE ENGINEERING PROPOSAL SS-08

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Use single-span bridge with MSE walls at Sta. 3224+88 in lieu of three-span bridge

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Concrete Class A		CY	535	473.73	253,446	115	473.73	54,479
Concrete Class AA		CY	762	506.49	385,945	355	506.49	179,804
Steel Reinforcement		LB	80,250	1.07	85,868	23,000	1.07	24,610
Steel Reinforcement, Epoxy Coated		LB	114,300	1.17	133,731	73,700	1.17	86,229
Structure Excavation Common		CY	979	14.28	13,980			
Structure Excavation Solid Rock		CY	133	37.59	4,999			
Crushed Aggregate Slope Protection		Ton	2,445	31.25	76,406			
Piles - Steel HP 12x53		LF	1,408	56.96	80,200	2,000	56.96	113,920
Test Piles		LF	200	71.62	14,324	200	71.62	14,324
Pile Points 12"		Each	44	92.72	4,080			
Precast PCIB Type IV		LF	1,125	234.39	263,689	670	234.39	157,041
Precast PCIB Type II		LF	930	215.00	199,950			
Rail System Type III		LF	841	92.96	78,179			
Armored Edge for Concrete		LF	270	114.50	30,915			
Masonry Coating		SY	1,546	9.36	14,471			
MSE Wall		SQFT				11,500	45.00	517,500
					1,640,182			**1,147,907**
							(BASELINE LESS PROPOSED)	**492,275**

*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL SS-08

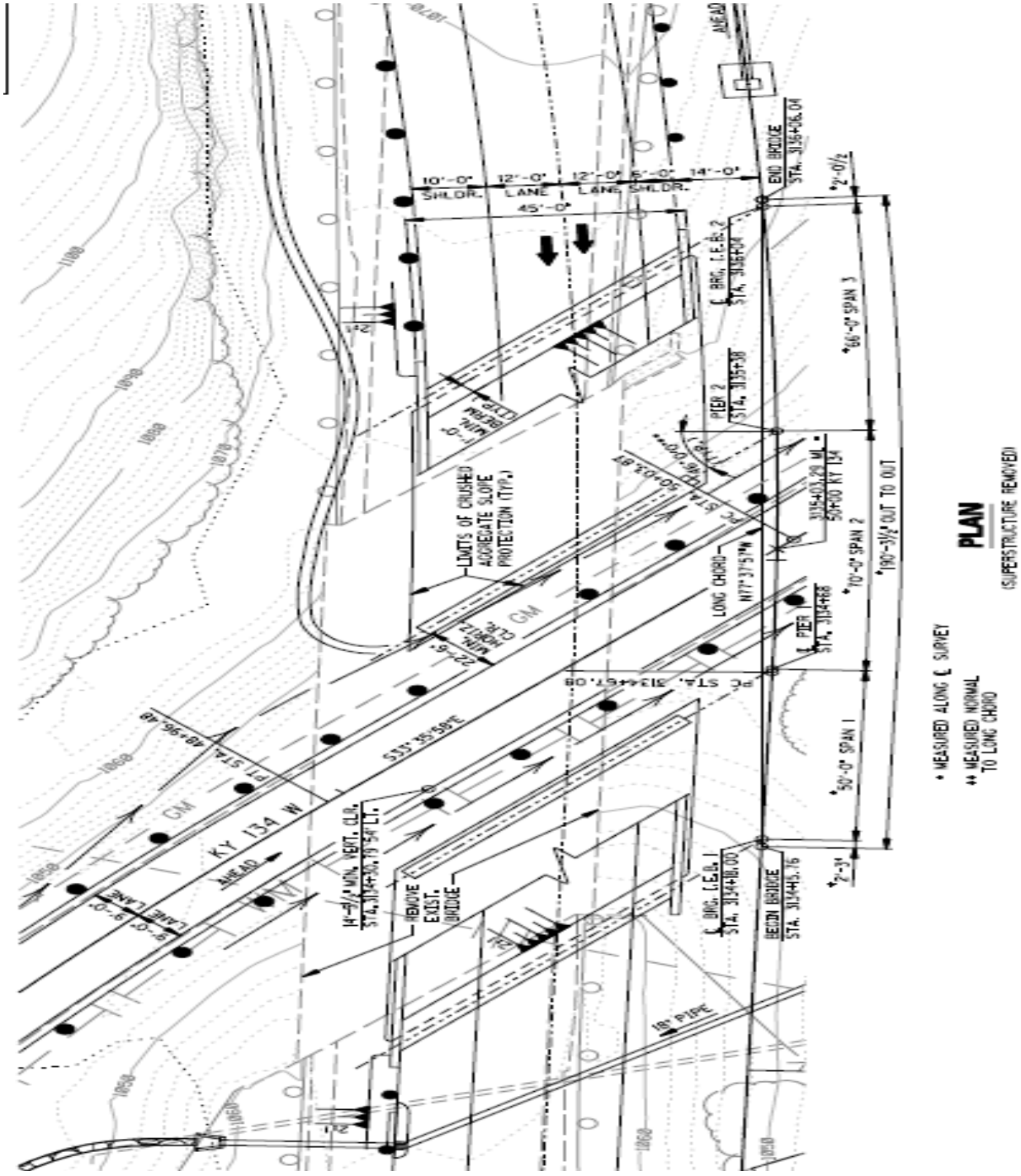
Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Use single-span bridge with MSE walls at Sta. 3224+88 in lieu of three-span bridge

SKETCH OF BASELINE ASSUMPTION - WB



VALUE ENGINEERING PROPOSAL SS-08

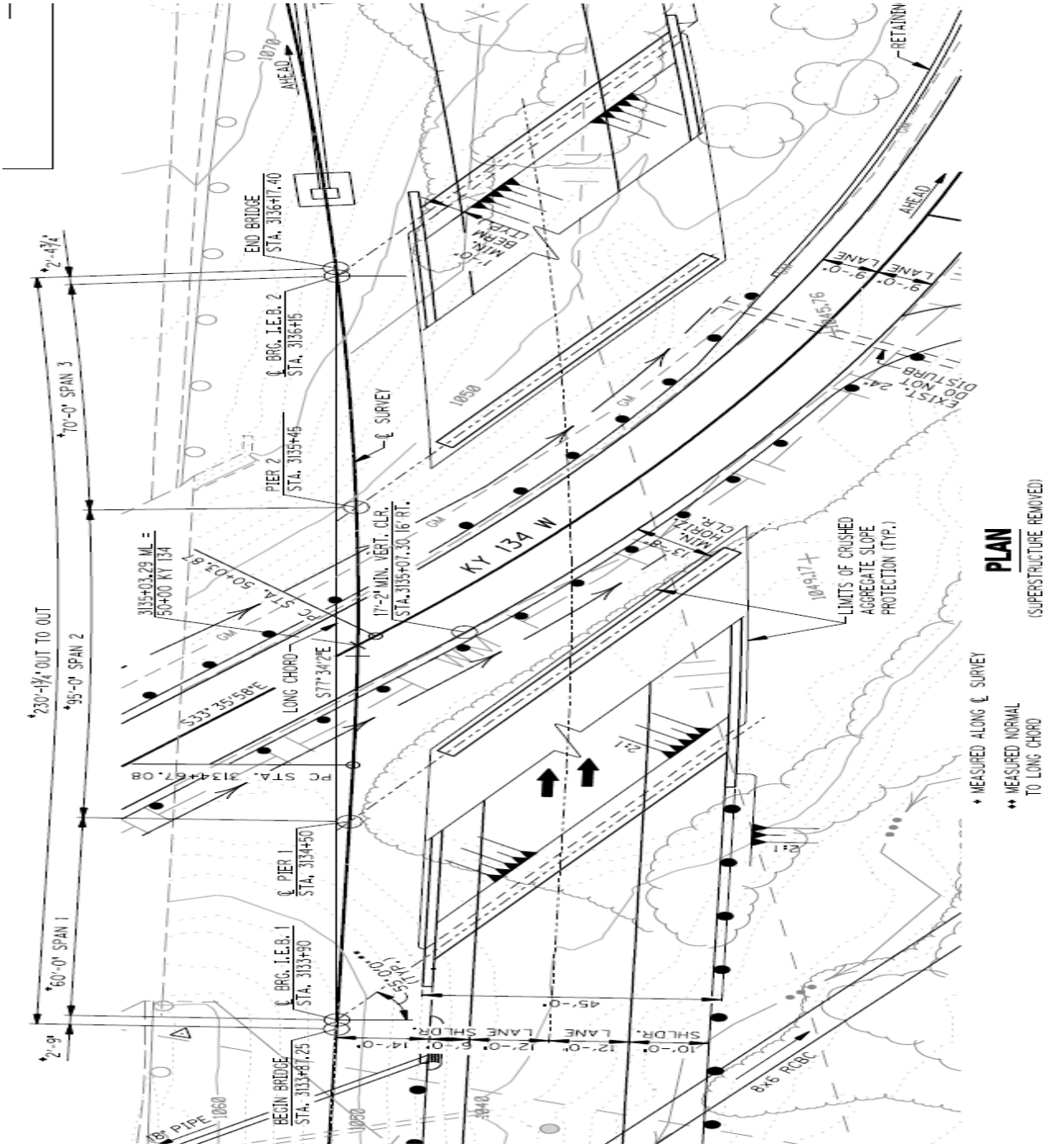
Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Use single-span bridge with MSE walls at Sta. 3224+88 in lieu of three-span bridge

SKETCH OF BASELINE ASSUMPTION - EB

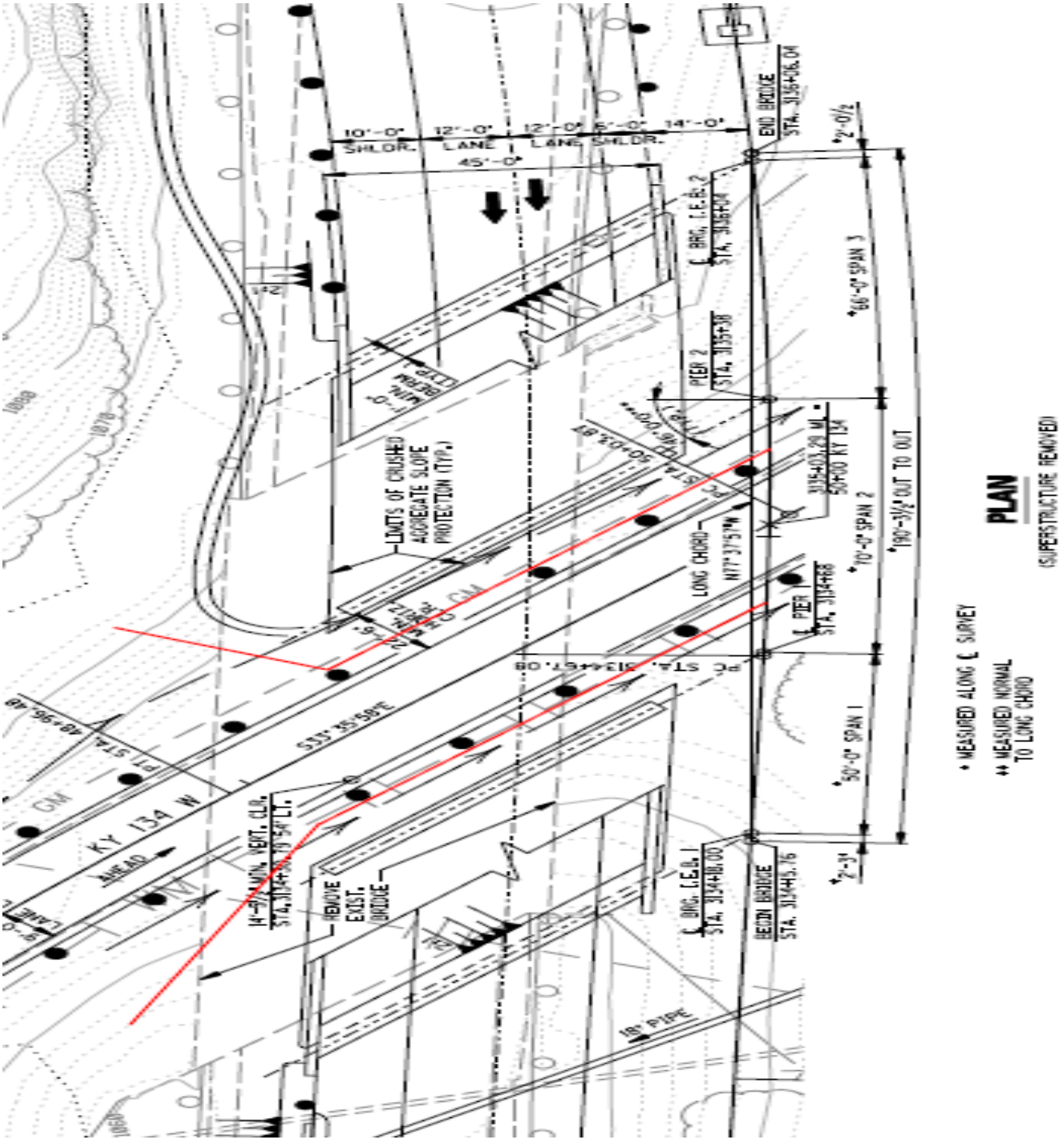


VALUE ENGINEERING PROPOSAL SS-08

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Use single-span bridge with MSE walls at Sta. 3224+88 in lieu of three-span bridge

SKETCH OF PROPOSED ALTERNATIVE - WB

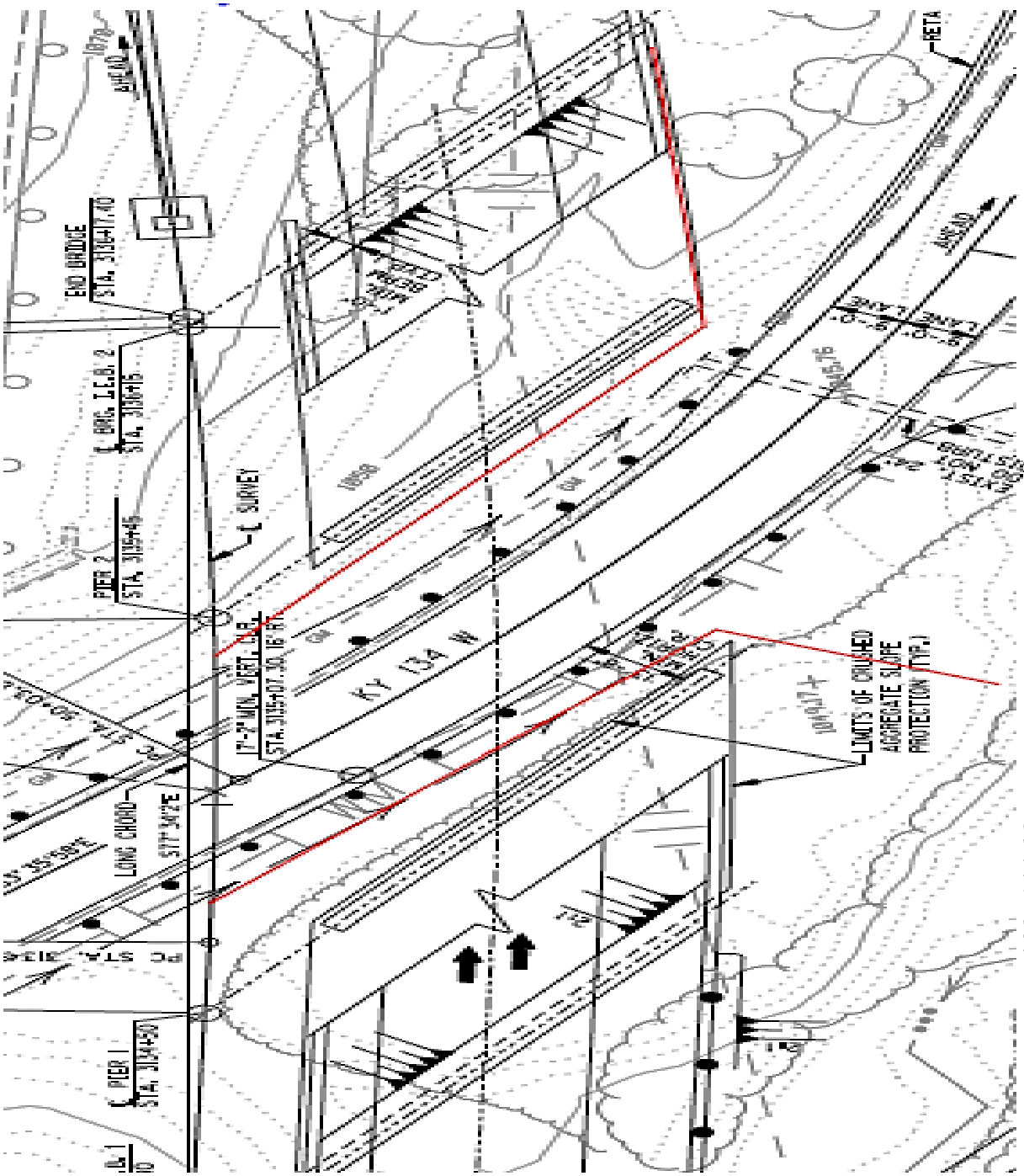


VALUE ENGINEERING PROPOSAL SS-08

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Use single-span bridge with MSE walls at Sta. 3224+88 in lieu of three-span bridge

SKETCH OF PROPOSED ALTERNATIVE - EB



VALUE ENGINEERING PROPOSAL C-04
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE: Detour traffic in 10.126.60 onto KY 191/KY 134 to close parkway during construction

FUNCTION: **Constructability**

BASELINE ASSUMPTION:

The original design for 10-126.60 calls for widening the parkway "under traffic," thus, causing the contractor to try to balance the tasks of maintaining production levels, while safely accommodating traffic through his work site. It would require flagging operation with allowing short duration closures for blasting.

PROPOSED ALTERNATIVE:

If traffic is allowed to "By-Pass" the work site via a parallel state road (KY 191/KY 134), the contractor would be able to increase excavation production rates and complete the job faster, while the traveling public is provided a reasonable by-pass of the active work site which improves safety. An interchange is already in place at the KY 205 to provide access to KY 191/KY 134 on the west end. However, to by-pass station 3435+00 to station 3225+00, there will need to be a "temporary tie" from existing Mountain Parkway to KY 134 constructed near station 3225+00.

BENEFITS	RISKS/CHALLENGES
• Shortens overall construction schedule by allowing longer, uninterrupted work hours for the contractor	• May require maintenance of KY 191/KY 134 during construction
• Decreases construction costs by improving production rates for contractor	• Public perception of the residents along KY 191/KY 134; likely won't appreciate the additional traffic
• Decreases traffic control costs	• Expect having to resurface KY 191 at the completion of project
• Improves safety - eliminates random/irregular timing of traffic cues in mountainous/curvy terrain	• Temporary tie location on east end of project
• Provides additional space (safety buffer) between work site and motorists	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 9,873,106	$ -	$ 9,873,106
PROPOSED ALTERNATIVE:	$ 8,319,176	$ -	$ 8,319,176
TOTAL (Baseline less Proposed)	$ 1,553,930	$ -	**$ 1,553,930**
			SAVINGS

VALUE ENGINEERING PROPOSAL C-04

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE: Detour traffic in 10.126.60 onto KY 191/KY 134 to close parkway during construction

DISCUSSION/JUSTIFICATION:

The proposed alternative of utilizing KY 191/KY 134 as a means to detour Mountain Parkway traffic during construction will allow for a reduced construction schedule, which will reduce cost (i.e., associated with improved production rates and less traffic control expenses) while reducing the amount of time the contractor and KYTC is subjected to the potential risk of more severe vehicle crashes occuring related to the project traffic cues in curvy, mountainous terrain.

IMPLEMENTATION CONSIDERATIONS:

Using the existing parallel routes (KY 191 and KY 134) will likely require resurfacing these routes after the Mountain Parkway project is complete. Additionally, there may be some resistance from local residents for using these routes as detours, due to the additional traffic during construction.

The temporary tie on the eastern end of the project will present a few challenges. The temporary tie will need to occur east of the existing bridge over KY 134 located at station 3224+88.41. However, that may push the work necessary for temporary tie onto the adjacent section (10-126.50). Also, there will need to be consideration given to KY 134 motorist that want to continue on KY 134 in either direction and do not wish to enter the parkway. There will be some additional permitting considerations resulting from crossing Johnson Creek with an "on-off ramp" to the existing parkway. A drainage evaluation will need to occur to ensure the on-off temporary tie ramp does not cause flooding potential.

IMPORTANT NOTE:

All pricing comparisons are based on original unit prices supplied for use during the VE Review. However, the VE team determined more "in-line" pricing to be as follows:
Asphalt Surface Mix = $95/TON
Asphalt Base Mix = $85/TON
Excavation = $4.00/CY

VALUE ENGINEERING PROPOSAL C-04

Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Detour traffic in 10.126.60 onto KY 191/KY 134 to close parkway during construction

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Excavation		CY	2,500,000	3.73	9,325,000	2,500,000	3.17	7,925,000
MOT Flagging Costs		LS	1	145,200.00	145,200			
Uniformed Officer		LS	1	240,000.00	240,000	1	120,000.00	120,000
MOT Temp ties to maintain traffic during construction		EA	6	27,151.00	162,906			
Surface Mix Asphalt for KY-134		TON				4,032	68.00	274,176
					9,873,106			**8,319,176**
							(BASELINE LESS PROPOSED)	**1,553,930**

*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL C-04

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Detour traffic in 10.126.60 onto KY 191/KY 134 to close parkway during construction

SKETCH OF PROPOSED ALTERNATIVE

Since this proposed alternate does not involve a design change, **NO SKETCH** is included. However, due to the limited information available from the project estimate, some assumptions had to be made for cost comparison purposes.

ASUMPTIONS:
1. Duration of Flagging Operations = 2 years
2. Improvement of 30% for excavation production rate
3. Assume 15% decrease in unit price of excavation item (as shown on cost estimate as a lower unit price of $4.25)
4. Assume 6 "temporary ties" during construction to maintain traffic on existing route during phases of construction
5. Existing KY 191/KY 131 would require resurfacing after completion of project

COST ASSUMPTIONS:
Flagging Operations:
2 years X 50 weeks/year X 5 days/week X 8 hours/day X $15/hour (X 1.10 O/H X 1.10 PROFIT) X 2 Flaggers = $145,000

Uniformed Officer
1 years X 50 weeks/year X 5 days/week X 8 hours/day X $60/hour = 120,000.00
(Only assumed savings of 1 year for uniformed officer costs because they will likely be used if backups occur or at the KY 134 temporary tie-in locations)

Temporary ties include:
500 TON Stone @ $28.41/CY X 6 Locations = $85,230.00
200 TON Asphalt Base @ $49.73/TON X 6 Locations = $59,676.00
Striping/Signage @ $3000 X 6 Locations = 18,000.00
$85,230 + $59,676 + $18,000 = $162,906/6 Locations = $27,151/location

Resurface Existing Routes at completion of Project:
KY 134: (18,000 LF X 24 FT)/9 X (1.5" Asphalt Surface X 112 LB/IN)/2000 LB/TON = 4,032 TON Surface Mix Asphalt

NOTE: Under project 10-126.60, resurfacing is included from the existing on-ramp at KY-134 from (approx. ML station 3142+00+/-) around to the proposed temporary tie at approximately ML station 3225+00.00+/-). Resurfacing costs associated with KY-134 east of ML Station 3434+68.00+/- AND all of the impacted KY-191 is accounted for under write-up for project 10-126.70.

VALUE ENGINEERING PROPOSAL SS-11DS
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE: Use concrete piles in lieu of H-pile or spread footings

FUNCTION: **Span Space**

BASELINE ASSUMPTION:

Current bridge designs will likely show steel H-piles for end bearing deep foundations.

PROPOSED ALTERNATIVE:

Have the option to use concrete piles for end bearing deep foundations.

BENEFITS	RISKS/CHALLENGES
● Introduce competition for deep foundation support	● Most state contractors are inexperienced in driving concrete piles
● Concrete is typically less expensive to purchase	● Closely monitor pile driving so that damage does not occur
●	● Instate suppliers that could supply the piles
●	●
●	●
●	●
●	●
●	●

DESIGN SUGGESTION

VALUE ENGINEERING PROPOSAL SS-11DS

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Use concrete piles in lieu of H-pile or spread footings

DISCUSSION/JUSTIFICATION:

Concrete piles can be used as deep foundation elements for bridges throughout the corridor. Concrete is typically cheaper to purchase and the capacities would vary based on the mix design of the concrete. In many cases, the concrete piles could be used as a 1 (concrete) to 1 (steel) or a 2 (concrete) to 1 (steel) substitute for steel H-piles. This concept could be implemented corridor wide on bridges in the valleys where the soil depths may require deep foundation elements. The cost estimate on page 2 is looked at considering 100 steel H-piles could be exchanged for 100 concrete piles.

IMPLEMENTATION CONSIDERATIONS:

Care must be exercised during driving so that problems with the piles are not encountered. In addition, particular attention would need to be paid to the Geotechnical Reports to see if there is potential for boulders in the foundation soils that could damage the piles during driving.

VALUE ENGINEERING PROPOSAL SS-11DS

Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Use concrete piles in lieu of H-pile or spread footings

EXCAVATION CALCULATIONS

At MEC Section 3626+00				
560 feet of common excavation				
Adding MSE Wall reduce 220 feet of common excavation				
220 feet / 560 feet portion of common excavation				
39%				
Common excavation as shown on the sheets				
7616				
8896				
7731				
4804				
3481				
3318				
3713				
2931				
2898				
3113				
1834				
50335				
Saved portion of common excavation				
19774	CY			
30561	CY			
MSE Wall				
3630+50 TO 3625+00				
550				
Average MSE wall height		30		
SF of MSE Wall		16500		

Value Engineering Study
Kentucky Transportation Cabinet
Mountain Parkway Corridor – Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

10-126.50

VALUE ENGINEERING PROPOSAL SS-12
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE:	Reduce bridge at Sta. 3350+00 from 4-span to 3-span
FUNCTION:	**Span Space**

BASELINE ASSUMPTION:

The current bridge at this location is a four-span structure within section 10-126.50.

PROPOSED ALTERNATIVE:

The proposed design is to replace bridge with a three-span structure with a MSE wall.

BENEFITS	RISKS/CHALLENGES
• Reduce costs	• MSE wall is within 100-year storm
• Reduce maintenance costs	•
•	•
•	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 451,260	$ -	$ 451,260
PROPOSED ALTERNATIVE:	$ 166,500	$ -	$ 166,500
TOTAL (Baseline less Proposed)	$ 284,760	$ -	**$ 284,760**
			SAVINGS

VALUE ENGINEERING PROPOSAL SS-12

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Reduce bridge at Sta. 3350+00 from 4-span to 3-span

DISCUSSION/JUSTIFICATION:

This benefit is to provide a reduction in the project cost.

This proposal replaces the west end spans of the twin bridges with a MSE wall. The MSE wall will be along Long Branch Road. The bridge will end just behind the MSE wall and rest on end bents drilled to rock. Both of the bridge spans to be removed will be 46 FT long and 45 FT wide. The MSE wall will be approximately 18 FT tall under the bridges and taper out with the roadway fills.

IMPLEMENTATION CONSIDERATIONS:

Determine that the floodplain will not be impacted beyond allowable as the area of opening below the 100-year storm will reduced.

This cost cutting measure can be used in other locations throughout the project.

VALUE ENGINEERING PROPOSAL SS-12

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Reduce bridge at Sta. 3350+00 from 4-span to 3-span

DESIGN ELEMENT	**Markup**	**BASELINE ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Bridge Deck		SF	4,140	109.00	451,260			
MSE Wall		SF				3,330	50.00	166,500
					451,260			**166,500**
							(BASELINE LESS PROPOSED)	**284,760**

*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL SS-12

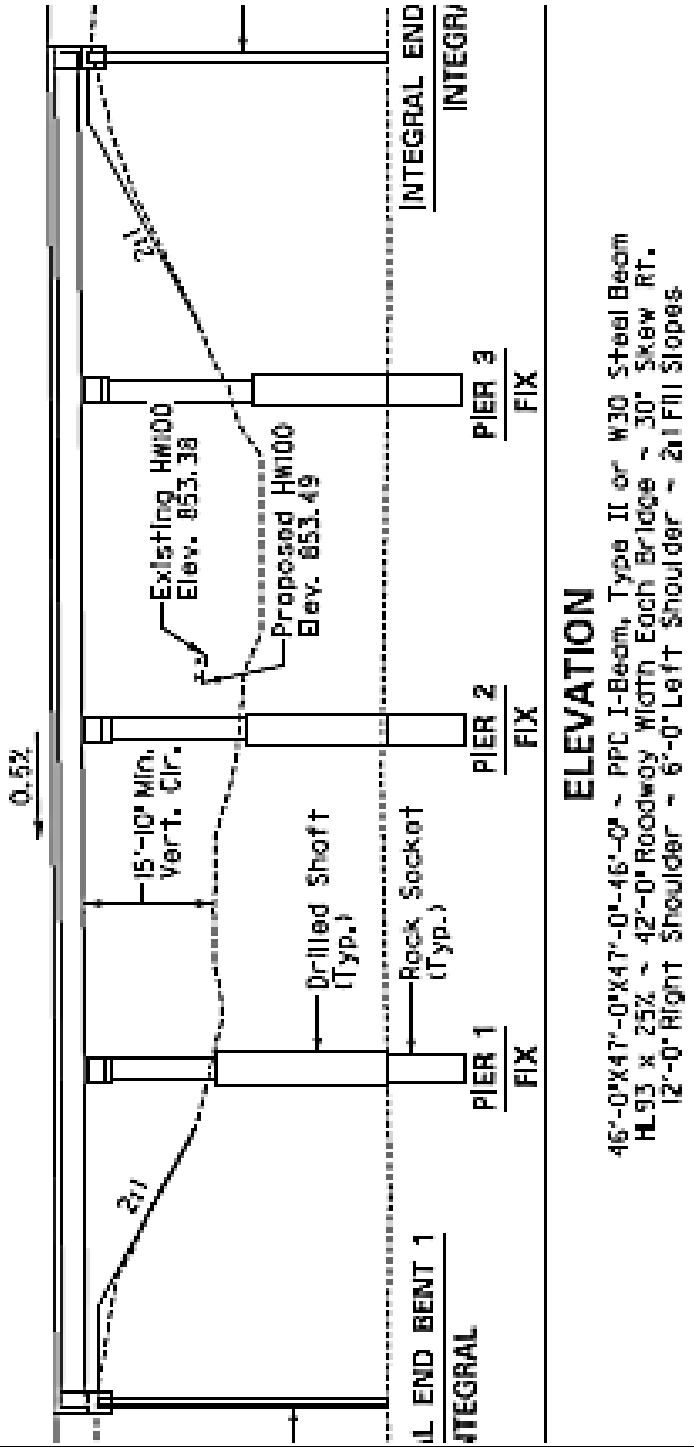
Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Reduce bridge at Sta. 3350+00 from 4-span to 3-span

SKETCH OF BASELINE ASSUMPTION

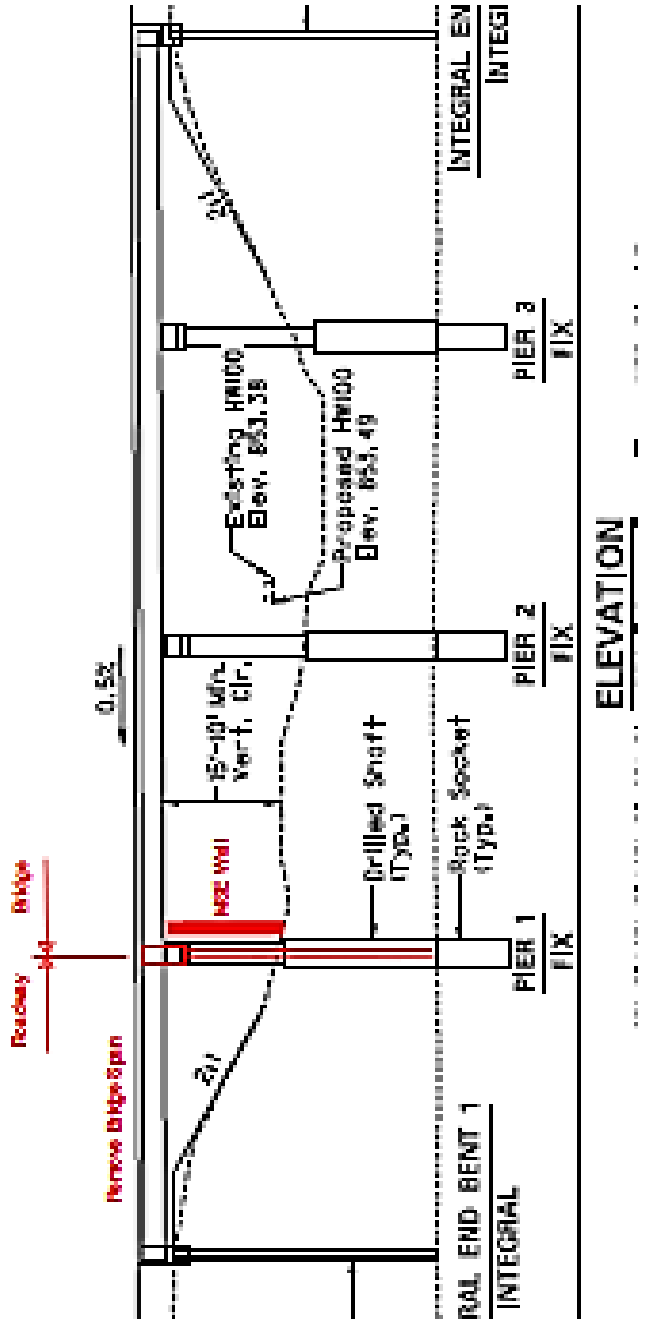


VALUE ENGINEERING PROPOSAL SS-12

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Reduce bridge at Sta. 3350+00 from 4-span to 3-span

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL SS-13
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE: Reduce the 8% superelevation on the bridge at Johnson Creek Road

FUNCTION: **Span Space**

BASELINE ASSUMPTION:

The current design for Project 10-126.50 calls for the bridge at approximately Station 3273+00 to have a superelevation of 8%.

PROPOSED ALTERNATIVE:

The proposed solution would involve shifting the alignment of KY 134 (approximately from Station 200+00 to 215+00) further north to allow the shifting of proposed Mountain Parkway to also be shifted to the north (from approximately 3250+00 to 3287+00). These shifts would allow for a lesser superelevation across the bridge.

BENEFITS	RISKS/CHALLENGES
• Improves safety	• Additional excavation required
• Prevents sliding into barrier under icy conditions	•
• Provides SE to conform to allowable standards	•
• Corrective action for addressing a high crash rate curve	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ -	$ -	$ -
PROPOSED ALTERNATIVE:	$ 900,000	$ -	$ 900,000
TOTAL (Baseline less Proposed)	$ (900,000)	$ -	**$ (900,000)**

COST

VALUE ENGINEERING PROPOSAL SS-13

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE: Reduce the 8% superelevation on the bridge at Johnson Creek Road

DISCUSSION/JUSTIFICATION:

Due to being in mountainous area that often experiences freezing conditions and inclement weather, there is a high likelihood of a crash that could have traffic backed up and stopped or slowed on the bridge. Under icy conditions, a motorist could slide across the bridge and end up against barrier rail.

IMPLEMENTATION CONSIDERATIONS:

When shifting both of these alignments to the north, the excavation is summarized as follows:

Excavation savings along shifted Mountain Pkwy = 125,000 CY
Additional excavation along shifted KY-134 = 305,000 CY
Net Difference = Additional 180,000 CY of Excavation

VALUE ENGINEERING PROPOSAL SS-13

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Reduce the 8% superelevation on the bridge at Johnson Creek Road

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Excavation (Additional)						180,000	5.00	900,000
								900,000
							(BASELINE LESS PROPOSED)	**(900,000)**

*Note: Costs are rounded to nearest thousand dollars.

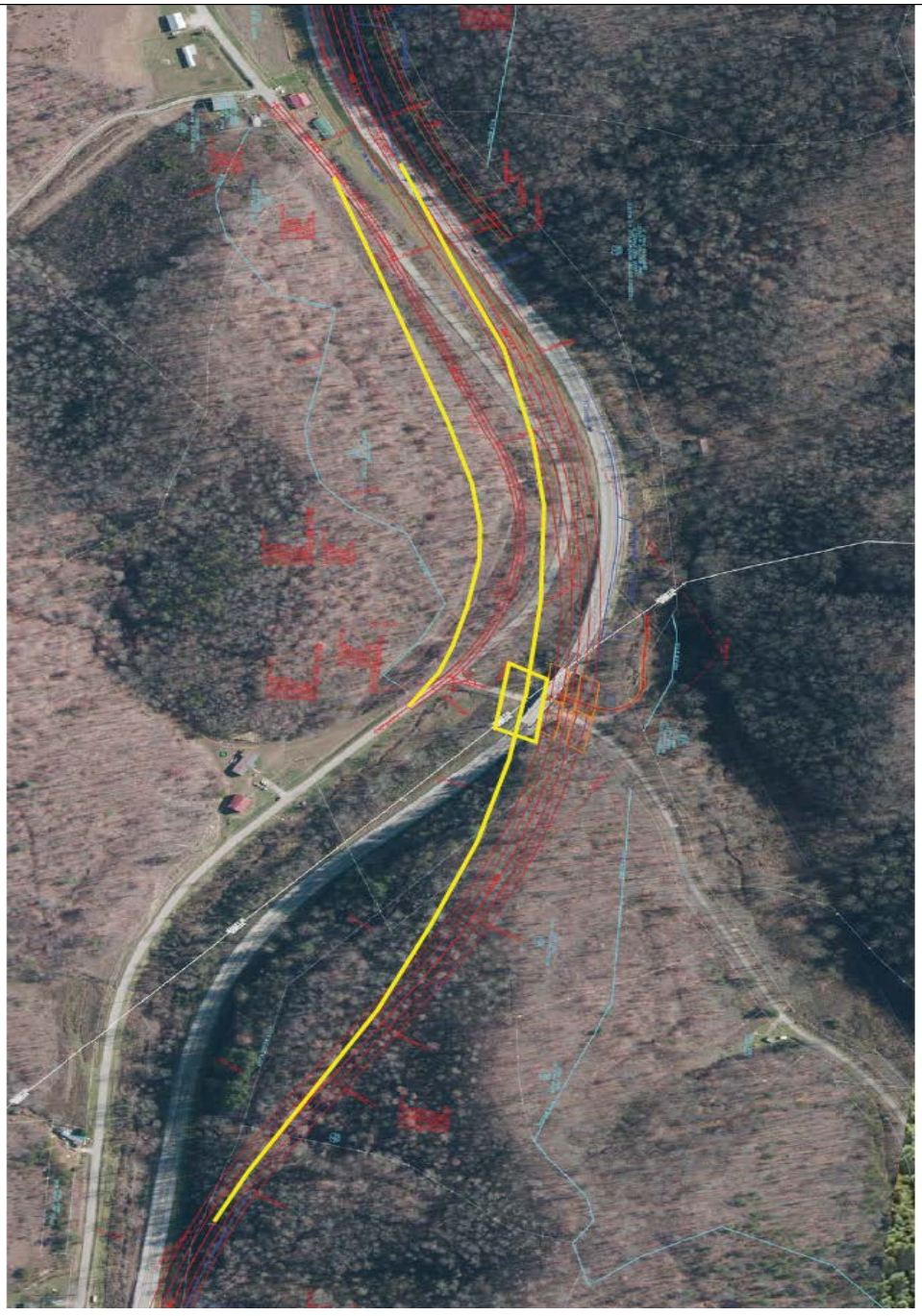
COST

VALUE ENGINEERING PROPOSAL SS-13

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Reduce the 8% superelevation on the bridge at Johnson Creek Road

SKETCH OF PROPOSED ALTERNATIVE



Value Engineering Study
Kentucky Transportation Cabinet
Mountain Parkway Corridor – Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

10-126.40

VALUE ENGINEERING PROPOSAL SS-16
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE: Shift the alignment south to eliminate five twin bridges

FUNCTION: **Span Space**

BASELINE ASSUMPTION:

The current alignment follows the FONSI document. The current alignment traverses the existing Mountain Parkway, crossing the Johnson Creek numerous times requiring six twin structures. The proposed interchange also requires four bridges.

PROPOSED ALTERNATIVE:

Shift the proposed Mountain Parkway alignment south of the existing plans.

BENEFITS	RISKS/CHALLENGES
• Reduces the cost of the entire project corridor	• May require a Phase I study for this corridor
• Reduces the number of crossing at Johnson Creek	•
• Reduces the total amount of excavation	•
• Removes an unorthodox interchange	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 66,306,808	$ -	$ 66,306,808
PROPOSED ALTERNATIVE:	$ 34,100,000	$ -	$ 34,100,000
TOTAL (Baseline less Proposed)	$ 32,206,808	$ -	**$ 32,206,808**
			SAVINGS

VALUE ENGINEERING PROPOSAL SS-16

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Shift the alignment south to eliminate five twin bridges

DISCUSSION/JUSTIFICATION:

The current plans for this section will require six twin bridges to cross the Johnson Creek. The current alignment traverses the existing corridor and traverses cross country to tie back into existing. It is apparent from the current drawings, a great effort was made to be within the FONSI footprint and utilize as much of the existing pavement as possible. It may be beneficial to evaluate other alternates and deviate from the existing corridor shown on the plans. By shifting the alignment south of the existing alignment (see sketch), it is possible to eliminate five of the twin structures and reduce three of the bridges associated with the current interchange. By shifting the alignment south, there will be an additional cost associated with the extra pavement. Shifting the alignment south reduces the total amount of excavation that is needed for the project. In this evaluation, savings is approximated at $6.5 million for pavement in cross country section, $2.5 million in overlay, and $4.4 million for the additional two-lane section.

IMPLEMENTATION CONSIDERATIONS:

A Phase I study should be conducted to evaluate other alternates than proposed.

VALUE ENGINEERING PROPOSAL SS-16

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,

Wolfe, Morgan and Magoffin Counties

TITLE: Shift the alignment south to eliminate five twin bridges

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Twin Bridge # 1		LS	1	3,276,000.00	3,276,000	1	1,800,000.00	1,800,000
Twin Bridge # 2		LS	1	5,394,450.00	5,394,450			
Twin Bridge # 3		LS	1	4,309,800.00	4,309,800			
Twin Bridge # 4		LS	1	3,839,550.00	3,839,550			
Twin Bridge # 5		LS	1	3,237,300.00	3,237,300			
Twin Bridge # 6		LS	1	6,741,000.00	6,741,000			
Ramp 1		LS	1	705,300.00	705,300			
Ramp 3		LS	1	755,700.00	755,700			
Ramp 4		LS	1	695,400.00	695,400			
Roadway Excavation		CUYD	3.5	8,232,000.00	28,812,000	3.5	5,400,000.00	18,900,000
Pavement			1	8,540,308.00	8,540,308	1	13,400,000.00	13,400,000
					66,306,808			**34,100,000**
							(BASELINE LESS PROPOSED)	**32,206,808**

*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL SS-16

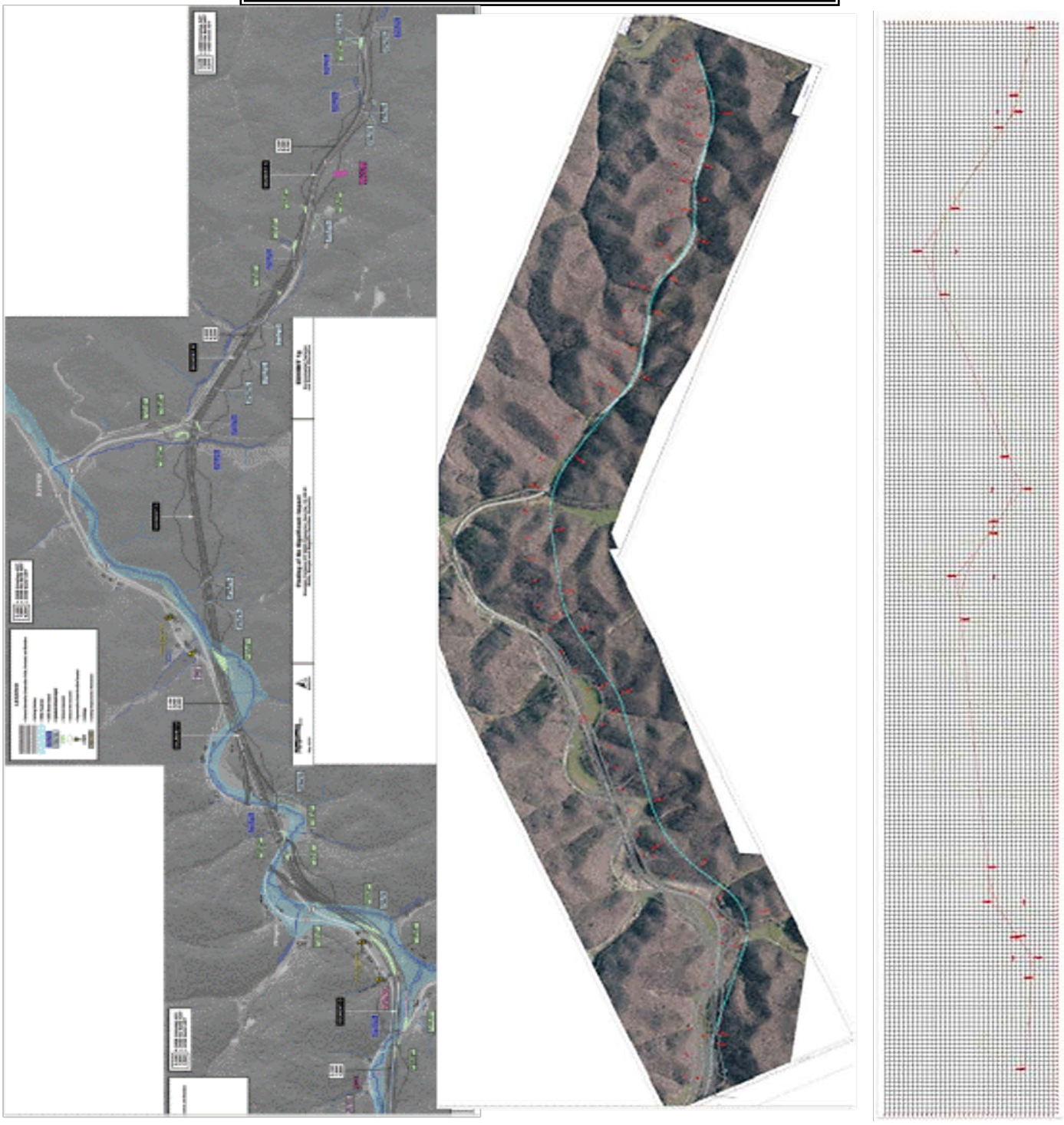
Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Shift the alignment south to eliminate five twin bridges

SKETCH OF BASELINE ASSUMPTION & PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL SS-19
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE: Eliminate the interchange of Section 10-126.40 at KY 134

FUNCTION: **Span Space**

BASELINE ASSUMPTION:

In the baseline design for 10-126.40, KY 134 and US 460 can be utilized to access Mountain Parkway via adjacent interchanges; eight-foot paved shoulders.

PROPOSED ALTERNATIVE:

Provide a bridge over KY 134 and eliminate Ramps 1, 2, 3, and 4.

BENEFITS	RISKS/CHALLENGES
• Eliminates four bridges	• Reduces access to Mountain Parkway for residents adjacent to proposed interchange
•	•
•	•
•	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 4,746,350	$ -	$ 4,746,350
PROPOSED ALTERNATIVE:	$ -	$ -	$ -
TOTAL (Baseline less Proposed)	$ 4,746,350	$ -	**$ 4,746,350**
			SAVINGS

VALUE ENGINEERING PROPOSAL SS-19

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Eliminate the interchange of Section 10-126.40 at KY 134

DISCUSSION/JUSTIFICATION:

The current approach proposes a full interchange at KY 134. The bridges over KY 134 for Mountain Parkway must be accommodated but the local traffic waiting to access at KY 134 could be accommodated via several other access points. Traffic counts for KY 134 may not warrant the additional cost for a full interchange. The traffic analysis should be evaluated to determine cost/benefit. By eliminating Ramps 1, 2, 3 and 4, this reduces the number of structures to be built over Johnson Creek.

IMPLEMENTATION CONSIDERATIONS:

May require local approval to eliminate access.

VALUE ENGINEERING PROPOSAL SS-19

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Eliminate the interchange of Section 10-126.40 at KY 134

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Mainline asphalt surface		Ton	1,570	90.00	141,300			
Mainline asphalt base		Ton	11,930	85.00	1,014,050			
Mainline crushed stone base		Ton	3,422	30.00	102,660			
Mainline rock road bed		CY	15,185	30.00	455,550			
Shoulder asphalt surface		Ton	252	90.00	22,680			
Shoulder asphalt base		Ton	604	85.00	51,340			
Shoulder crushed stone base		Ton	1,068	30.00	32,040			
Shoulder rock road bed		CY	2,441	30.00	73,230			
Guardrail		LF	2,800	20.00	56,000			
Ramp 1 Bridge		SF	4,800	150.00	720,000			
Ramp 2 Bridge		SF	3,750	150.00	562,500			
Ramp 3 Bridge		SF	5,200	150.00	780,000			
Ramp 4 Bridge		SF	4,900	150.00	735,000			
					4,746,350			
							(BASELINE LESS PROPOSED)	**4,746,350**

*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL SS-22
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE:	Use CON/SPAN at Sta. 3506+00 in lieu of a 3-span box
FUNCTION:	**Span Space**

BASELINE ASSUMPTION:

A triple 8 x 8 three-span box structure is proposed at Sta. 3506+00.

PROPOSED ALTERNATIVE:

Replace the proposed structure with a 25 LF x 12.5 LF structure.

BENEFITS	RISKS/CHALLENGES
• Reduces cost	• Perform a HEC-RAS analysis to determine the hydraulics
• Provides better hydraulic capacities versus. triple box culvert	•
• Beduces the chances of silting on the triple box culvert	•
• Reduces the in-lieu fees associated with culverts	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 674,275	$ -	$ 674,275
PROPOSED ALTERNATIVE:	$ 787,500	$ -	$ 787,500
TOTAL (Baseline less Proposed)	$ (113,225)	$ -	**$ (113,225)**

COST

VALUE ENGINEERING PROPOSAL SS-22

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Use CON/SPAN at Sta. 3506+00 in lieu of a 3-span box

DISCUSSION/JUSTIFICATION:

By utilizing arch-culverts, stream impacts are reduced and the stream in-lieu fees could be saved. In-lieu fees are estimated at $625/LF. Based on the estimate shown, the cost associated with the culvert may be more than represented in the estimate. The triple box culvert would have a higher tendency to get clogged, requiring continuous maintenance. The proposed culvert would function better hydraulically than a triple box culvert.

IMPLEMENTATION CONSIDERATIONS:

Conduct hydraulic analysis to determine there are no adverse effects.

VALUE ENGINEERING PROPOSAL SS-22

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Use CON/SPAN at Sta. 3506+00 in lieu of a 3-span box

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Station 3506+00 (Triple 8 x 8)		LF	175	3,228.00	564,900	175	4,500.00	787,500
In-lieu Fees channel mitigation		LF	175	625.00	109,375			
					674,275			**787,500**
							(BASELINE LESS PROPOSED)	**(113,225)**

*Note: Costs are rounded to nearest thousand dollars.

COST

VALUE ENGINEERING PROPOSAL SS-22

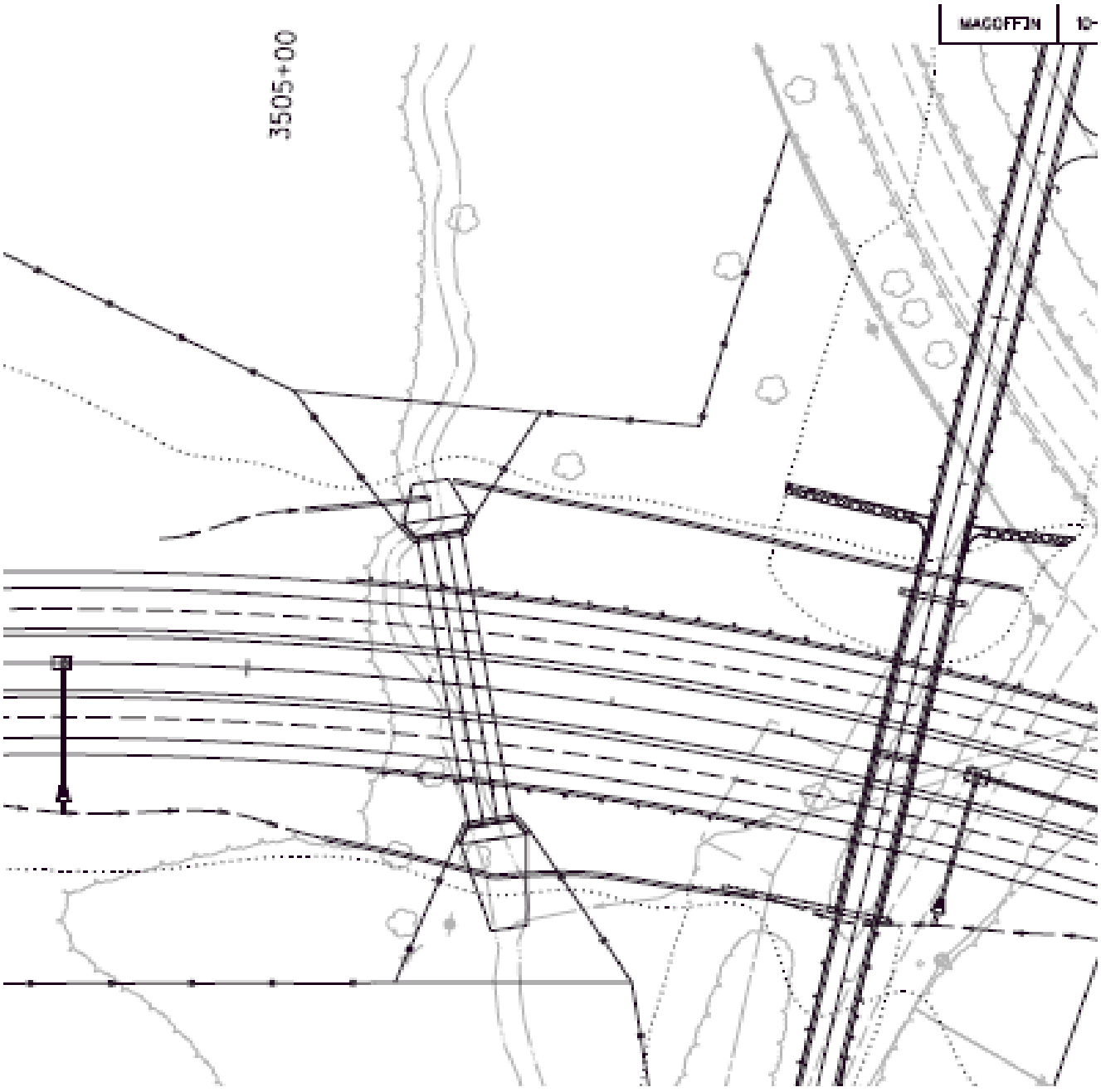
Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Use CON/SPAN at Sta. 3506+00 in lieu of a 3-span box

SKETCH OF BASELINE ASSUMPTION



VALUE ENGINEERING PROPOSAL SS-22

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Use CON/SPAN at Sta. 3506+00 in lieu of a 3-span box

SKETCH OF PROPOSED ALTERNATIVE

VALUE ENGINEERING PROPOSAL CR-14
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE:	Move alignment from Sta. 3595+00 to 3615+00, shift back to the existing alignment
FUNCTION:	**Clear Right-of-way**

BASELINE ASSUMPTION:

Current design shows a shift off of the original alignment to the north that reduces the curvature in this area (10-126.40).

PROPOSED ALTERNATIVE:

Leave the alignment close to the original alignment with the eastbound travel lane on the existing route and the westbound travel lane just to the north of the existing route.

BENEFITS	RISKS/CHALLENGES
• Reduces the size of the cut	• Tightens the curvature up and likely reduces the design speed
• Generates less waste	•
• Reduces the schedule because less excavation will be needed	•
•	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 3,047,916	$ -	$ 3,047,916
PROPOSED ALTERNATIVE:	$ 2,100,000	$ -	$ 2,100,000
TOTAL (Baseline less Proposed)	$ 947,916	$ -	**$ 947,916**

SAVINGS

VALUE ENGINEERING PROPOSAL CR-14

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Move alignment from Sta. 3595+00 to 3615+00, shift back to the existing alignment

DISCUSSION/JUSTIFICATION:

This would be an alignment shift that would move the westbound travel lane back near the existing road between +/- Station 3594+75 to +/- Station 3619+50. The shift would result in a +/- shift of 70 feet to the north at Station 3600+00. This shift would result in an overall reduction in the height of the cut which would reduce the excavation. In addition, this would allow for the reuse of the exisiting pavement through this interval. This would likely result in a reduction of the design speed for this curve. This cut starts in the 10-126.40 section and continues to the 10.167.00 section.

IMPLEMENTATION CONSIDERATIONS:

This curve would need to be studied to see if it would still meet the design speed of 60 mph.

VALUE ENGINEERING PROPOSAL CR-14

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,

Wolfe, Morgan and Magoffin Counties

TITLE: Move alignment from Sta. 3595+00 to 3615+00, shift back to the existing alignment

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Excavation		CY	870,833	3.50	3,047,916	600,000	3.50	2,100,000
					3,047,916			**2,100,000**
							(BASELINE LESS PROPOSED)	**947,916**

*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL CR-14

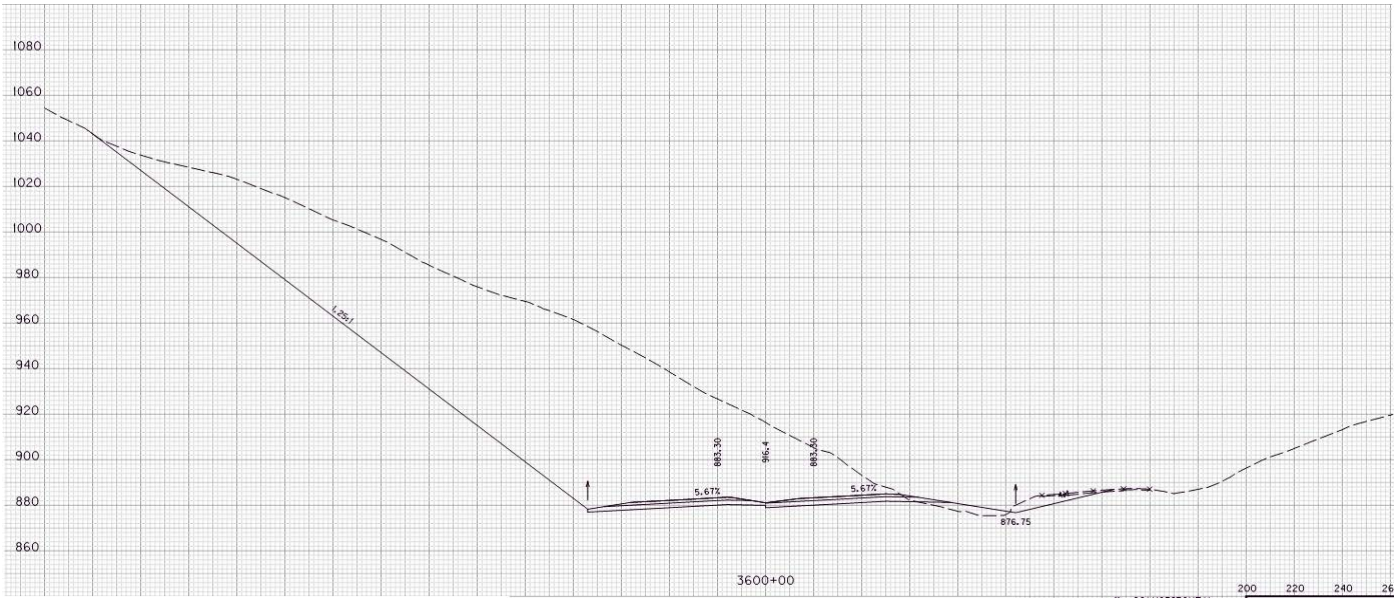
Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Move alignment from Sta. 3595+00 to 3615+00, shift back to the existing alignment

SKETCH OF BASELINE ASSUMPTION

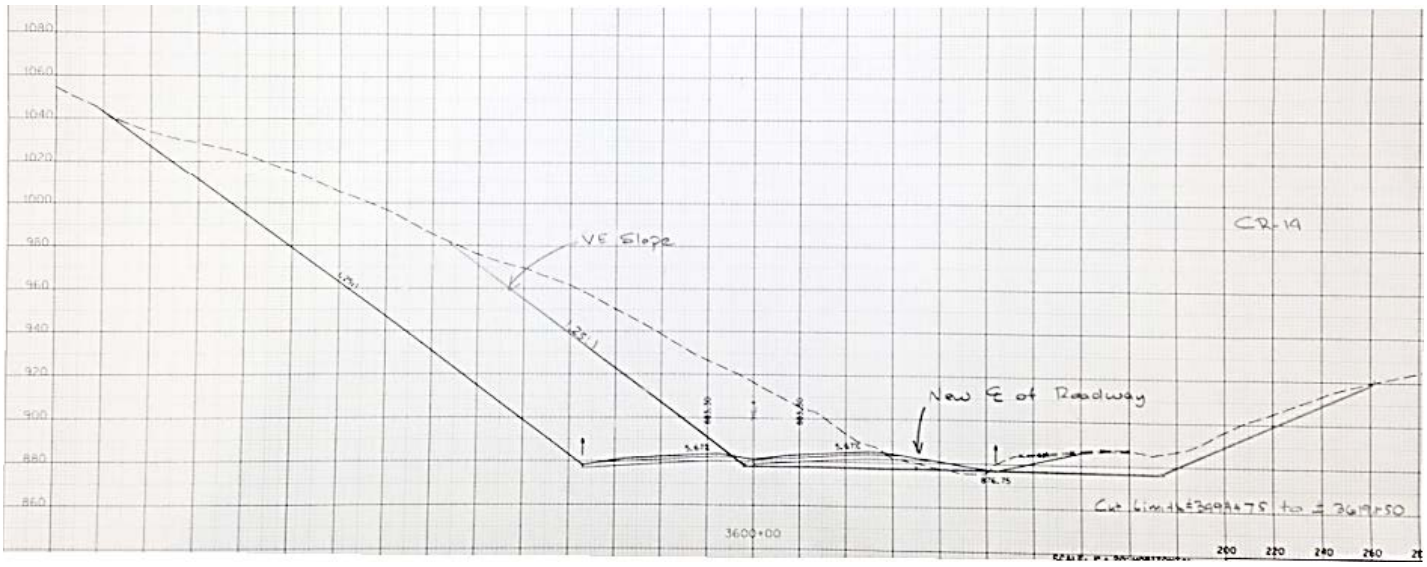


VALUE ENGINEERING PROPOSAL CR-14

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Move alignment from Sta. 3595+00 to 3615+00, shift back to the existing alignment

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL CR-14

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Move alignment from Sta. 3595+00 to 3615+00, shift back to the existing alignment

CALCULATIONS

Existing excavation					Reduced area of excavation		
Top Triangle	3000				Top Triangle	3000	
Middle Square	4400				Middle Square	4400	
Bottom Triangle	800				Bottom Triangle	800	
Outside Triangle	2887.5					8200	SF
Outside Bottom	787.5						
Triangle							
	11875				3594+75 to 3619+50		
						2475	
3594+75 to 3619+50							
	2475						
						20295000	CF
	29390625	CF					
						751666.67	CY
	1088542	CY					
					use a 20% reduction		
use a 20% reduction					as cut pinches ou	601333.33	CY
as cut pinches ou	870833.3	CY					

VALUE ENGINEERING PROPOSAL CR-15
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE: Move alignment from Sta. 3530+00 to 3550+00

FUNCTION: **Clear Right-of-way**

BASELINE ASSUMPTION:

Current design shows a shift off of the original alignment to the north that reduces the curvature in this area.

PROPOSED ALTERNATIVE:

Leave the alignment close to the original alignment with the eastbound travel lane on the existing route and the westbound travel lane just to the north of the existing route.

BENEFITS	RISKS/CHALLENGES
• Reduces the size of the cut	• Tightens the curvature up and likely reduces the design speed
• Generates less waste	•
• Reduces the schedule because less excavation will be needed	•
•	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 1,078,000	$ -	$ 1,078,000
PROPOSED ALTERNATIVE:	$ 864,500	$ -	$ 864,500
TOTAL (Baseline less Proposed)	$ 213,500	$ -	**$ 213,500**
			SAVINGS

VALUE ENGINEERING PROPOSAL CR-15

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Move alignment from Sta. 3530+00 to 3550+00

DISCUSSION/JUSTIFICATION:

This would be an alignment shift that would move the westbound travel lane back near the existing road between +/- Station 3531+50 to +/- Station 3544+00. The shift would result in a +/- shift of 60 feet to the north at Station 3600+00. This shift would result in an overall reduction in the height of the cut which would reduce the excavation. This would likely result in a reduction of the design speed for this curve.

IMPLEMENTATION CONSIDERATIONS:

This curve would need to be studied to see if it would still meet the design speed of 60 mph.

VALUE ENGINEERING PROPOSAL CR-15

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,

Wolfe, Morgan and Magoffin Counties

TITLE: Move alignment from Sta. 3530+00 to 3550+00

DESIGN ELEMENT	**Markup**	**BASELINE ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Excavation		CY	308,000	3.50	1,078,000	247,000	3.50	864,500
					1,078,000			**864,500**
							(BASELINE LESS PROPOSED)	**213,500**

*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL CR-15

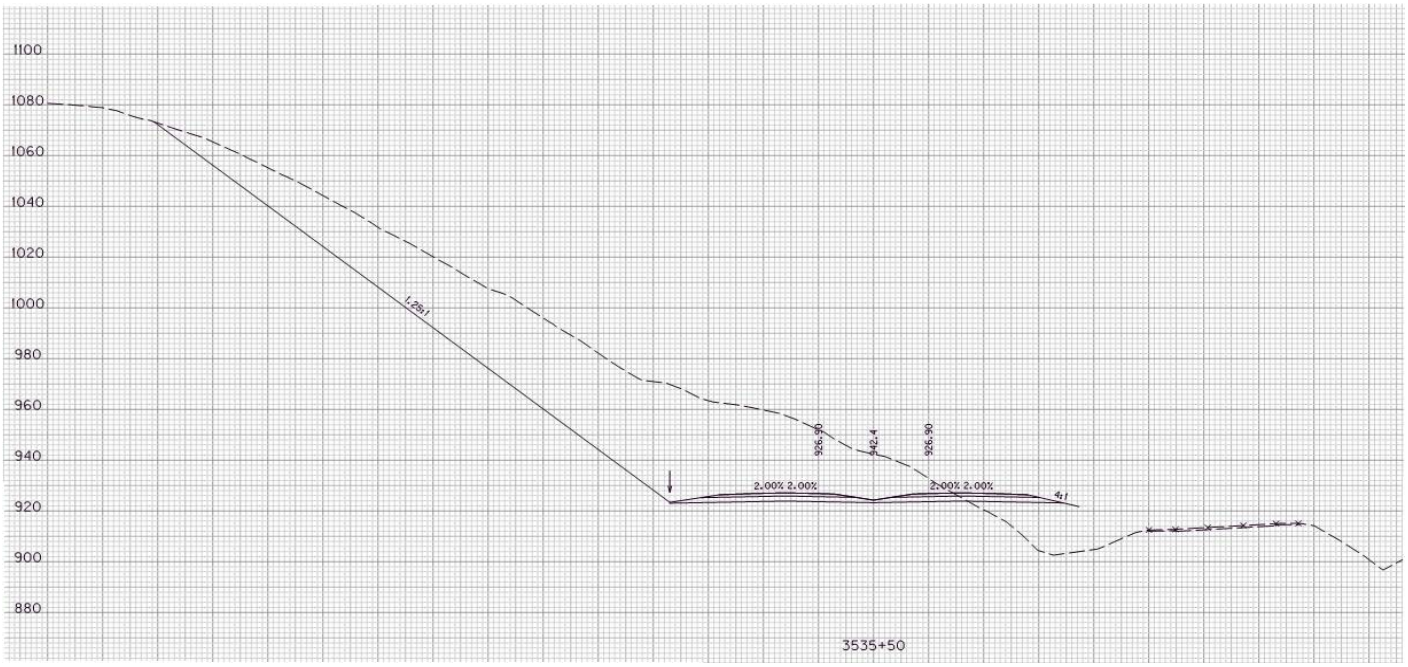
Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Move alignment from Sta. 3530+00 to 3550+00

SKETCH OF BASELINE ASSUMPTION

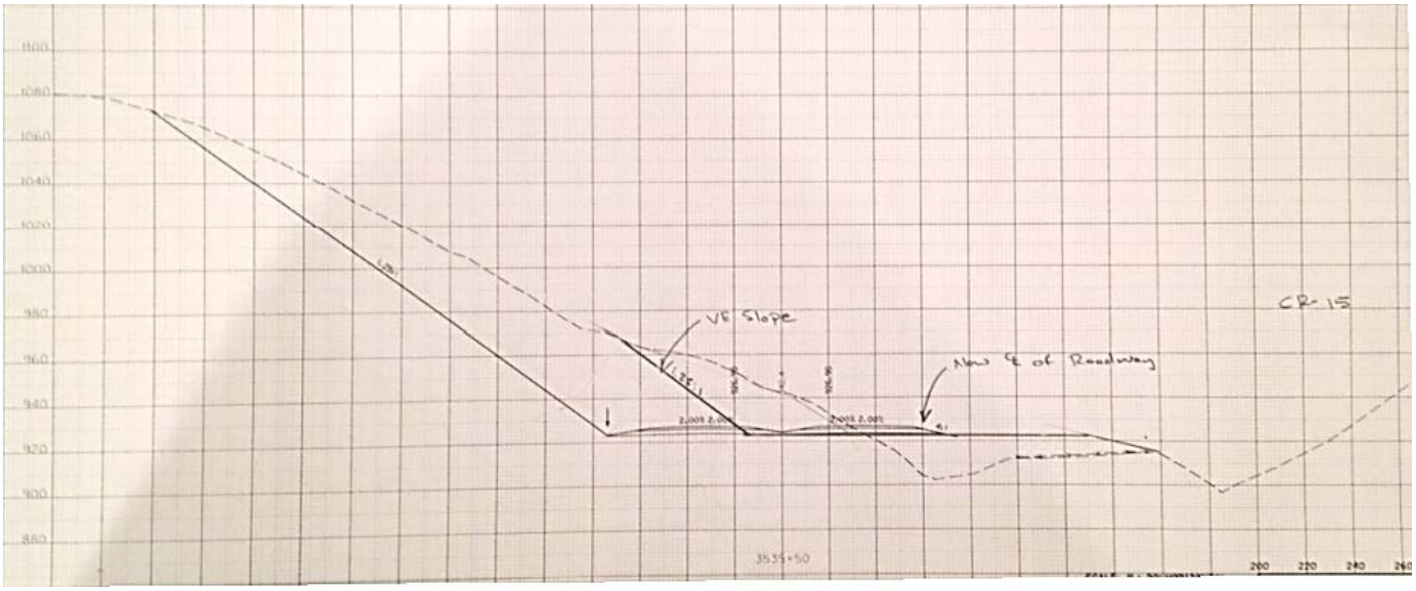


VALUE ENGINEERING PROPOSAL CR-15

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Move alignment from Sta. 3530+00 to 3550+00

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL CR-15

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Move alignment from Sta. 3530+00 to 3550+00

CALCULATIONS

Existing excavation					Reduced area of excavation		
Top Triangle	3850				Top Triangle	3850	
Middle Square	700				Middle Square	700	
Bottom Triangle	787.5				Bottom Triangle	787.5	
Outside Triangle	875					5337.5	SF
Outside Bottom Triangle	437.5						
	6650				3544+00 to 3531+50		
						1250	
3544+00 to 3531+50							
	1250						
						6671875	CF
	8312500	CF					
						247106.48	CY
	307870.4	CY					
					use a 20% reduction		
use a 20% reduction					as cut pinches ou	197685.19	CY
as cut pinches ou	246296.3	CY					

10-167.00 (No Alternatives developed for this design section)

Value Engineering Study
Kentucky Transportation Cabinet
Mountain Parkway Corridor – Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

10-126.12

VALUE ENGINEERING PROPOSAL SS-25
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE: Use SPUI in lieu of a full diamond interchange

FUNCTION: **Span Space**

BASELINE ASSUMPTION:

The current plans depict a typical diamond interchange.

PROPOSED ALTERNATIVE:

A SPUI (Single Point Urban Interchange) is proposed at this location. Since this is in a rural section, it could be called a SPRI (Single Point Rural Interchange).

BENEFITS	RISKS/CHALLENGES
● Minimizes right-of-way impacts	● Bridge is more expensive than traditional bridges
● Minimizes impacts to streams	● MSE walls associated with the bridge could be expensive
● Reduces the cost of in-lieu fees	● Requires lighting
● Ramps often require large excavation	● Requires additional signing
● By taking KY 30 over Mountain Parkway, eliminates twin bridges on MP and has a single bridge for KY 30	●
● Accommodates higher traffic volumes	●
●	●
●	●

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 15,000,000	$ -	$ 15,000,000
PROPOSED ALTERNATIVE:	$ 13,500,000	$ -	$ 13,500,000
TOTAL (Baseline less Proposed)	$ 1,500,000	$ -	**$ 1,500,000**

SAVINGS

VALUE ENGINEERING PROPOSAL SS-25

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Use SPUI in lieu of a full diamond interchange

DISCUSSION/JUSTIFICATION:

A traditional diamond interchange has a larger footprint than Single Point "Rural" Interchange (SPRI). Typically, SPUI/SPRI are not utilized in rural roadway projects. Steep terrain and streams are located in close proximity to all the proposed interchange locations. By utilizing a SPUI/SPRI, the overall footprint of the interchange could be drastically reduced. Typically, SPUI/SPRI costs an additional $1 to $2 million dollars than a traditional interchange. On this project, by placing the minor road over the Mountain Parkway, it would be possible to replace twin bridges with a single bridge. The amount of excavation associated with a large footprint could be greatly reduced by using a SPUI/SPRI. Additional studies should be conducted to determine the feasibility of a SPUI/SPRI versus a traditional diamond interchange. This type of interchange could be utilized in other sections within this corridor, 10-167.00 and 10-126.70, and potentially realize a similar savings ($1 to $2 million dollar range) per section.

IMPLEMENTATION CONSIDERATIONS:

None apparent.

VALUE ENGINEERING PROPOSAL SS-25

Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Use SPUI in lieu of a full diamond interchange

DESIGN ELEMENT	**Markup**	**BASELINE ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Existing Interchange		LS	1	15,000,000.00	15,000,000	1	13,500,000.00	13,500,000
					15,000,000			**13,500,000**
							(BASELINE LESS PROPOSED)	**1,500,000**
								SAVINGS

*Note: Costs are rounded to nearest thousand dollars.

VALUE ENGINEERING PROPOSAL SS-25

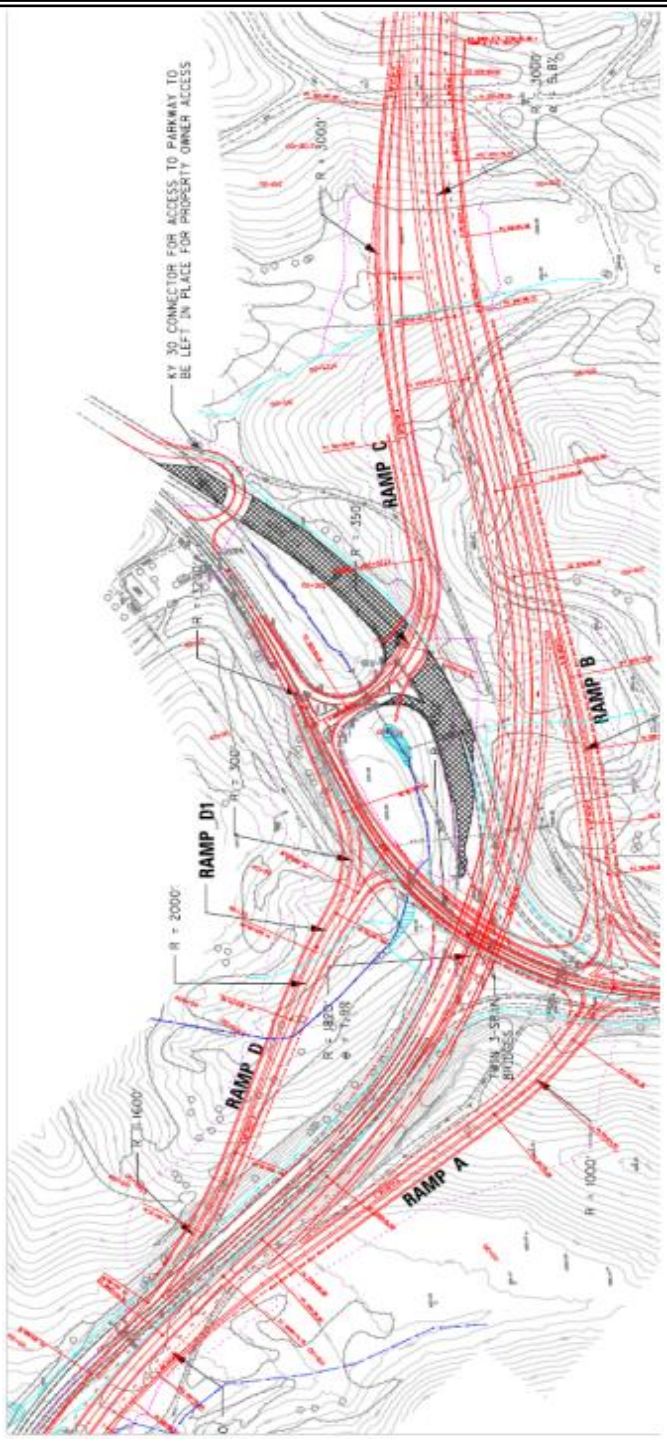
Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Use SPUI in lieu of a full diamond interchange

SKETCH OF BASELINE ASSUMPTION



VALUE ENGINEERING PROPOSAL SS-25

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Use SPUI in lieu of a full diamond interchange

SKETCH OF PROPOSED ALTERNATIVE

VALUE ENGINEERING PROPOSAL CR-01
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE: Use median barrier to reduce foot print through cuts

FUNCTION: **Clear Right-of-way**

BASELINE ASSUMPTION:

Current design indicates 28-foot grass medians with 2-foot grass shoulders and 4-foot paved shoulders adjacent to travel lanes.

PROPOSED ALTERNATIVE:

Reduce median width to accommodate 2.5 feet for concrete median barrier type 12E and 6-foot of paved shoulder using design similar to that used recently near Campton, Kentucky on the Mountain Parkway at the KY 15 Interchange. That design utilized a 60 MPH design speed and a 4-foot shoulder. Future designs could accomodate a 6-foot paved shoulder design to improve sight distances in curves.

BENEFITS	RISKS/CHALLENGES
• Reduces head on collisions	• Higher cost to maintain
• Reduces roadway width	• Reduces access
• Reduces excavation quantity	• Reduces sight distance in curves
• Reduces right-of-way need	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 154,499,450	$ -	$ 154,499,450
PROPOSED ALTERNATIVE:	$ 137,051,925	$ -	$ 137,051,925
TOTAL (Baseline less Proposed)	$ 17,447,525	$ -	**$ 17,447,525**
			SAVINGS

VALUE ENGINEERING PROPOSAL CR-01

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Use median barrier to reduce foot print through cuts

DISCUSSION/JUSTIFICATION:

Reduction in roadway width reduces earthwork and right-of-way required to construct road.

IMPLEMENTATION CONSIDERATIONS:

Maintenance cost should be considered closely, especially in winter when drains may not function properly due to snow and ice blocking drains. Routine maintenance to clean roadway and drains can be accomplished by Master Agreement; however, frequency of this maintenance may need to be increased compared beyond the frequency used on I-64 or I-75 in Lexington.

VALUE ENGINEERING PROPOSAL CR-01

Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Use median barrier to reduce foot print through cuts

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Concrete Median Barrier Type 12E		LF				100,320	100.00	10,032,000
Concrete Median Barrier Median Box Inlet Type 14B-1		EA				700	11,000.00	7,700,000
Roadway Excavation		CY	30,899,890	5.00	154,499,450	23,863,985	5.00	119,319,925
					154,499,450			**137,051,925**
							(BASELINE LESS PROPOSED)	**17,447,525**

*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL CR-01

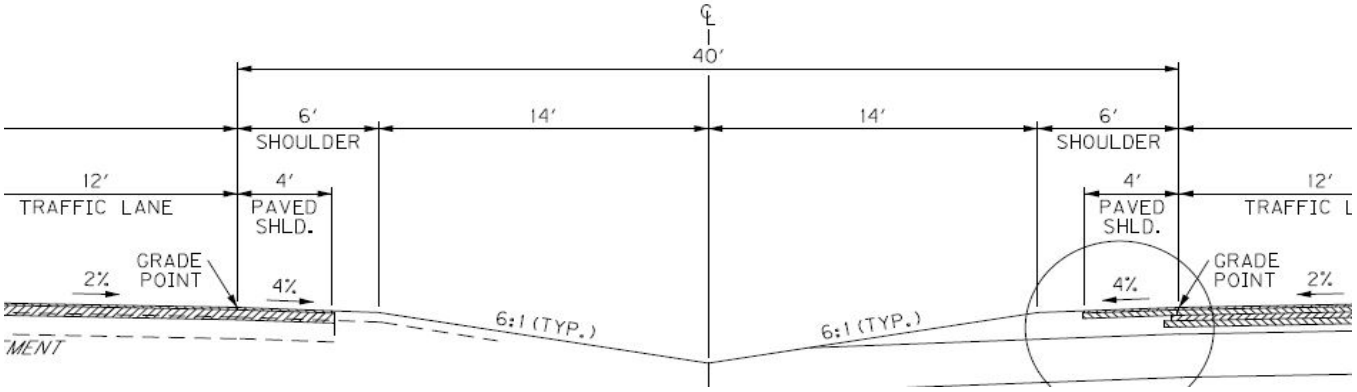
Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Use median barrier to reduce foot print through cuts

SKETCH OF BASELINE ASSUMPTION

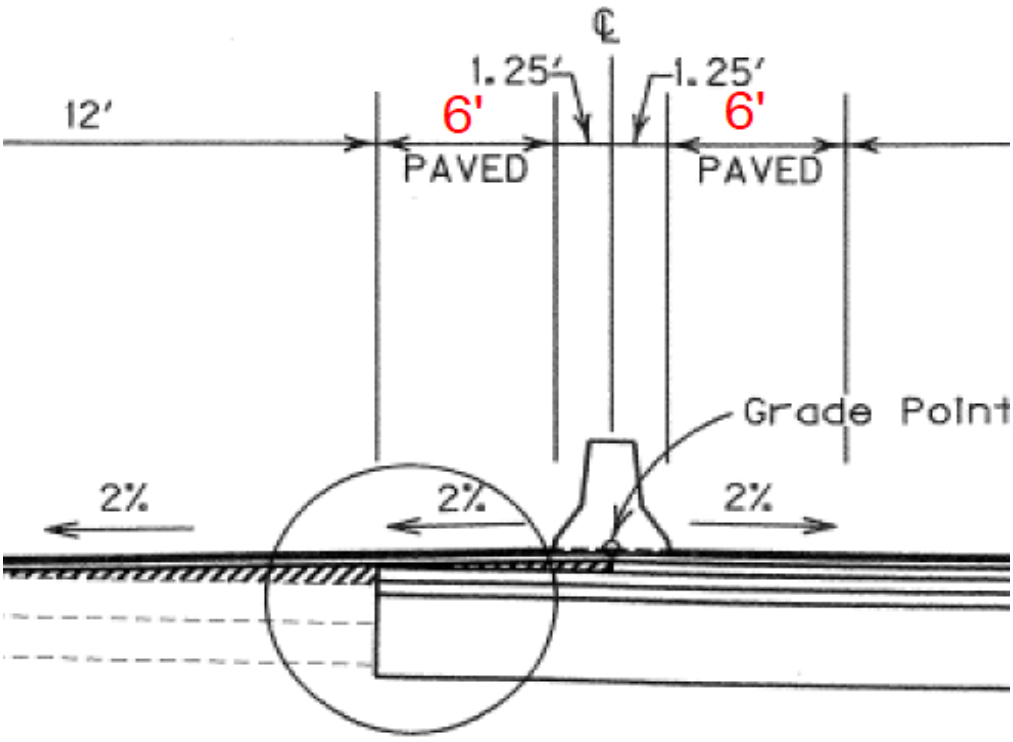


VALUE ENGINEERING PROPOSAL CR-01

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Use median barrier to reduce foot print through cuts

SKETCH OF PROPOSED ALTERNATIVE



Using (item No. 126-40) mainline excavation quantity of 6,830,500 CY (does not include left and right ditch cut excavation) and divided that quantity by the length of that project (4.2 miles) to find estimated 1,626,310 CY per mile. Multiplied the excavation per mile by the total miles (19 miles) for construction sequence 1 to get 30,899,890 CY estimate for this corridor. The proposed alternative excavation amount is 22.77% less based on a roadway width reduction of that percentage. Barrier median drainage boxes quantity assumes a box every 150 LF for 19 miles of roadway. Given the difficulty in determining pipe quantities, the over estimated quantity of boxes at an estimated cost of $11,000 EA helps account for pipe and headwalls. Superelevated sections of roadway may not require boxes; therefore, there will be areas with box spacing greater than 150 LF.

VALUE ENGINEERING PROPOSAL CR-01

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Use median barrier to reduce foot print through cuts

CALCULATIONS

STATION	COM.	VOLUME	EMB.	VOLUME	DT. LT	VOLUME	DT. RT.	VOLUME	EMB. BENCH	VOLUME	ROCK	VOLUME
Totals		14,845,743		655,015		60,162		37,792		0		0
MOUNTAIN PARKWAY		7396794		566294		60162		37792		0		0
KY 134 SECTION 1		294522		807		0		0		0		0
KY 134 SECTION 2		4466		14477		0		0		0		0
RAMP 1		10794		14888		0		0		0		0
RAMP 2		178483		17898		0		0		0		0
RAMP 3		63874		27974		0		0		0		0
RAMP 4		28116		12678		0		0		0		0
KY 3046		38194										

EMB. BENCH	VOLUME	ROCK	VOLUME	UNDERCUT	VOLUME	DT. LT	REFILL	VOLUME	DT. RT.	#2 Stone	VOLUME	EMB. BENCH	GRAN EMB	VOLUME	TY IV G FAB
	0		0		0		0		0		0			0	
			0		0		0		0		0			0	
	0		0		0		0		0		0			0	
	0		0		0		0		0		0			0	
	0		0		0		0		0		0			0	
	0		0		0		0		0		0			0	
	0		0		0		0		0		0			0	
	0		0		0		0		0		0			0	

VOLUME	RIP RAP	VOLUME	SPL EMB	VOLUME	ENT LT	VOLUME	ENT RT	VOLUME
#REF!	0	0	0	0	0	0	0	0
		#REF!						
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0

VALUE ENGINEERING PROPOSAL CR-04
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE: Bifurcate the road on one side at a higher elevation to reduce cuts

FUNCTION: **Clear Right-of-way**

BASELINE ASSUMPTION:

Current design shows both roadways throughout the corridor at approximately the same elevation at centerline.

PROPOSED ALTERNATIVE:

This alternate would propose that the travel lanes nearest to the cut would be raised approximately 15 feet at the critical section. This raised grade would need to adjust down as you come in and out of cuts so that the roadway was level or close to level at the embankment sections and some structures.

BENEFITS	RISKS/CHALLENGES
• Reduces the size of the cut	• Challenging from a design standpoint because this would require the upper travel lanes to transition vertically
• Generates less waste	• Need to make sure that the bench that the upper travel lanes is not on a highly degradeable shale
• Reduces the construction schedule because less excavation will be needed	• Good contractor control on travel lane bench so that the bench is not overshot
•	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 819,255	$ -	$ 819,255
PROPOSED ALTERNATIVE:	$ 540,586	$ -	$ 540,586
TOTAL (Baseline less Proposed)	$ 278,669	$ -	**$ 278,669**
			SAVINGS

VALUE ENGINEERING PROPOSAL CR-04

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Bifurcate the road on one side at a higher elevation to reduce cuts

DISCUSSION/JUSTIFICATION:

This would be a vertical alignment shift on the travel lanes that are nearest to the cut. The studied area is from Item No. 126.70 +/- Station 202+50 to +/- Station 211+50 where the cut section remains relatively constant and does not begin to transition out of the hillside until before and after the sections listed above. The raised portion would be approximate 15 foot vertical bifurcation between the elevations at the centerline of the roadway. This idea could be used corridor wide.

IMPLEMENTATION CONSIDERATIONS:

Need to study the cut that the roadway is on to see if it is a durable shale/sandstone or need to consider setting the edge of the roadway further back into the hill to allow for additional room for weathering. Additional vertical bifurcation could be could be used in some areas. Also need to pay particular attention to the vertical transition between the roadway grade separation.

VALUE ENGINEERING PROPOSAL CR-04

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,

Wolfe, Morgan and Magoffin Counties

TITLE: Bifurcate the road on one side at a higher elevation to reduce cuts

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Excavation		CY	163,851	5.00	819,255	105,518	5.00	527,590
Guardrail		LF				900	14.44	12,996
					819,255			**540,586**
							(BASELINE LESS PROPOSED)	**278,669**

*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL CR-04

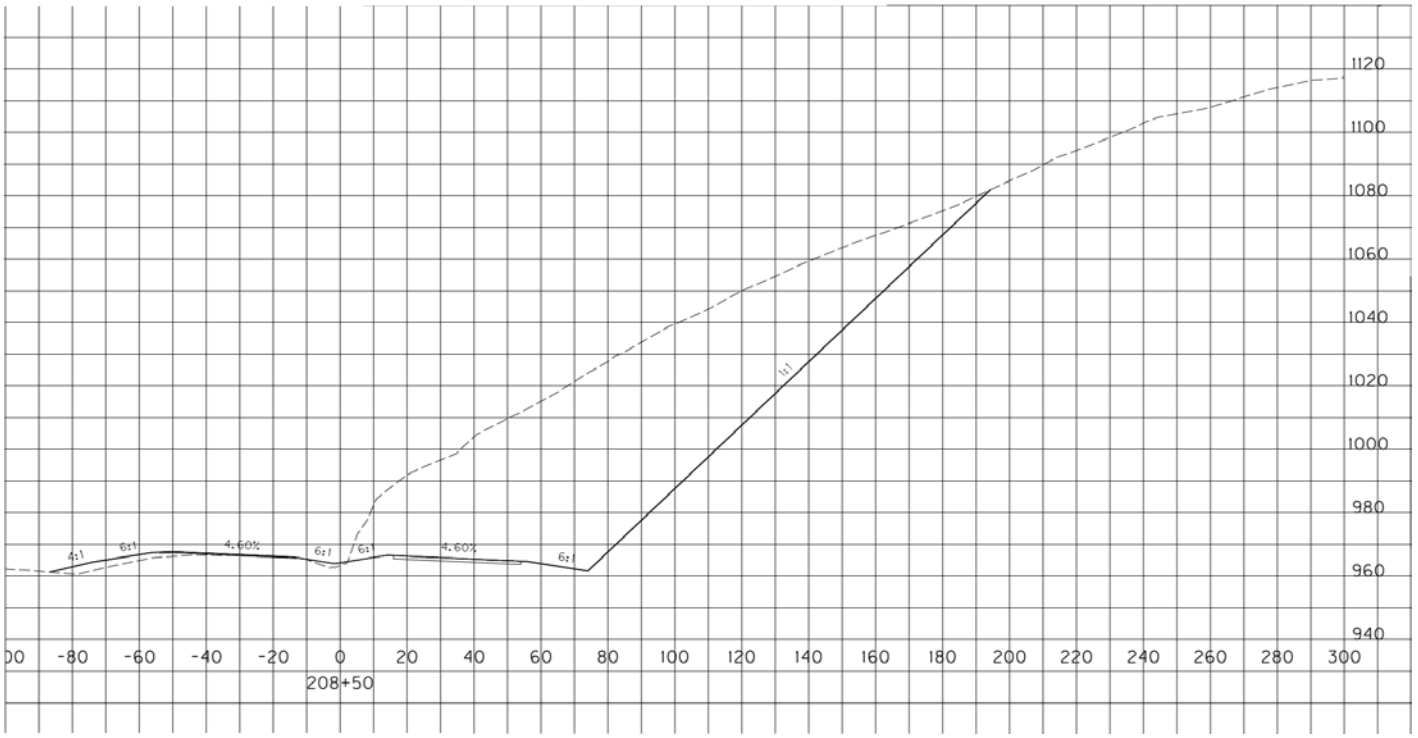
Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Bifurcate the road on one side at a higher elevation to reduce cuts

SKETCH OF BASELINE ASSUMPTION

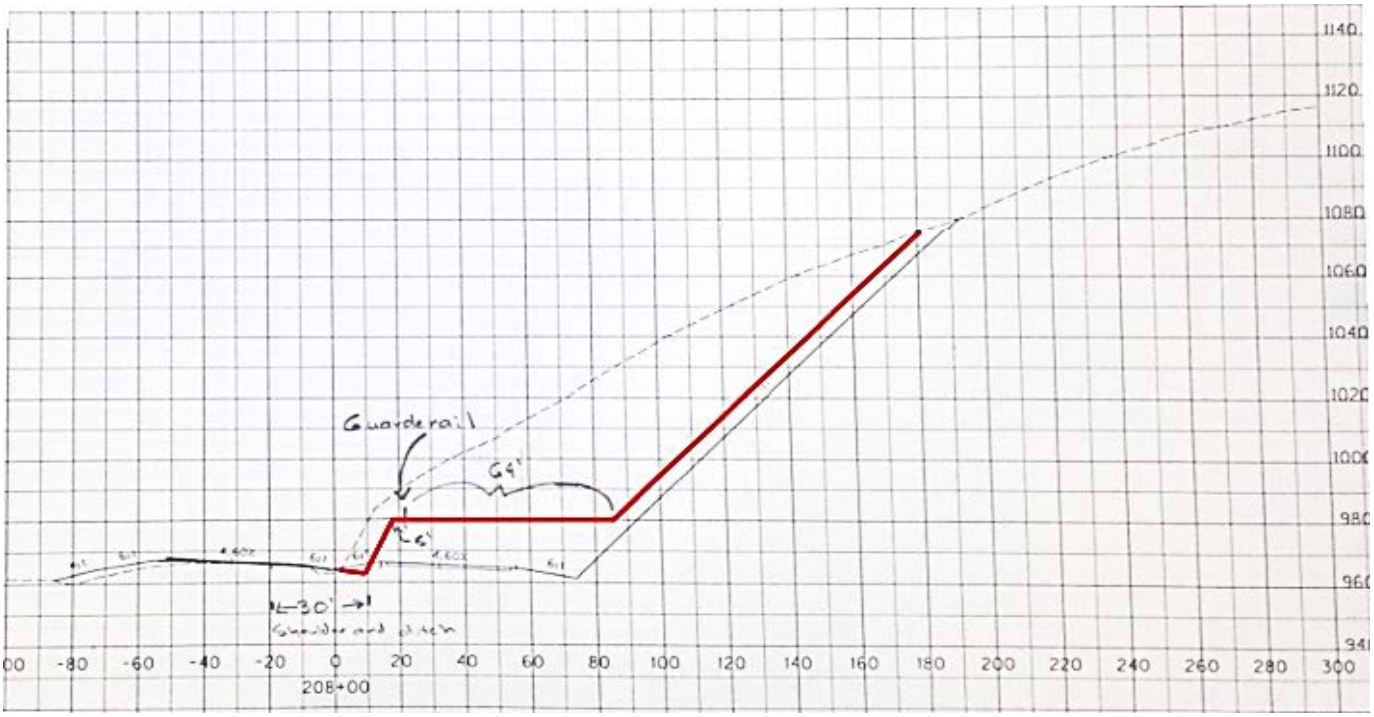


VALUE ENGINEERING PROPOSAL CR-04

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Bifurcate the road on one side at a higher elevation to reduce cuts

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL CR-04

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Bifurcate the road on one side at a higher elevation to reduce cuts

CALCULATIONS

Existing Design						
		Cut Area	Cut Volume			
202+50.00	1	3432.64	5247			
203+00.00	1	4165.61	7035			
203+50.00	1	3994.64	7556			
204+00.00	1	3167.95	6632			
204+50.00	1	1986.62	4773			
205+00.00	1	1517.31	3244			
205+50.00	1	2842.66	4037			
206+00.00	1	4330.57	6642			
206+50.00	1	5457.69	9063			
207+00.00	1	6049.37	10655			
207+50.00	1	6055.82	11209			
208+00.00	1	6441.94	11572			
208+50.00	1	6646.51	12119			
209+00.00	1	6724.74	12381			
209+50.00	1	6561.11	12302			
210+00.00	1	6080.59	11705			
210+50.00	1	5174.09	10421			
211+00.00	1	4733.88	9174			
211+50.00	1	3996.52	8084			
		89360.26	163851	CY		
					800	
					2700	
Bifurcated Section					675	
					312.5	
Reduce cut		1750	58333		4487.5	
@ Station 208+00						
					6237.5	
Section looked at 211+50 to 202+50						
900						
New Excavation			105518			

VALUE ENGINEERING PROPOSAL CR-05
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE: At Sta. 3705+00 to 3765+00 raise the grade to balance earthwork and reduce cuts

FUNCTION: **Clear Right-of-way**

BASELINE ASSUMPTION:

The current design has a 2% upgrade and a 4% downgrade that is off the existing alignment.

PROPOSED ALTERNATIVE:

This alternate would steepen the grades in this area to a maximum of 7%.

BENEFITS	RISKS/CHALLENGES
• Reduces excavation	• Steeper grades would create less sight distance through the vertical curves
• Reduces excess material	•
• Reduces right-of-way acquired for waste area	•
• Reduces stream impacts	•
• Reduces cost of permitting (ILF)	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 18,500,000	$ -	$ 18,500,000
PROPOSED ALTERNATIVE:	$ 16,725,000	$ -	$ 16,725,000
TOTAL (Baseline less Proposed)	$ 1,775,000	$ -	**$ 1,775,000**
			SAVINGS

VALUE ENGINEERING PROPOSAL CR-05

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: At Sta. 3705+00 to 3765+00 raise the grade to balance earthwork and reduce cuts

DISCUSSION/JUSTIFICATION:

This project is overwhelmingly excavation heavy due to the existing topography, resulting in excess material that needs to be disposed. Increasing the grades through this section of the proposed design will create less excavation and more embankment. This will result in less excess material to be disposed, which means stream impacts and in-lieu fees are reduced. These costs were difficult to quantify in this alternative but should be considered.

IMPLEMENTATION CONSIDERATIONS:

The same unit prices were used in the proposed as the baseline. However, the baseline price of $5/CY seems to be high relative to the quantity and historic bids in the region in which the project is located.

VALUE ENGINEERING PROPOSAL CR-05

Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: At Sta. 3705+00 to 3765+00 raise the grade to balance earthwork and reduce cuts

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Roadway Excavation		CY	3,700,000	5.00	18,500,000	3,345,000	5.00	16,725,000
					18,500,000			**16,725,000**
							(BASELINE LESS PROPOSED)	**1,775,000**

*Note: Costs are rounded to nearest thousand dollars.

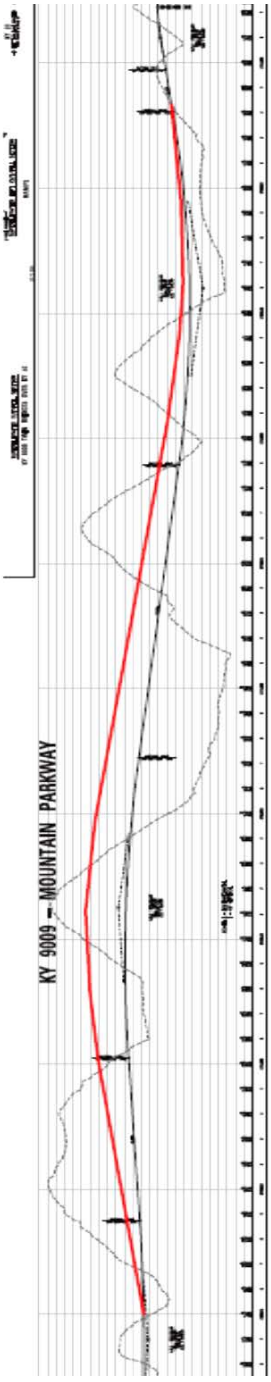
SAVINGS

VALUE ENGINEERING PROPOSAL CR-05

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: At Sta. 3705+00 to 3765+00 raise the grade to balance earthwork and reduce cuts

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL CR-06
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE: Flatten fill slopes to balance earthwork at Sta. 3705+00 to 3765+00

FUNCTION: **Clear Right-of-way**

BASELINE ASSUMPTION:

For Item No. 10-126.12, the current proposed design utilizes fill slopes steeper than 4:1 on this section for approximately 1600 FT.

PROPOSED ALTERNATIVE:

This proposes flattening filling slopes along this section to 4:1 to eliminate guardrail due to a non-recoverable slope.

BENEFITS	RISKS/CHALLENGES
● Provides location for excess material	● MOT will require part width construction of the proposed Mountain Parkway (which is required on portions of this section presently)
● May reduce permitting costs slightly in terms of waste sites	● Relocates ditches farther from the roadway
● Provides a recoverable slope for errant motorists	● Will require embankment benching on one location
●	● Right-of-way impacts will need to be further studied
●	●
●	●
●	●
●	●

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 48,552	$ -	$ 48,552
PROPOSED ALTERNATIVE:	$ -	$ -	$ -
TOTAL (Baseline less Proposed)	$ 48,552	$ -	**$ 48,552**
			SAVINGS

VALUE ENGINEERING PROPOSAL CR-06

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Flatten fill slopes to balance earthwork at Sta. 3705+00 to 3765+00

DISCUSSION/JUSTIFICATION:

The current proposed design utilizes fill slopes steeper than 4:1 on this section for approximately 1600 FT. This requires shielding for the slopes as they are classified as non-recoverable and there is little recovery area at the toe of the slope in these areas. The VE team proposes flattening the fill slopes along this section (and along Construction Sequence 1) to gain recoverable slopes. This eliminates the need for guardrail for errant motorists, reduces the amount of excess excavation hauled to offsite waste areas and should increase earthwork production rates. For illustration purposes, Sta. 3740+00-3740+50 demonstrate revised fill slopes. The excess excavation that could be placed between these stations is approximately 15,000 CY using the average end area method. These stations allow more material to be placed than what is typical for the 1600 FT of steepened slope. Therefore, the amount of excess material that can be placed along that distance would be more accurately estimated at 200,000 CY. This will not allow balancing of the section, nor will it come close. ***The primary benefit would be the increased safety with recoverable slopes and elimination of shielding.***

IMPLEMENTATION CONSIDERATIONS:

The proposed revision of fill slopes for this section may cause other issues that need to be studied further such as right-of-way impacts, need for embankment benches, etc. Additionally, MOT phasing will likely require part width construction along this section if flatter slopes are constructed. However, this may be the current plan already, given other impacts to traffic with the current proposed design.

VALUE ENGINEERING PROPOSAL CR-06

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Flatten fill slopes to balance earthwork at Sta. 3705+00 to 3765+00

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Guardrail Steel with Beam S-face		LF	2,800	14.59	40,852		14.59	
Guardrail end treatment Type 2A		EACH	3	634.99	1,905		634.99	
Guardrail end treatment Type 4A		EACH	3	1,931.59	5,795		1,931.59	
					48,552			
							(BASELINE LESS PROPOSED)	**48,552**

*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL CR-06

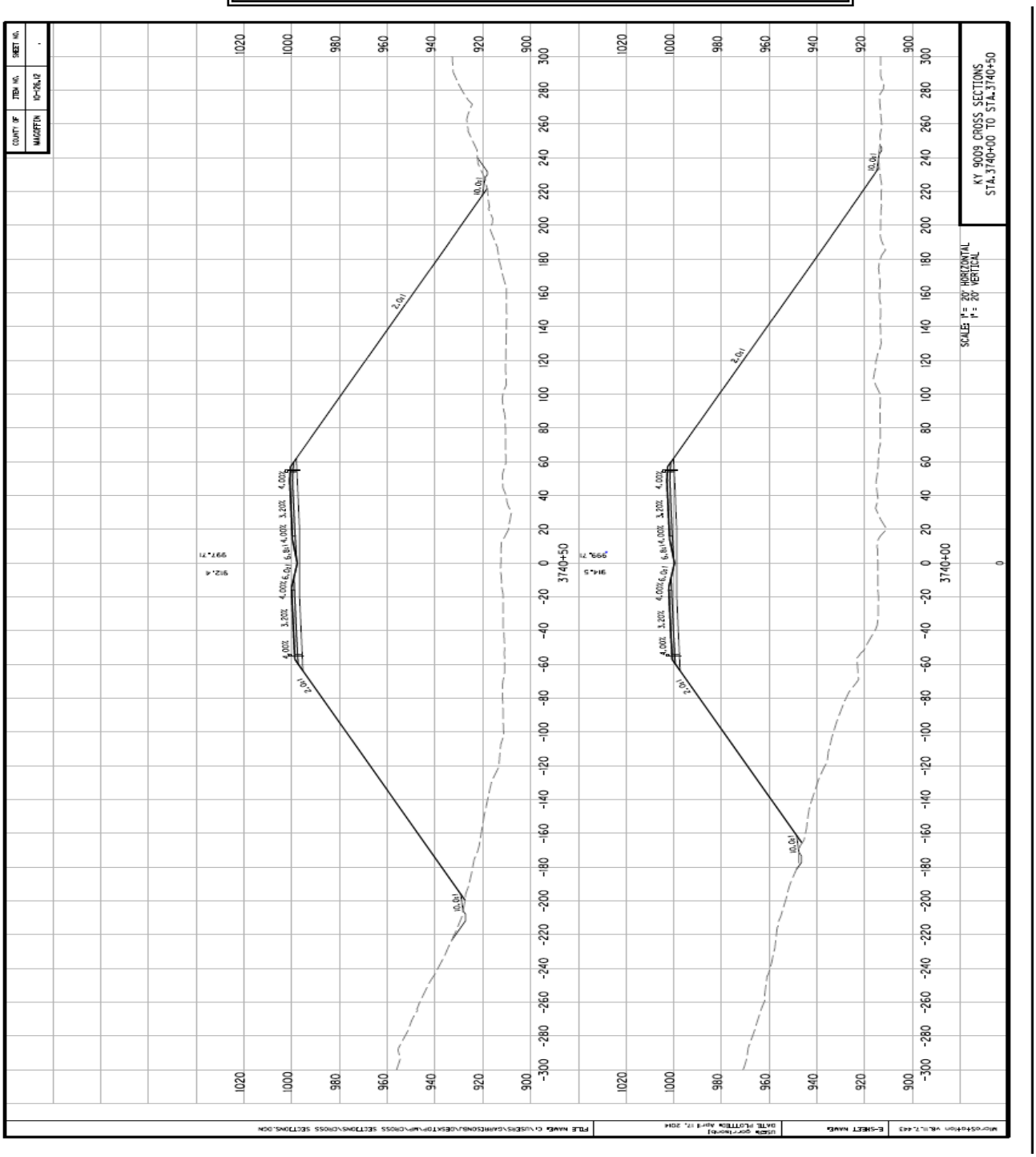
Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Flatten fill slopes to balance earthwork at Sta. 3705+00 to 3765+00

SKETCH OF BASELINE ASSUMPTION

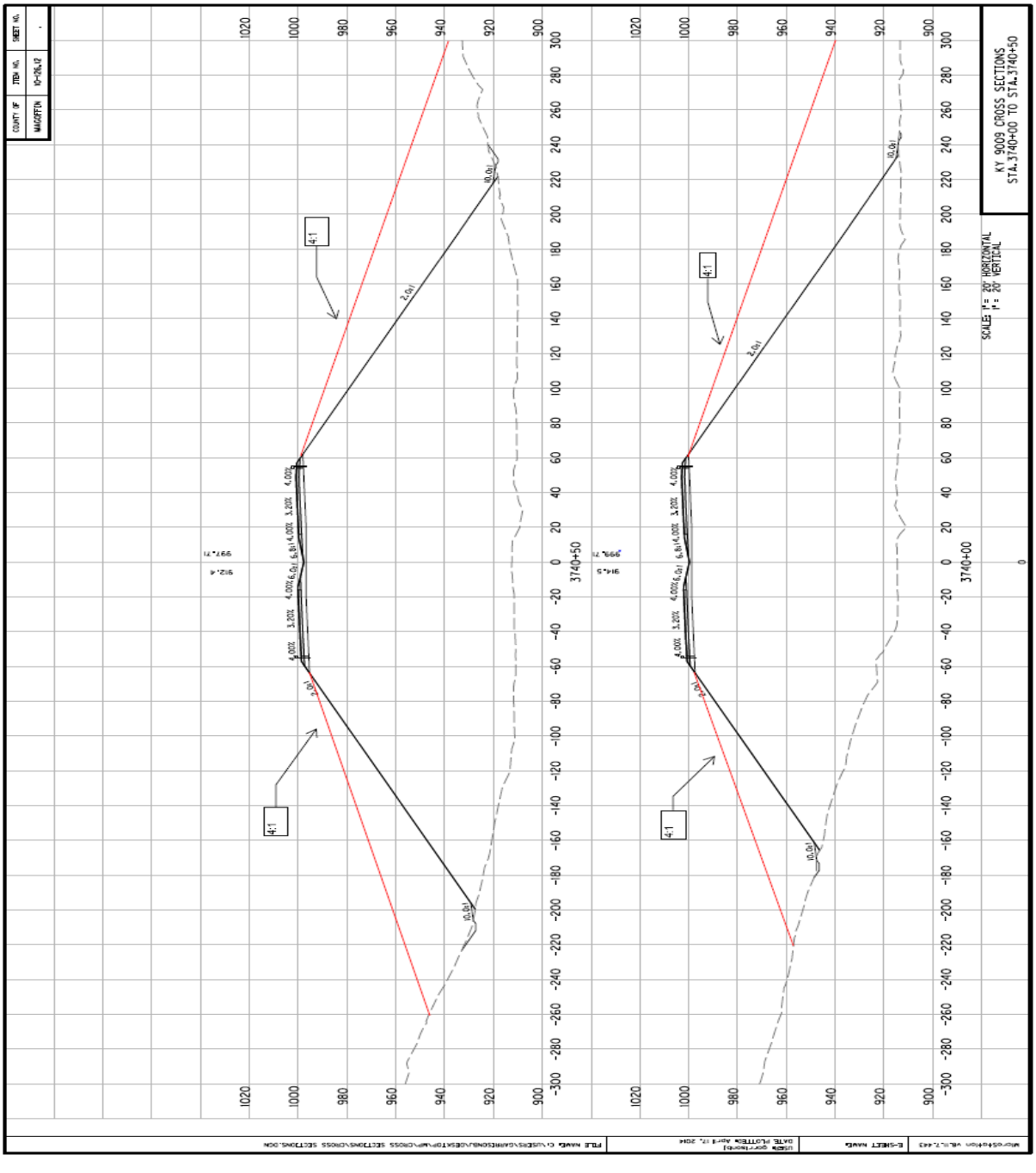


VALUE ENGINEERING PROPOSAL CR-06

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Flatten fill slopes to balance earthwork at Sta. 3705+00 to 3765+00

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL CR-08
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE: Introduce false cuts to reduce fill area footprint and waste site needs

FUNCTION: **Clear Right-of-way**

BASELINE ASSUMPTION:

The current typical sections show a minimum fill slope of 2:1 with guardrail and a 4:1 desirable.

PROPOSED ALTERNATIVE:

When ever feasible, (the embankment area in between two steep cuts) false cut areas could be introduced to waste excess material within the project.

BENEFITS	RISKS/CHALLENGES
• Reduces the size of waste areas	• Monitor additional fill areas
• Reduces the haul length of waste material	•
• Better pricing for earthwork	•
• Reduces the amount of guradrail	•
• Reduces cost of guardrail replacement	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 85,192,826	$ -	$ 85,192,826
PROPOSED ALTERNATIVE:	$ 80,541,908	$ -	$ 80,541,908
TOTAL (Baseline less Proposed)	$ 4,650,917	$ -	**$ 4,650,917**

SAVINGS

VALUE ENGINEERING PROPOSAL CR-08

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Introduce false cuts to reduce fill area footprint and waste site needs

DISCUSSION/JUSTIFICATION:

All of the sections on Mountain Parkway have excessive yardage that needs to be hauled off to waste areas for proper disposal. All the waste areas need to be permitted and could also involve paying in-lieu fees for streams that may be impacted. There is also a cost associated with acquiring the parcels. By introducing false cuts, especially where in between steep cuts, additional yardage could be wasted within these areas, minimizing the haul distance and reducing the cost associated with earthwork. The cost estimate assumes lower unit costs for excavation. It is estimated at least a savings of 5% could be realized in the unit cost of excavation. By flattening the slopes, it would be possible to eliminate guard rail and entreatments for the project.

IMPLEMENTATION CONSIDERATIONS:

None apparent.

VALUE ENGINEERING PROPOSAL CR-08

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Introduce false cuts to reduce fill area footprint and waste site needs

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
10-126.70			845,063	5.00	4,225,315	845,063	4.750	4,014,049
10-126.60			2,500,000	3.73	9,321,025	2,500,000	3.544	8,858,750
10-126.50			2,414,774	5.00	12,073,870	2,414,774	4.750	11,470,177
10-126.40			8,232,000	3.50	28,812,000	8,232,000	3.325	27,371,400
10-167			1,525,703	4.10	6,259,136	1,525,703	3.895	5,942,613
10-126.12			3,700,000	5.00	18,500,000	3,700,000	4.750	17,575,000
10-140.00			1,340,381	4.17	5,586,480	1,340,381	3.962	5,309,919
Guard Rail (entire project)			20,000	14.50	290,000			
End Treatments (entire corridor)			2,500	50.00	125,000			
					85,192,826			**80,541,908**
							(BASELINE LESS PROPOSED)	**4,650,917**

*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL CR-08

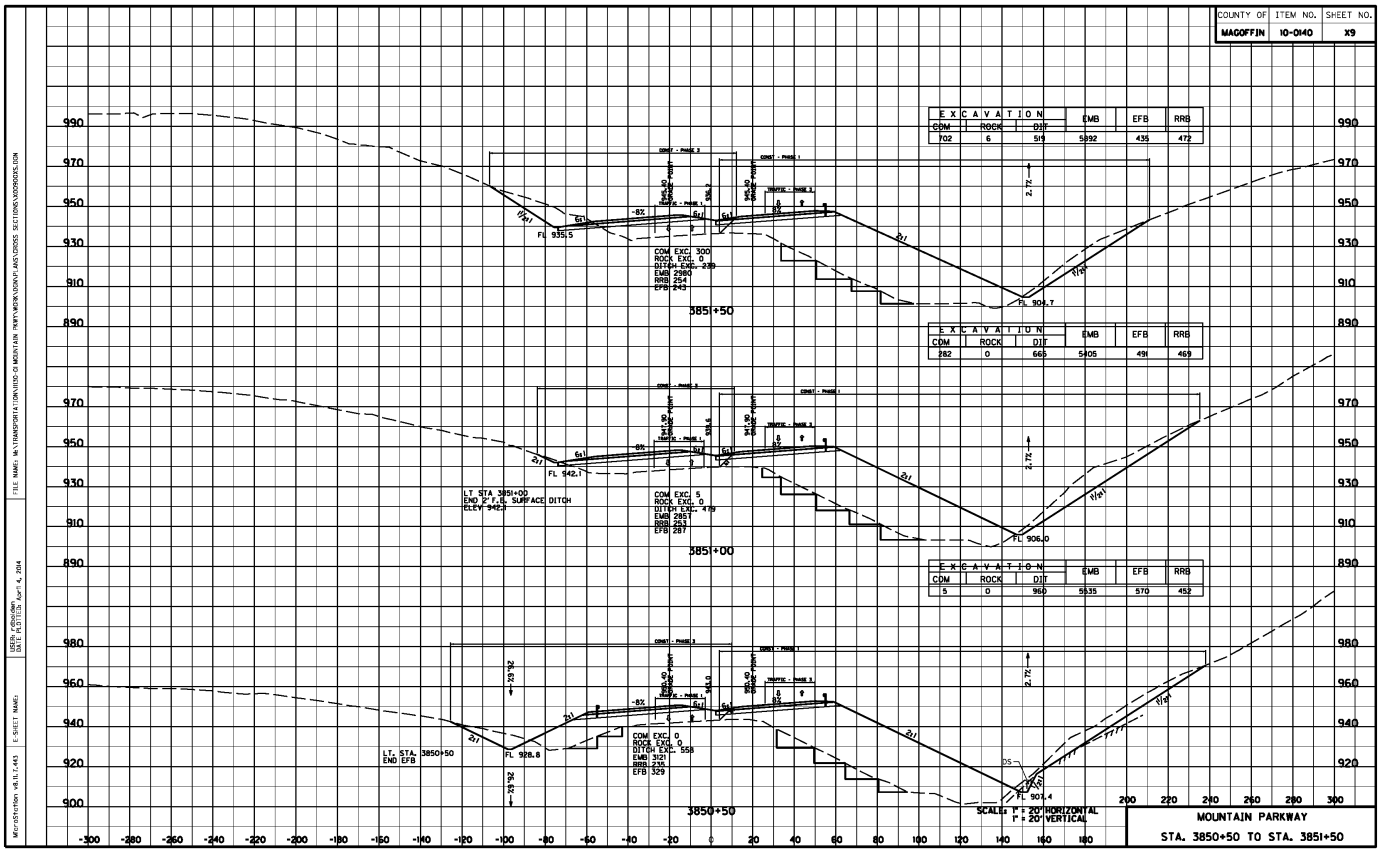
Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Introduce false cuts to reduce fill area footprint and waste site needs

SKETCH OF BASELINE ASSUMPTION



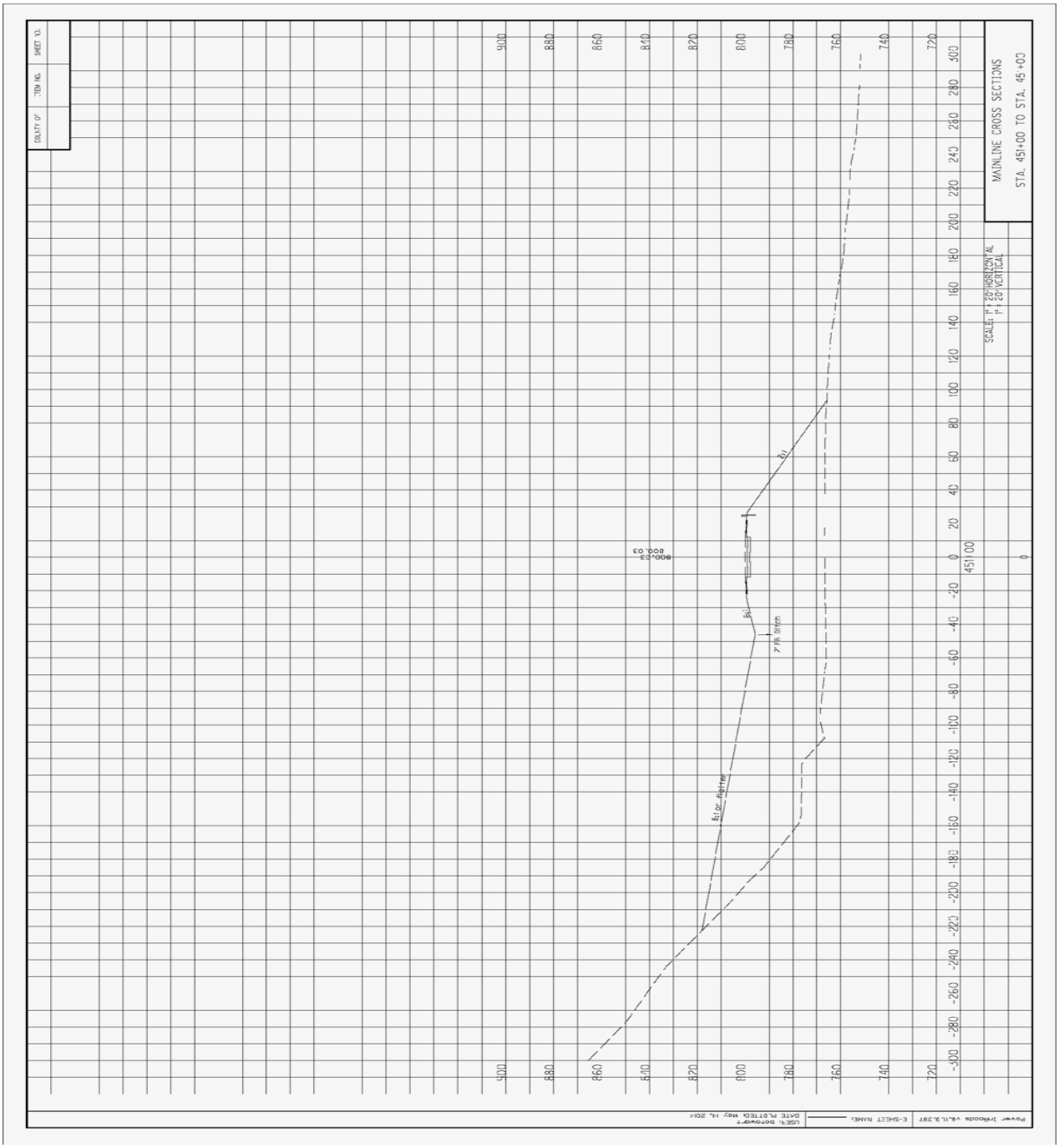
Above sketch is provided for Section 10-140.00 only; however, it is representative of what can be anticipated for the entire Mountain Parkway corridor. Proposed sketch (next page) illustrates what may be applied to the entire corridor, and cost detail reflects anticipated cost savings for the entire Mountain Parkway corridor.

VALUE ENGINEERING PROPOSAL CR-08

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Introduce false cuts to reduce fill area footprint and waste site needs

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL CR-09
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE: Use MSE walls for retaining walls to reduce cuts

FUNCTION: **Clear Right-of-way**

BASELINE ASSUMPTION:

Current design shows 1.5:1 (H:V) or 2:1 (H:V) daylight slopes through the common excavation.

PROPOSED ALTERNATIVE:

At various sections along the corridor, it may be possible to place a MSE wall on the overburden bench.

BENEFITS	RISKS/CHALLENGES
• Reduces the size of the cut	• May have challenges locating structural backfill in the area
• Generates less waste	• May increase schedule because of the time to construct MSE wall
• Reduces ROW impacts	•
•	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 206,374	$ -	$ 206,374
PROPOSED ALTERNATIVE:	$ 950,300	$ -	$ 950,300
TOTAL (Baseline less Proposed)	$ (743,927)	$ -	**$ (743,927)**

COST

VALUE ENGINEERING PROPOSAL CR-09

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Use MSE walls for retaining walls to reduce cuts

DISCUSSION/JUSTIFICATION:

Placing a MSE wall on the overburden bench at the top of the cuts would reduce the daylight point on some cuts throughout the corridor. In addition, it could help reduce ROW impacts in area where ROW is expensive. The area that was studied was from +/- Station 3625+00 to +/- Station 3530+50 so this opportunity could be scaled to other areas.

IMPLEMENTATION CONSIDERATIONS:

The MSE wall at the top of the slope may not be a solution in all the areas because the overburden slopes will daylight fast enough that the wall would not be necessary.

VALUE ENGINEERING PROPOSAL CR-09

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Use MSE walls for retaining walls to reduce cuts

DESIGN ELEMENT	**Markup**	**BASELINE ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Excavation		CY	50,335	4.10	206,374	30,561	4.10	125,300
MSE Wall						16,500	50.00	825,000
					206,374			**950,300**
							(BASELINE LESS PROPOSED)	**(743,927)**

*Note: Costs are rounded to nearest thousand dollars.

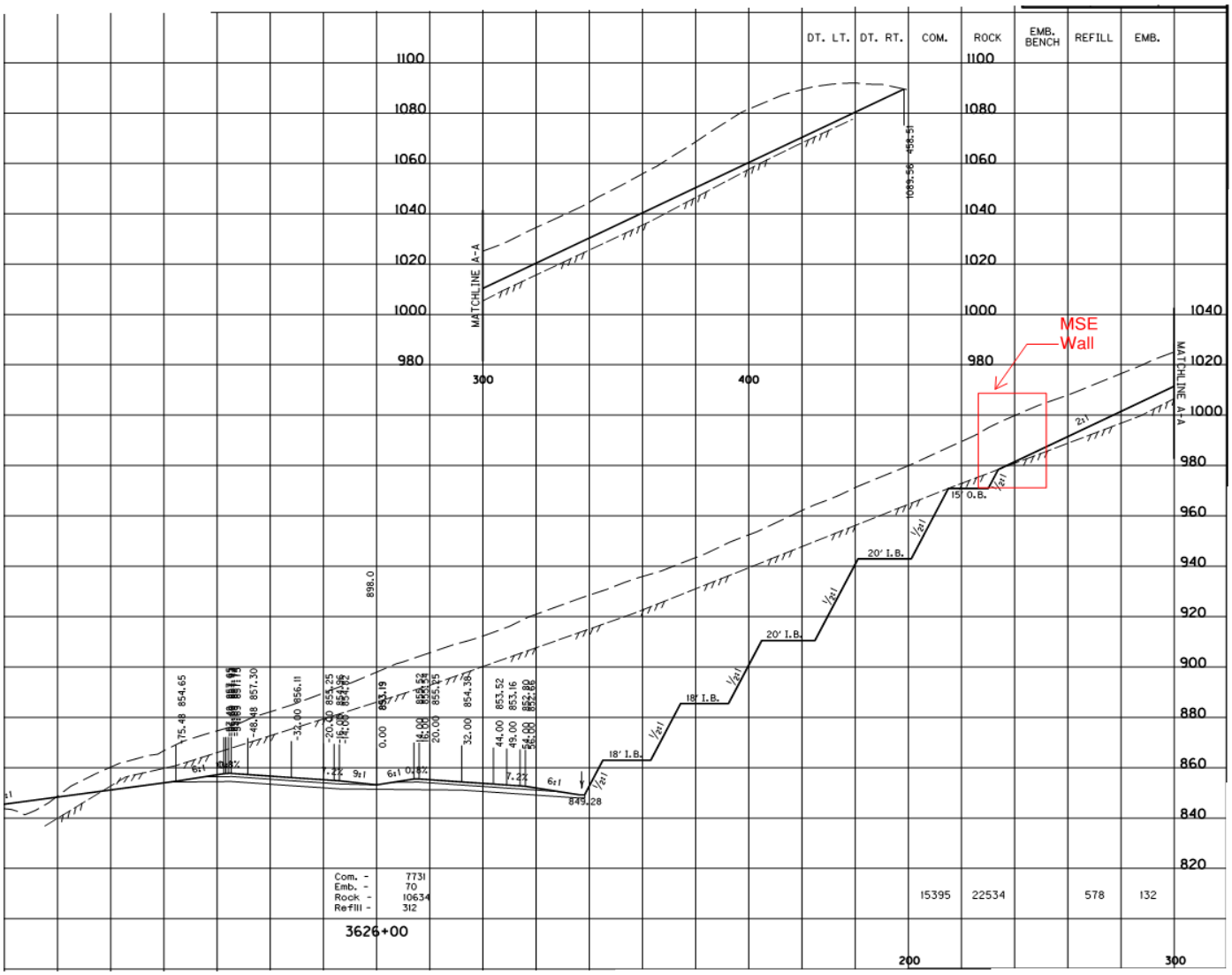
COST

VALUE ENGINEERING PROPOSAL CR-09

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Use MSE walls for retaining walls to reduce cuts

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL CR-09

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Use MSE walls for retaining walls to reduce cuts

CALCULATIONS

At MEC Section 3626+00				
560 feet of common excavation				
Adding MSE Wall reduce 220 feet of common excavation				
220 feet / 560 feet portion of common excavation				
39%				
Common excavation as shown on the sheets				
7616				
8896				
7731				
4804				
3481				
3318				
3713				
2931				
2898				
3113				
1834				
50335				
Saved portion of common excavation				
19774	CY			
30561	CY			
MSE Wall				
3630+50 TO 3625+00				
550				
Average MSE wall height		30		
SF of MSE Wall		16500		

VALUE ENGINEERING PROPOSAL CR-07DS
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE: Use the existing area between the ramps as fill areas

FUNCTION: **Clear Right-of-way**

BASELINE ASSUMPTION:

The baseline design has an excess material that is generated from excavation. Currently, it is proposed to find, purchase, and permit off project "waste sites" to dispose of this material.

PROPOSED ALTERNATIVE:

This alternative would utilize areas between interchange ramps and the Parkway to dispose material in. Fill could also be placed in abandoned portions of the existing Mountain Parkway.

BENEFITS	RISKS/CHALLENGES
• Less right-of-way to purchase	• Existing terrain may not allow this in all areas
• Less stream impacts	•
• Less permitting	•
• Shorter haul to dump material	•
•	•
•	•
•	•
•	•

DESIGN SUGGESTION

VALUE ENGINEERING PROPOSAL CR-07DS

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Use the existing area between the ramps as fill areas

DISCUSSION/JUSTIFICATION:

This project will generate an excessive amount of excess material. Currently, areas known as "waste sites" are being located, acquired, and permitted for the disposal of this material. This alternate will place some of the excess material generated from the project between the Mountain Parkway and it's interchange ramps. An additional alternate to this idea is to use the abandoned portions of the current Mountain Parkway as fill sites as well. This will result in less material going to "waste sites" which means stream impacts will be reduced. This will also reduce permitting requirements.

IMPLEMENTATION CONSIDERATIONS:

This alternate should be evaluated at all interchanges and abandoned locations of the Mountain Parkway along the corridor. Some interchanges or abandoned portions of the Parkway may not be conducive to this suggestion due to existing terrain, proposed geometry, or construction phasing.

10-140.00 (No Alternatives developed for this design section)

Other (Not specific to a particular design section)

VALUE ENGINEERING PROPOSAL C-02
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE:	Complete early construction package to construct roadway portions that are off the existing alignment
FUNCTION:	**Constructablilty**

BASELINE ASSUMPTION:

Construction Sequence 1 is broken into seven construction sections.

PROPOSED ALTERNATIVE:

This alternative would break out two additional construction sections that could go to construction sooner and provide a substantial amount of work.

BENEFITS	RISKS/CHALLENGES
• Advance substantial amount of work sooner	• Adjacent contractors may have to use the same waste site simultaneously
•	•
•	•
•	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 25,731,300	$ -	$ 25,731,300
PROPOSED ALTERNATIVE:	$ 25,731,300	$ -	$ 25,731,300
TOTAL (Baseline less Proposed)	$ -	$ -	**$** -

NO CHANGE

VALUE ENGINEERING PROPOSAL C-02

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Complete early construction package to construct roadway portions that are off the existing alignment

DISCUSSION/JUSTIFICATION:

The benefit is to advance the schedule of work.

This proposal adds two construction sections. These sections are cross country sections - one from 10-126.40 and one from 10-126.12. These sections contain the largest concentrations of excavation in Construction Sequence 1. These sections would not require any MOT except egress and ingress to access the project. Only grade and drain would be performed ending with the rock roadbed. The paving would be done under the parent project.

The breakout section from 10-126.40 is 4,300 FT from Sta. 3465+00 to Sta. 3508+00 and includes approximately 4.3 million CY of excavation. It includes 5 property owners and one utility pole within the footprint of the bridge in this section. If this temporary move of the utility pole could not be done, the bridges would also be done with the parent project.

The breakout section from 10-126.12 is 3,600 FT from Sta. 3717+00 to Sta. 3753+00 and includes approximately 1.6 million CY of excavation. It has 4 property owners and does not require utility relocations.

IMPLEMENTATION CONSIDERATIONS:

This project and the parent project use the same waste site(s). The use of these waste sites will have to be coordinated between the contractors.

VALUE ENGINEERING PROPOSAL C-02

Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Complete early construction package to construct roadway portions that are off the existing alignment

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
10-126.40 Breakout								
Roadway Excavation		CY	4,300,000	4.00	17,200,000			
Twin Bridge #6		LS	1	6,741,000.00	6,741,000			
Triple 8x8 RCBC		LS	1	565,000.00	565,000			
Miscellaneous (5%)		LS	1	1,225,300.00	1,225,300			
Roadway Excavation		CY				4,300,000	4.00	17,200,000
Twin Bridge #6		LS				1	6,741,000.00	6,741,000
Triple 8x8 RCBC		LS				1	565,000.00	565,000
Miscellaneous (5%)		LS				1	1,225,300.00	1,225,300
					25,731,300			**25,731,300**
							(BASELINE LESS PROPOSED)	
								NO CHANGE

*Note: Costs are rounded to nearest thousand dollars.

VALUE ENGINEERING PROPOSAL C-02

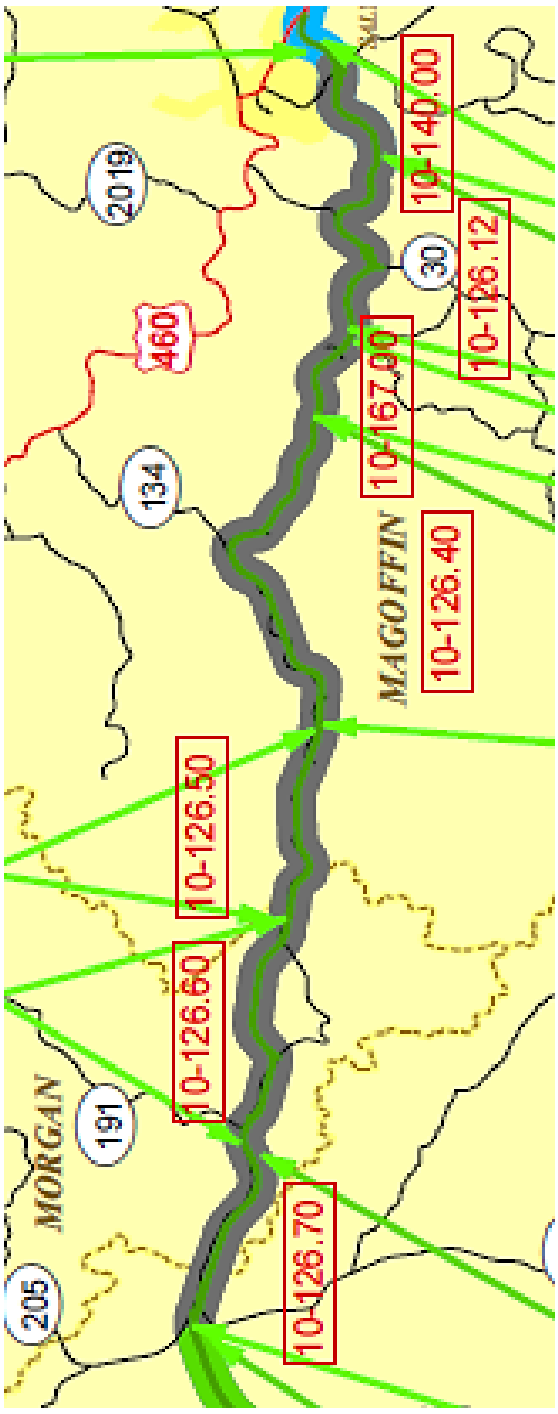
Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Complete early construction package to construct roadway portions that are off the existing alignment

SKETCH OF BASELINE ASSUMPTION

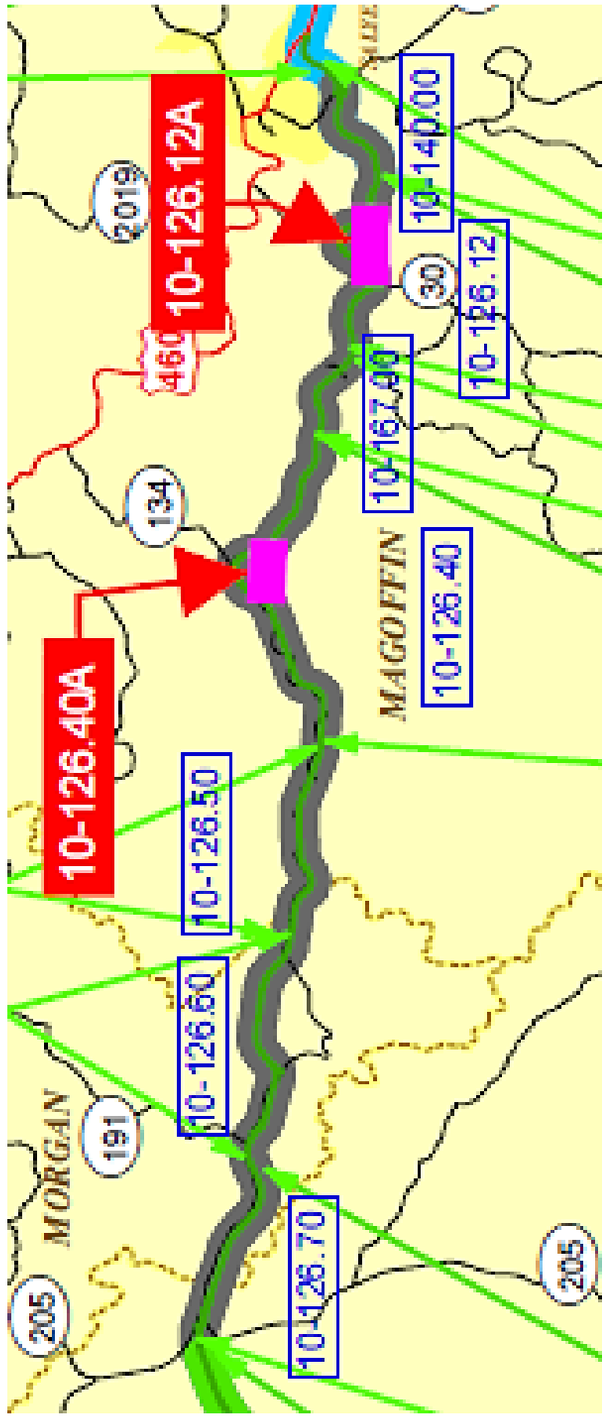


VALUE ENGINEERING PROPOSAL C-02

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Complete early construction package to construct roadway portions that are off the existing alignment

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL AV-01
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE: Pavement thickness should change based on usage (ADT)

FUNCTION: **Accommodate Vehicles**

BASELINE ASSUMPTION:

In discussion with the KYTC Pavement Branch, the recommended pavement was designed based on one assumed value for ESALs distributed along the entire corridor.

PROPOSED ALTERNATIVE:

The VE team proposes further investigation of each section to determine if the pavement structures can be revised.

BENEFITS	RISKS/CHALLENGES
• Customizes pavement design based on traffic usage	• New pavement design will require KYTC Pavement Branch concurrence
• Achieves acceptable pavement design for traffic loading	•
•	•
•	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 17,693,130	$ -	$ 17,693,130
PROPOSED ALTERNATIVE:	$ 16,529,110	$ -	$ 16,529,110
TOTAL (Baseline less Proposed)	$ 1,164,020	$ -	**$ 1,164,020**
			SAVINGS

VALUE ENGINEERING PROPOSAL AV-01

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Pavement thickness should change based on usage (ADT)

DISCUSSION/JUSTIFICATION:

The Pavement Branch for KYTC provided recommended pavement designs for the Mountain Parkway based on design ESALs of 7.2 million. However, upon closer inspection, most sections indicate 20 year design ESALs ranging from 4.1 million to 4.5 million with the exception of Item No. 10-140.00 (14.4 million design ESALs) as provided by the designing consultants. With this in mind, pavement structures may be reduced to adequately accomodate design ESALs and reduce capital cost. Communication with the Pavement Branch indicated that by reducing the design ESAL by 1/2 could reduce the pavement structure by 1 inch. With the given information, the design ESALs are reduced to approximately 62.5 % of the original design ESALs. This would be equivalent to a reduction of 5/8 of an inch to the pavement structure in the travel lanes.

MATERIAL CALCULATIONS: 18.5 MI X 48 FT @ 9.5" = 272,202 TONS ASPH. BASE 18.5 MI X 48 FT @ 8.875" = 254,294 TONS ASPH. BASE

IMPLEMENTATION CONSIDERATIONS:

For the purpose of illustration, an average of the unit cost of $65/ton was used for asphalt base courses; however, the District indicated that historically $85/ton is more accurate. More thorough analysis will be needed to confirm that the pavement structure reduction can be reduced by the assumed amount and achieve acceptable longevity. Additionally, it would be appropriate to investigate the provided design ESALs for the 10-140.00 section to confirm the calculation. No access points exist in this section except at the project termini at the intersection with KY 7. With that information, the pavement structure along this section may need to be increased.

VALUE ENGINEERING PROPOSAL AV-01

Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Pavement thickness should change based on usage (ADT)

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
CL3 ASPH BASE 1.0 D		TON	272,202	65.00	17,693,130	254,294	65.00	16,529,110
					17,693,130			**16,529,110**
							(BASELINE LESS PROPOSED)	**1,164,020**

*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL AV-01

Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Pavement thickness should change based on usage (ADT)

SKETCH OF BASELINE ASSUMPTION AND PROPOSED ALTERNATIVE

BASELINE ASSUMPTION	PROPOSED ALTERNATIVE
Full-Depth Asphalt Sections (Overlay) 1 ½" Milling 4" CL3 Asph Base 1.0D PG64-22 1 ¼" CL3 Asph Surf 0.38B PG64-22	Full-Depth Asphalt Sections (Overlay) 1 ½" Milling 3 3/8" CL3 Asph Base 1.0D PG64-22 1 ¼" CL3 Asph Surf 0.38B PG64-22
Full-Depth Asphalt Sections 1 ¼" CL3 AS 0.38B PG64-22 3" CL3 AB 1.00D PG64-22 3" CL3 AB 1.00D PG64-22 3 ½" CL3 AB 1.00D PG64-22 4" CSB	Full-Depth Asphalt Sections 1 ¼" CL3 AS 0.38B PG64-22 2 7/8" CL3 AB 1.00D PG64-22 3" CL3 AB 1.00D PG64-22 3" CL3 AB 1.00D PG64-22 4" CSB

VALUE ENGINEERING PROPOSAL AV-02
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE: Maintain current median 36 FT width in lieu of 40 FT

FUNCTION: **Accommodate Vehicles**

BASELINE ASSUMPTION:

Currently, proposed design includes a 40 FT depressed median dividing the opposing travel lanes.

PROPOSED ALTERNATIVE:

The VE team proposes matching the existing depressed median width found in previously constructed sections.

BENEFITS	RISKS/CHALLENGES
● Reduces earthwork	● Some sections may be near completion on design
● Maintains design standard acceptance for freeways	● This revision could cause delay to the construction letting
● Reduces waste, lessening impact to waste areas and potentially stream impacts	●
●	●
●	●
●	●
●	●
●	●

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 82,231,684	$ -	$ 82,231,684
PROPOSED ALTERNATIVE:	$ 80,900,590	$ -	$ 80,900,590
TOTAL (Baseline less Proposed)	$ 1,331,094	$ -	**$ 1,331,094**
			SAVINGS

VALUE ENGINEERING PROPOSAL AV-02

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE: Maintain current median 36 FT width in lieu of 40 FT

DISCUSSION/JUSTIFICATION:

Current proposed design includes a 40 FT depressed median dividing the opposing travel lanes. Existing sections of the Mountain Parkway that have been constructed as a divided highway have a depressed median width of 36 FT. The VE team proposes constructing new divided four lane sections with the same depressed median width as previously constructed sections. This will allow uniformity among the sections and satisfies driver expectation. Additionally, this will allow excavation to be reduced. Checking this concept against AASHTO publications, this is acceptable. AASHTO recommends median barrier be considered on medians of this width when ADT exceeds 20,000. Current and forecasted traffic volumes are considerably less than 20,000 and crash history on current 4 lane configurations do not indicate a cross over issue. The AASHTO interstate design standards recommend a minimum 36 FT, but allow as little as 10 FT in mountainous terrain. This option provides no clear disadvantage when compared to the proposed 40 FT median, with substantial potential savings in earthwork costs.

For illustration purposes this revision has been applied to section 10-126.50 in Morgan/Magoffin Counties as this project has a median quantity of earthwork when compared to Construction Sequence 1. The earthwork savings are then extrapolated to project potential savings. The detailed cross-section at 3262+50 and 3280+00 are representative of cuts encountered.

IMPLEMENTATION CONSIDERATIONS :

One major consideration for implementation of this concept is the amount of design work that has been completed to this point. The level of effort necessary on sections that are near completion and potential delay of construction letting may outweigh the benefit of the cost savings. This recommended change should have very little effect on structures, only revising their physical location slightly. Additionally, assumptions have been made to illustrate the revision may have on the entire Construction Sequence 1. Admittedly, savings will vary from section to section depending on the characteristics of the excavation, established waste areas, etc. Though difficult to immediately quantify, the excess material on the project will be lessened as well, thus lessening the impact to waste areas and potentially stream impacts.

VALUE ENGINEERING PROPOSAL AV-02

Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Maintain current median 36 FT width in lieu of 40 FT

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
ROADWAY EXC. (Const. Seq. 1)		CY	20,557,921	4.00	82,231,684	20,225,148	4.00	80,900,590
					82,231,684			**80,900,590**
							(BASELINE LESS PROPOSED)	**1,331,094**

*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL AV-02

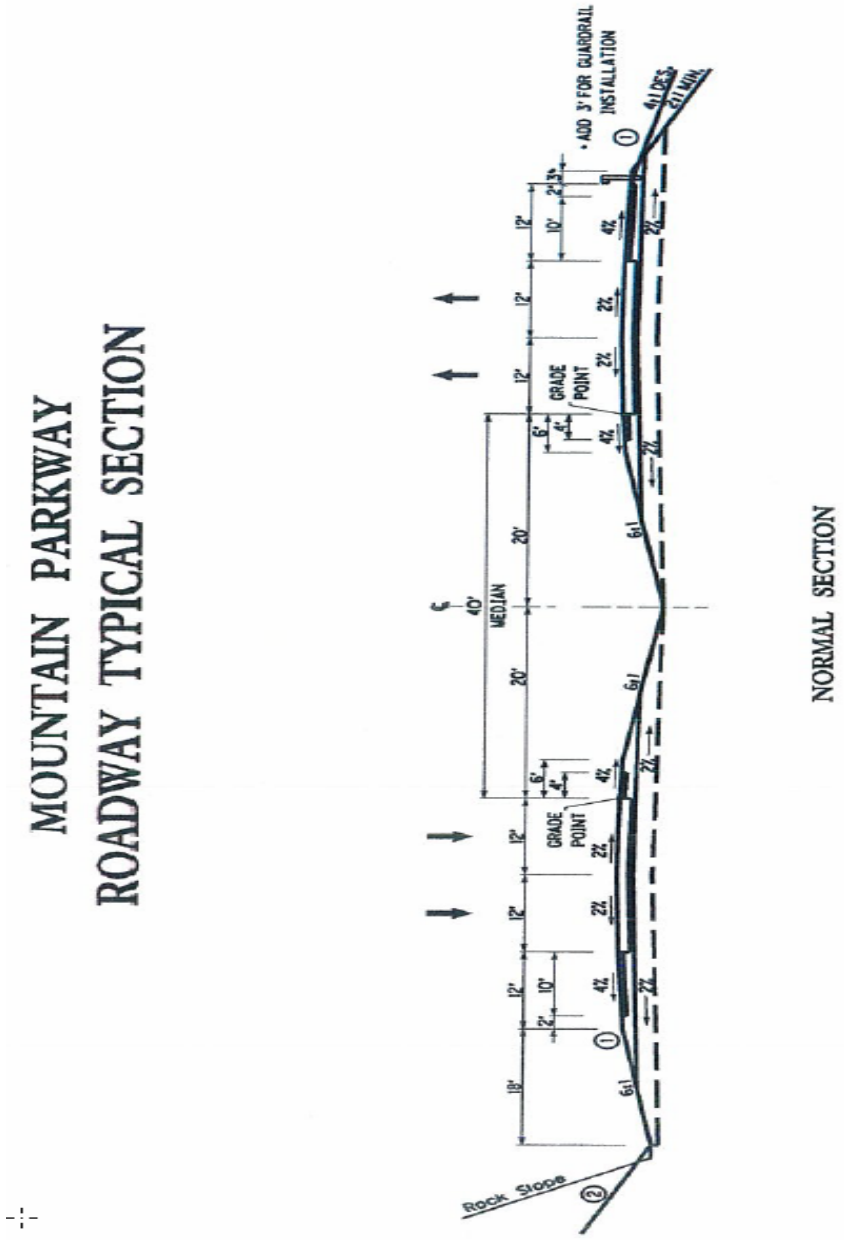
Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Maintain current median 36 FT width in lieu of 40 FT

SKETCH OF BASELINE ASSUMPTION

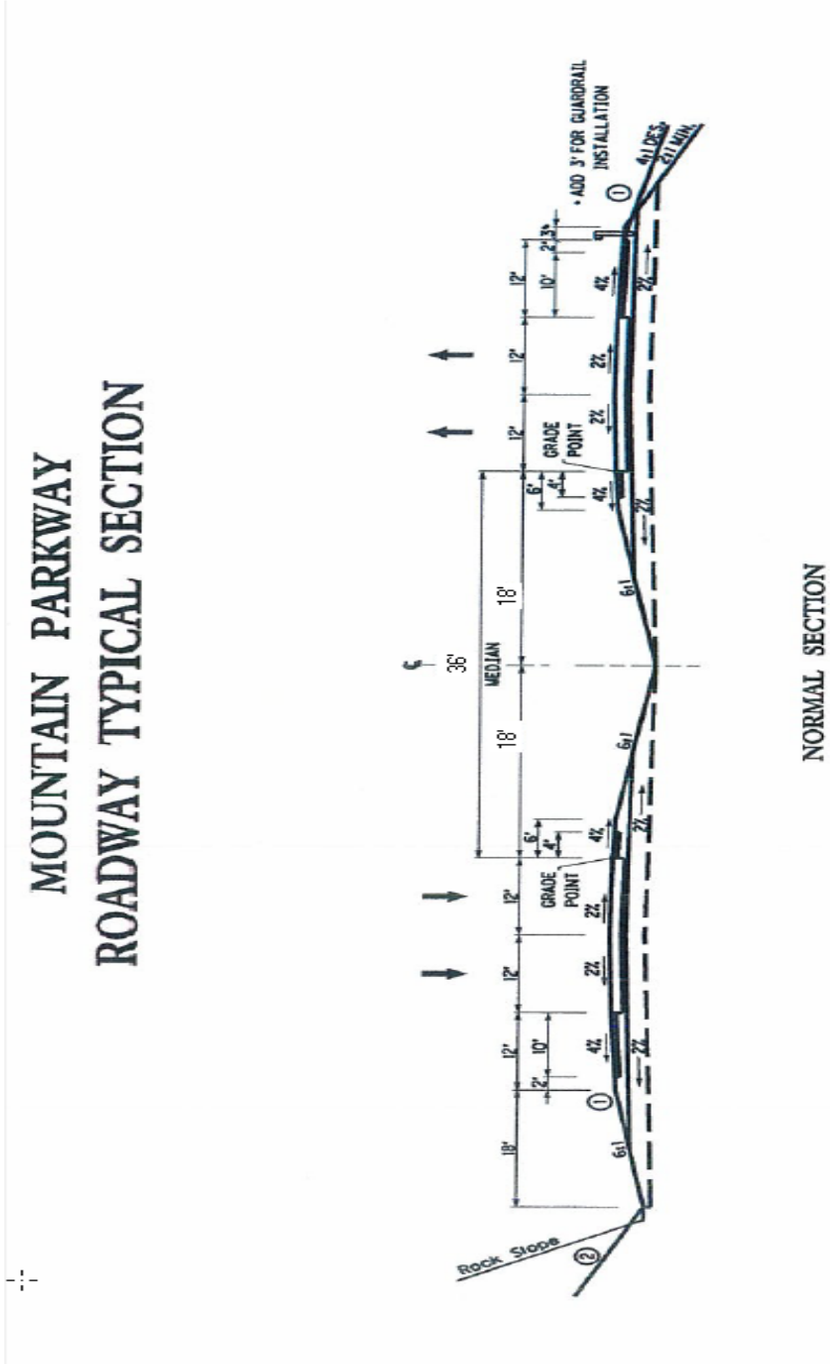


VALUE ENGINEERING PROPOSAL AV-02

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Maintain current median 36 FT width in lieu of 40 FT

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL AV-02

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Maintain current median 36 FT width in lieu of 40 FT

CALCULATIONS

Additional Calcs AV-02			
Assumptions:			
Use representative x-sec to represent entire cut length			
Extrapolate results from Item No. 10-126.50 to all sections in Const. Seq. #1			
Unit cost of excavation as provided by the District = $4/cy			
Looking at Sta. 3265+50			
Length of slope @ lt. sta.	134	ft	
Length of slope @ rt. sta.	209	ft	
Length of cut evaluated	1600	ft	
(134' + 209') x 2' x 1600' / 27 =	40652		
Looking at Sta. 3280+00			
Length of slope @ lt. sta.	170	ft	
Length of slope @ rt. sta.	0	ft	
Length of cut evaluated	400	ft	
(134' + 209') x 2' x 1600' / 27 =	5037		
Total Earthwork Reduction:	45689		
Extrapolate Results to all sections of Const. Seq. 1			
Length of 10-126.50	2.54	mi	
Length of Const. Seq. 1	18.5	mi	
(18.5 / 2.54) x 45,689 =	332773.4		
Total Exc. For Const. Seq. 1 =	20557921		
Revised Earthwork Qty =	20225148		

VALUE ENGINEERING PROPOSAL AV-03
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE: Reduce outside paved shoulder width

FUNCTION: **Accommodate Vehicles**

BASELINE ASSUMPTION:

Existing outside shoulder design provides a 12 FT graded shoulder with a 10 FT paved shoulder.

PROPOSED ALTERNATIVE:

The VE team proposes an outside graded shoulder design of 10 FT and a paved shoulder of 8 FT.

BENEFITS	RISKS/CHALLENGES
• Maintains AASHTO design standards for interstates	• To meet AASHTO design standards for interstates exceptions must be made for mountainous terrain
• Reduces asphalt placement	• This revision could cause delay to the construction letting
• Reduces future maintenance cost	• Some sections may be near completion on design
• Reduces earthwork	• This revision varies from the existing divided four-lane previously constructed
•	• This revision doesn't satisfy recommended shy line distance according to AASHTO Roadside Design
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 93,286,184	$ 711,000	$ 93,997,184
PROPOSED ALTERNATIVE:	$ 89,740,590	$ 568,000	$ 90,308,590
TOTAL (Baseline less Proposed)	$ 3,545,594	$ 143,000	**$ 3,688,594**
			SAVINGS

VALUE ENGINEERING PROPOSAL AV-03

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Reduce outside paved shoulder width

DISCUSSION/JUSTIFICATION:

Current proposed design includes 12 FT graded shoulders, 10 FT paved shoulders. The VE Study Team proposes constructing 10 FT graded shoulders, 8 FT paved shoulders. This revision falls within AASHTO interstate design standards with exceptions for mountainous terrain. This revision allows room for vehicles to safely utilize the shoulders for emergencies. Additonally, this reduces the excavation by the same amount provided in VE Proposal AV-02 and reduces asphalt placement on the shoulders initially and lowers future maintenance cost of resurfacing this area.

CALCULATIONS (10 FT paved shlder, 9.5 IN base, 1.25 IN surf, 18.5-mile for Const Seq 1, both directions):
113,400 TONS ASPH BASE
14,900 TONS ASPH SURF

CALCULATIONS (8 FT paved shlder, 9.5 IN base, 1.25 IN surf, 18.5-mile for Const Seq 1, both directions):
90,700 TONS ASPH BASE
11,900 TONS ASPH BASE

IMPLEMENTATION CONSIDERATIONS:

This revision falls short of KYTC Design Manual Recommendation of 12 FT paved shoulder on 4 lane freeways, as did the current proposed design. AASHTO Roadside Design Guide recommends 9.2 FT shy line offset for 70 mph design speed, but admits this is generally not considered for decision making. This revision may not be practical for all sections, especially given the progress of the design of roadway/structures and the letting schedule.

For illustration purposes, the entire Const. Seq. 1 has been evaluated at unit costs below. These unit costs were provided by the District as more accurate reflections of historical asphalt costs:

ASPH SURF: $ 95.00/TON
ASPH BASE: $95.00/TON

When combined with VE Proposal No. AV-02, the earthwork savings are doubled.

VALUE ENGINEERING PROPOSAL AV-03

Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Reduce outside paved shoulder width

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
ROADWAY EXC. (Const. Seq. 1)		CY	20,557,921	4.00	82,231,684	20,225,148	4.00	80,900,590
CL3 ASPH BASE 1.00 D		TON	113,400	85.00	9,639,000	90,700	85.00	7,709,500
CL3 ASPH SURF 1.00 D		TON	14,900	95.00	1,415,500	11,900	95.00	1,130,500
					93,286,184			**89,740,590**
							(BASELINE LESS PROPOSED)	**3,545,594**

*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL AV-03

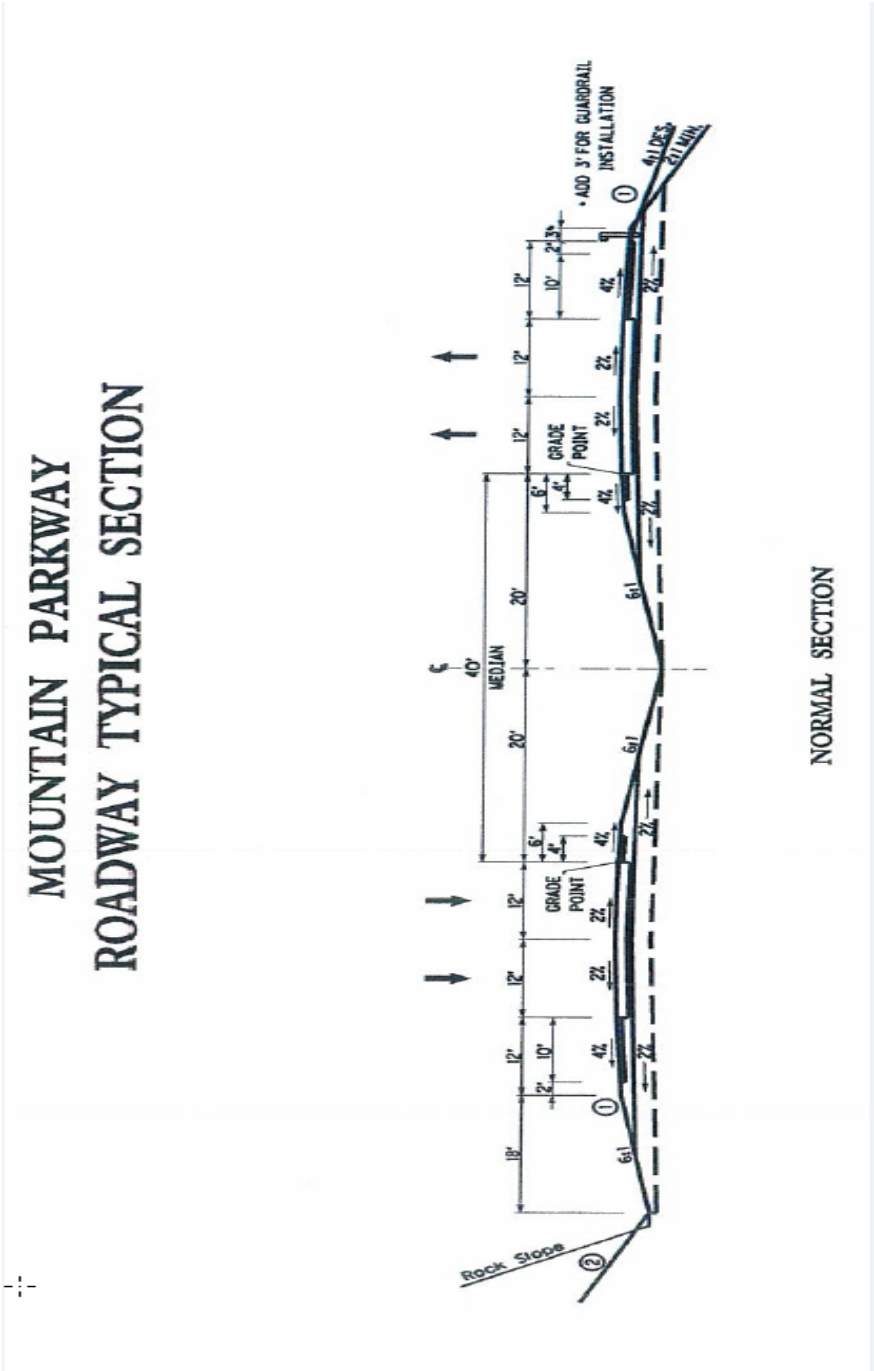
Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Reduce outside paved shoulder width

SKETCH OF BASELINE ASSUMPTION



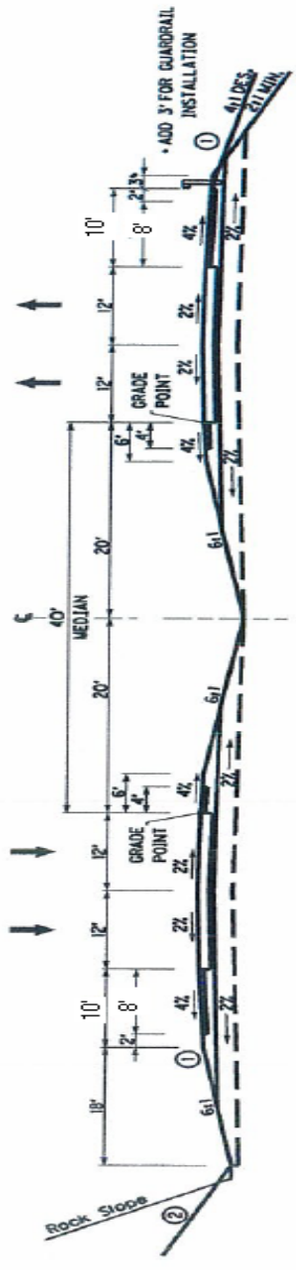
VALUE ENGINEERING PROPOSAL AV-03

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Reduce outside paved shoulder width

SKETCH OF PROPOSED ALTERNATIVE

MOUNTAIN PARKWAY
ROADWAY TYPICAL SECTION



NORMAL SECTION

VALUE ENGINEERING PROPOSAL DS-01
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE:	Change design speed from 65 mph to 60 mph to reduce earthwork
FUNCTION:	**Design Speed**

BASELINE ASSUMPTION:

The current design adheres to the FONSI which dictates a design speed of 65 mph.

PROPOSED ALTERNATIVE:

The proposed alternative evaluates excavation with a reduced design speed of 60 mph.

BENEFITS	RISKS/CHALLENGES
• Reduces excavation	• FONSI reconsiderations
•	• Re-design effort
•	• Reduces design speed
•	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 42,120,000	$ -	$ 42,120,000
PROPOSED ALTERNATIVE:	$ 16,680,000	$ -	$ 16,680,000
TOTAL (Baseline less Proposed)	$ 25,440,000	$ -	**$ 25,440,000**
			SAVINGS

VALUE ENGINEERING PROPOSAL DS-01

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Change design speed from 65 mph to 60 mph to reduce earthwork

DISCUSSION/JUSTIFICATION:

The cost models and estimates indicate the highest cost driver for the project to be excavation of earthwork. To minimize this, the VE team evaluated reducing the design speed from 65 mph to 60 mph.

IMPLEMENTATION CONSIDERATIONS:

Re-evaluation of FONSI.

VALUE ENGINEERING PROPOSAL DS-01

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Change design speed from 65 mph to 60 mph to reduce earthwork

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Excavation		CY	10,530,000	4.00	42,120,000	4,170,000	4.00	16,680,000
					42,120,000			**16,680,000**
							(BASELINE LESS PROPOSED)	**25,440,000**

*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL DS-01

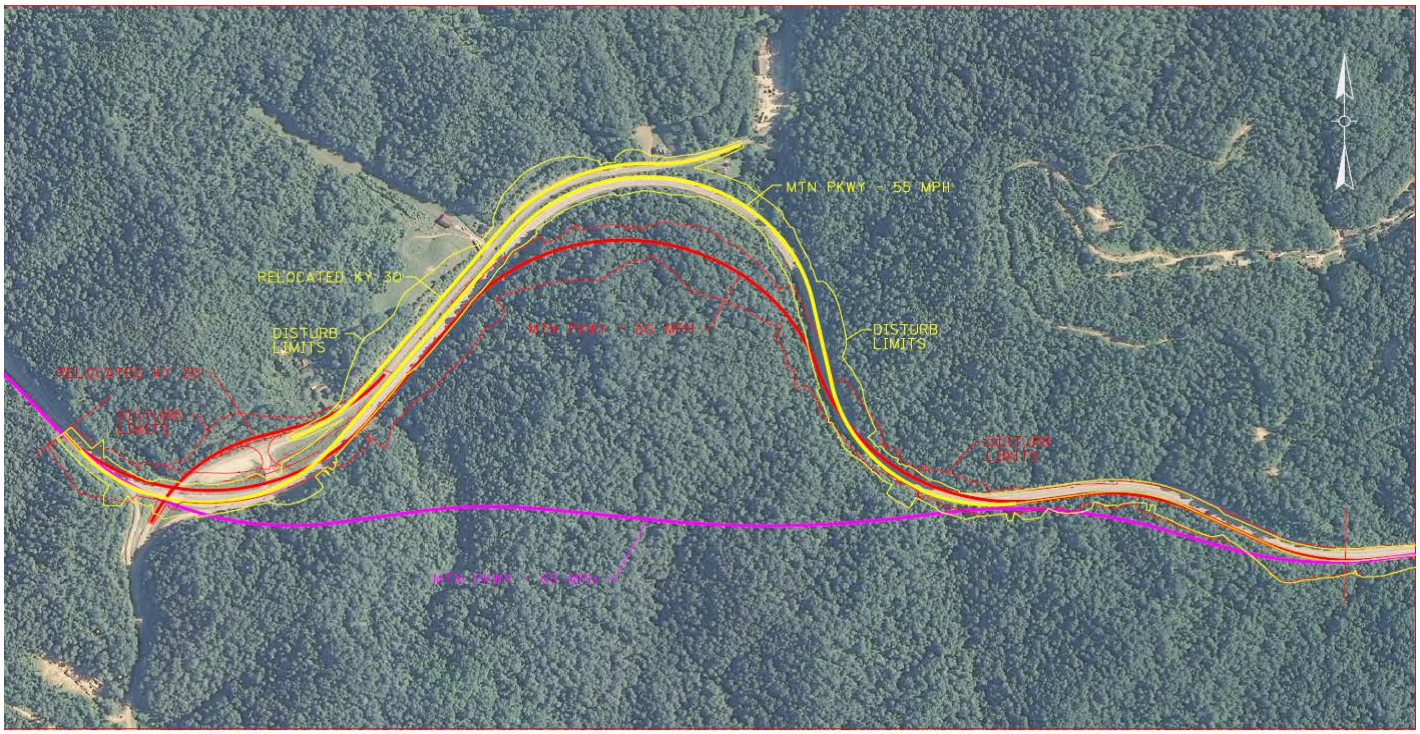
Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Change design speed from 65 mph to 60 mph to reduce earthwork

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL DS-01

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Change design speed from 65 mph to 60 mph to reduce earthwork

SKETCH OF PROPOSED ALTERNATIVE

MOUNTAIN PARKWAY CONSTRUCTION SEQUENCE NO. 1
EXCAVATION COMPARISON

PROJECT	CONSULTANT	ITEM NO.	STATION		LENGTH	EXCAVATION (MILLION CY)			
						PROJECT	SECTION		
						65 MPH		60 MPH	
			BEGIN	END	MILE	CURRENT	CURRENT	REVISED	SAVINGS (millions)
1A	LOCHNER	10-126.70				0.85			N/A
1B	HMB	10-126.60				2.50			N/A
1C	EA	10-126.50				2.41			
			3248+00	3287+00	0.7		1.78	0.42	1.36
1D	AEI	10-126.40				8.23			
			3456+00	3517+00	1.2		4.73	1.51	3.22
			3527+00	3551+00	0.5		0.28	0.09	0.19
			3590+00	3603+00	0.2		0.39	0.15	0.24
1E	MEC	10-167.00				1.53			
			3603+00	3634+00	0.6		1.00	0.32	0.68
1F	PB	10-126.12				3.70			
			3705+00	3784+00	1.5		1.92	1.48	0.44
1G	VM	10-140.00				1.34			
			3848+00	3891+00	0.8		0.43	0.20	0.23
					5.5	20.56	10.53	4.17	6.36

TOTAL DIFFERENCE	6.36

TOTAL CONSTUCTION SEQUENCE 1	20.56		14.20

VALUE ENGINEERING PROPOSAL DS-02
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE:	Change design speed from 65 mph to 55 mph to reduce earthwork
FUNCTION:	**Design Speed**

BASELINE ASSUMPTION:

The current design adheres to the FONSI which dictates a design speed of 65 mph.

PROPOSED ALTERNATIVE:

The proposed alternative evaluates excavation with a reduced design speed of 55 mph.

BENEFITS	RISKS/CHALLENGES
• Reduces excavation	• FONSI reconsiderations
•	• Re-design effort
•	• Reduces design speed
•	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 42,120,000	$ -	$ 42,120,000
PROPOSED ALTERNATIVE:	$ 9,040,000	$ -	$ 9,040,000
TOTAL (Baseline less Proposed)	$ 33,080,000	$ -	**$ 33,080,000**
			SAVINGS

VALUE ENGINEERING PROPOSAL DS-02

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Change design speed from 65 mph to 55 mph to reduce earthwork

DISCUSSION/JUSTIFICATION:

The cost models and estimates indicate the highest cost driver for the project to be excavation of earthwork. To minimize this, the VE team evaluated reducing the design speed from 65 mph to 55 mph.

IMPLEMENTATION CONSIDERATIONS:

Re-evaluation of FONSI.

VALUE ENGINEERING PROPOSAL DS-02

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Change design speed from 65 mph to 55 mph to reduce earthwork

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Excavation		CY	10,530,000	4.00	42,120,000	2,260,000	4.00	9,040,000
					42,120,000			**9,040,000**
							(BASELINE LESS PROPOSED)	**33,080,000**

*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL DS-02

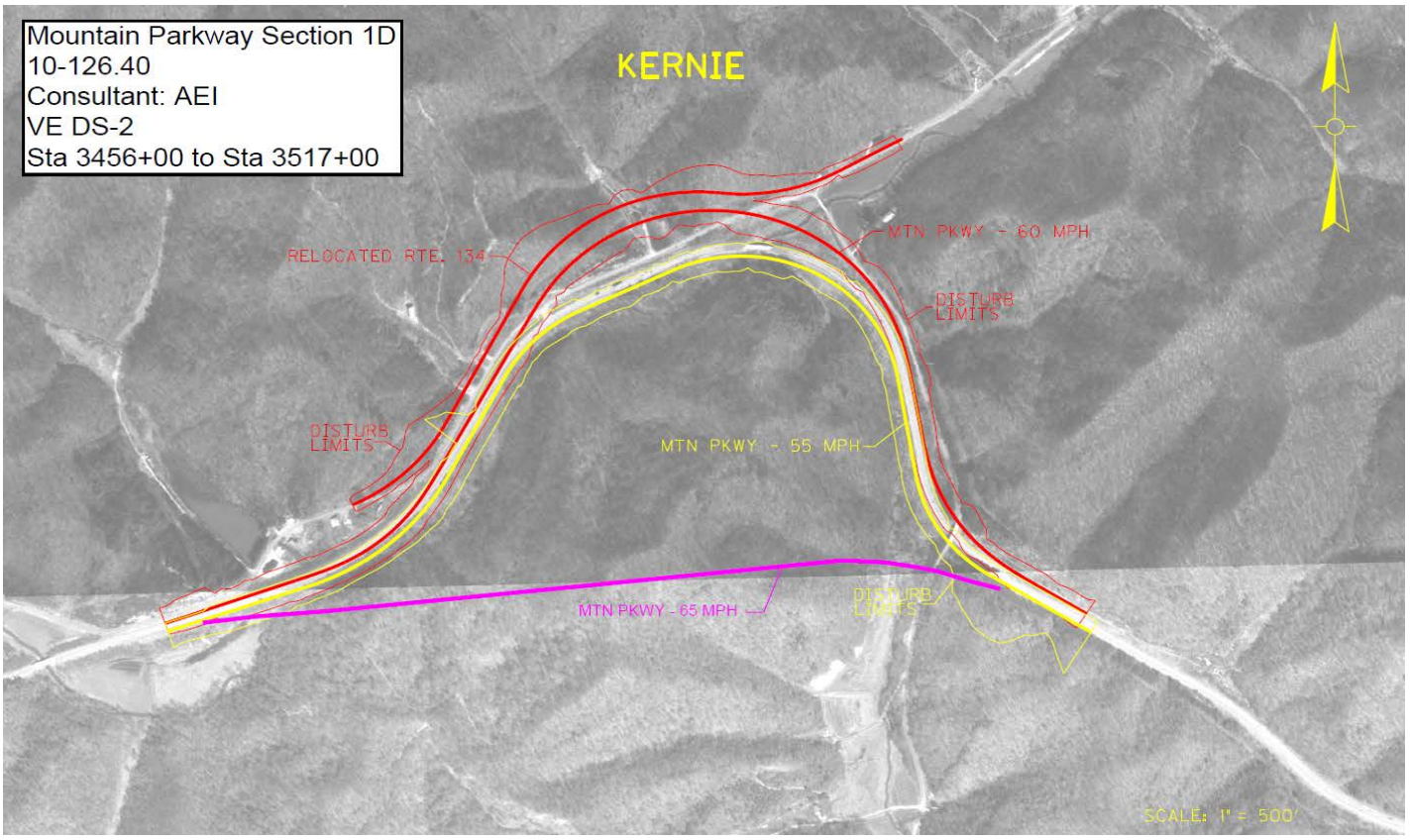
Kentucky Transportation Cabinet

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Change design speed from 65 mph to 55 mph to reduce earthwork

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL DS-02

Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00,
Wolfe, Morgan and Magoffin Counties

TITLE: Change design speed from 65 mph to 55 mph to reduce earthwork

SKETCH OF PROPOSED ALTERNATIVE

MOUNTAIN PARKWAY CONSTRUCTION SEQUENCE NO. 1
EXCAVATION COMPARISON

PROJECT	CONSULTANT	ITEM NO.	STATION		LENGTH	EXCAVATION (MILLION CY)			
						PROJECT	SECTION		
						65 MPH		55 MPH	
			BEGIN	END	MILE	CURRENT	CURRENT	REVISED	SAVINGS (millions)
1A	LOCHNER	10-126.70				0.85			N/A
1B	HMB	10-126.60				2.50			N/A
1C	EA	10-126.50				2.41			
			3248+00	3287+00	0.7		1.78	0.36	1.42
1D	AEI	10-126.40				8.23			
			3456+00	3517+00	1.2		4.73	0.39	4.34
			3527+00	3551+00	0.5		0.28	0.09	0.19
			3590+00	3603+00	0.2		0.39	0.15	0.24
1E	MEC	10-167.00				1.53			
			3603+00	3634+00	0.6		1.00	0.32	0.68
1F	PB	10-126.12				3.70			
			3705+00	3784+00	1.5		1.92	0.75	1.17
1G	VM	10-140.00				1.34			
			3848+00	3891+00	0.8		0.43	0.20	0.23
					5.5	20.56	10.53	2.26	8.27

TOTAL DIFFERENCE	8.27

TOTAL CONSTUCTION SEQUENCE 1	20.56		12.29

VALUE ENGINEERING PROPOSAL C-05DS
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE:	Package construction bids to have bridges built separately
FUNCTION:	**Constructability**
BASELINE ASSUMPTION:	
Each project is expected to be bid separately with grade, drain, and surfacing included in one contract.	
PROPOSED ALTERNATIVE:	
This alternative proposes that a contract can be let that combines structures from one section or multiple sections into one contract.	

BENEFITS	**RISKS/CHALLENGES**
• Better structure costs	• Some structures can't be built independently
• More structure competition	•
• Could expedite construction	•
•	•
•	•
•	•
•	•
•	•

DESIGN SUGGESTION

VALUE ENGINEERING PROPOSAL C-05DS

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Package construction bids to have bridges built separately

DISCUSSION/JUSTIFICATION:

This corridor requires a large number of new structures to be constructed. It may be beneficial to package structures into a separate contract from grade and surfacing. If this were implemented the owner would likely see a reduction in costs of the structures due to larger quantities being bid and more bid competition.

Structures could be packaged inside one section or a package of structures may include multiple sections.

IMPLEMENTATION CONSIDERATIONS:

This suggestion may not be able to be implemented in all areas. Some structures cannot be built independently due to maintenance of traffic.

VALUE ENGINEERING PROPOSAL C-07DS
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE:	Package construction bids to have pavement bid/built separately
FUNCTION:	**Constructability**
BASELINE ASSUMPTION:	
Each project is expected to be with grade, drain, and surfacing included in one contract.	
PROPOSED ALTERNATIVE:	
This alternate proposes that surfacing should be bid in a separate contract than grade and drain.	

BENEFITS	**RISKS/CHALLENGES**
• More competitive bids	• Maintenance of traffic
•	•
•	•
•	•
•	•
•	•
•	•
•	•

DESIGN SUGGESTION

VALUE ENGINEERING PROPOSAL C-07DS

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Package construction bids to have pavement bid/built separately

DISCUSSION/JUSTIFICATION:

This corridor has 7 design/construction sections. There are 3 major costs in each section: excavation, pavement, and structures. Historically, this region of Kentucky has little to no competitive asphalt bids. When pavement becomes the dominant cost on a project, it could result in the pavement contractor controlling the bid by partnering with one grade contractor.

Of the 7 projects we are looking at, pavement is a very dominant cost on three sections. These sections are 10-126.70, 10-126.60, and 10-140. It could end up being the highest cost item based on asphalt prices at the time these projects are let to construction.

Bidding the pavement separately would allow more competition by grade contractors which would bring excavation costs and the total project costs down.

IMPLEMENTATION CONSIDERATIONS:

One challenge to implementing this is maintenance of traffic concerns. In many sections, the MOT plan is to shift traffic onto a newly built 2 lane section while the opposing 2 lane section is completed. This would not be a concern through the cross country sections or if a section of Mountain Parkway could be shut down and detoured during construction.

VALUE ENGINEERING PROPOSAL C-08DS
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

TITLE: Establish blast windows to provide longer work windows

FUNCTION: **Constructability**

BASELINE ASSUMPTION:

The current allowable work conditions are as follows:
*No lane closures from 7:00 a.m. until 9:00 a.m.
*No lane closures from 3:00 p.m. until 6:00 p.m. (3:00 p.m. because of schools)
*Work hours are 9:00 a.m. until 3:00 p.m. and/or 6:00 p.m. until 7:00 a.m.
*Allowable closure of up to 20 minutes during other times

PROPOSED ALTERNATIVE:

Allow longer Mountain Parkway closures (during work hours identified above) to provide a longer blast window for the contractor.

BENEFITS	RISKS/CHALLENGES
• Longer clear time after blasting	• Public Inconvenience
• Improves production rates	• Emergency response considerations
• Potentially lower bid prices	•
•	•
•	•
•	•
•	•
•	•

DESIGN SUGGESTION

VALUE ENGINEERING PROPOSAL C-08DS

Kentucky Transportation Cabinet

Mountain Parkway Corridor - Construction Sequence 1

Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00

Wolfe, Morgan and Magoffin Counties

TITLE: Establish blast windows to provide longer work windows

DISCUSSION/JUSTIFICATION:

If blasted excavation blocks a roadway, the contractor will be required to remove the material and ensure a safe passageway for motorists. The allowable 20 minute closures may not be enough time to hold traffic if a blast causes excavation material to obstruct the roadway.

IMPLEMENTATION CONSIDERATIONS:

There are a couple of considerations that will need to be taken into account. First is the idea that traffic may be stopped longer than the 20 minutes currently allowed. This may not be received well by some. Another concern would be the ability to provide timely emergency response if needed. With longer closures, there is the possibility of more vehicles accummulating, which would take longer to clear once all lanes are re-opened.

APPENDICES

APPENDIX A
Study Participants

VE STUDY ATTENDEES
Mountain Parkway Corridor – Construction Sequence 1
Items #10-126.70, 10-126.60, 10-126.50, 10-126.40, 10-167.00, 10-126.12, 10-140.00
Wolfe, Morgan and Magoffin Counties

May 2014					NAME	ORGANIZATION	POSITION	TELEPHONE		CELL	
12	13	14	15	16				E-MAIL			
X	X	X			Renee Hoekstra	RHA, LLC	Team Leader	602	493-1947	623	764-7490
								Renee@TeamRHA.com			
X	X	X	X	X	Patrice Miller	RHA, LLC	Assistant Team Leader	602	493-1947	480	773-8533
								Patrice@TeamRHA.com			
X				X	Marshall Carrier	KYTC	Project Manager KYTC Mountain Parkway	502	782-4872		
								Marshall.Carrier@ky.gov			
X				X	Mike Vaughn	KYTC	Value Engineering Coordinator	502	782-4923		
								Mike.Vaughn@ky.gov			
X	X	X	X	X	Darren Back	KYTC	VE TEAM: Roadway	606	666-8841		
								Darren.Back@ky.gov			
X	X	X	X	X	Travis Carrico	KYTC	VE TEAM: Construction / Constructability	502	782-4871		
								Travis.Carrico@ky.gov			
X	X	X	X	X	Shawn Russell	KYTC	VE TEAM: Construction / Constructability	502	782-4926		
								Shawn.Russell@ky.gov			
X	X	X	X	X	Bill Morris	Stantec	VE TEAM: Roadway	859	233-2100		
								Bill.Morris@stantec.com			
X	X	X	X	X	Christopher Jenkins	Qk4	VE TEAM: Construction	865	661-1554	865	254-3118
								cjenkins@qk4.com			
X	X	X	X	X	Danny Woods	Stantec	VE TEAM: Structures	859	233-2100	859	475-8744
								Danny.Woods@stantec.com			

VE STUDY ATTENDEES
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Wolfe, Morgan and Magoffin Counties

May 2014					NAME	ORGANIZATION	POSITION	TELEPHONE		CELL	
12	13	14	15	16				E-MAIL			
X	X	X	X	X	Adam Crace	Stantec	VE TEAM: Geotechnical	859	422-3084	859	299-3992
								acrace@stantec.com			
X	X	X	X	X	Harsha Wijesiri	Integrated Engineering	VE TEAM: Drainage	859	368-0145	859	351-9748
								harsha@int-engineering.com			
X				X	Aric Skaggs	KYTC District 10	Team Project Development	606	666-8841	606	207-5004
								Aric.Skaggs@ky.gov			
				X	Paul Looney	KYTC SHE Office	ASHE				
								Paul.Looney@ky.gov			
				X	Samuel Hale	KYTC District 12	Team Project Development	606	433-7791	606	226-1011
								Samuel.Hale@ky.gov			
				X	Glen Kelly	Qk4	President	502	693-6278		
								gkelly@qk4.com			
				X	Glenn Hardin	Stantec	Roadway	859	233-2100		
								Glenn.Hardin@stantec.com			
				X	Eileen Vaughan	KYTC C.O.	Planning				
								Eileen.Vaughan@ky.gov			
				X	Jason Blackburn	KYTC District 10	Planning				
								Jason.Blackburn@ky.gov			
				X	Brent Sweger	KYTC C.O. Highway Design	Location Engineer				
								Brent.Sweger@ky.gov			

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Mountain Parkway Corridor – Construction Sequence 1
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Wolfe, Morgan and Magoffin Counties

May 2014					NAME	ORGANIZATION	POSITION	TELEPHONE		CELL	
12	13	14	15	16				E-MAIL			
				X	Corbett Caudill	KYTC District 10	Executive Director				
								Corbett.Caudill@ky.gov			
				X	Bill Gulick	KYTC Highway Design	Director				
								Bill.Gulick@ky.gov			
				X	Brad Eldridge	KYTC Design	Roadway Design Branch				
								Brad.Eldridge@ky.gov			

APPENDIX B
Pareto Cost Models

Appendix B – Cost Models

The team studied one project; however, these were reviewed as seven project sections. Each of the seven sections have separate cost models. These are shown on the next several pages.

In addition, the VE team discussed the cost estimates for each design section; comments are provided by design section as follows:

10-126.70
- Unit price for roadway excavation is high
- Cost per ton for surface course and base course is low

10-126.60
- Cost per ton for surface course and base course is low

10-126.50
- Unit price for roadway excavation is high

10-126.40
- Base course unit price is low

10-167.00
- Unit price for roadway excavation a little high
- Cost per ton for base course is low; surface course is a little low

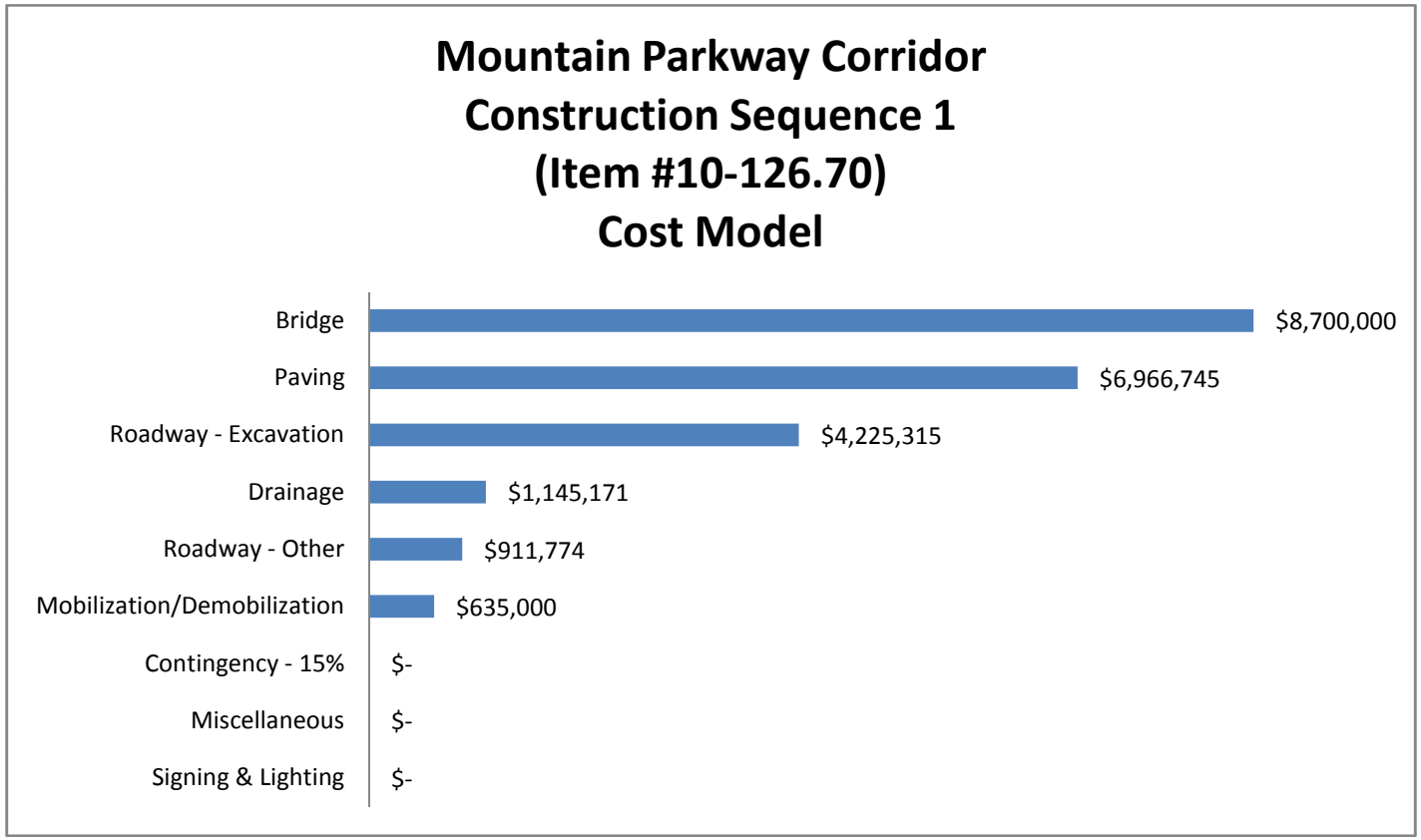
10-126.12
- Unit price for roadway excavation is high
- Cost estimate in square yards versus by the ton; price appears okay

10-140.00
- Cost per ton for base course is low

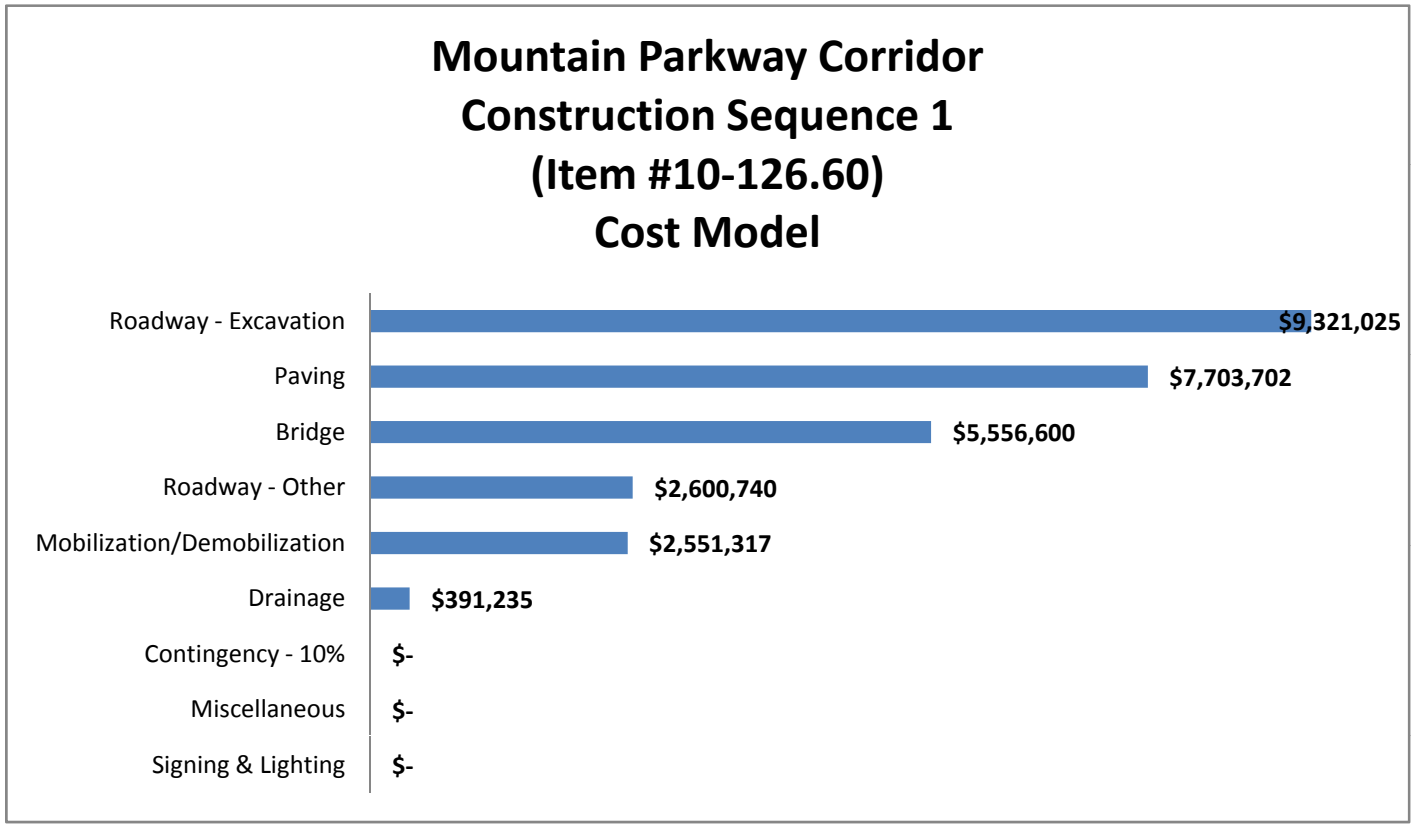
For the purposes of this VE study, the following prices were used in estimating costs for assumed baseline and proposed alternative:

- Base course - $85/ton
- Asphalt - $95/ton
- Excavation - $4/CY

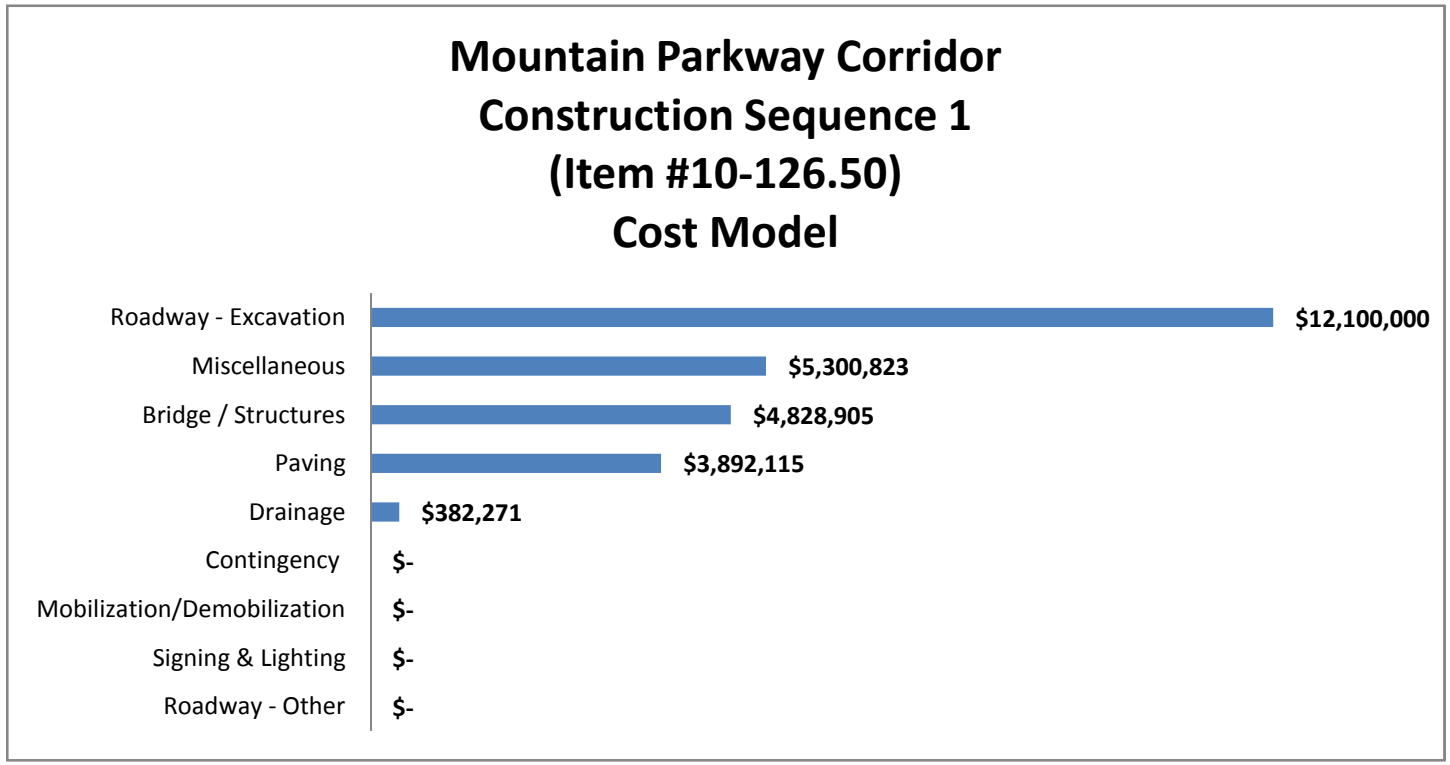
Work Item Description	Cost	% of Total	Comments
Signing & Lighting	$ -	0%	
Miscellaneous	$ -	0%	
Contingency - 15%	$ -	0%	
Mobilization/Demobilization	$ 635,000	3%	
Roadway - Other	$ 911,774	4%	
Drainage	$ 1,145,171	5%	
Roadway - Excavation	$ 4,225,315	19%	
Paving	$ 6,966,745	31%	
Bridge	$ 8,700,000	39%	
Total	**$ 22,584,004**	**100%**	



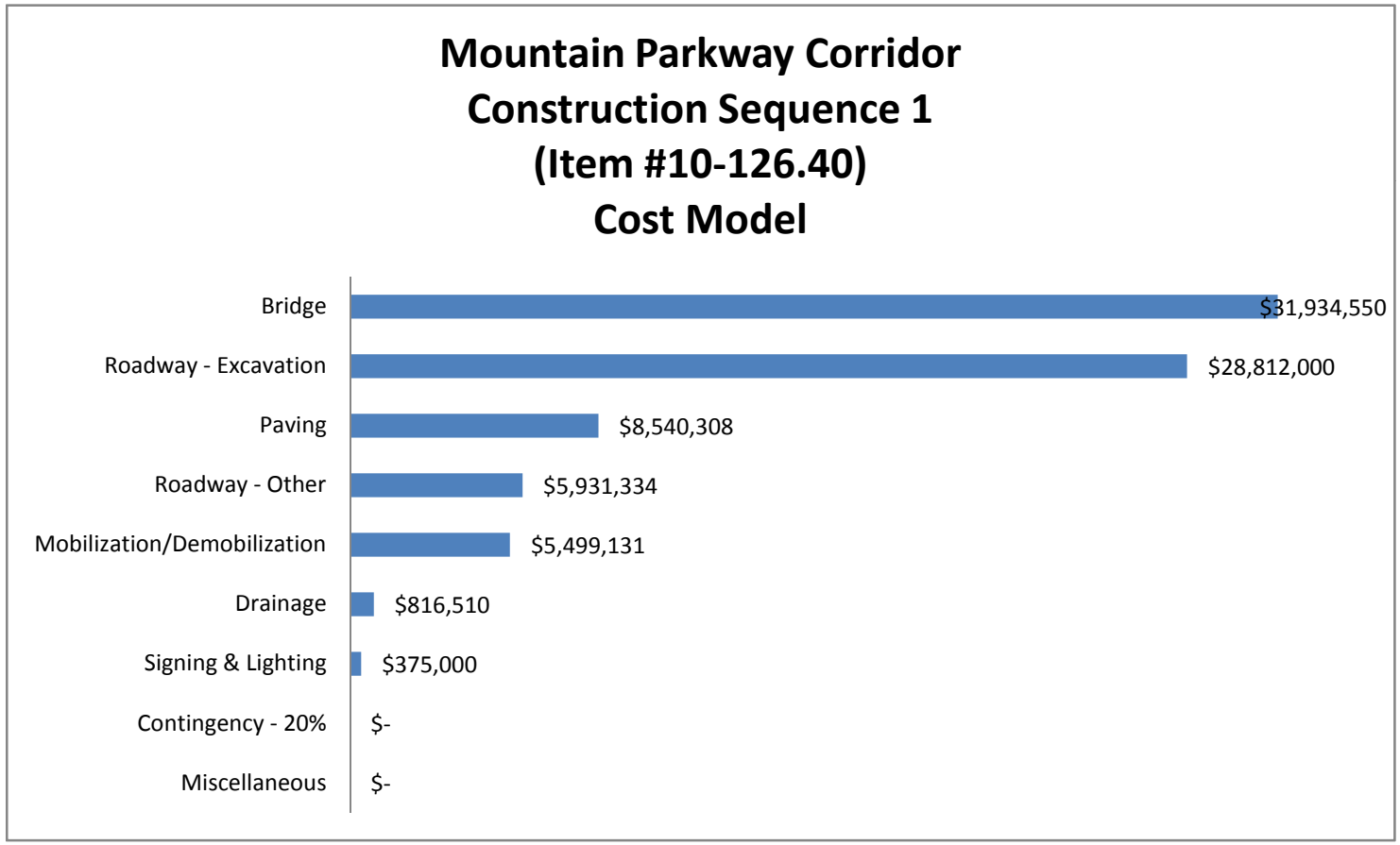
Work Item Description	Cost	% of Total	Comments
Signing & Lighting	$ -	0%	
Miscellaneous	$ -	0%	
Contingency - 10%	$ -	0%	
Drainage	$ 391,235	1%	
Mobilization/Demobilization	$ 2,551,317	9%	
Roadway - Other	$ 2,600,740	9%	
Bridge	$ 5,556,600	20%	
Paving	$ 7,703,702	27%	
Roadway - Excavation	$ 9,321,025	33%	
Total	**$ 28,124,618**	**100%**	



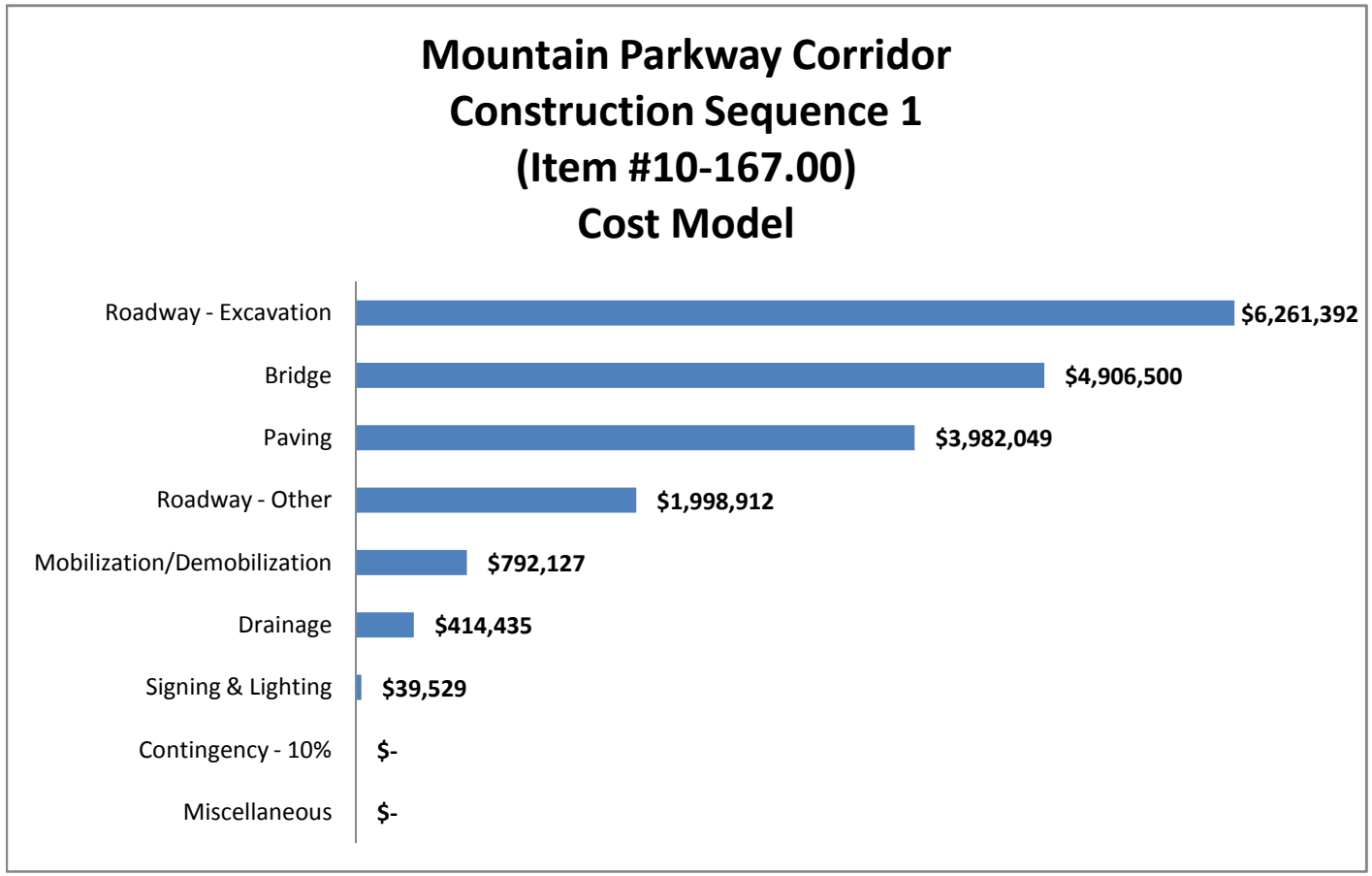
Work Item Description	Cost	% of Total	Comments
Roadway - Other	$ -	0%	
Signing & Lighting	$ -	0%	
Mobilization/Demobilization	$ -	0%	
Contingency	$ -	0%	
Drainage	$ 382,271	1%	
Paving	$ 3,892,115	15%	
Bridge / Structures	$ 4,828,905	18%	
Miscellaneous	$ 5,300,823	20%	
Roadway - Excavation	$ 12,100,000	46%	
Total	**$ 26,504,114**	**100%**	



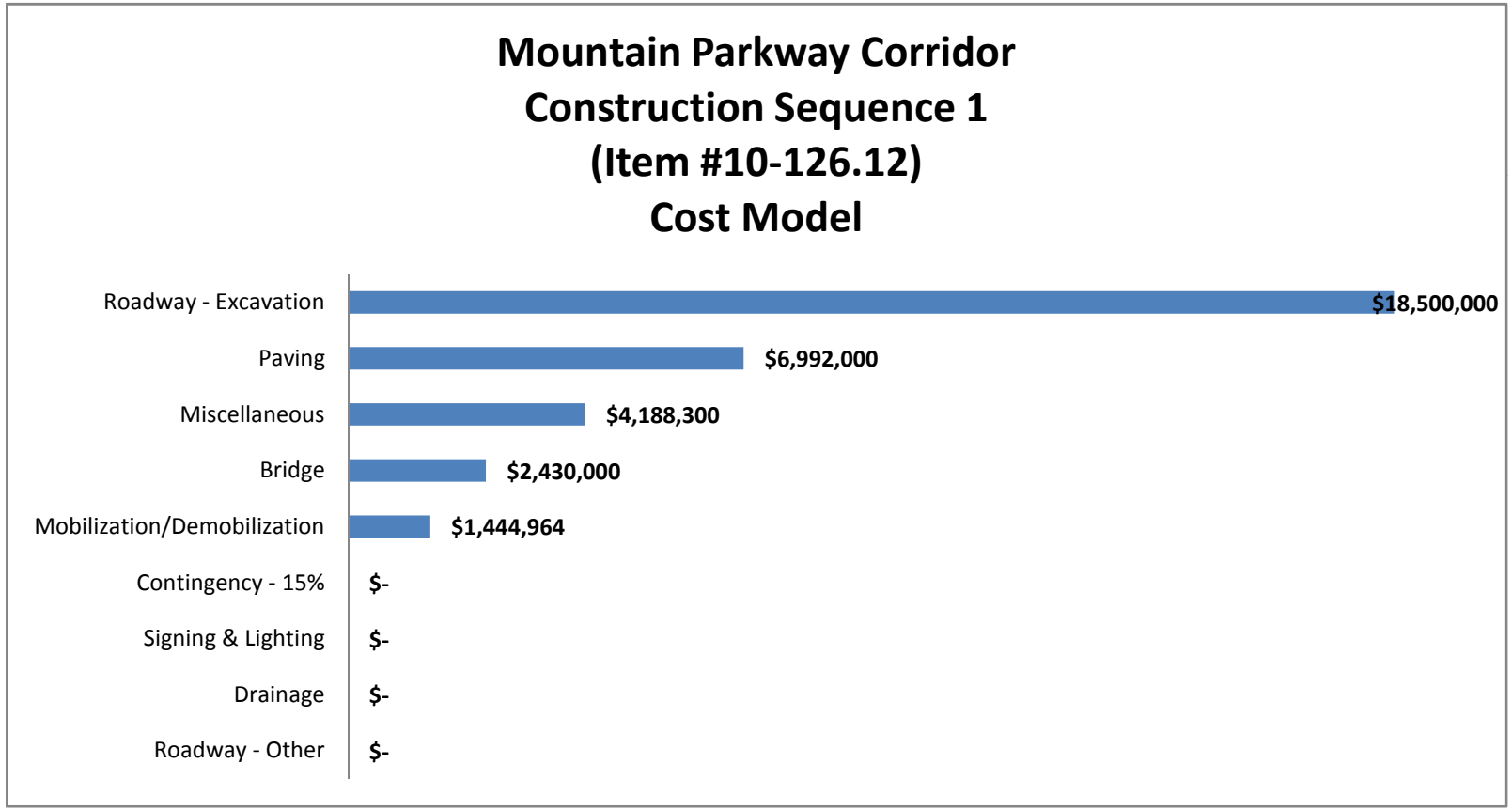
Work Item Description	Cost	% of Total	Comments
Miscellaneous	$ -	0%	
Contingency - 20%	$ -	0%	
Signing & Lighting	$ 375,000	0%	
Drainage	$ 816,510	1%	
Mobilization/Demobilization	$ 5,499,131	7%	
Roadway - Other	$ 5,931,334	7%	
Paving	$ 8,540,308	10%	
Roadway - Excavation	$ 28,812,000	35%	
Bridge	$ 31,934,550	39%	
Total	**$ 81,908,833**	**100%**	



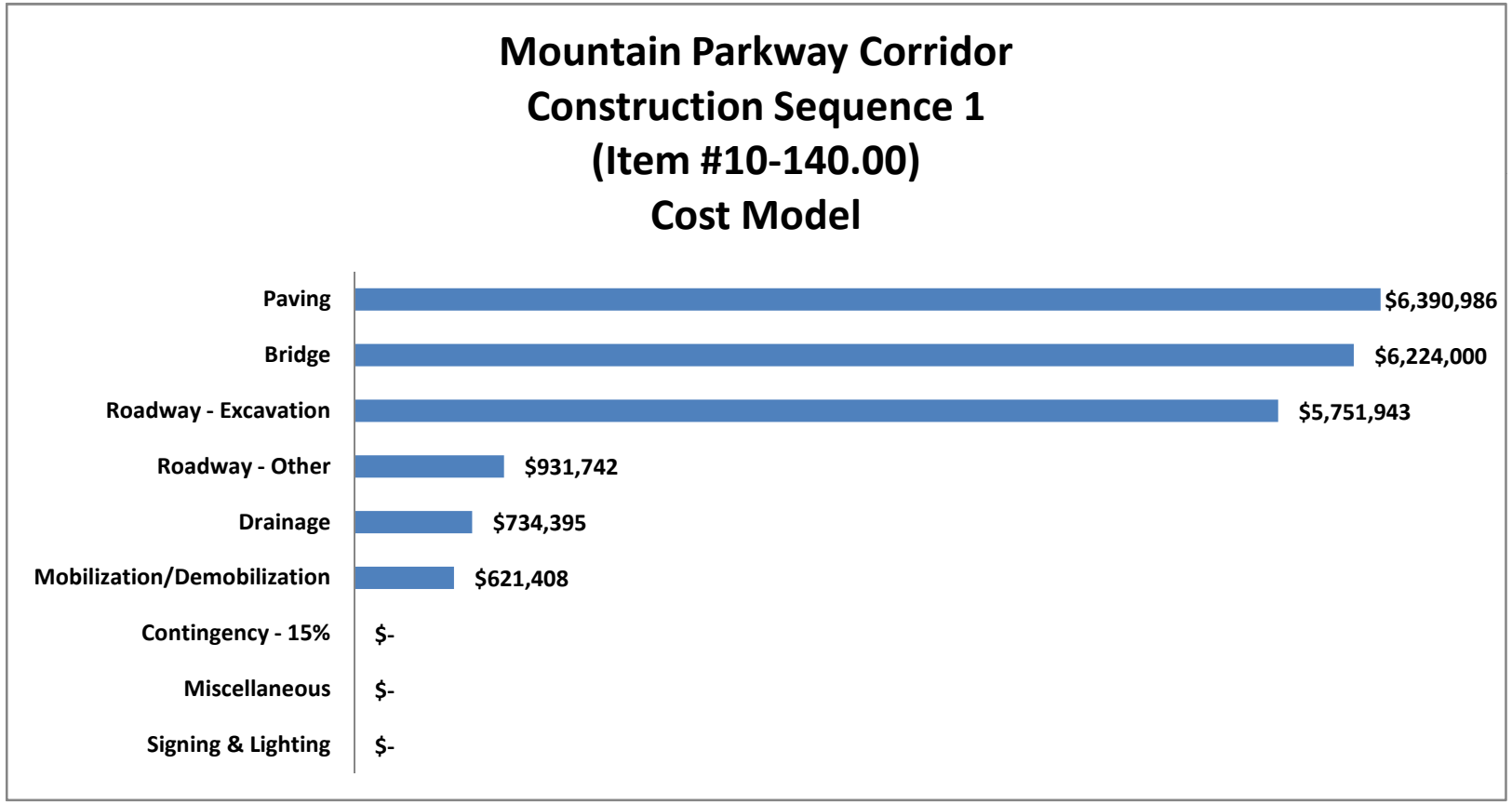
Work Item Description	Cost	% of Total	Comments
Miscellaneous	$ -	0%	
Contingency - 10%	$ -	0%	
Signing & Lighting	$ 39,529	0%	
Drainage	$ 414,435	2%	
Mobilization/Demobilization	$ 792,127	4%	
Roadway - Other	$ 1,998,912	11%	
Paving	$ 3,982,049	22%	
Bridge	$ 4,906,500	27%	
Roadway - Excavation	$ 6,261,392	34%	
Total	**$ 18,394,944**	**100%**	



Work Item Description	Cost	% of Total	Comments
Roadway - Other	$ -	0%	
Drainage	$ -	0%	
Signing & Lighting	$ -	0%	
Contingency - 15%	$ -	0%	
Mobilization/Demobilization	$ 1,444,964	4%	
Bridge	$ 2,430,000	7%	
Miscellaneous	$ 4,188,300	12%	
Paving	$ 6,992,000	21%	
Roadway - Excavation	$ 18,500,000	55%	
Total	**$ 33,555,264**	**100%**	



Work Item Description	Cost	% of Total	Comments
Signing & Lighting	$ -	0%	
Miscellaneous	$ -	0%	
Contingency - 15%	$ -	0%	
Mobilization/Demobilization	$ 621,408	3%	
Drainage	$ 734,395	4%	
Roadway - Other	$ 931,742	5%	
Roadway - Excavation	$ 5,751,943	28%	
Bridge	$ 6,224,000	30%	
Paving	$ 6,390,986	31%	
Total	**$ 20,654,474**	**100%**	



APPENDIX C
Function Analysis

Appendix C – Function Analysis

Function definition and analysis is the heart of Value Engineering. It is the primary activity that separates VE from all other "improvement" programs. The objective of this phase is to ensure the entire team agrees upon the purposes for the project elements. Furthermore, this phase assists with development of the most beneficial areas for continuing study.

The VE team identified the functions of the projects based on the entire corridor using active verbs and measurable nouns. This process allowed the team to truly understand all of the functions associated with the project.

Function	Classification
Promote Economic-Growth	***Higher Order***
Ensure Connectivity	***Higher Order***
Increase Capacity	**Basic**
Control Access	Secondary
Accommodate Vehicles	Secondary
Separate Traffic	Secondary
Span Space	Secondary
Clear Right-of-way	Secondary
Store Materials	Secondary
Accommodate Utilities	Secondary
Convey Stormwater	Secondary
Mitigate Impact	Secondary
Maximize Budget	Secondary
Ensure Safety	Secondary
Build Project	Lower Order (Assumed)

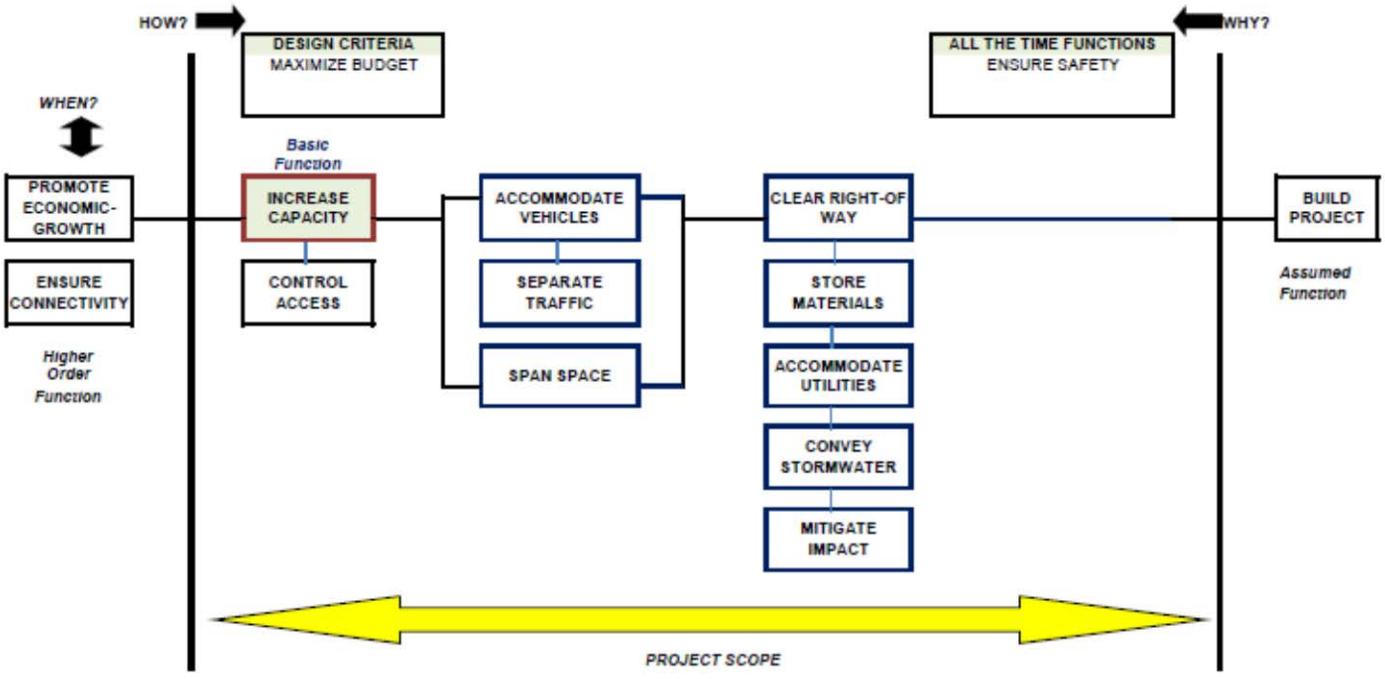
The definitions of the classifications are:

Higher Order Function defines the problem (study) goal and is outside the scope of the study.

Basic Function defines a performance feature that *must* be obtained to satisfy only user's needs not desires. It answers the question, “What must it do?”.

Secondary Functions defines required performance features other than those that must be accomplished. These are the user’s desires and answers the question, “What else do we want or does it do?”.

The following represents the Function Analysis Systems Technique (FAST) Diagram completed for this project.



APPENDIX D
Creative Idea List & Evaluation

Appendix D – Creative List and Evaluation Process

Creative Idea List
The list of ideas and comments that resulted from the study is included in this appendix. Some of the ideas were selected for further development as represented in the previous section.

Performance Attributes
The project manager helped to define the key performance attributes for the VE team members to use for evaluation. The following key attributes were used to score the ideas (see below):

- Maintainability – looking at long-term impacts related to project; ability and cost to maintain facility
- Mainline Operations – Level of Service, 4-lane, horizontal and vertical alignments, throughput, driver expectations (permanent)
- Schedule – delivery (process)
- Environmental – impacts to streams (interim and permanent)
- Constructability – ease of construction
- Maintenance of Traffic – construction impacts (interim), timing, phasing

Evaluation Process
To aid in the evaluation of the ideas, the team scored the ideas using a value index (shown on following page).

The ideas were scored relative to the criteria previously discussed. The prioritization for further development and documentation is as follows:

Score =
- 4-5 – Number of votes meeting the criteria (Workbook)
- 2-3 – Number of votes meeting the criteria (No workbook)
- DS – Design Suggestion (No workbook)
- DS* – Design Suggestion (Workbook)
- FF (1) – Fatal Flaw
- ABC – Already Been Considered
- OS – Outside Scope

The creative idea list represents all of the ideas and includes scoring for the ideas that were rated using the value index.

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Value Relationship		**Value Index = $\frac{\text{Function}}{\text{Cost}}$ = $\frac{\text{F}}{\text{C}}$**					
Rating							
5.	Great Opportunity	F C--	F+ C-	F++ C	F++ C-	F++ C--	F++ C+
4.	Good Opportunity	F- C--	F C-	F+ C	F+ C-	F+ C+	F++(*) C++
3.	Moderate Value	F-- C--	F- C-	F++(*) C++			
2.	Poor Value	F-- C	F-- C--	F C+	F C++		
1.	Unacceptable Impacts/Fatal Flaw						

*Is the Function improved to the point that it overcomes the high cost?

VALUE CUE KEY – MAGNITUDE OF CHANGE

F	=	No impact to function
F-	=	Small negative impact to function
F--	=	Large negative impact to function
F+	=	Small increase in function
F++	=	Large increase in function
C	=	No impact to cost
C-	=	Small decrease in cost
C--	=	Large decrease in cost
C+	=	Small increase in cost
C++	=	Large increase in cost

Creative Idea List

No.	Description	Score
SS	**SPAN SPACE**	
	10-126.70 (1)	
SS-01	Use a wagon box on local roads in lieu of bridges	w/SS-02
SS-02	Shift the interchange further north	2
SS-03	Shift the interchange to the east - eliminate bridges over creeks	3
SS-04	Use an arch-bridge for Mountain Parkway, KY 205 and ramps	4
SS-05	Use an arch bridge in lieu of box culvert - three opportunities	4
	10-126.60 (2)	
SS-06	Use single-span bridge at Sta. 3072+55 in lieu of three-span bridge	4
SS-07	Use single-span bridge with MSE walls at Sta. 3134+68.50 in lieu of three-span bridge	3
SS-08	Use single-span bridge with MSE walls at Sta. 3224+88 in lieu of three-span bridge	5
SS-09	Use composite beams in lieu of concrete beams for longer spans	FF
SS-10	Evaluate bridges to see if any parts are reusable	DS
SS-11	Use concrete piles in lieu of H-piles or spread footings	DS*
	10-126.50 (3)	
SS-12	Reduce bridge at Sta. 3350+00 from 4-span to 3-span	5
SS-13	Reduce the 8% superelevation on the bridge at Johnson Creek Road	4
	10-126.40 (4)	
SS-14	Use MSE wall to shorten the bridge length at Sta. 3390+00	w/SS-08
SS-15	Shift the alignment north to eliminate four twin bridges	3
SS-16	Shift the alignment south to eliminate five twin bridges	5
SS-17	Shift KY 134 to the north, use culvert crossings in lieu of bridges	FF
SS-18	Use MSE wall abutments to eliminate spans - 2 opportunities	3
SS-19	Eliminate the interchange of Section 10-126.40 at KY 134	4
SS-20	Use a partial access interchange	3
SS-21	Relocate ramp 1 directly across to ramp 4	3
SS-22	Use CON/SPAN at Sta. 3506+00 in lieu of a 3-span box	4
	10-167.00 (5)	
SS-23	Use a combination of CON/SPAN and MSE walls to reduce the impact to the overall footprint	3
SS-24	Use 3-sided precast culverts in lieu of triple box culverts	2
	10-126.12 (6)	
SS-25	Use SPUI in lieu of a full diamond interchange	4

Creative Idea List

No.	Description	Score
SS-26	Use MSE walls to reduce the bridge from 4-span to 2-span at the interchange, Sta. 3645+00 (Gifford Road over Mountain Parkway)	w/SS-08
SS-27	Reduce the 7.9% elevation on the bridge to 6%	3
CR	**CLEAR RIGHT OF WAY**	
	10-126.12 (6)	
CR-01	Use median barrier to reduce the footprint through the cuts	4
CR-02	Eliminate the full access control	FF
CR-03	Ensure that right of way identification is very liberal to account for back slopes	DS
CR-04	Bifurcate the road on one side at a higher elevation to reduce cuts	4
CR-05	At Sta. 3705+00 to 3765+00 raise the grade to balance earthwork and reduce cuts	5
CR-06	Flatten fill slopes to balance earthwork from Sta. 3705+00 to 3765+00	4
CR-07	Use the existing area between the ramps as fill areas	DS*
CR-08	Introduce false cuts to reduce fill area footprint and waste site needs	4
CR-09	Use MSE walls for retaining walls to reduce cuts	4
	10-167.00 (5)	
CR-10	Have the county take more fill in the engineered fill location	DS
CR-11	Use the abandoned areas of the existing Mountain Parkway for fill areas	w/CR-07
	10-126.40 (4)	
CR-12	Move the interchange to Sta. 3510+00 - Sta. 3046+00	w/SS-15 and SS-16
CR-13	Raise the grade from Sta. 3460+00 to 3510+00	3
CR-14	Move alignment from Sta. 3595+00 to 3615+00, shift back to the existing alignment	4
CR-15	Move alignment from Sta. 3530+00 to 3550+00	4
CR-16	Go over the existing Sta. 3046+00 with new Mountain Parkway	w/CR-14
	10-126.50 (3)	
CR-17	Shift alignment to the north Sta. 3253+00 to 3295+00 to reduce excavation and reduce curvature	w/SS-13
	10-126.60 (2)	
CR-18	Eliminate the interchange at KY 134	2

Creative Idea List

No.	Description	Score
CR-19	Provide slope protection in cut areas to reduce the18 FT ditch	w/CR-20
CR-20	Provide a rock fall fence to reduce the 18 FT ditch setback	3
	10-126.70 (1)	
CR-21	Use a jug handle interchange in lieu of a diamond interchange	4
C	**CONSTRUCTABILITY**	
C-01	Develop sequencing schedule for construction	DS
C-02	Complete early construction package to construct roadway portions that are off the existing alignment	4
C-03	Detour traffic in 10-126.70 onto KY 191/KY 134 to close parkway during construction	5
C-04	Detour traffic in 10-126.60 onto KY 134/KY 191 to close parkway during construction	4
C-05	Package construction bids to have bridges built separately	DS*
C-06	Package construction bids to have grade and drain bid/built separately	DS
C-07	Package construction bids to have pavement bid/built separately	DS*
C-08	Establish blast windows to provide longer work windows	DS*
C-09	Allow temporary closures of Mountain Parkway	DS
C-10	Provide an early completion bonus	DS
C-11	Provide a contractor coordination clause in the specifications	DS
C-12	Establish a specification for the contractor to provide the permit for waste site areas	DS
C-13	Account for a larger swell factor to account for material challenges in this corridor	DS
C-14	Provide a specification that identifies "x" amount of waste site area and then any additional would be the responsibility of the contractor	DS
C-15	In areas where existing pavement is salvaged, ensure traffic direction is outside of pavement area	DS
AV	**ACCOMMODATE VEHICLES**	
AV-01	Pavement thickness should change based on usage (ADT)	5
AV-02	Maintain current median 36 FT width in lieu of 40 FT	4
AV-03	Reduce outside paved shoulder width	4
M	**MISCELLANEOUS**	
M-01	Create wetlands and stream restorations to reduce in-lieu fees	3
M-02	Review in-lieu impacts to alter design to reduce fees	DS

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Creative Idea List

No.	Description	Score
M-03	Complete early environmental surveys to eliminate possible delays	DS
M-04	Prioritize parcels for right-of-way process to identify areas where condemnation will be required	DS
M-05	Escalate utility work to be completed early on	DS
M-06	Consider Design-Build for early release of packages	DS
M-07	Escalate geotechnical to identify right-of-way needs now to purchase right-of-way early	DS
M-08	Use smaller bid packages - i.e., bid the cross-country sections separate to start work earlier	DS
M-09	Evaluate Sta. 3430+00 to 3440+00 hydraulics for proposed interchange	DS
DS	**ADDITIONAL IDEAS BASED ON DESIGN SPEED**	
DS-01	Change design speed from 65 mph to 60 mph to reduce earthwork	5
DS-02	Change design speed from 65 mph to 55 mph to reduce earthwork	5

APPENDIX E
Supporting Data

Appendix E – Supporting Data

Team Observations

The VE team identified observations, concerns and opportunities to be addressed during the creative generation of potential ideas and alternatives. The following is a list of the VE team's observations:

- Very little geotechnical information available
- A couple of bridges have a super elevation of 7.9%; KYTC usually only allows 6%
- Some of the estimates use Class 3 lining; may be an opportunity
- Three of the sections are almost 100% complete with design
- Excavation is the biggest piece on this project
- Saving pavement may be difficult on this project, but we may have some opportunities
- Design sections appear well integrated
- Unknown construction schedules
- A typical section was provided for each design section; however, each of these was different from the other, especially the back slope
- Item 10-126.40 costs are almost doubled from original; needs to be evaluated
- Level of Service "A" will just occur when the project is increased to four lanes
- Traffic levels don't mandate four lanes; focus is on Regional Connectivity
- One section of the project has a detour
- This project will provide a safer road
- Corridor-wide approach provides some opportunities
- Concern with having three of the segments almost complete and the potential impact to having to go backward and do redesign may not be a good idea
- Willing to pay more for depressed medians
- Interstate-like requirements
- Working in a very tight corridor; very constrained site
- FONSI and design followed very close to one another
- Designers did a good job considering the constraints

Risk Register

During the kick-off meeting, the project team identified the risk elements related to the overall project success. The group then rated and ranked the risks defining the probability and the severity of the risk if the risk occurred. The following risk register summarizes those discussions.

The VE team brainstormed opportunities for mitigating the identified risks and identified potential ideas and alternatives. These are included as ideas on the creative idea list.

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Probability of Occurrence	**Highly Likely**	**Likely**	**Possible**	**Unlikely**	**Very unlikely**	**MATRIX KEY**
	> 70%	51 - 70%	21 - 50%	5 - 20%	< 5%	
Severity of Impact	**Catastrophic**	**Substantial**	**Moderate**	**Marginal**	**Negligible**	
	100	50	20	5	1	
Risk Rating	**Extremely High**		**High**	**Moderate**	**Low**	
	Red (50- 100)		Orange (15 - 49)	Yellow (3 - 14)	Green (0 - 2.9)	

Identify the Risk		**Assign the Risk**	**Classify the Risk**			**Quantify**	**Quantify**	**Risk Response**	
Risk ID	**Description of Risk**	**Who does the risk affect?**	**Probability of Impact %**	**Severity of Impact (numeric)**	**Risk Rating**	**$$ Impact**	**Construc-tion Schedule Impact**	**Avoid? Mitigate? Accept? Transfer?**	**Plan of action and risk champion/owner.**
1	Environmental - escalating cost of in lieu fees as the project moves to construction	KYTC budget, Delay construction letting process	**75%**	**50**	**250.0**	$60 per foot per year		Mitigate	
2	Lack of geotechnical information and amount of right-of-way required	Design Delivery, Budget, Schedule	**10%**	**50**	**25.0**		Over 2 years	Mitigate	Current use of GEC is providing mitigation measures
3	Delay in obtaining right-of-way	Construction	**75%**	**50**	**250.0**	50% higher than current	3-6 months	Mitigate	ROW and condemnation process needs to be escalated
4	Time related to utility relocations	Construction	**75%**	**5**	**25.0**			Accept	This relies on the ROW risk (1.3)
5	Underestimated waste site areas	Construction	**15%**	**50**	**25.0**	Potential delay claims	4-6 months	Mitigate	

Standard KYTC VE Report Abbreviations

List of Common Abbreviations

AADT	Average Annual Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
ADD	Area Development District
ADT	Average Daily Traffic
CRF	Crtical Rate Factor
CSB	Crushed Stone Base
CY	Cubic Yard
DES	Design Executive Summary
DGA	Dense Graded Aggregate
DHV	Design Hour Volume
EA	Each
FHWA	Federal Highway Administration
FT	Foot or Feet
IJS	Interchange Justification Study
KTC	Kentucky Transportation Center
KYTC	Kentucky Transportation Cabinet
LF	Linear Feet
LOS	Level of Service
LS	Lump Sum
MI	Mile
MOU	Memorandum of Understanding
MP	Milepoint
MPO	Metropolitan Planning Organziation
MSE	Mechanically Stabilized Earth
NHS	National Highway System
PD	Project Development
PDP	Project Delivery and Preservation
PL&G	Preliminary Line and Grade
RCBC	Reinforced Concrete Box Culvert
ROW	Right-of-Way
SYP	Six Year Plan
TRB	Transportation Research Board
V/C	Volume to Capacity Ratio
VE	Value Engineering
VPH	Vehicles per Hour