Kentucky Transportation Cabinet Value Engineering Study

Mountain Parkway Corridor – Construction Sequence 4

Item #10-168.00, Wolfe County

Final Value Engineering Study Report

Study Dates: March 9-13, 2015

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

Contact: Renee L. Hoekstra, CVS
(602) 493-1947
Final: May 2015

Guiding Teams – Building Success

May 28, 2015

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

Re: Mountain Parkway Corridor – Construction Sequence 4
Item #10-168.00, Wolfe County
FINAL Value Engineering Study Report

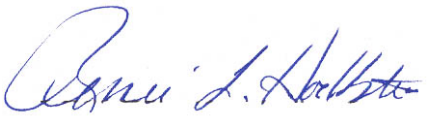
Dear Mr. Carrier:

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

Value Engineering Study
Kentucky Transportation Cabinet
Mountain Parkway Corridor – Construction Sequence 4
Item #10-168.00, Wolfe County

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INTRODUCTION

Value Engineering Study
Kentucky Transportation Cabinet
Mountain Parkway Corridor – Construction Sequence 4
Item #10-168.00, Wolfe County

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. 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 Register
    iii. Constructability Comments
    iv. List of Standard KYTC VE Report Abbreviations

EXECUTIVE SUMMARY

Executive Summary

Background

A Value Engineering (VE) study was conducted during March 9-13, 2015 for the Kentucky Transportation Cabinet (KYTC) for the Mountain Parkway Corridor – Construction Sequence 4 project.

The decision makers identified the project goals as:

- Improve connectivity in the corridor
- Promote and support economic vitality in eastern Kentucky
- Meet driver expectations
- A safer and more efficient corridor
- Limit right-of-way impacts
- Use as much existing pavement as possible
- Limit environmental impacts

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:

- Limit material impacts, there is over 3 million cubic yards of export currently on the project
- Look at the need to pave the maintenance access road and Bedwell Road versus leaving it in its current gravel condition
- Review the alignment at KY1419
- Review the eastbound exist ramp on KY191, including sight distance
- Review the KY1010 exit ramp, related to driver expectations
- Recommend contract packaging for construction
- Limit right of way impacts

Project Constraints

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

- Staying within the existing budget
- Must maintain 4-lanes
- Fully controlled access
- Minimum 60 mph design speed
- Maintain identified bridge clearances

Project Description

This project will widen Mountain Parkway in Wolfe County, KY from two to four lanes from the KY 191 (MP 46.2) overpass bridge in Campton to the KY 205 interchange (MP 57.2) towards Salyersville. The project length is 11.0 miles. Two Build Alternatives and a No Build Alternative were analyzed for potential noise impacts and assessed to provide a preliminary evaluation of mitigation measures.

The existing conditions of Mountain Parkway include two, twelve foot lanes and ten foot paved shoulders. It currently has a posted speed limit of 55 mph. There are five existing bridges and one wagon box through the corridor. All six structures have been recommended to be replaced with new bridges. There is an existing partial interchange at KY 191 and an existing full interchange at KY 1010. The other roads the Mountain Parkway crosses through this corridor are KY 2491, KY 1812, KY 3034, and KY 1419. There are streams running alongside the parkway throughout a majority of the corridor.

Summary of Results
The VE team brainstormed a total of 51 ideas. Of the 51 ideas, twenty-four (24) ideas were identified and were developed into VE proposed alternatives, including cost impacts. Three (3) Design Suggestions, without any cost impact, were written and ten (10) Design Comments were identified, and not developed, to provide additional information for KYTC and the designers to consider. Seven (7) of the developed ideas were dropped or not recommended for further consideration after further evaluation. The description and further discussion of these are included in the VE recommendations and workbook sections of this report.

No.	Description	Initial Cost Savings / (Add)	O&M	Total Life Cycle Cost
CV	**CONVEY VEHICLES**			
CV-01	Use retaining wall at KY 1419 (Sta 617+00 to 620+00) to eliminate part of the reconstruction	$86,065	$0	$86,065
CV-04	Use barrier wall in lieu of 40-foot median the entire length of the project	$5,553,120	$47,000	$5,600,120
CV-05	Use a loop ramp for Ramp B in lieu of a diamond ramp	$3,740,000	$0	$3,740,000
CV-06	Tie in Bedwell Road to the south at KY 3034	Dropped		
CV-08	Straighten KY 1419 on the south side to reduce the skew	($896,000)	$0	($896,000)

No.	Description	Initial Cost Savings / (Add)	O&M	Total Life Cycle Cost
CV	**CONVEY VEHICLES**			
CV-09	Relocate KY 1419 to Sta 620+00 and cross over the mainline	($76,550)	$0	($76,550)
CV-10	Bifurcate the roadway from Sta 536+00 to Sta 544+00	$283,128	$0	$283,128
CV-11	Bifurcate the roadway from Sta 176+00 to Sta 197+00	$638,195	$0	$638,195
CV-12	Bifurcate the roadway from Sta 570+00 to 590+00 on one side	$139,182	$0	$139,182
CV-13	Bifurcate the roadway from Sta 402+00 to 465+00	$779,857	$0	$779,857
CV-14	Do not pave Mountain Parkway Service Road	$206,200	$0	$206,200
CV-15	Do not pave Bedwell Road	W/CV-14		
CV-16	Do not pave Wendy Hills Drive	W/CV-14		
CV-17	Leave existing alignment at Sta 150+00 to Sta 220+00 and go cross-country	($1,454,883)	$0	($1,454,883)
CV-18	Leave existing alignment Sta 530+00 to Sta 545+00 and go across country	($2,204,883)	$0	($2,204,883)
CV-19	Straighten the skew at KY 1812	$1,032,511	$0	$1,032,511
CV-20	Improve KY 1010 exit Ramps A and D	($374,153)	$0	($374,153)
CV-21	Reconfigure KY 191 traffic interchange	$1,321,024	$0	$1,321,024
CV-22	Increase the grades from Sta 537+00 to 545+00	$600,000	$0	$600,000
CV-23	Realign Bedwell Road over mainline at Sta 380+00 and eliminate twin mainline bridges at KY 3034	$528,125	$0	$528,125
CV-26	Eliminate KY 1010 Interchange	$9,750,000	$0	$9,750,000
CV-27	Consider using a 2+1 approach in lieu of 4 lanes	$20,912,000	$0	$20,912,000
SS	**SPAN SPACE**			
SS-02	Extend the wagon box and eliminate the twin bridges at KY 3034	$1,230,000	$0	$1,230,000

No.	Description	Initial Cost Savings / (Add)	O&M	Total Life Cycle Cost
SS-03	Use precast arch at KY 3034 in lieu of the twin bridges at KY 3034	$820,000	$0	$820,000
CW	**CHANNEL WATER**			
CW-01	Extend box culvert to relocate channel change	Dropped		
AU	**ACCOMMODATE UTILITIES**			
AU-01	Use a retaining wall at Sta 615+00 to stay away from the electrical tower	Dropped		

Risk Analysis

A formal risk analysis was completed on this project to identify any potential risks that might negatively or positively impact the project. However, with this project being in preliminary design, there were very few risks identified. It is recommended that a continuation of the risk analysis be done throughout the design process to identify, rate and rank, and then a treatment plan developed. The VE team identified eight (8) potential risks. A risk register was completed, without impacts, and is included in Appendix E 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 purpose of 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 *Improve Connectivity*. A Function Analysis Systems Technique (FAST) diagram was completed and is included in Appendix C.

VE Study Team

Name	Organization	Role
Renee Hoekstra	RHA, LLC	Team Leader
Shawn Russell	KYTC	Program Coordinator
Duffy Ford	Qk4	Roadway
Bob Farley	HMB Professional Engineers	Roadway
Matt Moore	KYTC	Operations & Construction
Rodney Little	Qk4	Constructability
David Moses	Integrated Engineering	Drainage
Bill Amrhein	Stantec	Structures
David Kirby	HMB Professional Engineers	Structures

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. **10-168.00** PROJECT COUNTY: **Wolfe** DATE OF STUDY: **March 9-13, 2015**

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
Alternatives Completed										
CV-01		Use retaining wall at KY 1419 (Sta 617+00 to 620+00) to eliminate part of the reconstruction			$240,970	$154,905	$86,065			
CV-04		Use barrier wall in lieu of 40-foot median the entire length of the project			$93,973,180	$88,420,060	$5,553,120	$47,000		
CV-05		Use a loop ramp for Ramp B in lieu of a diamond ramp			$4,272,500	$532,500	$3,740,000			
CV-10		Bifurcate the roadway from Sta 536+00 to Sta 544+00			$1,989,000	$1,705,872	$283,128			
CV-11		Bifurcate the roadway from Sta 176+00 to Sta 197+00			$2,609,425	$1,971,230	$638,195			
CV-12		Bifurcate the roadway from Sta 570+00 to Sta 590+00 on one side			$773,280	$634,098	$139,182			
CV-13		Bifurcate the roadway from Sta 402+00 to 465+00			$2,326,165	$1,546,308	$779,857			
CV-14		Do not pave Mountain Parkway Service Road, Bedwell Road, or Wendy Hills Drive			$402,857	$196,657	$206,200			
CV-19		Straighten the skew at KY 1812			$2,432,411	$1,400,000	$1,032,411			
CV-20		Improve KY 1010 exit Ramps A and D			$0	$374,153	($374,153)			
CV-21		Reconfigure KY 191 traffic interchange			$3,439,825	$2,118,800	$1,321,025			
CV-22		Increase the grades from Sta 537+00 to 545+00			$2,200,000	$1,600,000	$600,000			
CV-23		Realign Bedwell Road over mainline at Sta 380+00 and eliminate twin mainline bridges at KY 3034			$1,470,000	$941,875	$528,125			
CV-26		Eliminate KY 1010 interchange			$10,900,000	$1,300,000	$9,600,000			
CV-27		Consider using a 2+1 approach in lieu of 4 lanes			$0	-$21,182,050	$21,182,050			
SS-02		Extend the wagon box and eliminate the twin bridges at KY 3034			$1,470,000	$240,000	$1,230,000			
SS-03		Use precast arch in lieu of the twin bridges at KY 3034			$1,470,000	$650,000	$820,000			
Alternatives Completed, Not Recommended										
CV-08		Straighten KY 1419 on the south side to reduce the skew			$2,240,000	$3,136,000	-896,000			
CV-09		Relocate KY 1419 to STA 620+00 and cross over the mainline			$0	$76,550	-76,550			
CV-17		Leave existing alignment at Sta 150+00 to Sta 220+00 and go cross-country			$1,765,000	$3,219,883	-1,454,883			
CV-18		Leave existing alignment Sta 530+00 to Sta 545+00 and go across country			$0	$2,204,883	-2,204,883			
CV-20		Improve KY 1010 exit Ramps A and D			$0	$374,153	-374,153			
Design Suggestions										
AU-06		Move the pier at KY 1812 to avoid the fiber optic cable								
M-01		Project to be delivered as a Design/Build for the entire 11 miles								
M-02		Develop 3 construction packages and allow the contractor to bid 1 or all 3								

PROJECT DESCRIPTION

Introduction

The VE study reviewed the Mountain Parkway Corridor Construction Sequence 4 located in Wolfe County from MP 46.2 to MP 57.2. The project widens Mountain Parkway from two to four lanes. The project length is 11.0 miles and initially included two alternatives. Alternative 2 was selected as the basis of design for the purposes of this study.

Purpose and Need

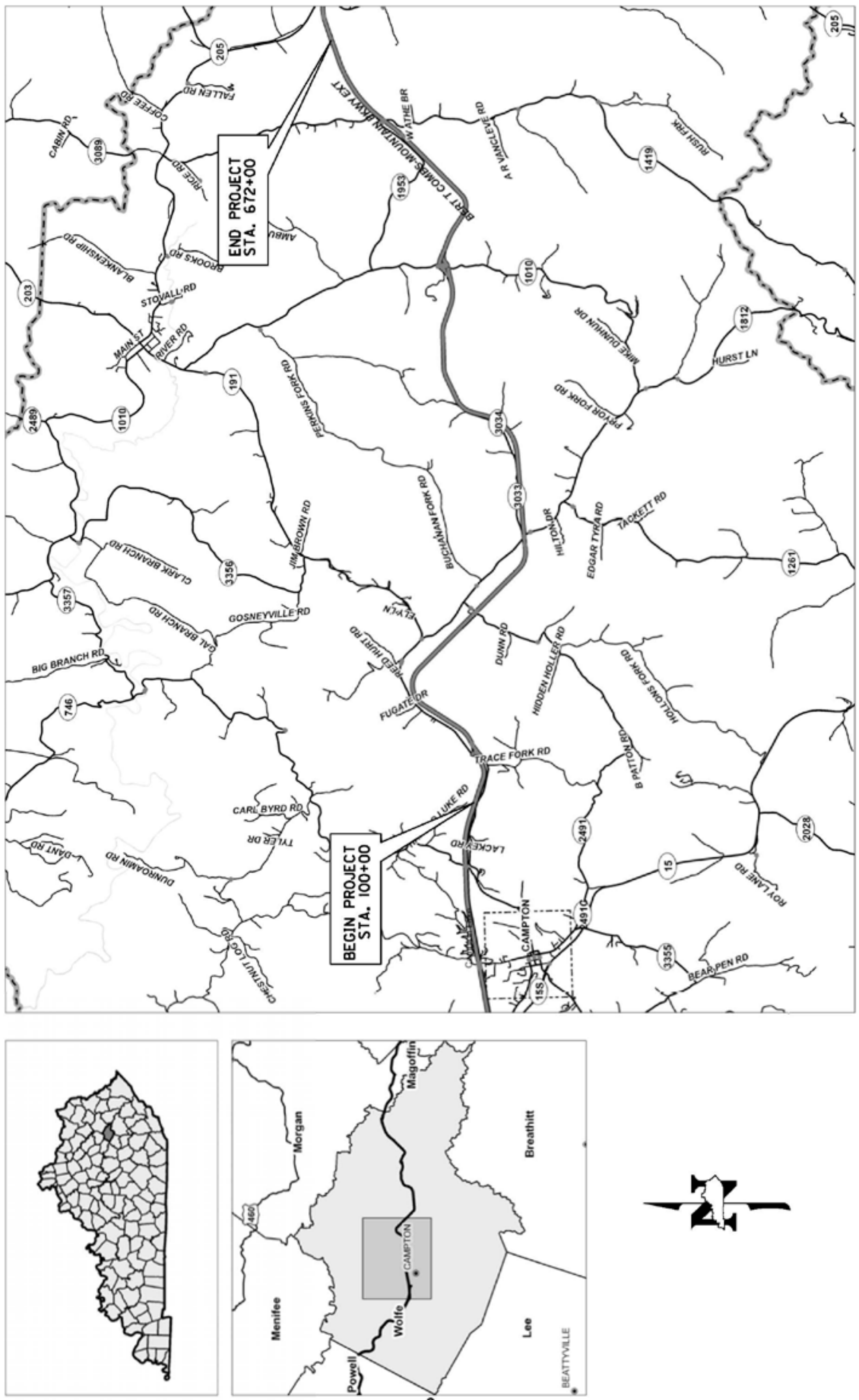
The Mountain Parkway Corridor connects I-64 to US 23 and is a vital arterial route into the Appalachian region of Kentucky. The Mountain Parkway Extension is part of the KYTC State Primary System and the Appalachian Development Highway System. Eastern Kentucky has a lack of sufficient transportation infrastructure and system linkage. The purpose of the project is to improve upon this and the safety of the corridor while increasing capacity to meet future traffic demands. This section of the Mountain Parkway Extension has geometric deficiencies that need to be upgraded to current standards in order to provide travelers with a modern and safe transportation facility.

Alternative 2

Alternative 2 is the preferred alternative by the design team and the basis of design for this VE study. This alternative utilizes as much of the existing Mountain Parkway as possible while widening to the south of the corridor. It begins just west of the KY 205 interchange. This alternative provides four, twelve-foot lanes (two in each direction), twelve-foot outside shoulders, six-foot inside shoulders (four-foot paved), with a forty-foot depressed median. The design speed will be 65 mph, with a minimum radius of 1480 feet. Access will be limited through the corridor, with new diamond interchanges at KY 191 and KY 1010. Minor improvements will be made to the side roads KY 2491, KY 1812, KY 3034, and KY 1419, where new bridges will be built along the parkway. Minor realignments will be made to the Service Road off of KY 2491, Bedwell Road off of KY 3034, and CR 3035 off of KY 1010. Two cemeteries and five residential locations will be affected by widening to the south. This alternative has less right-of-way, utility and stream impacts compared to other alternatives.

Stream Channel Impacts

This alternative will impact a total of 47 streams, approximately 17,840 linear feet in length. Some of the streams impacted include Trace Fork, Stillwater Creek, Landsaw Creek, Lacy Creek and Gilmore Creek. Impacts to the streams will be minimized by replacing drainage structures in the same location when possible. Proposed channel changes are consistent with the existing channel width and slope. Erosion control measures will be used to mitigate impacts to the area.


END PROJECT
STA. 672+00
BEGIN PROJECT
STA. 100+00
BERT T COMBS MOUNTAIN PKWY EXT
CAMPTON
TRACE FORK RD
CARL BYRD RD
BIG BRANCH RD
GOSNEYVILLE RD
CLARK BRANCH RD
BUCHANAN FORK RD
PERKINS FORK RD
JIM BROWN RD
FUGATE DR
DUNN RD
HIDDEN HOLLER RD
HOLLONS FORK RD
B PATTON RD
TACKETT RD
EDGAR TYRA RD
PRYOR FORK RD
HURST LN
BEAR PEN RD
ROY LANE RD
STOVALL RD
MAIN ST
RIVER RD
A R VANCLEVE RD
Magoffin
Morgan
Breathitt
Menifee
Wolfe
Lee
Powell
CAMPTON
BEATTYVILLE

3

VE RECOMMENDATIONS, DESIGN SUGGESTIONS & DESIGN COMMENTS

VE Proposed Alternatives, Design Suggestions and Design Comments

Introduction

The VE study evaluated the 51 ideas that were brainstormed during the Creative Phase. The twenty-four (24) 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

Although several were identified as dropped or not recommended, these are also included in this section to show the additional evaluation that was conducted. Additionally, three (3) 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

Alternatives

No.	Description	Initial Cost Savings / (Add)	O&M	Total Life Cycle Cost
CV	**CONVEY VEHICLES**			
CV-01	Use retaining wall at KY1419 (Sta 615-620) to eliminate part of the reconstruction	$86,065	$0	$86,065
CV-04	Use barrier wall in lieu of 40-foot median the entire length of the project	$5,553,120	$47,000	$5,600,120
CV-05	Use a loop ramp for Ramp B in lieu of a diamond ramp on KY1010	$3,740,000	$0	$3,740,000
CV-06	Tie in Bedwell Road to the south at KY 3034	Dropped		
CV-08	Straighten KY1419 on the south side to reduce the skew	($896,000)	$0	($896,000)

No.	Description	Initial Cost Savings / (Add)	O&M	Total Life Cycle Cost
CV	**CONVEY VEHICLES**			
CV-09	Relocate KY1419 to Sta 620+00 and cross over the mainline	($76,550)	$0	($76,550)
CV-10	Bifurcate the roadway from Sta 536+00 to 544+00	$283,128	$0	$283,128
CV-11	Bifurcate the roadway from Sta 176+00 to 197+00	$638,195	$0	$638,195
CV-12	Bifurcate the roadway from Sta 570+00 to 590+00 on one side	$139,182	$0	$139,182
CV-13	Bifurcate the roadway from Sta 402 to 465	$779,857	$0	$779,857
CV-14	Do not pave Mountain Parkway Service Road	$206,200	$0	$206,200
CV-15	Do not pave Bedwell Road	W/CV-14		
CV-16	Do not pave Wendy Hills Drive	W/CV-14		
CV-17	Leave the existing alignment at Sta 150+00 to 220+00 and go across country	($1,454,883)	$0	($1,454,883)
CV-18	Leave the existing alignment from Sta 530+00 to 545+00 and go across country	($2,204,883)	$0	($2,204,883)
CV-19	Straighten the skew at KY 1812	$1,032,511	$0	$1,032,511
CV-20	Improve KY 1010 exit Ramps A and D	($374,153)	$0	($374,153)
CV-21	Reconfigure KY 191 traffic interchange	$1,321,024	$0	$1,321,024
CV-22	Increase the grades from Sta 537+00 to 545+00	$600,000	$0	$600,000
CV-23	Realign Bedwell Road over the mainline at Sta 380+00 and eliminate twin mainline bridges at KY 3034	$528,125	$0	$528,125
CV-26	Eliminate KY 1010 Interchange	$9,750,000	$0	$9,750,000
CV-27	Consider using a 2+1 approach in lieu of 4 lanes	$20,912,000	$0	$20,912,000
SS	**SPAN SPACE**			
SS-02	Extend the wagon box and eliminate the twin bridges at KY 3034	$1,230,000	$0	$1,230,000
SS-03	Use precast arch at KY 3034 in lieu of the twin bridges at KY 3034	$820,000	$0	$820,000

No.	Description	Initial Cost Savings / (Add)	O&M	Total Life Cycle Cost
CW	**CHANNEL WATER**			
CW-01	Straighten the channel change at KY 191			Dropped
AU	**ACCOMMODATE UTILITIES**			
AU-01	Use a retaining wall at Sta 615+00 to stay away from the electrical tower			Dropped

Design Suggestions

No.	Description
AU	**ACCOMMODATE UTILITIES**
AU-06	Move the pier at KY 1812 to avoid the fiber optic cable
M	**MISCELLANEOUS**
M-01	Project to be delivered as a Design/Build for the entire 11 miles
M-02	Develop 3 construction packages and allow the contractor to bid 1 or all 3

Design Comments

No.	Description
CW	**CHANNEL WATER**
CW-08	Ensure that the existing culverts and pipes are to be cleared out during construction
AU	**ACCOMMODATE UTILITIES**
AU-02	Have the contractor responsible for locating all utilities as part of the construction contract which transfers the risk from KYTC
AU-03	Include a performance specification to allow the contractor to modify the design to stay away from the electrical tower at Sta 615+00
AU-04	Ensure there are funds in the contract to pay the utility companies to move their utilities by a certain time
AU-05	Ensure that the water and sewer line relocations are included in the contractor's scope to eliminate potential delays and claims to the project
AU-07	Obtain information from the power company as to the potential restrictions that will be placed on the contractor when working around the tower or lines (i.e. blasting impacts)

No.	Description
M	**MISCELLANEOUS**
M-03	If 3 contracts are used, ensure that the contractors are responsible for coordinating the blasting plans between the various contractors and ensure that the same times are given for blasting operations
M-04	Ensure that the length of time allowable for road closures is identified and include a disincentive in the contract
M-05	Have the contractor responsible for obtaining and managing the SWPPP
M-06	Ensure that the pond at the Maintenance Service Road on the Tapley's property is not designated a "wetlands"

VALUE ENGINEERING PROPOSAL CV-01
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE:	Use retaining wall at KY 1419 (Sta 617+00 to 620+00) to eliminate part of the reconstruction
FUNCTION:	**Convey Vehicles**

BASELINE ASSUMPTION:

Realign KY 1419 away from the mainline fill slopes.

PROPOSED ALTERNATIVE:

Construct a retaining wall left of the mainline from Sta 617+00 to 620+00 along existing KY 1419 and eliminate realigning KY 1419 in this area.

BENEFITS	RISKS/CHALLENGES
• Cost savings	• Accommodate the 5-foot x 4 foot RCBC runs under proposed wall
•	•
•	•
•	•
•	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 240,970	$ -	$ 240,970
PROPOSED ALTERNATIVE:	$ 154,905	$ -	$ 154,905
TOTAL (Baseline less Proposed)	$ 86,065	$ -	**$ 86,065**
			SAVINGS

VALUE ENGINEERING PROPOSAL CV-01
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Use retaining wall at KY 1419 (Sta 617+00 to 620+00) to eliminate part of the reconstruction

DISCUSSION/JUSTIFICATION:

The retaining wall could be a gravity wall. The retaining wall would start at approximately Sta 617+10, 120 feet left of centerline and ends at Sta 619+90, 140 feet left of centerline. The average height was conservatively assumed to be 10 feet. The assumed length was 280 feet. This would eliminate 1100 feet of two-lane road relocation on KY 1419 from Sta 52+00 to Sta 63+00 and a 155-foot long 5ft. x 4ft. RCBC under KY 1419 at Sta 53+90. Approximately 4.5 acres of right-of-way is required with the relocated KY 1419 that would not need to be acquired if the retaining wall were built.

The retaining wall would have to be placed over an existing 5-foot x 4 foot RCBC. The relocation of KY 1419 is in fill so this area provides an additional waste area which is an advantage that is not associated with a cost.

IMPLEMENTATION CONSIDERATIONS:

None apparent.

VALUE ENGINEERING PROPOSAL CV-01
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

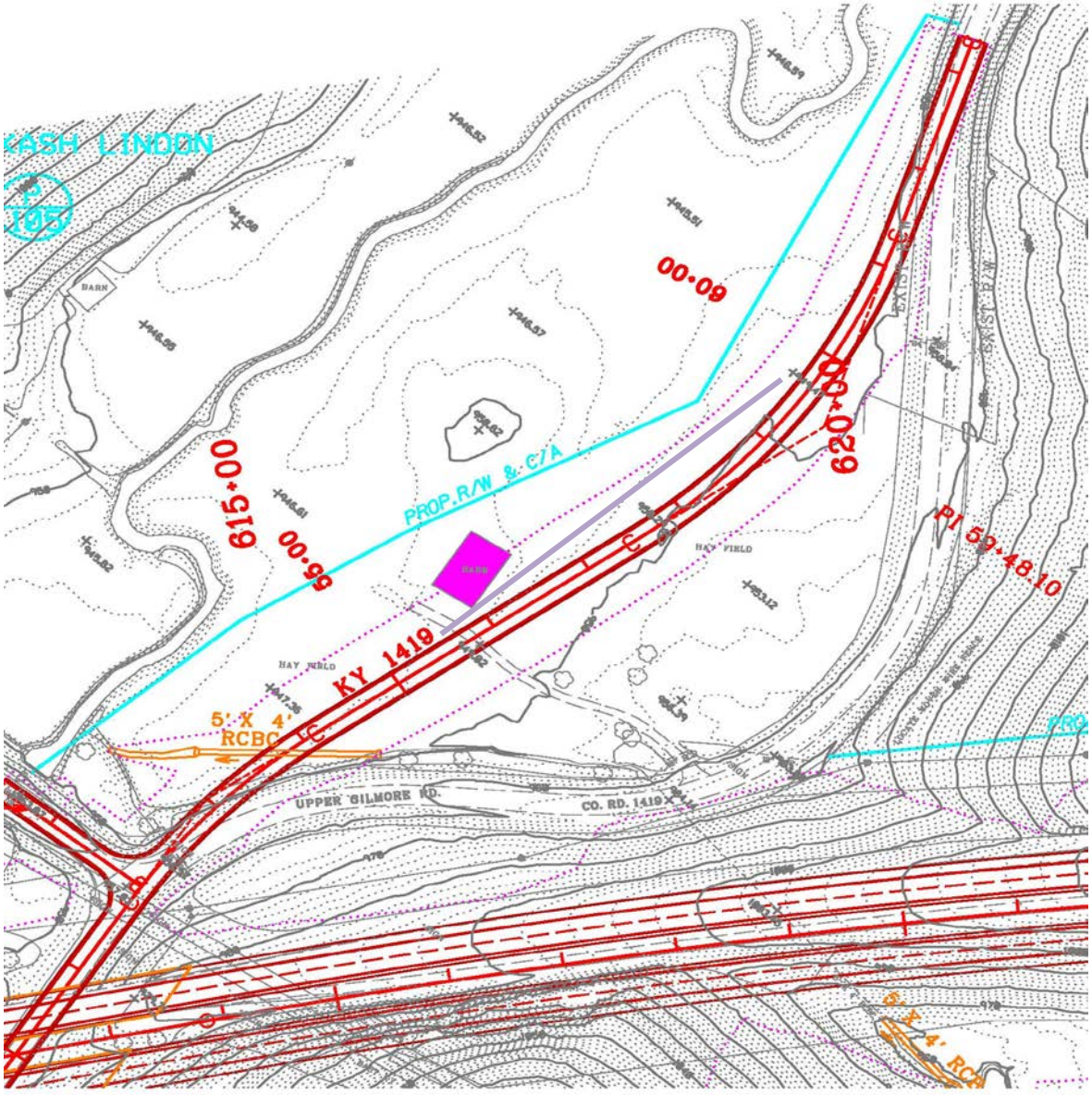
TITLE: Use retaining wall at KY 1419 (Sta 617+00 to 620+00) to eliminate part of the reconstruction

DESIGN ELEMENT	**Markup**	**BASELINE ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Retaining wall - concrete Class B		CY		397.00		365	397.00	144,905
Right-of-way		acres	4.5	5,000.00	22,500		5,000.00	
Crushed stone base		Ton	1600	26.50	42,400		26.50	
5x4 RCBC concrete Class B		CY	110	397.00	43,670		397.00	
5x4 RCBC reinforcing steel		LB	20000	0.79	15,800		0.79	
CL3 asphalt base 1.00D PG64-22		Ton	1300	70.00	91,000		70.00	
CL3 asphalt surface 0.38B PG64-22		Ton	320	80.00	25,600		80.00	
Retaining wall foundation prep		LS				1	10,000.00	10,000
					240,970			**154,905**
							(BASELINE LESS PROPOSED)	**86,065**
								SAVINGS

VALUE ENGINEERING PROPOSAL CV-01
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Use retaining wall at KY 1419 (Sta 617+00 to 620+00) to eliminate part of the reconstruction

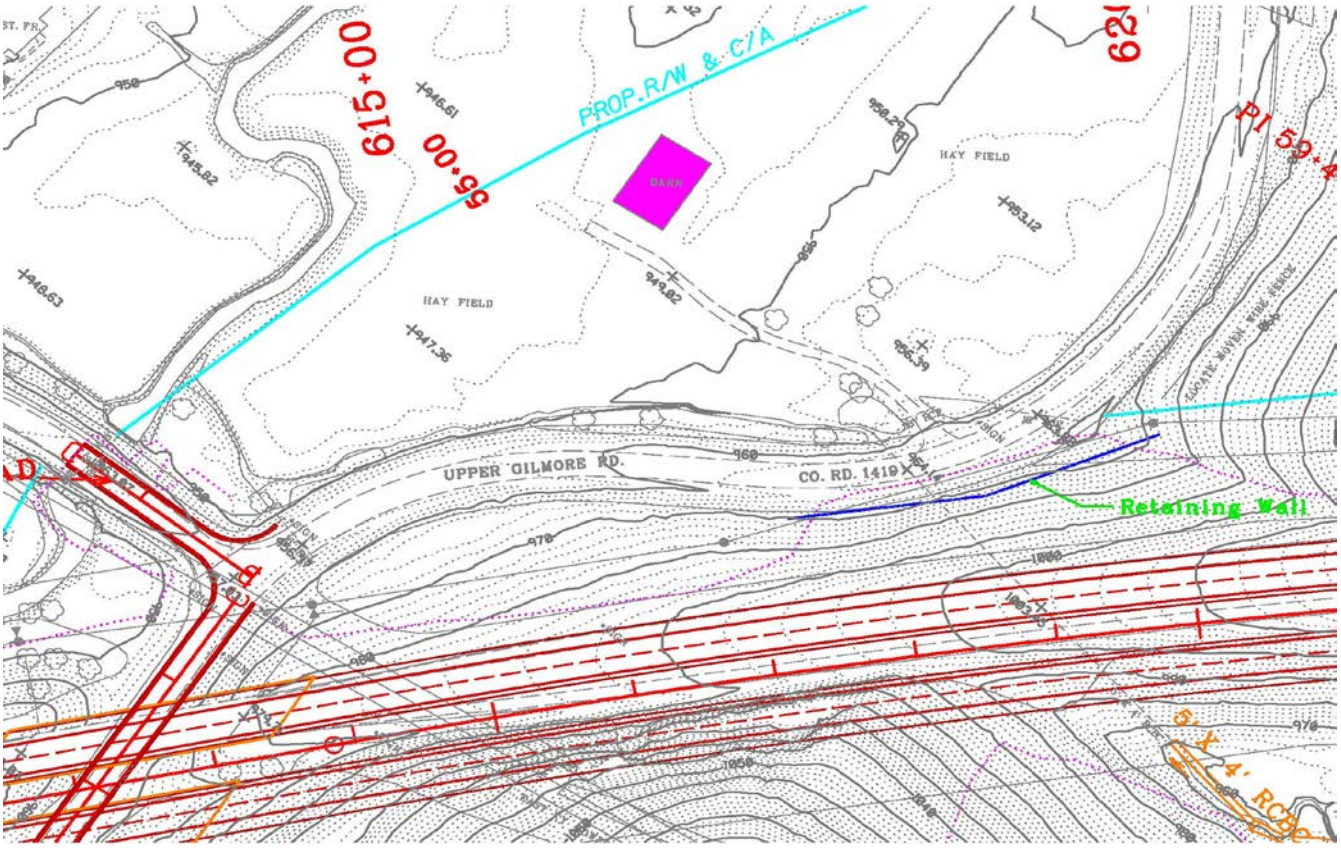
SKETCH OF BASELINE ASSUMPTION



VALUE ENGINEERING PROPOSAL CV-01
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Use retaining wall at KY 1419 (Sta 617+00 to 620+00) to eliminate part of the reconstruction

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL CV-04
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE:	Use barrier wall in lieu of 40-foot median the entire length of the project
FUNCTION:	**Convey Vehicles**

BASELINE ASSUMPTION:

The current design uses a 40-foot depressed median with 6-foot inside shoulders (4-foot paved) on each side.

PROPOSED ALTERNATIVE:

This alternative proposes to use continuous concrete median barrier wall with 6-foot paved inside shoulders on each side.

BENEFITS	RISKS/CHALLENGES
• Reduces excavation	• Increases maintenance of median drainage
• Eliminates cross-over crashes	• More restrictive during snow/ice removal operations
• Eliminates median mowing	•
• Eliminates illegal vehicle crossings/U-turns	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 93,879,180	$ 94,000	$ 93,973,180
PROPOSED ALTERNATIVE:	$ 88,373,060	$ 47,000	$ 88,420,060
TOTAL (Baseline less Proposed)	$ 5,506,120	$ 47,000	**$ 5,553,120**
			SAVINGS

VALUE ENGINEERING PROPOSAL CV-04
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Use barrier wall in lieu of 40-foot median the entire length of the project

DISCUSSION/JUSTIFICATION:

Roadway excavation is the largest cost item on project. As a means to reduce the volume of excavation on the project, this alternative recommends using concrete median wall throughout corridor in lieu of the proposed 40-foot depressed median. This change would reduce the width of roadway, which will result in less excavation, along with a decrease in overall disturbance footprint.

Safety advantages associated with this revision would include elimination of potential cross-over crashes, and elimination of illegal vehicle cross-overs/U-turns.

This alternative would also reduce future maintenance costs by eliminating median mowing. This would require occasional maintenance of median drainage boxes and pipes.

Construction cost estimate obtained from Phase I designer's alternatives review matrix was used to determine the detailed costs.

IMPLEMENTATION CONSIDERATIONS:

The design team should also look at the possibility that this may reduce some of the box culvert extension costs as well as some potential reduction in impacts to the in-lieu fees for environmental mitigation.

VALUE ENGINEERING PROPOSAL CV-04
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Use barrier wall in lieu of 40-foot median the entire length of the project

DESIGN ELEMENT	**Markup**	**BASELINE ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Parkway construction cost		LS	1	93,879,180.00	93,879,180	1	88,373,060.00	88,373,060
					93,879,180			**88,373,060**
							(BASELINE LESS PROPOSED)	**5,506,120**
								SAVINGS

VALUE ENGINEERING PROPOSAL CV-04
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Use barrier wall in lieu of 40-foot median the entire length of the project

Assumptions			
Interest/Discount Rate(%):	3.5%	**Economic Life (yrs):**	50

LIFE CYCLE COST ANALYSIS

Salvage & Replacement Costs			Baseline Assumption		Proposed Alterative	
Item	**Description**	**Yr**	**Est Cost**	**Pres Worth**	**Est Cost**	**Pres Worth**
1						
2						
3						
4						
5						
Total Salvage & Replacement Costs						

Annual Costs (pres worth calculated over 50 yrs)		Baseline Assumption		Proposed Alternative	
Item	**Description**	**Est Cost**	**Pres Worth**	**Est Cost**	**Pres Worth**
1	Median mowing	4,000	93,822		
2	Maintenance of median drainage structures			2,000	46,911
3					
4					
5					
Total Annual Costs		**4,000**	**93,822**	**2,000**	**46,911**

SUMMARY	Baseline Present Worth	Proposed Present Worth
Total Present Worth (salvage+annual pres worth)	94,000	47,000
RESULTS (Proposed less baseline)		

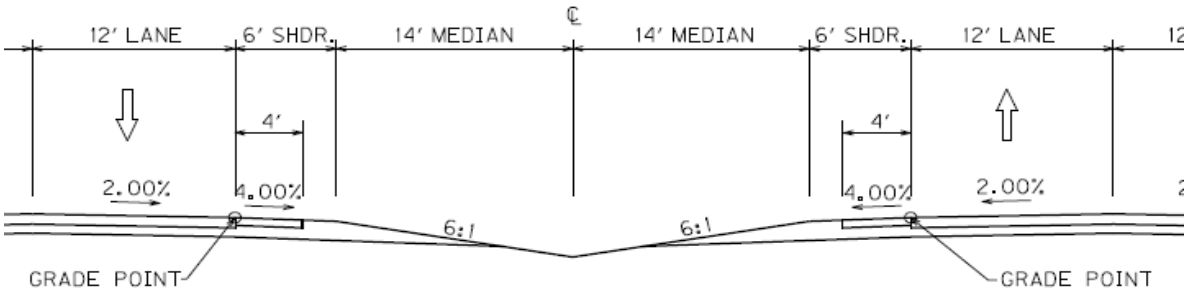
Notes: 1) Total Present Worth is rounded to the nearest thousand dollars, 2) Initial costs are covered in the Detail sheet.

VALUE ENGINEERING PROPOSAL CV-04
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Use barrier wall in lieu of 40-foot median the entire length of the project

SKETCH OF BASELINE ASSUMPTION

MOUNTAIN PARKWAY



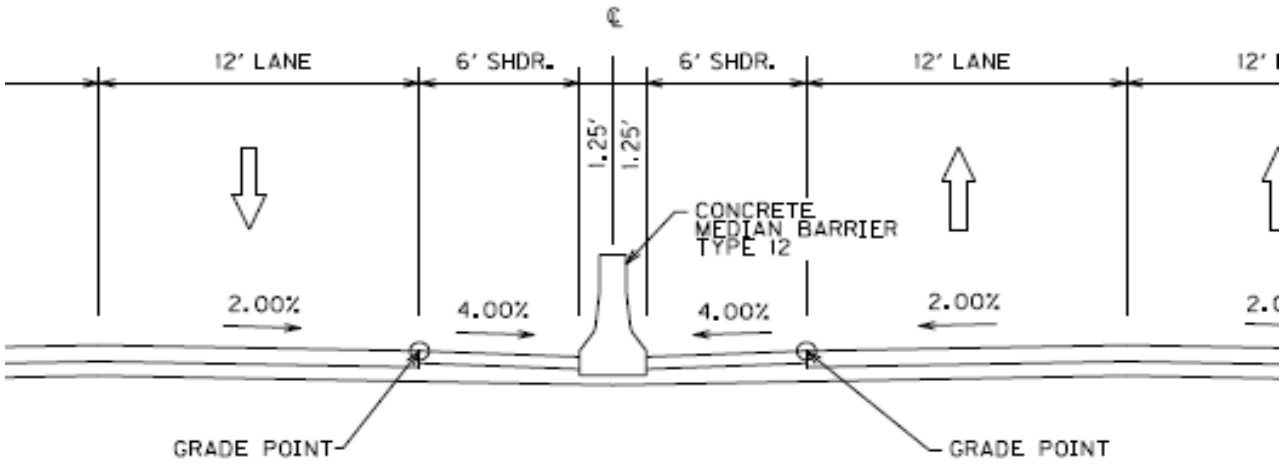
NORMAL SECTION

VALUE ENGINEERING PROPOSAL CV-04
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Use barrier wall in lieu of 40-foot median the entire length of the project

SKETCH OF PROPOSED ALTERNATIVE

MOUNTAIN PARKWAY WITH MEDIAN BARRIER



NORMAL SECTION

VALUE ENGINEERING PROPOSAL CV-05
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE:	Use a loop ramp for Ramp B in lieu of a diamond ramp
FUNCTION:	**Convey Vehicles**

BASELINE ASSUMPTION:

The current design of the interchange at KY 1010 is a normal diamond with Ramp B going through a rather large cut.

PROPOSED ALTERNATIVE:

This alternative proposes to use a loop ramp for Ramp B.

BENEFITS	RISKS/CHALLENGES
• Reduces excavation	• Potential driver expectancy lessened with a loop ramp
• Lessens snow and ice problems since the sun may not hit the baseline Ramp B	• Additional culvert length
•	• Additonal in lieu fees from stream impacts
•	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 4,272,500	$ -	$ 4,272,500
PROPOSED ALTERNATIVE:	$ 532,500	$ -	$ 532,500
TOTAL (Baseline less Proposed)	$ 3,740,000	$ -	**$ 3,740,000**
			SAVINGS

VALUE ENGINEERING PROPOSAL CV-05
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Use a loop ramp for Ramp B in lieu of a diamond ramp

DISCUSSION/JUSTIFICATION:

The current design for Ramp B would require extensive excavation. Replacing the proposed diamond ramp with a loop ramp in the southwest quadrant and moving Ramp A farther out and south from the mainline will help to avoid additional excavation. The proposed double 12-foot x 6-foot RCBC at Sta 15+00 would have to be extended further than initially proposed to accommodate the additional impact to the stream. Length of the ramps would be same for the proposed versus this alternative, so pavement costs would remain the same.

Excavation costs are based on 13,350sf. at Sta 14+00 as average for 1700ft. = 840,555cy.

IMPLEMENTATION CONSIDERATIONS:

Using a loop ramp may be somewhat against driver expectancy since the other ramps are in a conventional diamond interchange; however, there are nearby examples so this may be inconsequential.

The designer should evaluate the radius for truck turning.

VALUE ENGINEERING PROPOSAL CV-05
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Use a loop ramp for Ramp B in lieu of a diamond ramp

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Excavation		CY	840,555	5.00	4,202,775			
60ft. pipe		LF	100	725.00	72,500			
12ft. X 6ft. double culvert extension		LF				150	2,000.00	300,000
Additional in-lieu fee		LF				150	750.00	112,500
Additional right of way		Acre				4	5,000.00	20,000
					4,275,275			**432,500**
							(BASELINE LESS PROPOSED)	**3,842,775**

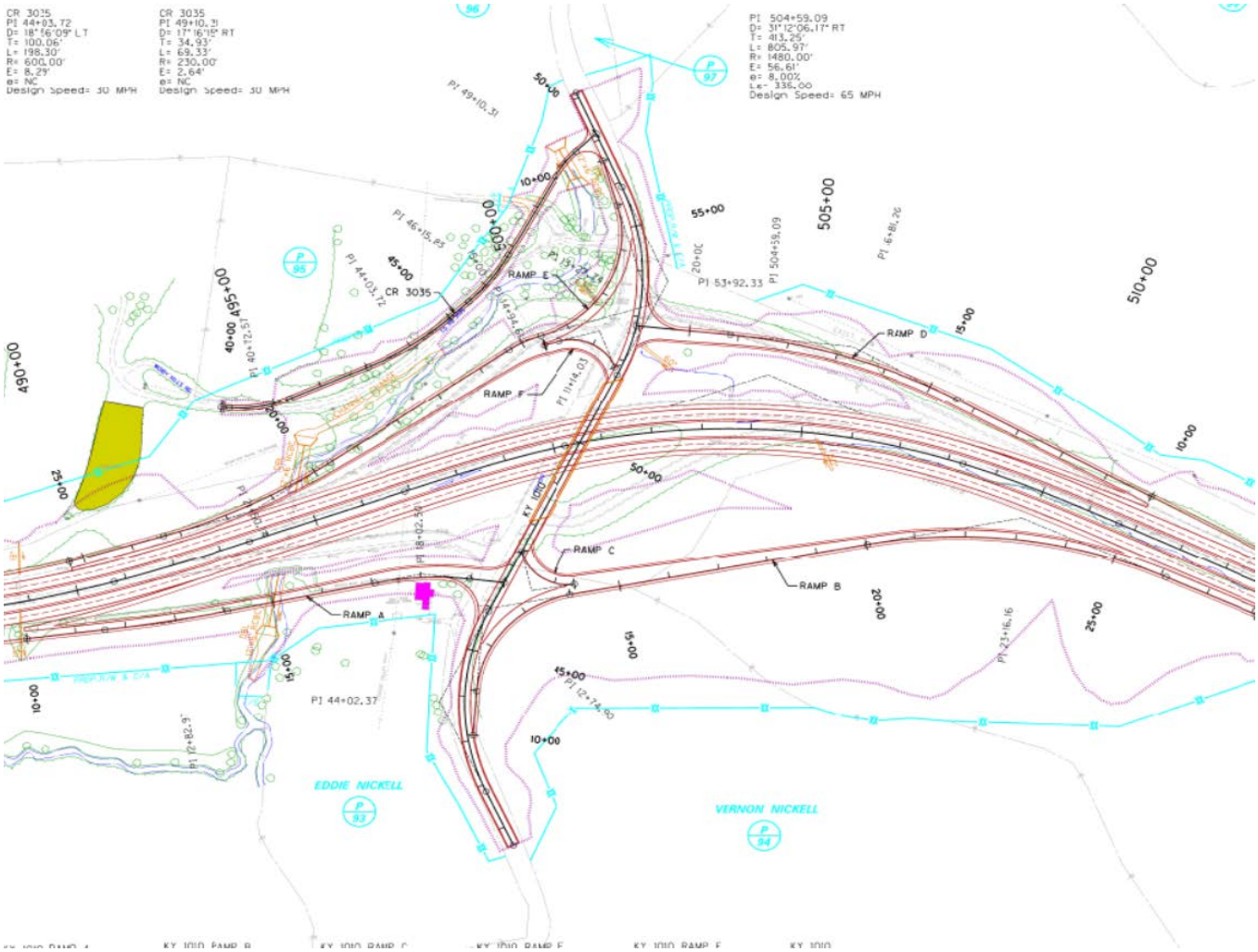
*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL CV-05
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Use a loop ramp for Ramp B in lieu of a diamond ramp

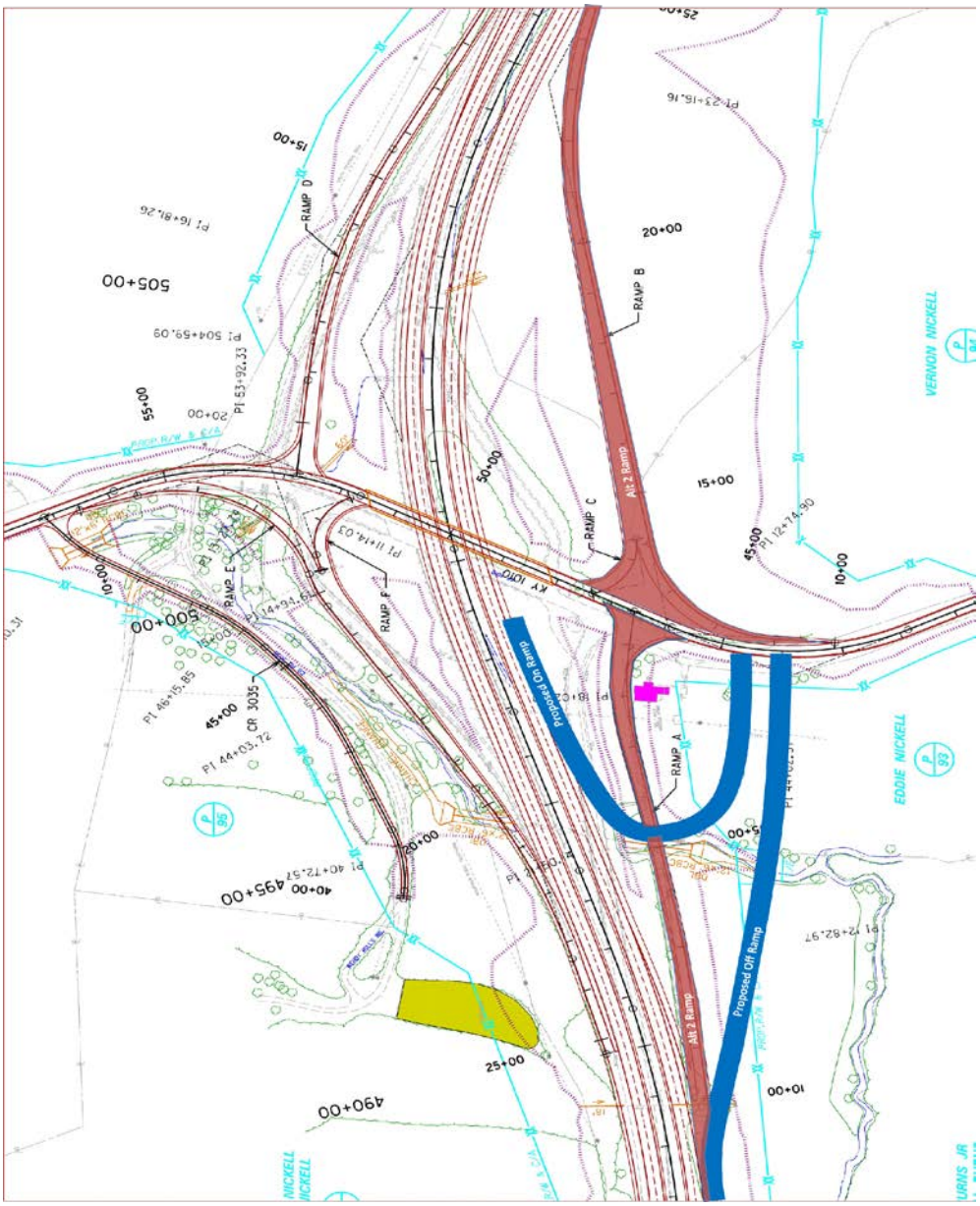
SKETCH OF BASELINE ASSUMPTION



VALUE ENGINEERING PROPOSAL CV-05
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Use a loop ramp for Ramp B in lieu of a diamond ramp

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL CV-06
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE:	Tie in Bedwell Road to the south at KY 3034
FUNCTION:	**Convey Vehicles**

BASELINE ASSUMPTION:

Widening of the Mountain Parkway requires the relocation of Bedwell Road. It is proposed to relocate the road as near as possible to the existing road and near the Mountain Parkway.

PROPOSED ALTERNATIVE:

As an alternative, it was proposed to relocate the Bedwell Road further south and tie in to KY 3034 by going cross country and hopefully reduce the amount of excavation.

BENEFITS	RISKS/CHALLENGES
• None apparent	• More excavation
•	• More right-of-way
•	•
•	•
•	•
•	•
•	•
•	•

DROPPED

VALUE ENGINEERING PROPOSAL CV-06
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Tie in Bedwell Road to the south at KY 3034

DISCUSSION/JUSTIFICATION:

After further review and looking at the contours, it was determined that this would be a much larger cut than what is currently being designed, which means that the excavation is increased with this alternative. This would also require additional right of way takes. **This alternative is not recommended and should be dropped from further consideration.**

IMPLEMENTATION CONSIDERATIONS:

None apparent.

VALUE ENGINEERING PROPOSAL CV-08
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Straighten KY 1419 on the south side to reduce the skew

FUNCTION: **Convey Vehicles**

BASELINE ASSUMPTION:

The current design shows the mainline crossing over KY 1419 at approximately a 45 degree skew. The proposed bridge is approximately 220-foot long, three span Precast I-Beam bridge.

PROPOSED ALTERNATIVE:

The proposal will realign KY 1419 to cross under the mainline at a smaller skew to shorten the bridge.

BENEFITS	RISKS/CHALLENGES
• None apparent	• Larger cut into the hillside right of centerline
•	•
•	•
•	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 2,240,000	$ -	$ 2,240,000
PROPOSED ALTERNATIVE:	$ 3,136,000	$ -	$ 3,136,000
TOTAL (Baseline less Proposed)	$ (896,000)	$ -	**$ (896,000)**

COST

VALUE ENGINEERING PROPOSAL CV-08
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Straighten KY 1419 on the south side to reduce the skew

DISCUSSION/JUSTIFICATION:

This alternative proposes to straighten the bridge to provide a cost savings with the bridge. The bridge savings is estimated at approximately $250,000 however, the costs of excavating the hillside right of centerline ($1.1 million) exceeds the savings of a shorter bridge. **No further consideration of this alternative is recommended due to the increase in cost with no improvement to project function.**

IMPLEMENTATION CONSIDERATIONS:

None apparent.

VALUE ENGINEERING PROPOSAL CV-08
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Straighten KY 1419 on the south side to reduce the skew

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Bridge		SF	17920	125.00	2,240,000	15908	125.00	1,988,500
Excavation		CY		5.00		225000	5.00	1,125,000
Right of way		Acre		5,000.00		4.5	5,000.00	22,500
					2,240,000			**3,136,000**
							(BASELINE LESS PROPOSED)	**(896,000)**

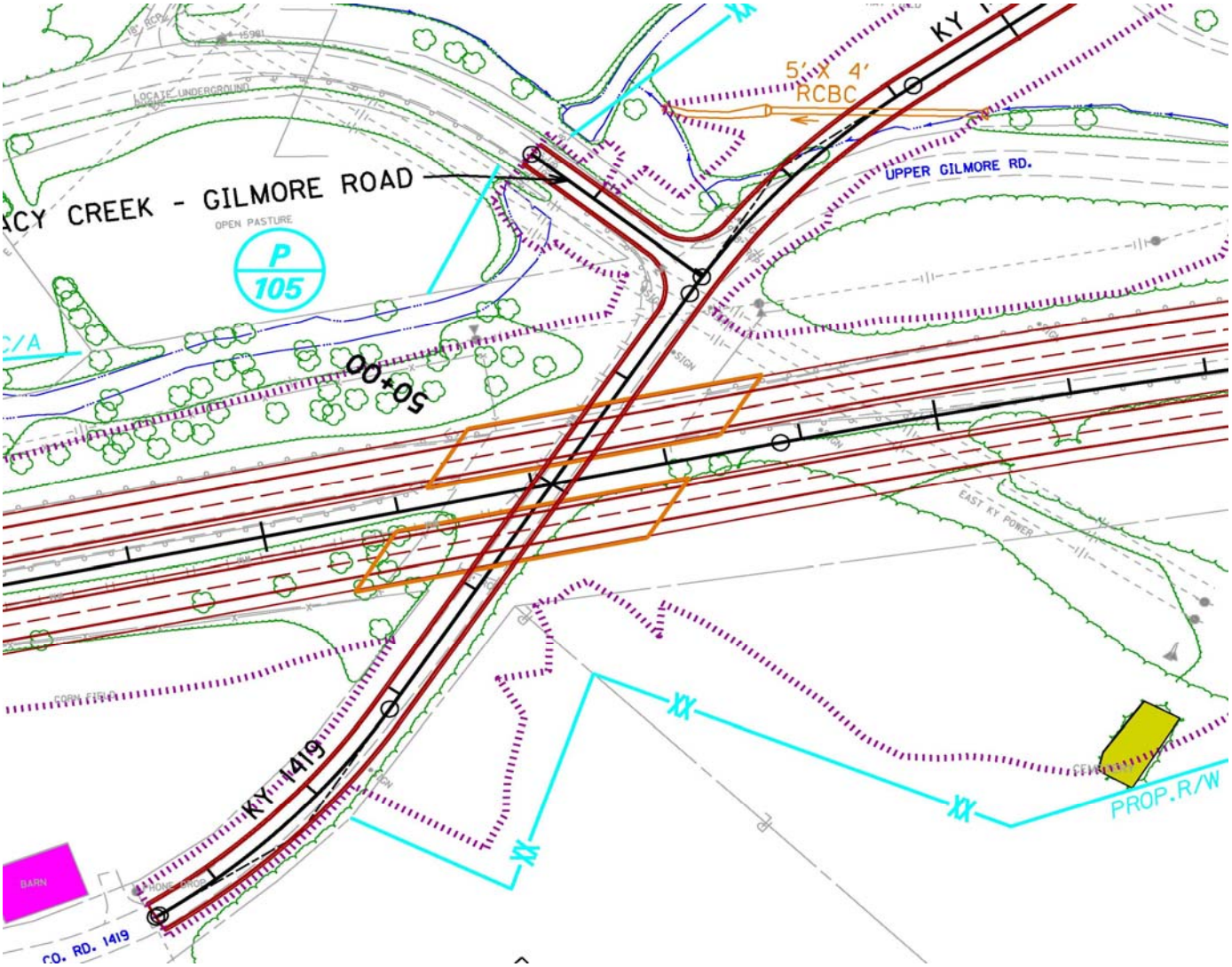
*Note: Costs are rounded to nearest thousand dollars.

COST

VALUE ENGINEERING PROPOSAL CV-08
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Straighten KY 1419 on the south side to reduce the skew

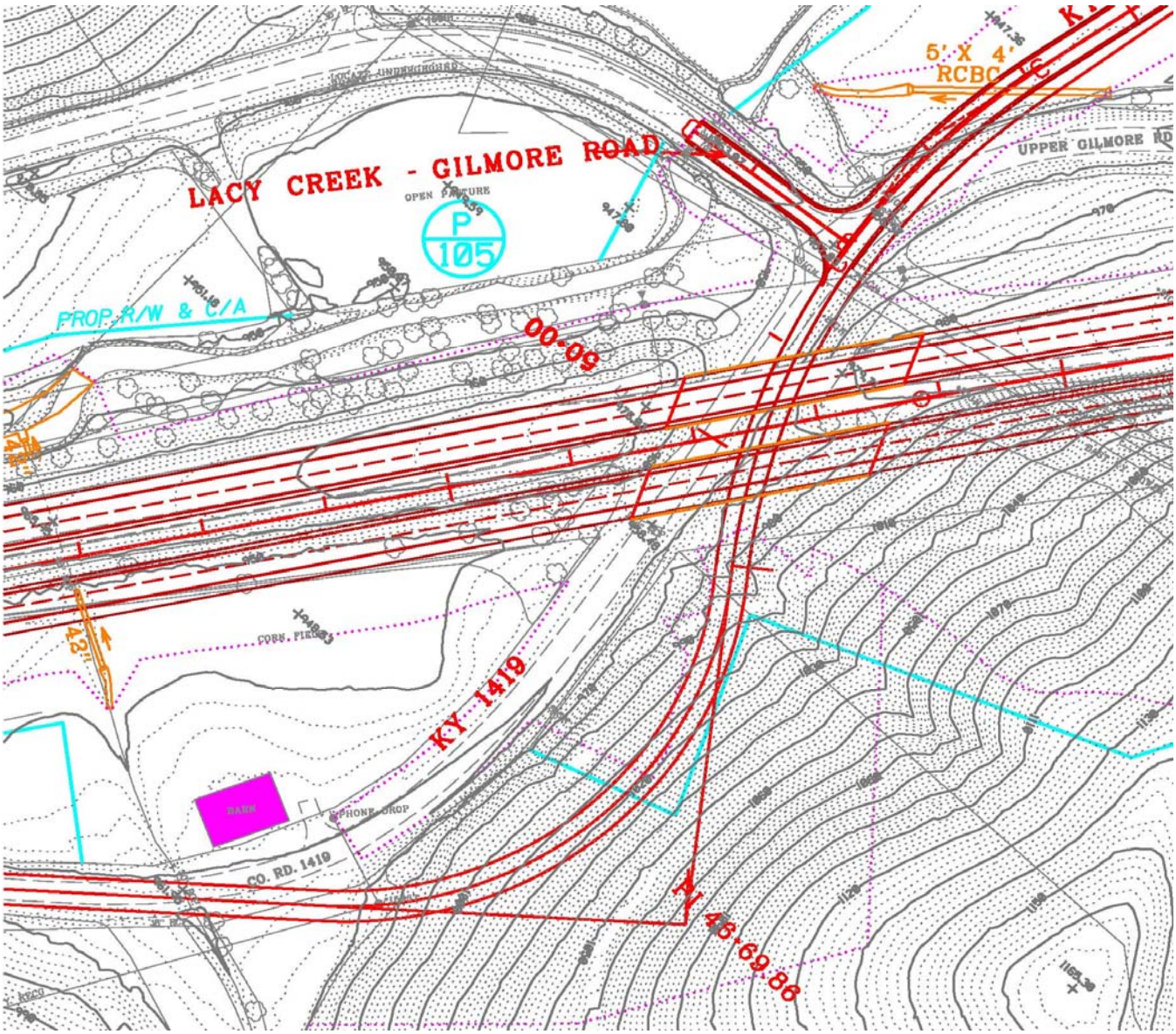
SKETCH OF BASELINE ASSUMPTION



VALUE ENGINEERING PROPOSAL CV-08
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Straighten KY 1419 on the south side to reduce the skew

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL CV-09
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Relocate KY 1419 to STA 620+00 and cross over the mainline

FUNCTION: **Convey Vehicles**

BASELINE ASSUMPTION:

The current design shows the mainline crossing KY 1419 with new twin bridges at approximately the same location as the existing skewed crossing.

PROPOSED ALTERNATIVE:

Realign KY 1419 to cross over the parkway with a single bridge east of the existing crossing.

BENEFITS	RISKS/CHALLENGES
• One less bridge to construct and maintain	• Increases excavation
•	• 25 mph horizontal curve
•	• Vertical alignment has steeper approach grades
•	• Less sight distance on vertical curves
•	• Additional right of way required
•	• Additional paving required
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 2,240,000	$ -	$ 2,240,000
PROPOSED ALTERNATIVE:	$ 2,316,550	$ -	$ 2,316,550
TOTAL (Baseline less Proposed)	$ (76,550)	$ -	**$ (76,550)**

COST

VALUE ENGINEERING PROPOSAL CV-09
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Relocate KY 1419 to STA 620+00 and cross over the mainline

DISCUSSION/JUSTIFICATION:

This alternative involves realigning KY 1419 on the south side to run approximately parallel with mainline and then cross the Parkway east of the existing road with a single bridge. This would eliminate the twin parkway bridges over KY 1419.

After a more detailed review, the Value Engineering team does not recommend this alternative as the estimated costs related to this alternative indicate there would be no savings, primarily due to the relatively large increase in excavation volume for KY 1419. Also, the horizontal and vertical alignments required for KY 1419 to cross over the parkway would not be as desirable as the baseline approach. The alternative alignment would only meet approximately a 25 mph design speed. This alternative would also require a steep tie-in for Lacy Creek-Gilmore Road.

IMPLEMENTATION CONSIDERATIONS:

None apparent.

VALUE ENGINEERING PROPOSAL CV-09
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Relocate KY 1419 to STA 620+00 and cross over the mainline

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Twin Bridges over KY 1419		LS	1	2,240,000.00	2,240,000			
KY 1419 single bridge over parkway		SF				7540	125.00	942,500
Additional roadway excavation		CY				254820	5.00	1,274,100
Additional guardrail		LF				1250	23.48	29,350
Additional right of way		ACRE				2	5,000.00	10,000
Additional crushed stone base		TON				800	26.50	21,200
Additional asphalt base		TON				380	70.00	26,600
Additional asphalt surface		TON				160	80.00	12,800
					2,240,000			**2,316,550**
							(BASELINE LESS PROPOSED)	**(76,550)**

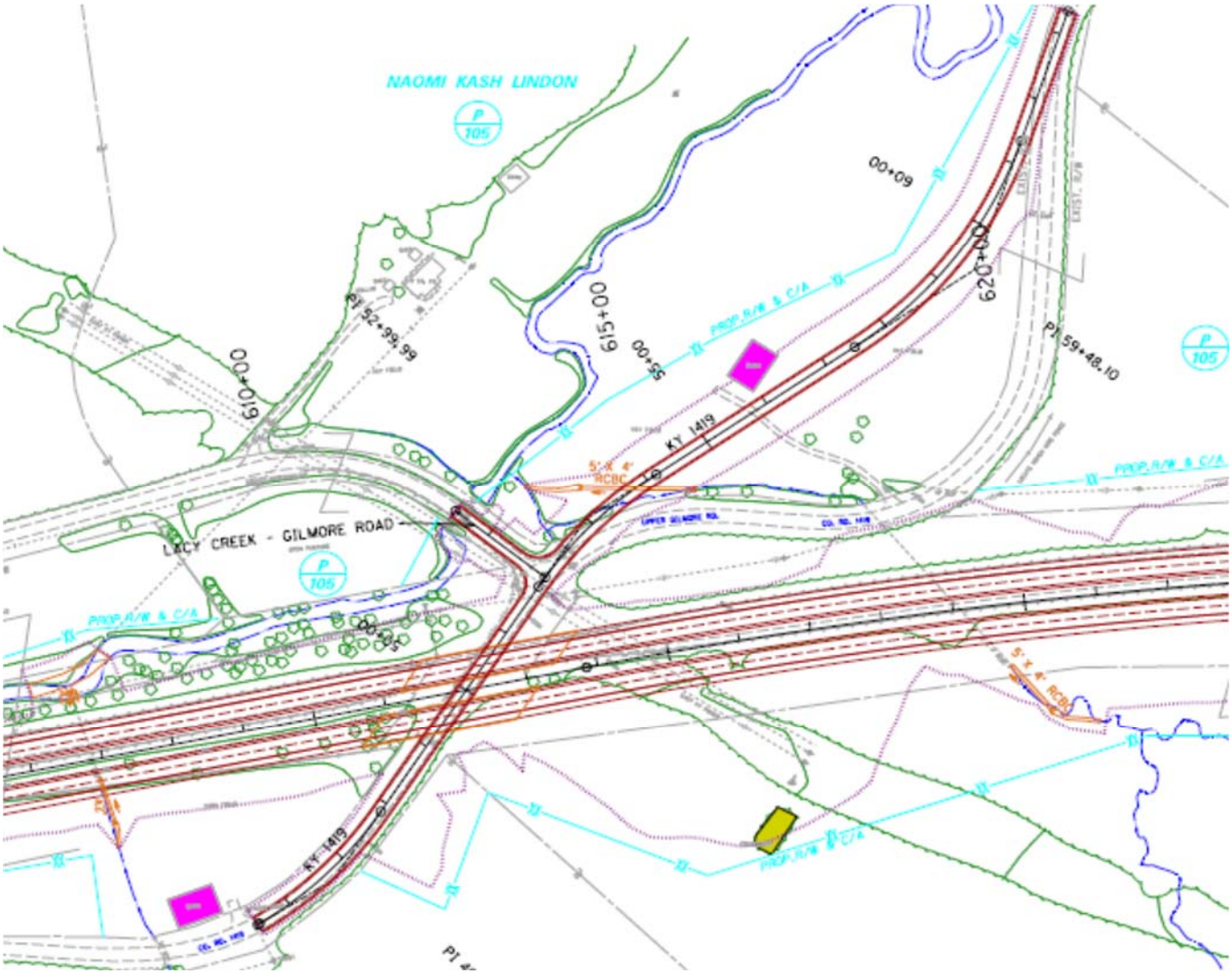
*Note: Costs are rounded to nearest thousand dollars.

COST

VALUE ENGINEERING PROPOSAL CV-09
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Relocate KY 1419 to STA 620+00 and cross over the mainline

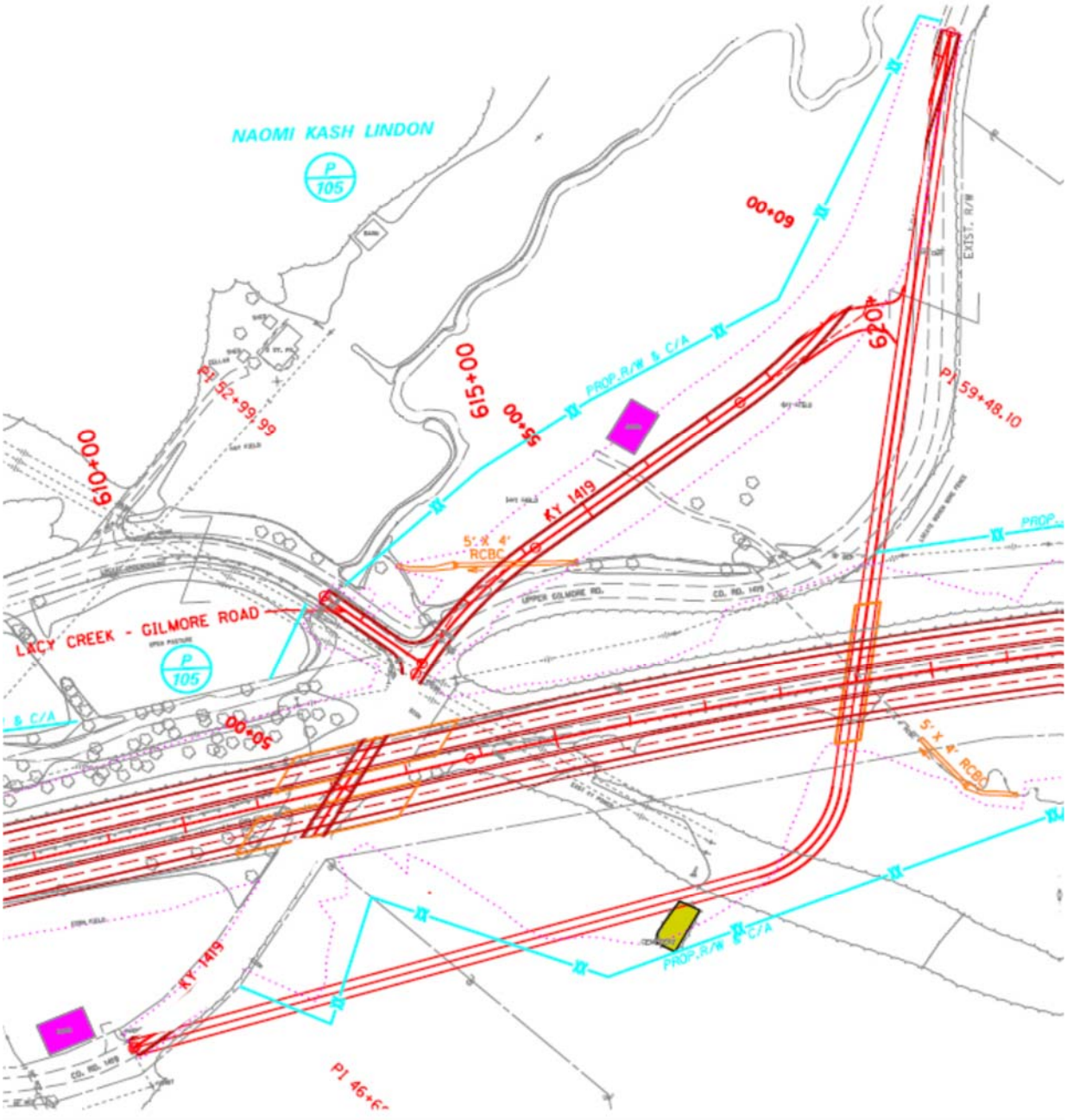
SKETCH OF BASELINE ASSUMPTION



VALUE ENGINEERING PROPOSAL CV-09
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Relocate KY 1419 to STA 620+00 and cross over the mainline

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL CV-10
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Bifurcate the roadway from Sta 536+00 to Sta 544+00

FUNCTION: **Convey Vehicles**

BASELINE ASSUMPTION:

The current design shows the east bound and west bound lanes at the same elevation along centerline throughout the entire corridor.

PROPOSED ALTERNATIVE:

The proposed alternate would reduce the cross-sectional width of the roadway through the cut sections. The elevations for the lanes nearest the cut will be raised by approximate 15 feet. The grade change will be transitioned on each side of the cut.

BENEFITS	RISKS/CHALLENGES
• Reduces quantity of excavation	• Depending upon the durability of the rock. The high wall could erode, compromising the roadway section above
• Reduces construction time, due to reduction in roadway excavation quantities	• The elevated lanes could shade the lower lanes, creating a cold spot in the winter
•	• The bench width required for elevated lanes could be compromised, due to fallouts or improper blasting practices
•	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 1,989,000	$ -	$ 1,989,000
PROPOSED ALTERNATIVE:	$ 1,705,872	$ -	$ 1,705,872
TOTAL (Baseline less Proposed)	$ 283,128	$ -	**$ 283,128**
			SAVINGS

VALUE ENGINEERING PROPOSAL CV-10
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Bifurcate the roadway from Sta 536+00 to Sta 544+00

DISCUSSION/JUSTIFICATION:

The current plans call for 5.915 million cubic yards of roadway excavation for this eleven mile section of the Mountain Parkway. The proposed alternate reduces the cross-sectional width of the roadway through the cut sections, thus reducing the roadway excavation quantity. The travel lanes closest to the cut will be raised approximate 15 feet. The grade changes will be transitioned on the back station and ahead station ends of the cut. This will require installation of guardrail with end treatments.

IMPLEMENTATION CONSIDERATIONS:

Further geotechnical investigations will be necessary to insure the rock strata in the cut will be durable and non-weathering.

VALUE ENGINEERING PROPOSAL CV-10
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Bifurcate the roadway from Sta 536+00 to Sta 544+00

DESIGN ELEMENT	**Markup**	**BASELINE ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Roadway excavation		CUYD	397,800	5.00	1,989,000	336,267	5.00	1,681,335
Guardrail steel W-Beam		LF				1600	12.83	20,528
Guardrail end treatment Type 1		Each				2	2,004.54	4,009
					1,989,000			**1,705,872**
							(BASELINE LESS PROPOSED)	**283,128**

*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL CV-10
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Bifurcate the roadway from Sta 536+00 to Sta 544+00

CV-10 CALCULATIONS

Existing Design (Baseline Assumption)

Station	End Area	Interval	Cut Volume
536	0		
		200	47,256
538	12759		
		200	148,459
540	27325		
		200	151,644
542	13619		
		200	50,441
544	0		
		Total	**397,800**

Proposed Alternative

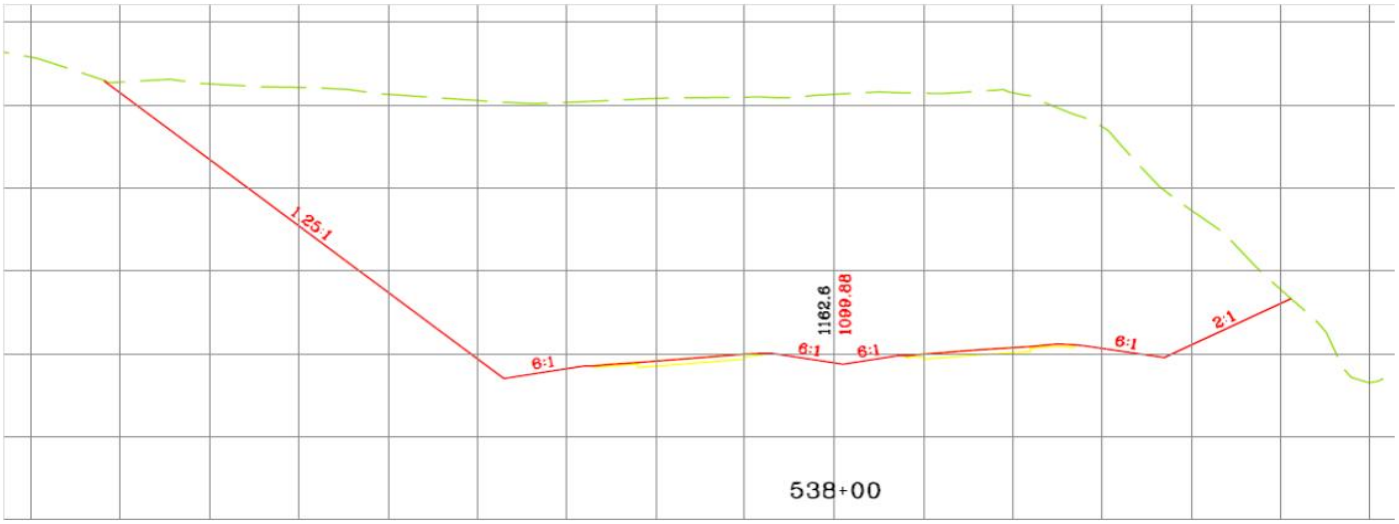
Station	End Area	Interval	Cut Volume
536	0		
		200	38,489
538	10,392		
		200	126,744
540	23,829		
		200	129,644
542	11,175		
		200	41,389
544	0		
		Total	**336,267**

Existing Design	397,800
Proposed Alternative	336,267
Reduced Yardage	**61,533**

VALUE ENGINEERING PROPOSAL CV-10
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Bifurcate the roadway from Sta 536+00 to Sta 544+00

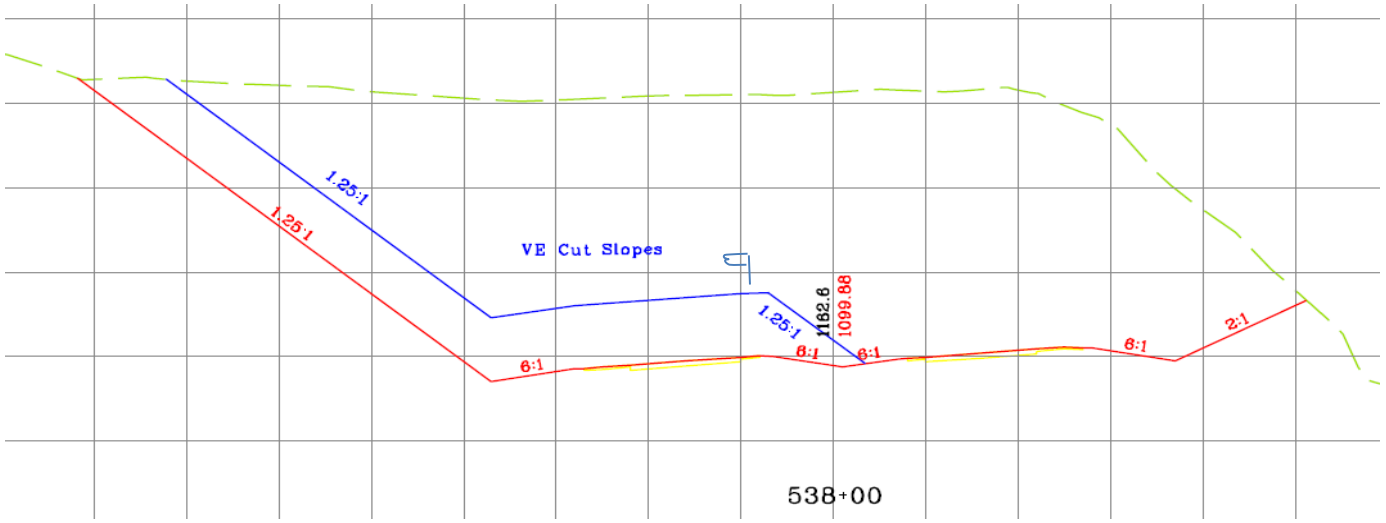
SKETCH OF BASELINE ASSUMPTION



VALUE ENGINEERING PROPOSAL CV-10
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Bifurcate the roadway from Sta 536+00 to Sta 544+00

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL CV-11
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Bifurcate the roadway from Sta 176+00 to Sta 197+00

FUNCTION: **Convey Vehicles**

BASELINE ASSUMPTION:

The current design shows the east bound and west bound lanes at the same elevation along centerline throughout the entire corridor.

PROPOSED ALTERNATIVE:

The proposed alternative would reduce the cross-sectional width of the roadway through the cut sections. The elevations for the lanes nearest the cut will be raised by approximately 10 feet. The grade change will be transitioned on each side of the cut.

BENEFITS	RISKS/CHALLENGES
• Reduces quantity of excavation	• Requires installation of guardrail with end treatments
• Reduces construction time, due to reduction in roadway excavation quantities	• Depending upon the durability of the rock. The high wall could erode, compromising the roadway section above
•	• The elevated lanes could shade the lower lanes, creating a cold spot in the winter
•	• The bench width required for elevated lanes could be compromised, due to fallouts or improper blasting practices
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 2,609,425	$ -	$ 2,609,425
PROPOSED ALTERNATIVE:	$ 1,971,230	$ -	$ 1,971,230
TOTAL (Baseline less Proposed)	$ 638,195	$ -	**$ 638,195**

SAVINGS

VALUE ENGINEERING PROPOSAL CV-11
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Bifurcate the roadway from Sta 176+00 to Sta 197+00

DISCUSSION/JUSTIFICATION:

The current plans call for 5.915 million cubic yards of roadway excavation for this eleven mile section of the Mountain Parkway. The proposed alternative reduces the cross-sectional width of the roadway through the cut sections, thus reducing the roadway excavation quantity. The travel lanes closest to the cut will be raised approximately 10 feet. The grade changes will be transitioned on the back station and ahead station ends of the cut.

IMPLEMENTATION CONSIDERATIONS:

Further geotechincal investigations will be necessary to insure the rock strata in the cut will be durable and non-weathering.

VALUE ENGINEERING PROPOSAL CV-11
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Bifurcate the roadway from Sta 176+00 to Sta 197+00

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Roadway excavation		CUYD	521,885	5.00	2,609,425	382,667	5.00	1,913,335
Guardrail- steel W-beam		LF				4200	12.83	53,886
Guardrail end treatment Type 1		Each				2	2,004.54	4,009
					2,609,425			**1,971,230**
							(BASELINE LESS PROPOSED)	**638,195**

*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL CV-11
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Bifurcate the roadway from Sta 176+00 to Sta 197+00

CALCULATIONS

Existing Design (Baseline Assumption)

Station	End Area	Interval	Cut Volume
176	3,851		
		200	28,715
178	3,902		
		200	52,144
180	10,177		
		200	105,122
182	18,206		
		200	100,963
184	9,054		
		200	38,485
186	1,337		
		200	9,089
188	1,117		
		200	19,500
190	4,148		
		200	44,678
192	7,915		
		200	57,915
194	7,722		
		200	46,937
196	4,951		
		200	18,337
198	0		
		Total	**521,885**

Proposed Alternative

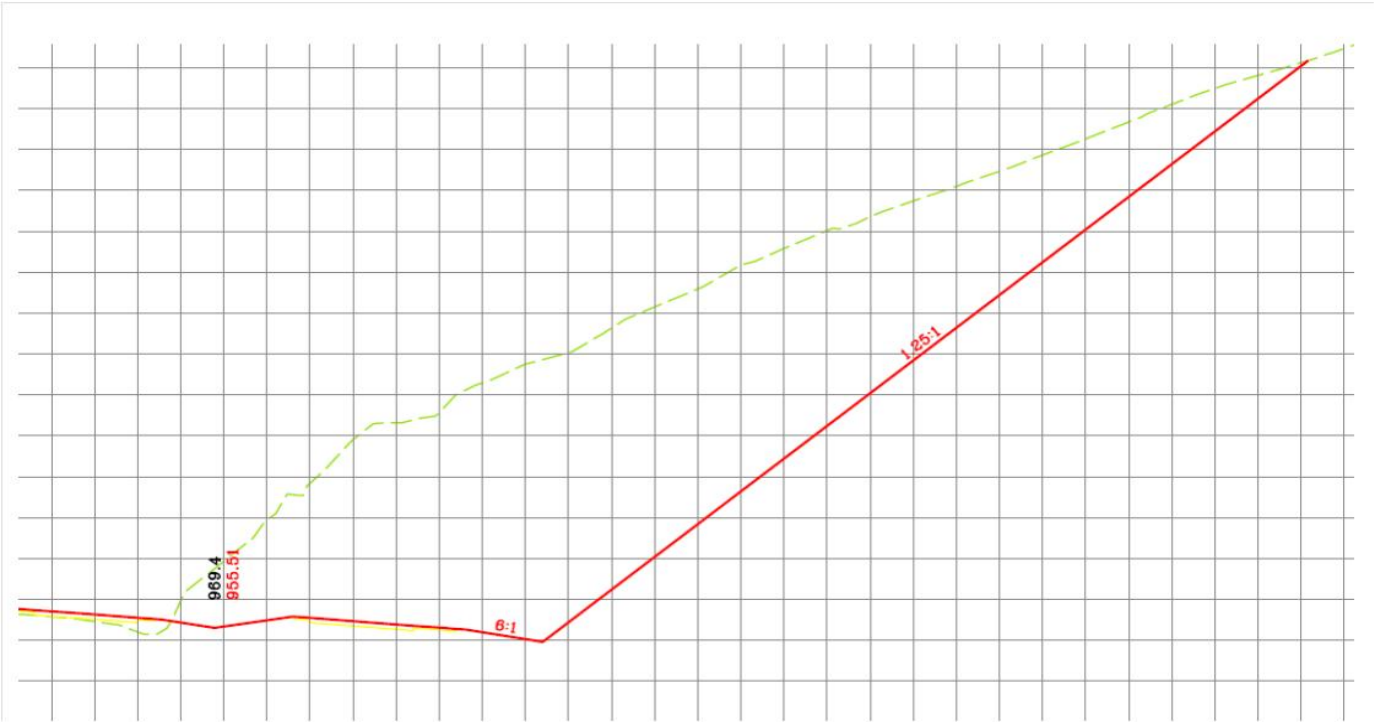
Station	End Area	Interval	Cut Volume
176	2,064		
		200	15,874
178	2,222		
		200	36,111
180	7,528		
		200	83,533
182	15,026		
		200	80,700
184	6,763		
		200	26,567
186	410		
		200	2,437
188	248		
		200	10,600
190	2,614		
		200	32,622
192	6,194		
		200	45,722
194	6,151		
		200	35,641
196	3,472		
		200	12,859
198	0		
		Total	**288,444**

Existing Design	521,885
Proposed Alternative	288,444
Reduced Yardage	**233,441**

VALUE ENGINEERING PROPOSAL CV-11
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Bifurcate the roadway from Sta 176+00 to Sta 197+00

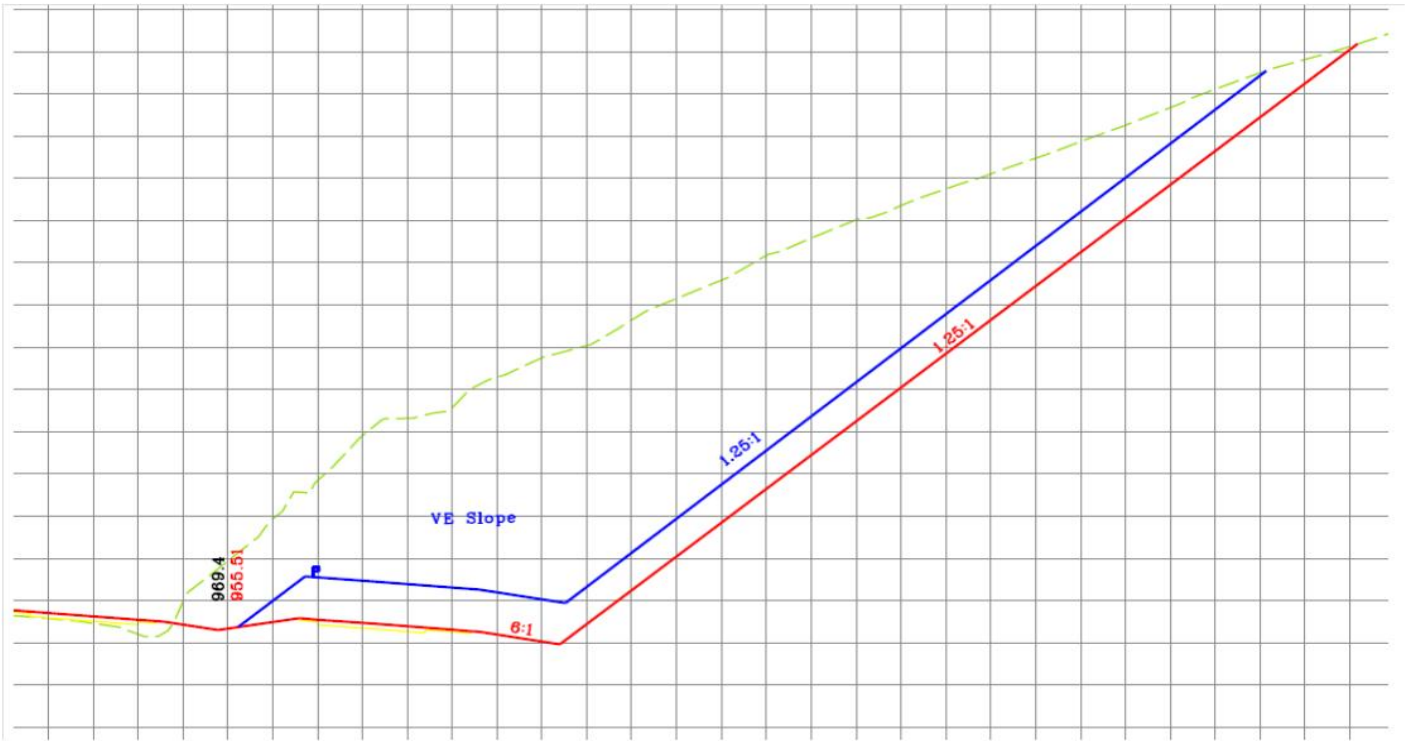
SKETCH OF BASELINE ASSUMPTION



VALUE ENGINEERING PROPOSAL CV-11
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Bifurcate the roadway from Sta 176+00 to Sta 197+00

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL CV-12
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Bifurcate the roadway from Sta 570+00 to Sta 590+00 on one side

FUNCTION: **Convey Vehicles**

BASELINE ASSUMPTION:

The current design shows the east bound and west bound lanes at the same elevation along centerline throughout the entire corridor.

PROPOSED ALTERNATIVE:

The proposed alternative would reduce the cross-sectional width of the roadway through the cut sections. The elevations for the lanes nearest the cut will be raised by approximately 5 feet. The grade change will be transitioned on each side of the cut.

BENEFITS	RISKS/CHALLENGES
• Reduces quantity of excavation	• Requires installation of guardrail with end treatments
• Reduces construction time, due to reduction in roadway excavation quantities.	• Depending upon the durability of the rock. The high wall could erode, compromising the roadway section above
•	• The elevated lanes could shade the lower lanes, creating a cold spot in the winter
•	• The bench width required for elevated lanes could be compromised, due to fallouts or improper blasting practices
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 773,280	$ -	$ 773,280
PROPOSED ALTERNATIVE:	$ 634,098	$ -	$ 634,098
TOTAL (Baseline less Proposed)	$ 139,182	$ -	**$ 139,182**
			SAVINGS

VALUE ENGINEERING PROPOSAL CV-12
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Bifurcate the roadway from Sta 570+00 to Sta 590+00 on one side

DISCUSSION/JUSTIFICATION:

The current plans call for 5.915 million cubic yards of roadway excavation for this eleven mile section of the Mountain Parkway. The proposed alternative reduces the cross-sectional width of the roadway through the cut sections, thus reducing the roadway excavation quantity. The travel lanes closest to the cut will be raised approximately 5 feet. The grade changes will be transitioned on the back station and ahead station ends of the cut.

IMPLEMENTATION CONSIDERATIONS:

Further geotechincal investigations will be necessary to insure the rock strata in the cut will be durable and non-weathering.

VALUE ENGINEERING PROPOSAL CV-12
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Bifurcate the roadway from Sta 570+00 to Sta 590+00 on one side

DESIGN ELEMENT	**Markup**	**BASELINE ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Roadway excavation		CUYD	154,656	5.00	773,280	118,833	5.00	594,165
Guardrail - steel W-beam		LF				2800	12.83	35,924
Guardrail end treatment Type 1		Each				2	2,004.54	4,009
					773,280			**634,098**
							(BASELINE LESS PROPOSED)	**139,182**

*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL CV-12
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Bifurcate the roadway from Sta 570+00 to Sta 590+00 on one side

CALCULATIONS

Existing Design (Baseline Assumption)

Station	End Area	Interval	Cut Volume
576	3,630		
		200	22,274
578	2,384		
		200	15,048
580	1,679		
		200	11,256
582	1,360		
		200	21,159
584	4,353		
		200	43,278
586	7,332		
		200	32,674
588	1,490		
		200	8,967
590	931		
		Total	**154,656**

Proposed Alternative

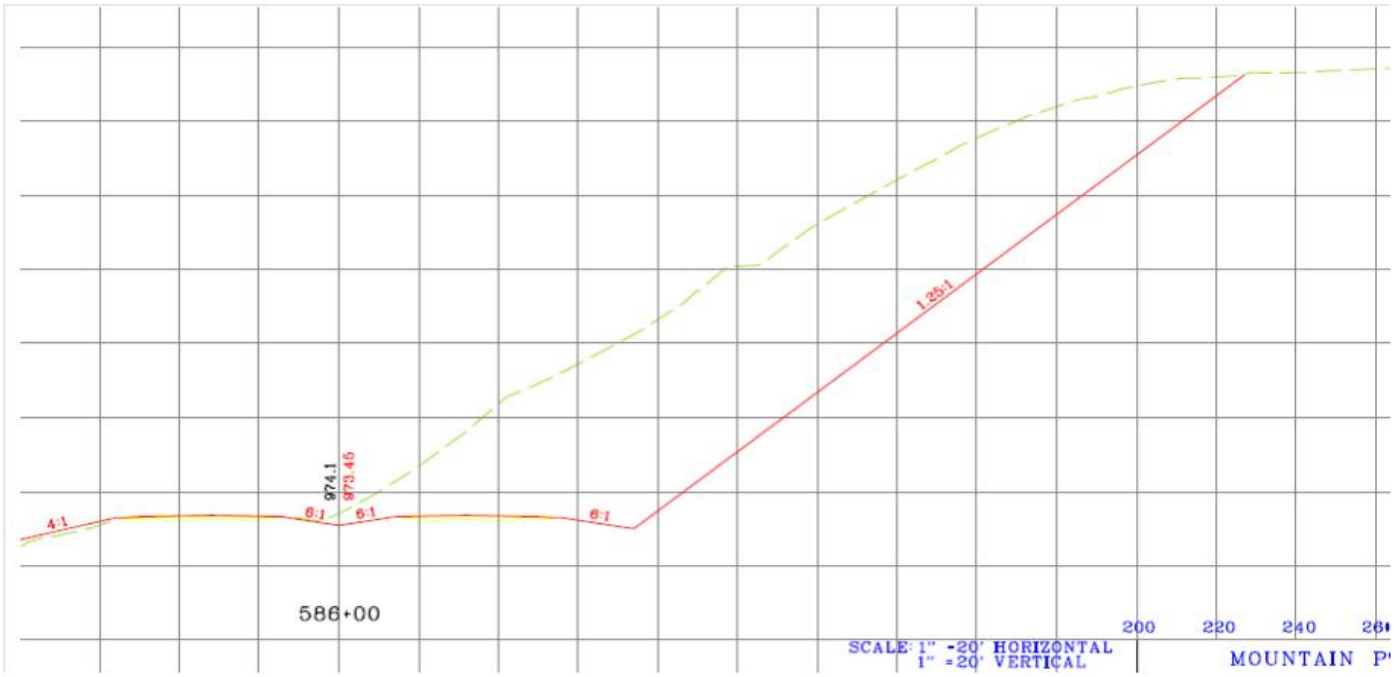
Station	End Area	Interval	Cut Volume
576	2,835		
		200	16,948
578	1,741		
		200	10,748
580	1,161		
		200	7,711
582	921		
		200	16,178
584	3,447		
		200	35,752
586	6,206		
		200	26,515
588	953		
		200	4,981
590	392		
		Total	**118,833**

Existing Design	154,656
Proposed Alternative	118,833
Reduced Yardage	**35,822**

VALUE ENGINEERING PROPOSAL CV-12
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Bifurcate the roadway from Sta 570+00 to Sta 590+00 on one side

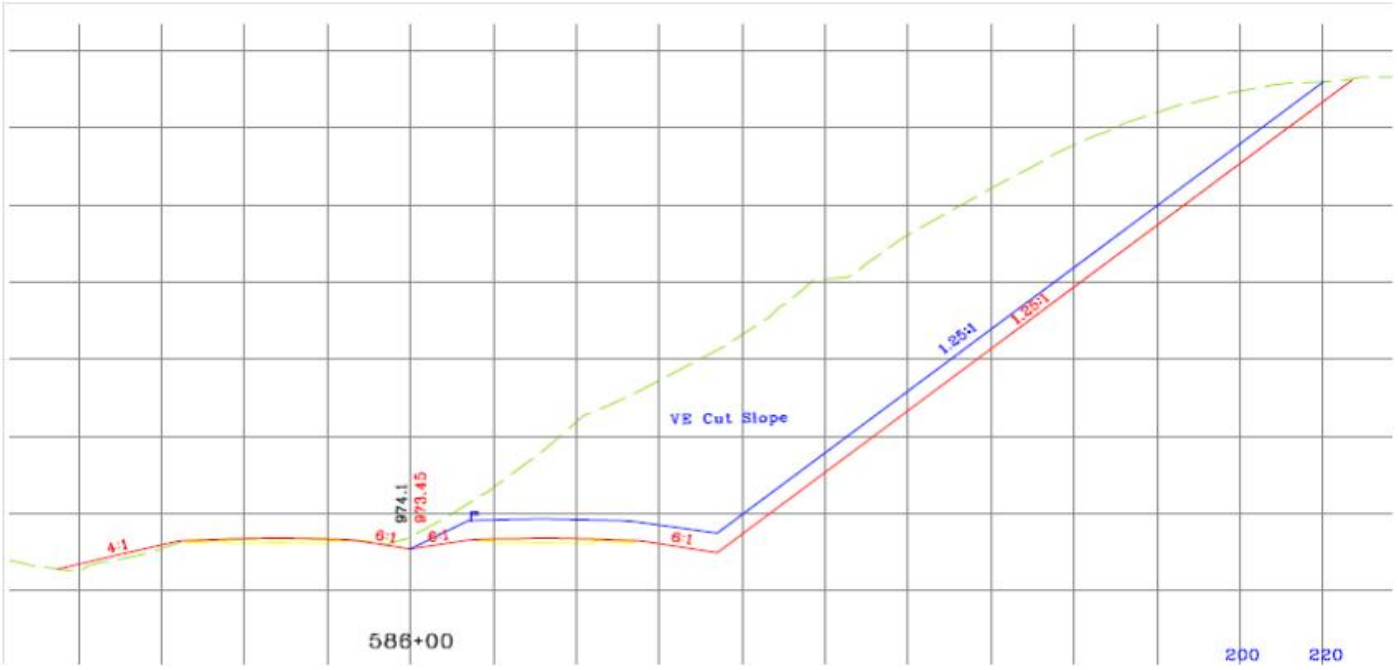
SKETCH OF BASELINE ASSUMPTION



VALUE ENGINEERING PROPOSAL CV-12
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Bifurcate the roadway from Sta 570+00 to Sta 590+00 on one side

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL CV-13
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Bifurcate the roadway from Sta 402+00 to 465+00

FUNCTION: **Convey Vehicles**

BASELINE ASSUMPTION:

The current design shows the east bound and west bound lanes at the same elevation along centerline throughout the entire corridor.

PROPOSED ALTERNATIVE:

The proposed alternative would reduce the cross-sectional width of the roadway through the cut sections. The elevations for the lanes nearest the cut will be raised by approximately 10 feet. The grade change will be transitioned on each side of the cut.

BENEFITS	RISKS/CHALLENGES
• Reduces quantity of excavation	• Requires installation of guardrail with end treatments
• Reduces construction time, due to reduction in roadway excavation quantities.	• Depending upon the durability of the rock. The high wall could erode, compromising the roadway section above
•	• The elevated lanes could shade the lower lanes, creating a cold spot in the winter
•	• The bench width required for elevated lanes could be compromised, due to fallouts or improper blasting practices.
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 2,326,165	$ -	$ 2,326,165
PROPOSED ALTERNATIVE:	$ 1,546,308	$ -	$ 1,546,308
TOTAL (Baseline less Proposed)	$ 779,857	$ -	**$ 779,857**
			SAVINGS

VALUE ENGINEERING PROPOSAL CV-13
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Bifurcate the roadway from Sta 402+00 to 465+00

DISCUSSION/JUSTIFICATION:

The current plans call for 5.915 million cubic yards of roadway excavation for this eleven mile section of the Mountain Parkway. The proposed alternative reduces the cross-sectional width of the roadway through the cut sections, thus reducing the roadway excavation quantity. The travel lanes closest to the cut will be raised approximately 10 feet. The grade changes will be transitioned on the back station and ahead station ends of the cut.

IMPLEMENTATION CONSIDERATIONS:

Further geotechincal investigations will be necessary to insure the rock strata in the cut will be durable and non-weathering.

VALUE ENGINEERING PROPOSAL CV-13
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Bifurcate the roadway from Sta 402+00 to 465+00

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Roadway excavation		CUYD	465,233	5.00	2,326,165	275,615	5.00	1,378,075
Guardrail - steel W-beam		LF				12800	12.83	164,224
Guardrail end treatment Type 1		Each				2	2,004.54	4,009
					2,326,165			**1,546,308**
							(BASELINE LESS PROPOSED)	**779,857**

*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL CV-13
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Bifurcate the roadway from Sta 402+00 to 465+00

CALCULATIONS

Existing Design (Baseline Assumption)

Station	End Area	Interval	Cut Volume
402	2,199		
		200	31,274
404	6,245		
		200	59,730
406	9,882		
		200	67,859
408	8,440		
		200	41,322
410	2,717		
		200	18,759
412	2,348		
		200	11,937
414	875		
		200	5,156
416	517		0
		200	5,815
418	1,053		
		200	5,981
420	562		
		200	2,811
422	197		
		200	3,467
424	739		
		200	3,781
426	282		
		200	9,452
428	2,270		
		200	18,407
430	2,700		
		200	25,152
432	4,091		
		200	35,859
434	5,591		
		200	26,674
436	1,611		
		200	8,019

Existing Design (Baseline Assumption)

Station	End Area	Interval	Cut Volume
438	554		
		200	2,052
440	0		
		200	915
442	247		
		200	915
444	0		
		200	322
446	87		
		200	8,133
448	2,109		
		200	17,041
450	2,492		
		200	10,293
452	287		
		200	2,019
454	258		
		200	1,907
456	257		
		200	9,285
458	2,250		
		200	17,007
460	2,342		
		200	11,281
462	704		
		200	2,607
464	0		
		Total	**465,233**

VALUE ENGINEERING PROPOSAL CV-13
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Bifurcate the roadway from Sta 402+00 to 465+00

CALCULATIONS

Proposed Alternative

Station	End Area	Interval	Cut Volume
402	1,062		
		200	19,922
404	4,317		
		200	45,163
406	7,877		
		200	51,959
408	6,152		
		200	27,770
410	1,346		
		200	9,300
412	1,165		
		200	5,181
414	234		
		200	1,033
416	45		
		200	1,185
418	275		
		200	1,170
420	41		
		200	152
422	0		
		200	922
424	249		
		200	922
426	0		
		200	4,530
428	1,223		
		200	10,944
430	1,732		
		200	16,830
432	2,812		
		200	24,785
434	3,880		
		200	17,330
436	799		
		200	3,252

Proposed Alternative

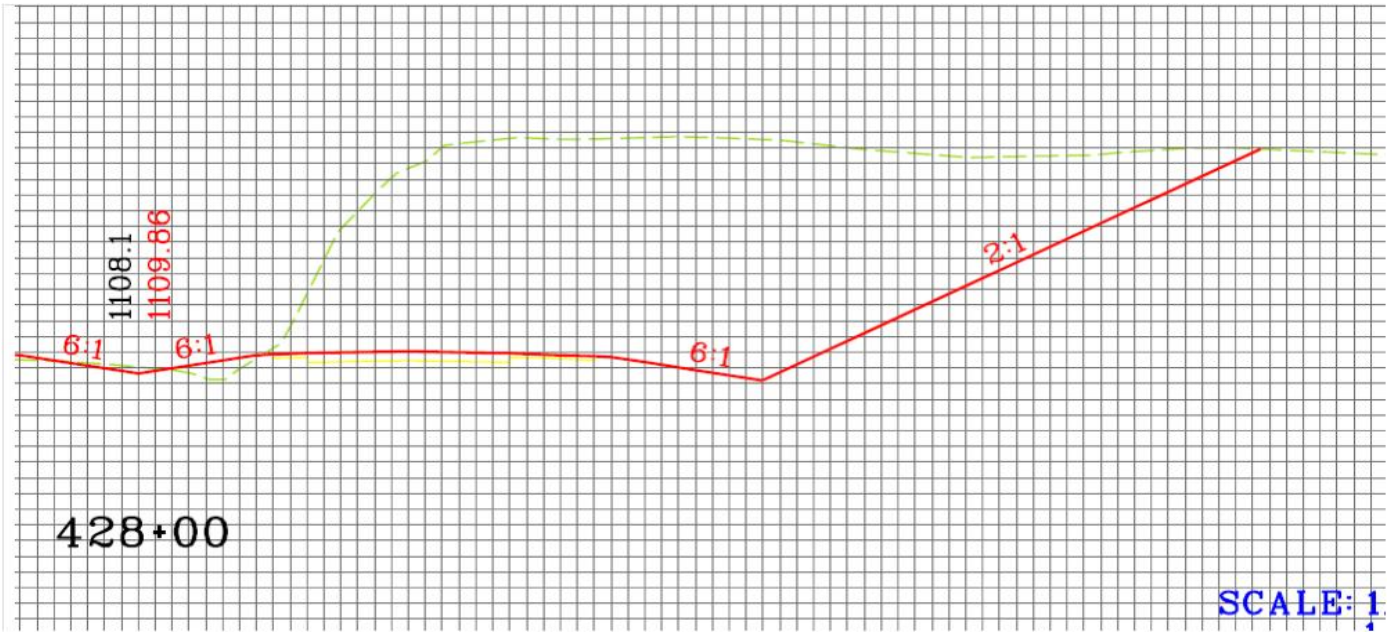
Station	End Area	Interval	Cut Volume
438	79		
		200	293
440	0		
		200	0
442	0		
		200	0
444	0		
		200	0
446	0		
		200	3,804
448	1,027		
		200	8,474
450	1,261		
		200	4,670
452	0		
		200	0
454	0		
		200	0
456	0		
		200	4,093
458	1,105		
		200	7,670
460	966		
		200	3,919
462	92		
		200	341
464	0		
		Total	**275,615**

Existing Design	465,233
Proposed Alternative	275,615
Reduced Yardage	**189,619**

VALUE ENGINEERING PROPOSAL CV-13
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Bifurcate the roadway from Sta 402+00 to 465+00

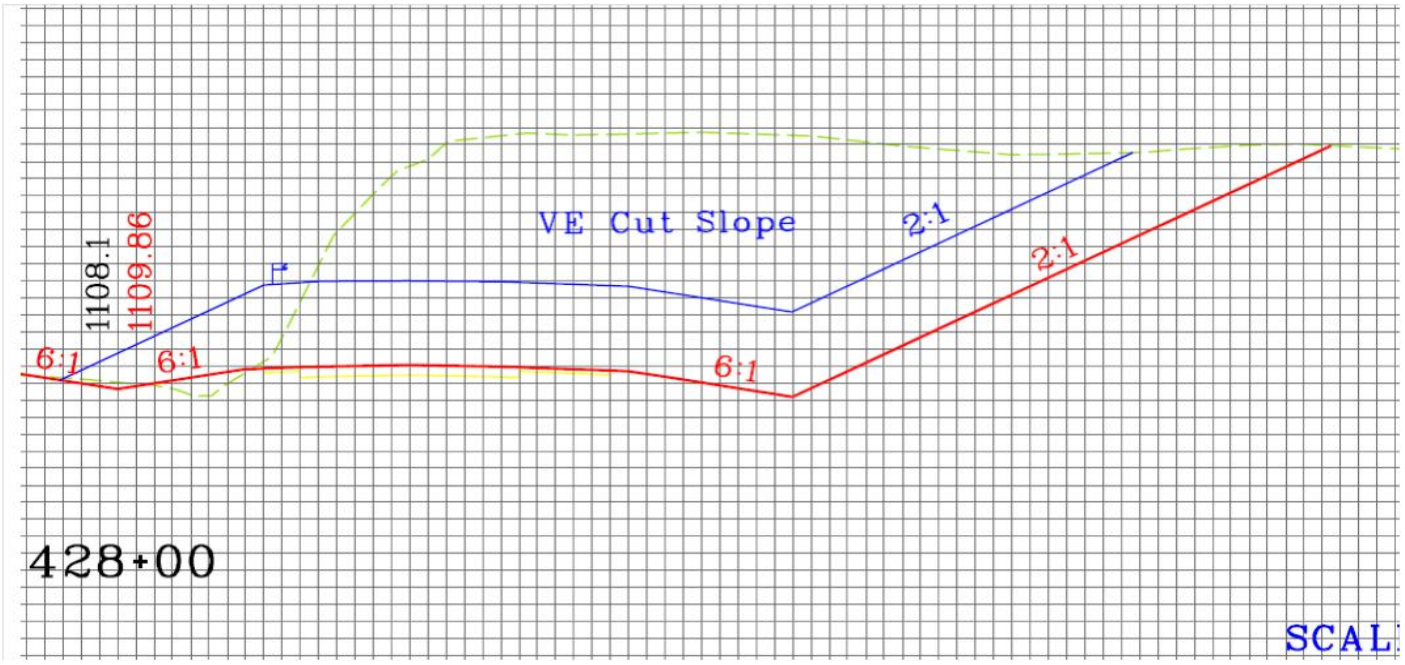
SKETCH OF BASELINE ASSUMPTION



VALUE ENGINEERING PROPOSAL CV-13
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Bifurcate the roadway from Sta 402+00 to 465+00

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL CV-14
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Do not pave Mountain Parkway Service Road, Bedwell Road, or Wendy Hills Drive

FUNCTION: **Convey Vehicles**

BASELINE ASSUMPTION:

Existing gravel roads are paved in this design. The typical is 8in. DGA, 3in. Asphalt base and 1.25in. asphalt surface.

PROPOSED ALTERNATIVE:

Do not pave Mountain Parkway Service Road, Bedwell Road, or Wendy Hills Drive. Place crushed stone gravel to return to existing condition. It was indicated that about 3in. DGA would be appropriate fro a gravel road.

BENEFITS	RISKS/CHALLENGES
● New gravel is improvement over existing gravel	● Care needed to maintain guardrail height during life of road
● Maintenance could be done with state forces and equipment	●
● No asphalt to maintain	●
● Savings not calculated here, but various entrances on these roads would not need to be paved	●
●	●
●	●
●	●
●	●

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 402,857	$ -	$ 402,857
PROPOSED ALTERNATIVE:	$ 196,657	$ -	$ 196,657
TOTAL (Baseline less Proposed)	$ 206,200	$ -	**$ 206,200**
			SAVINGS

VALUE ENGINEERING PROPOSAL CV-14
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Do not pave Mountain Parkway Service Road, Bedwell Road, or Wendy Hills Drive

DISCUSSION/JUSTIFICATION:

Gravel is successfully used on many similar roads in the Midwest. Placement of adequate gravel would provide better condition than currently exists. The simplicity of gravel would make maintaining possible with Department personnel and equipment.

IMPLEMENTATION CONSIDERATIONS:

If the Department intends to transfer ownership of these roads over to the county, then paving these roads is most likely needed to achieve county acceptance of those roads. If the Department intends to keep these roads then a substantial savings could be realized by not using asphalt.

VALUE ENGINEERING PROPOSAL CV-14
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Do not pave Mountain Parkway Service Road, Bedwell Road, or Wendy Hills Drive

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Service Road CSB		TON	3680	26.50	97,520	3,680	26.50	97,520
Bedwell Road CSB		TON	1288	26.50	34,132	1,288	26.50	34,132
Wendy Hills Drive CSB		TON	2453	26.50	65,005	2,453	26.50	65,005
Service Road asphalt base		TON	990	70.00	69,300			
Bedwell Road asphalt base		TON	346	70.00	24,220			
Wendy Hills Drive asphalt base		TON	660	70.00	46,200			
Service Road asphalt surface		TON	412	80.00	32,960			
Bedwell Road asphalt surface		TON	144	80.00	11,520			
Wendy Hills Drive asphalt surface		TON	275	80.00	22,000			
					402,857			**196,657**
							(BASELINE LESS PROPOSED)	**206,200**

*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL CV-17
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Leave existing alignment at Sta 150+00 to Sta 220+00 and go cross-country

FUNCTION: **Convey Vehicles**

BASELINE ASSUMPTION:

The preliminary line and grade preferred alternative generally follows the existing alignment and widens to the south. These improvements to the horizontal curve in this location shifts the alignment farther south which gets into substantial cut sections.

PROPOSED ALTERNATIVE:

The proposed alternative would be a cross country alignment to try and minimize excavation material.

BENEFITS	RISKS/CHALLENGES
• Shortens route approximately 1,800 feet	• Might have an impact on the current environmental CE status
• More geometrically pleasing - gentler curve	•
•	•
•	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 1,765,000	$ -	$ 1,765,000
PROPOSED ALTERNATIVE:	$ 3,219,883	$ -	$ 3,219,883
TOTAL (Baseline less Proposed)	$ (1,454,883)	$ -	**$ (1,454,883)**
			COST

VALUE ENGINEERING PROPOSAL CV-17
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Leave existing alignment at Sta 150+00 to Sta 220+00 and go cross-country

DISCUSSION/JUSTIFICATION:

At first glance of the USGS drainage map, it appeared that this proposed alternative would be a viable option. However, after doing a quick plot of the existing ground profile along a sketch of the proposed alignment, it became obvious that an earthwork reduction would not be accomplished. Even using 6% maximum grades and 60-mph vertical design, it appears the cut lengths would be longer and the maximum depth would be 35-feet deeper. Also with the baseline alternative only the right side would be in a cut, with this alternative both sides of the road would be in cut. Excavation would likely increase approximately 350,000CY at a cost of $1,750,000. Approximately $250,000 in pavement savings could be realized due to the shorter length. **This alternative is not recommended as the potential earthwork reduction will not be realized as well as the fact that there is an increase in cost with no improvement to project function, based on the description above.**

IMPLEMENTATION CONSIDERATIONS:

May require additional environmental work.

VALUE ENGINEERING PROPOSAL CV-17
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Leave existing alignment at Sta 150+00 to Sta 220+00 and go cross-country

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Added roadway excavation			353000	5.00	1,765,000	703000	5.00	3,515,000
Reduced asphalt surface						-438	80.00	-35,040
Reduced asphalt base						-3157	70.00	-220,990
Reduced crushed stone base						-1475	26.50	-39,088
					1,765,000			**3,219,883**
							(BASELINE LESS PROPOSED)	**(1,454,883)**

*Note: Costs are rounded to nearest thousand dollars.

COST

VALUE ENGINEERING PROPOSAL CV-17
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

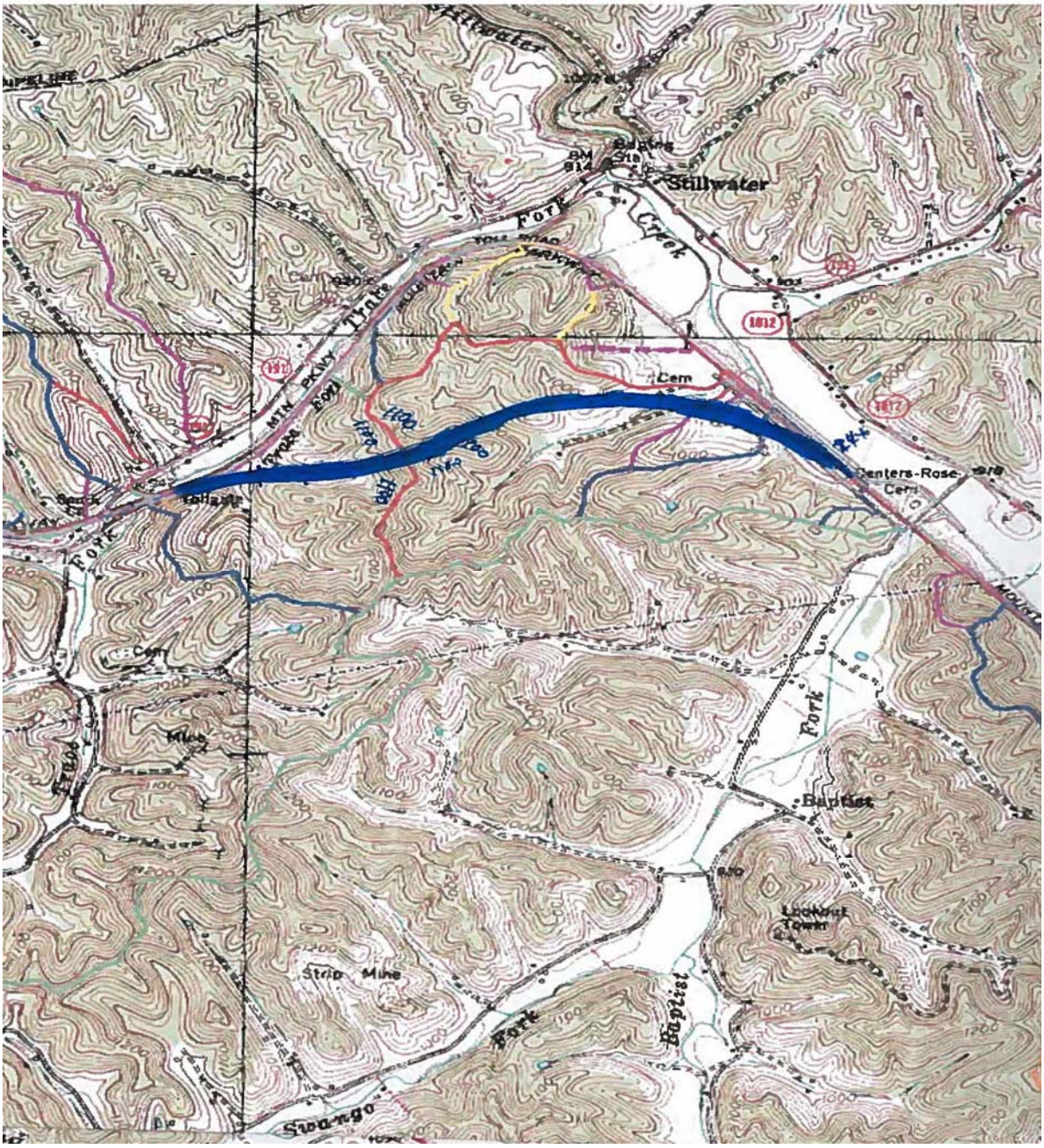
TITLE: Leave existing alignment at Sta 150+00 to Sta 220+00 and go cross-country

SKETCH OF BASELINE ASSUMPTION

VALUE ENGINEERING PROPOSAL CV-17
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Leave existing alignment at Sta 150+00 to Sta 220+00 and go cross-country

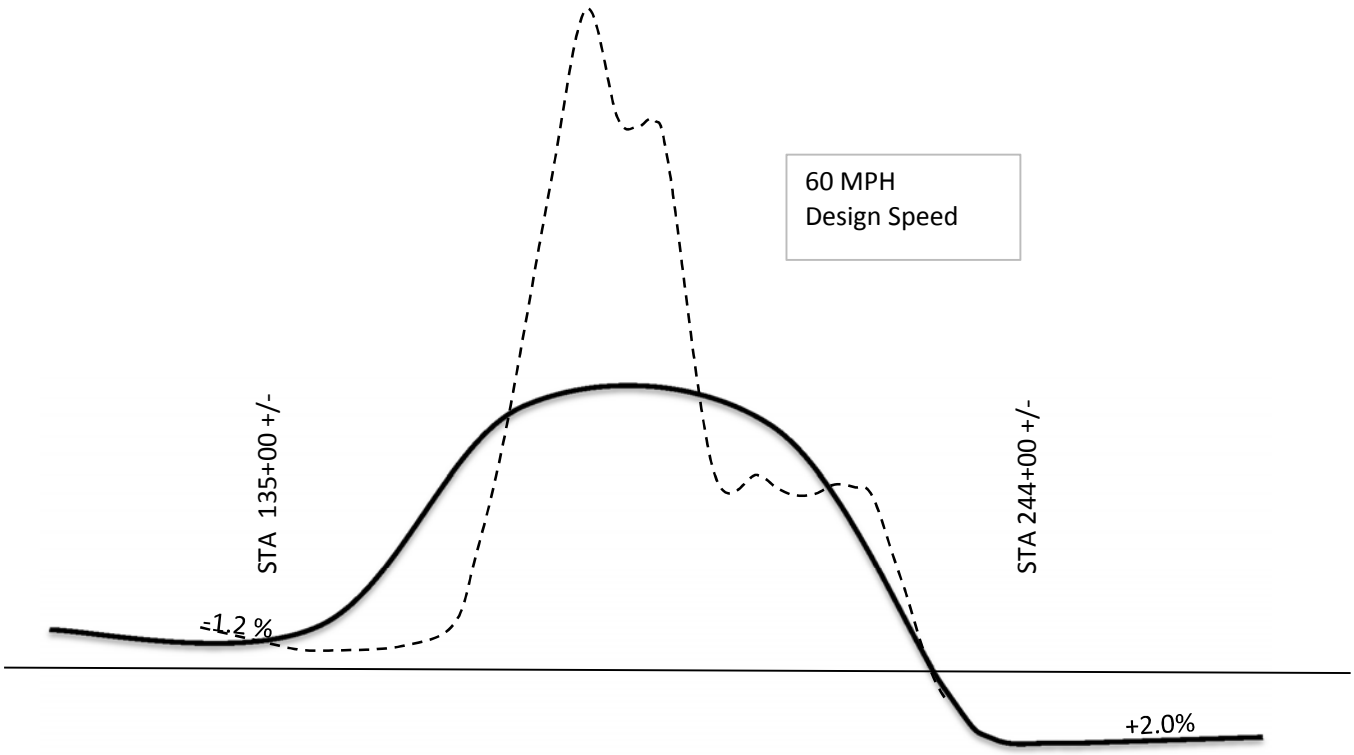
SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL CV-17
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Leave existing alignment at Sta 150+00 to Sta 220+00 and go cross-country

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL CV-18
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Leave existing alignment Sta 530+00 to Sta 545+00 and go across country

FUNCTION: **Convey Vehicles**

BASELINE ASSUMPTION:

Preliminary Line and Grade for the preferred alternative generally follows the existing alignment and widens to the south. Improvements to the horizontal curve in this location shifts the alignment farther north which gets into substantial cut sections.

PROPOSED ALTERNATIVE:

The proposed alternative would be a cross country alignment to improve geometry and minimize excavation material.

BENEFITS	RISKS/CHALLENGES
• Shortens route approximately 1,800 feet	• Might change the environmental CE status
• More geometrically pleasing with a gentler curve	•
•	•
•	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ -	$ -	$ -
PROPOSED ALTERNATIVE:	$ 2,204,883	$ -	$ 2,204,883
TOTAL (Baseline less Proposed)	$ (2,204,883)	$ -	**$ (2,204,883)**
			COST

VALUE ENGINEERING PROPOSAL CV-18
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Leave existing alignment Sta 530+00 to Sta 545+00 and go across country

DISCUSSION/JUSTIFICATION:

This segment is very similar to the cut section from Station 150+00 to 220+00. After inspection of the USGS drainage map it became apparent that an earthwork reduction would not be accomplished. In fact, this location is even more challenging. Excavation would likely increase at least 500,000CY at a cost of $2,500,000. We assumed approximately $250,000 in pavement savings could be also be realized due to the shorter length at this location. **This alternative is not recommended as the proposed earthwork savings will not be realized and there is a significant increase in cost with no improvement to project function.**

IMPLEMENTATION CONSIDERATIONS:

May require additional environmental work.

VALUE ENGINEERING PROPOSAL CV-18
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Leave existing alignment Sta 530+00 to Sta 545+00 and go across country

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Added roadway excavation						500000	5.00	2,500,000
Reduced asphalt surface						-438	80.00	-35,040
Reduced asphalt base						-3157	70.00	-220,990
Reduced crushed stone base						-1475	26.50	-39,088
								2,204,883
							(BASELINE LESS PROPOSED)	**(2,204,883)**

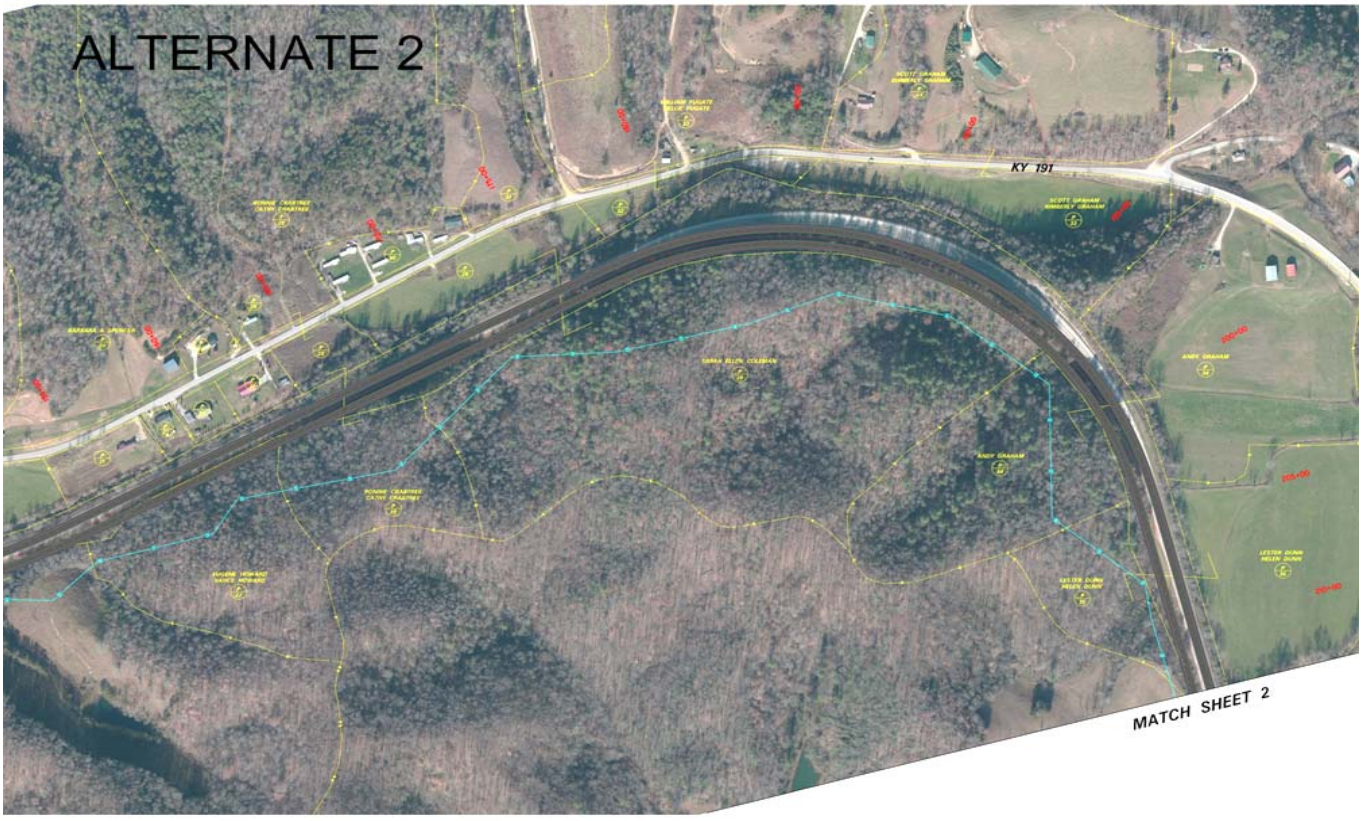
*Note: Costs are rounded to nearest thousand dollars.

COST

VALUE ENGINEERING PROPOSAL CV-18
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Leave existing alignment Sta 530+00 to Sta 545+00 and go across country

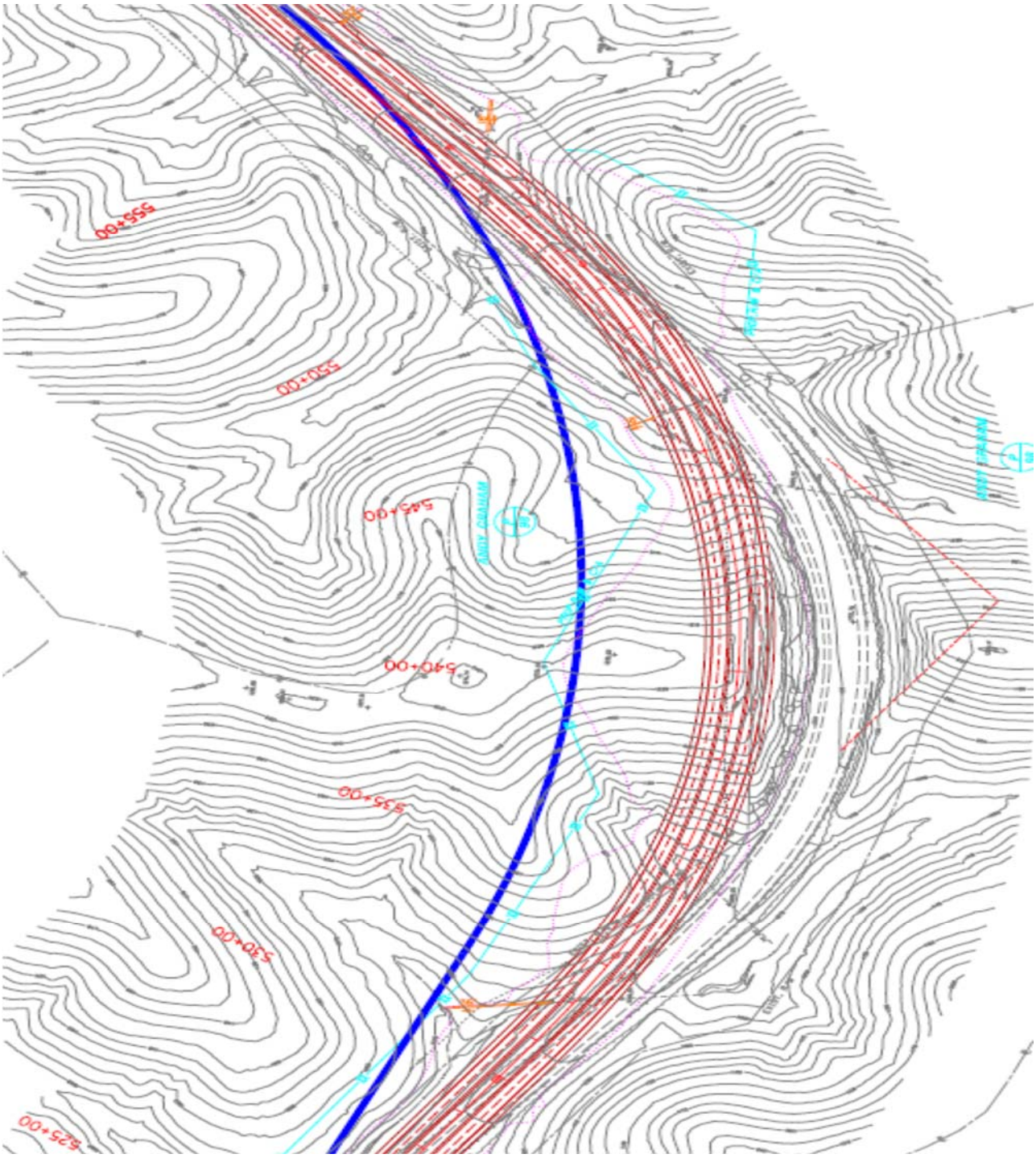
SKETCH OF BASELINE ASSUMPTION



VALUE ENGINEERING PROPOSAL CV-18
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Leave existing alignment Sta 530+00 to Sta 545+00 and go across country

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL CV-19
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE:	Straighten the skew at KY1812
FUNCTION:	**Convey Vehicles**

BASELINE ASSUMPTION:

As designed, KY 1812 is currently passing under the parkway via a pair of skewed 3-span bridges.

PROPOSED ALTERNATIVE:

Straighten KY 1812 to tie into KY 3033 resulting in a perpendicular pair of single span bridges on the parkway.

BENEFITS	RISKS/CHALLENGES
• Shorter bridges	• None apparent
• Bridges not skewed	•
• Avoids the fiber optic line	•
• Avoids reconstruction of 18in. culvert	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 2,432,511	$ -	$ 2,432,511
PROPOSED ALTERNATIVE:	$ 1,400,000	$ -	$ 1,400,000
TOTAL (Baseline less Proposed)	$ 1,032,511	$ -	**$ 1,032,511**
			SAVINGS

VALUE ENGINEERING PROPOSAL CV-19
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Straighten the skew at KY1812

DISCUSSION/JUSTIFICATION:

KY 1812 passes under the parkway at a 45 degree skew. By realigning KY 1812 and teeing it into KY 3033, the crossing can be made perpendicular versus the 45 degree skew. The result is to provide single span bridges that are not skewed. It also avoids impact to the identified fiber optic line that will conflict with the proposed bridges. Is also avoids the reconstruction of an 18in. pipe under KY 3033.

IMPLEMENTATION CONSIDERATIONS:

None apparent.

VALUE ENGINEERING PROPOSAL CV-19
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Straighten the skew at KY1812

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
KY 1812 bridge		LS	1	2,405,000.00	2,405,000	1	1,400,000.00	1,400,000
Fiber optic relocation		LS	1	20,000.00	20,000			
18'ft.culvert pipe		LF	155	48.46	7,511			
					2,432,511			**1,400,000**
							(BASELINE LESS PROPOSED)	**1,032,511**

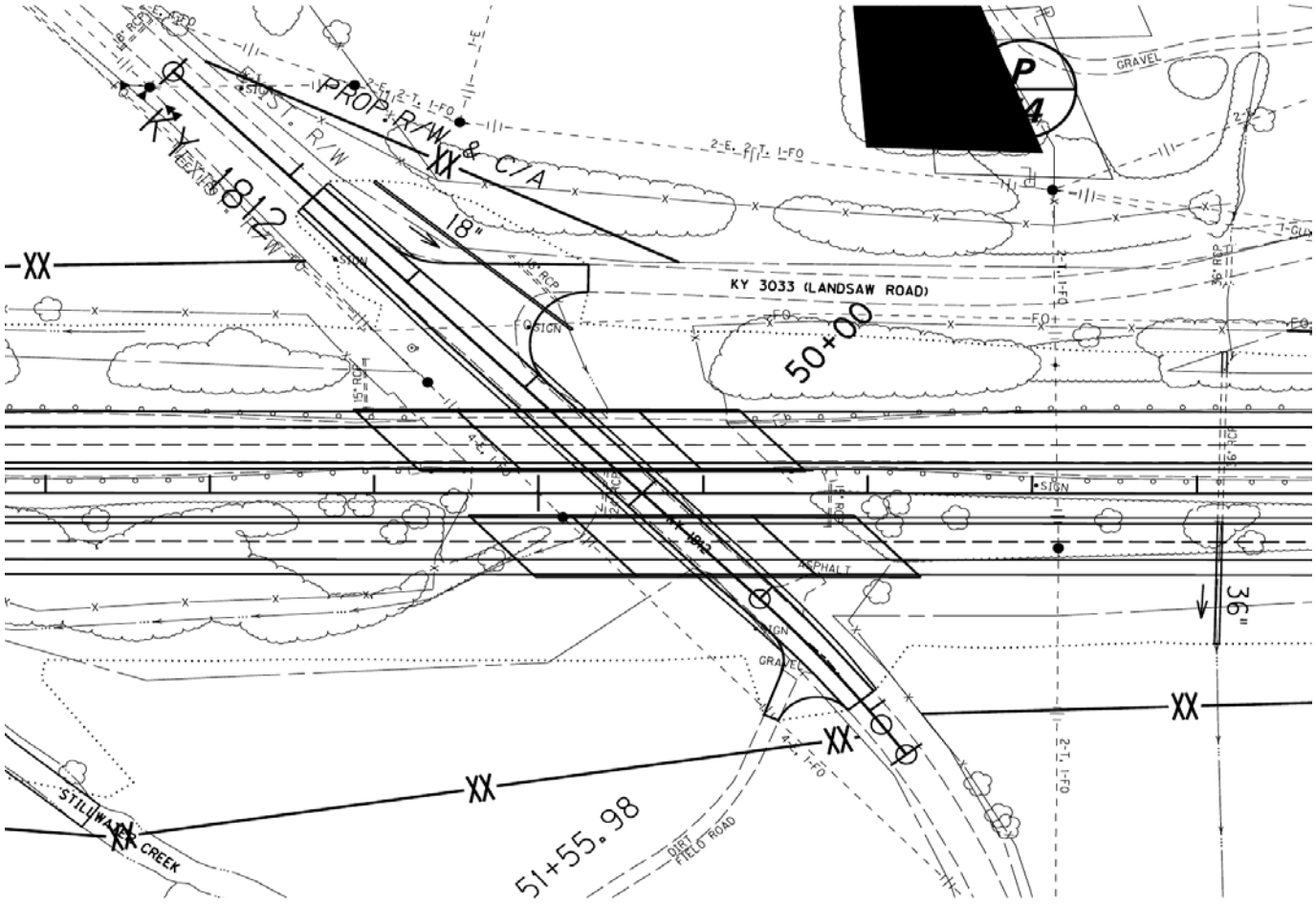
*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL CV-19
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Straighten the skew at KY1812

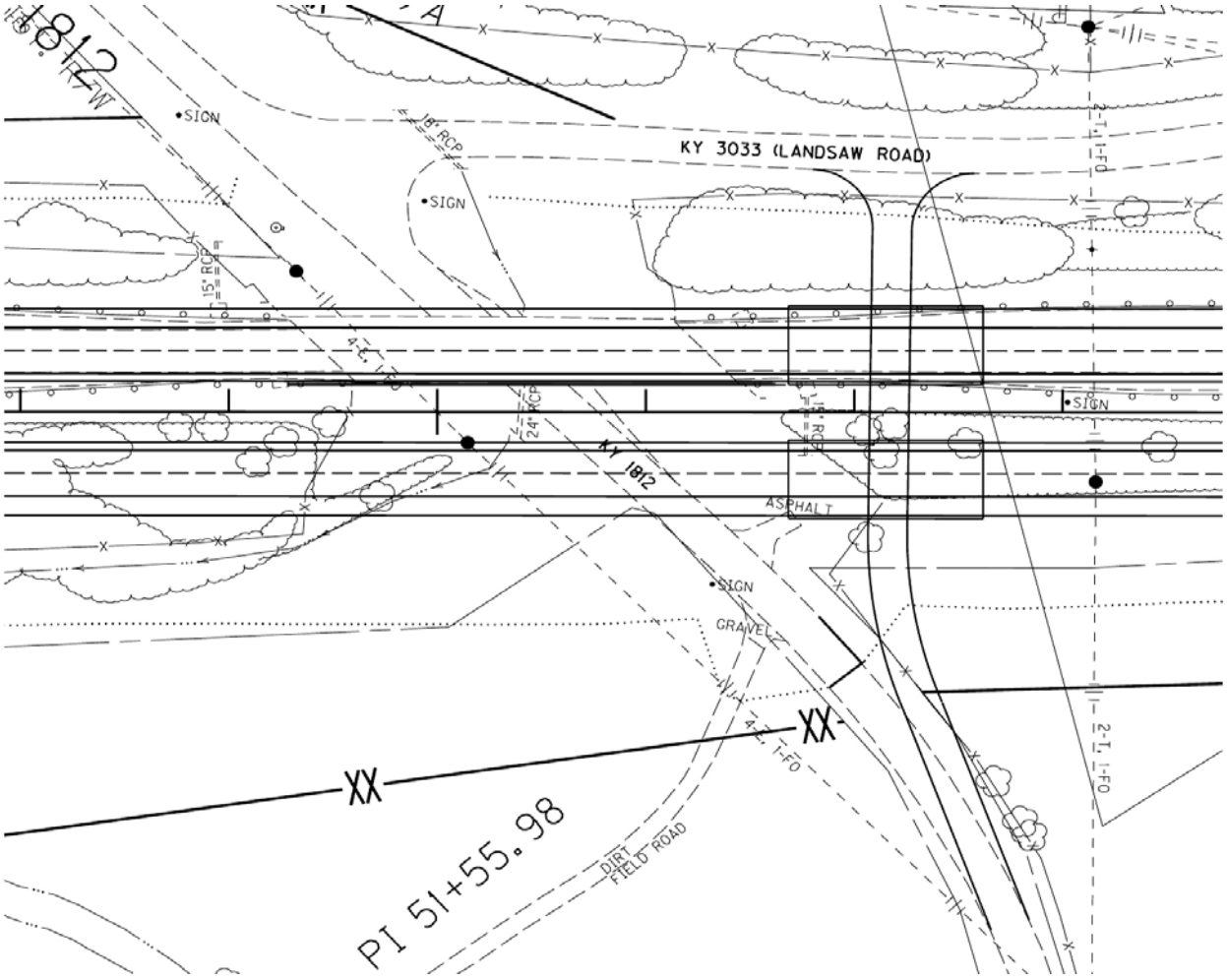
SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL CV-19
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Straighten the skew at KY1812

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL CV-20
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Improve KY 1010 exit Ramps A and D

FUNCTION: **Convey Vehicles**

BASELINE ASSUMPTION:

Preliminary line and grade for the preferred alternative generally follows the existing alignment and widens to the south. The proposed interchange is in a horizontal curve and Ramps A and D exit the parkway at tangents.

PROPOSED ALTERNATIVE:

Shift ramp exit locations or add parallel ramps to improve ramp geometry.

BENEFITS	RISKS/CHALLENGES
• Improves the geometry and safety at the exit ramps	• Ramp A impacts to channel would be increased raising in-lieu fees
• Improves sight distance	• Ramp D would impact a greater distance of South Central Bell line
• Reduces potential for motorist to confuse ramp with mainline alignment	•
•	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ -	$ -	$ -
PROPOSED ALTERNATIVE:	$ 374,153	$ -	$ 374,153
TOTAL (Baseline less Proposed)	$ (374,153)	$ -	**$ (374,153)**

COST

VALUE ENGINEERING PROPOSAL CV-20
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Improve KY 1010 exit Ramps A and D

DISCUSSION/JUSTIFICATION:

This alternative shifts Ramp A's taper west and Ramp D's taper east to provide parallel exit ramps approximately 500-feet in length. Ramp A would lengthen two culvert extensions and impact a channel which would increase in-lieu fees. Ramp D would also lengthen a culvert extension and could possibly increase impacts to the South Central Bell overhead line. Approximately 1,000 additional feet of ramp pavement would also be needed. All totaled, the cost of implementing the ramp improvements would be approximately $375,000. The added length could make the ramp exits more visible, provide deceleration length and therefore, safer. However the ramp's daily Design Hour Volume (DHV) is 20, so that should also be considered when determining the need to make additional changes.

IMPLEMENTATION CONSIDERATIONS:

None apparent.

VALUE ENGINEERING PROPOSAL CV-20
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Improve KY 1010 exit Ramps A and D

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Increase excavation		CY				11900	5.00	59,500
Increase in-lieu fees		LF				300	750.00	225,000
Increase asphalt surface		Ton				115	80.00	9,200
Increase asphalt base		Ton				825	70.00	57,750
Increase crushed stone base		Ton				385	26.50	10,203
Culvert pipe		LF				50	50.00	2,500
South Central Bell impacts		LS				1	10,000.00	10,000
								374,153
							(BASELINE LESS PROPOSED)	**(374,153)**

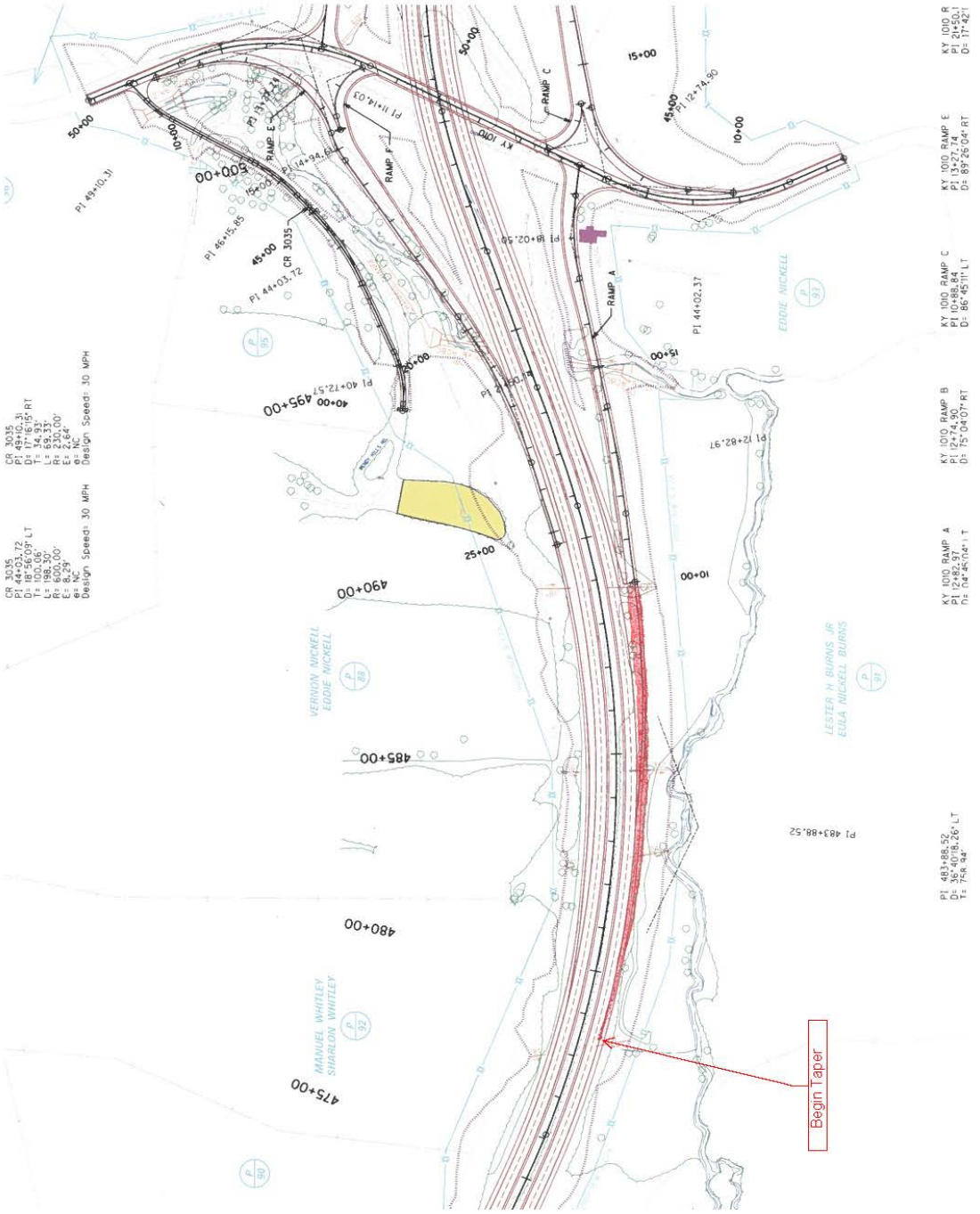
*Note: Costs are rounded to nearest thousand dollars.

COST

VALUE ENGINEERING PROPOSAL CV-20
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Improve KY 1010 exit Ramps A and D

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL CV-20
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Improve KY 1010 exit Ramps A and D

SKETCH OF PROPOSED ALTERNATIVE

VALUE ENGINEERING PROPOSAL CV-21
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE:	Reconfigure KY 191 traffic interchange
FUNCTION:	**Convey Vehicles**

BASELINE ASSUMPTION:

The current design is with a new diamond interchange at Sta 129+00 with the parkway crossing KY 191 at approximately the same location and skew as the existing interchange.

PROPOSED ALTERNATIVE:

Keep the current KY 191 alignment and modify the interchange design.

BENEFITS	RISKS/CHALLENGES
• Reduces bridge length	• None apparent
• Reduces paving quantities	•
• Decreases stream impacts	•
• Eliminates the box culvert	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 3,439,824	$ -	$ 3,439,824
PROPOSED ALTERNATIVE:	$ 2,118,800	$ -	$ 2,118,800
TOTAL (Baseline less Proposed)	$ 1,321,024	$ -	**$ 1,321,024**
			SAVINGS

VALUE ENGINEERING PROPOSAL CV-21
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Reconfigure KY 191 traffic interchange

DISCUSSION/JUSTIFICATION:

As designed, the project proposes to carry 3 lanes of KY 191 through the interchange. It also proposes ramp terminals for east and west bound parkway traffic that intersect KY 191 at approximately 750 feet from one another. The proposed alternative leaves KY 191 as a two lane roadway and tightens the ramp terminals up so that they intersect KY 191 at approximately 400 feet from each other. A retaining wall will be required between Ramp B and the mainline.

IMPLEMENTATION CONSIDERATIONS:

This will require that the accleration and decleration lengths need to be reviewed and finalized during the final design.

VALUE ENGINEERING PROPOSAL CV-21
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Reconfigure KY 191 traffic interchange

DESIGN ELEMENT	**Markup**	**BASELINE ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Twin parkway bridges		SF	20000	125.00	2,500,000	18968	125.00	2,371,000
Retaining wall		SF				3000	45.00	135,000
Reconstruct all of KY 191 and		LF	212	1,500.00	318,000			
In lieu fee (decrease)		LF				-620	750.00	-465,000
Excavation reduction		SY				-7600	5.00	-38,000
Crushed stone base		Ton	3016	26.50	79,924			
Asphalt base		Ton	3338	70.00	233,660			
Asphalt surface		Ton	778	80.00	62,240	435	80.00	34,800
RCBC extension (4ft. x 3ft.)		LF	100	600.00	60,000			
Double 10ft. X 6ft. RCBC extension		LF	124	1,500.00	186,000	54	1,500.00	81,000
					3,439,824			**2,118,800**
							(BASELINE LESS PROPOSED)	**1,321,024**

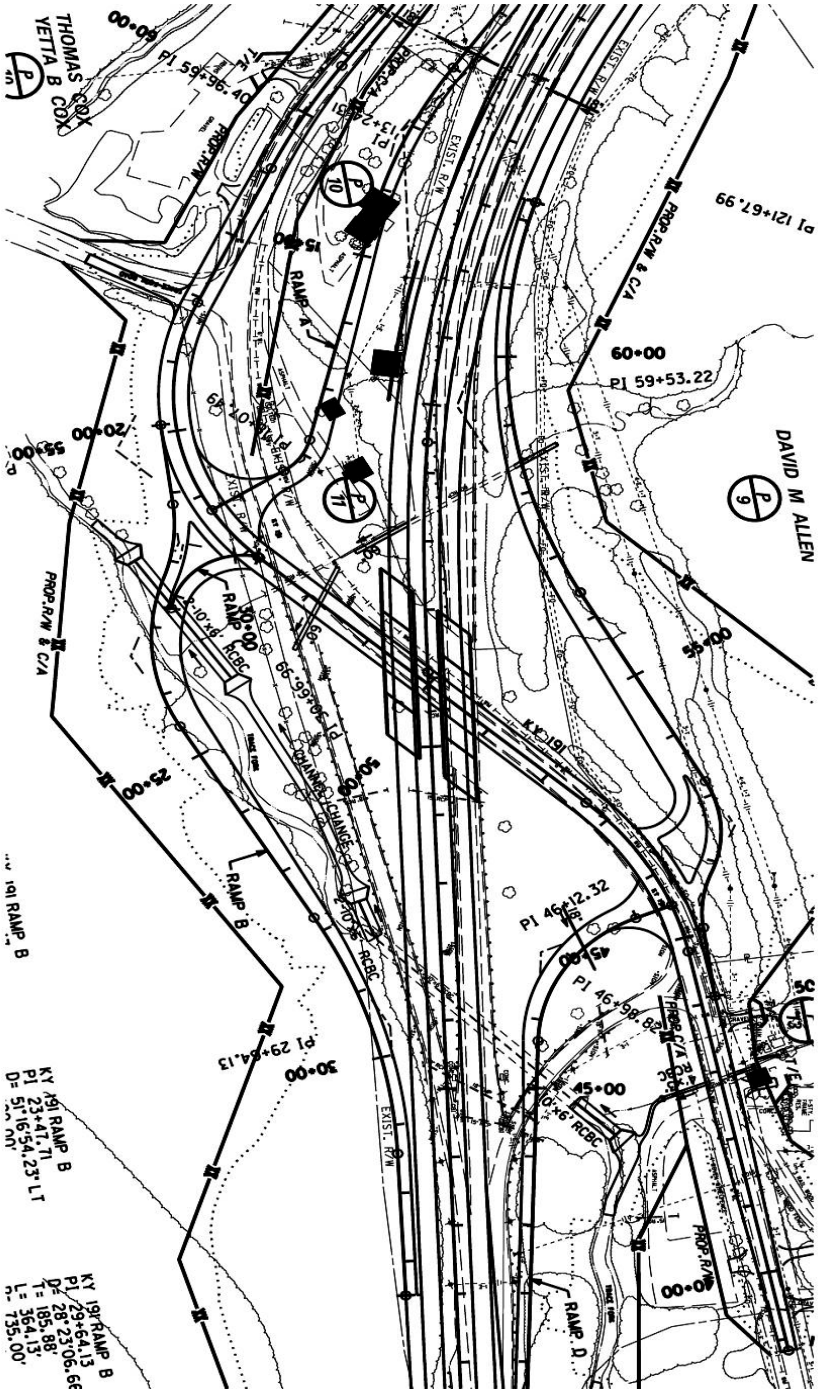
*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL CV-21
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Reconfigure KY 191 traffic interchange

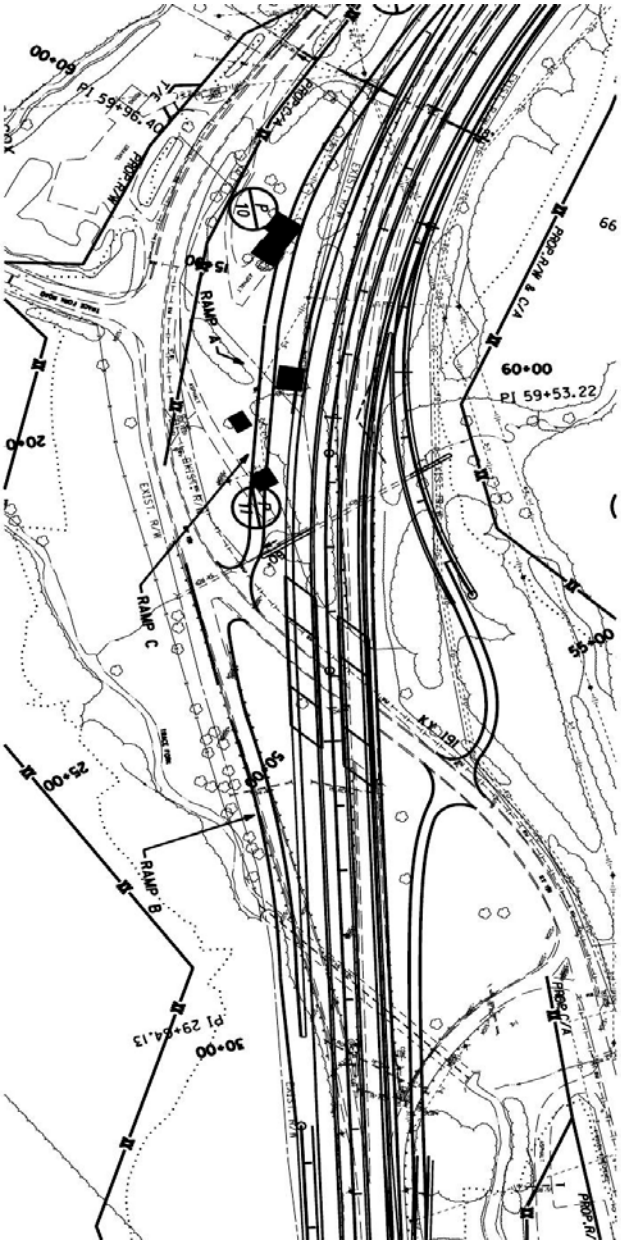
SKETCH OF BASELINE ASSUMPTION



VALUE ENGINEERING PROPOSAL CV-21
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Reconfigure KY 191 traffic interchange

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL CV-22
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE:	Increase the grades from Sta 537+00 to 545+00
FUNCTION:	**Convey Vehicles**

BASELINE ASSUMPTION:

The large cut at Sta 537+00 to Sta 545+00 is currently at 5+% grade.

PROPOSED ALTERNATIVE:

Use max grade of 6% on both sides of the vertical curve.

BENEFITS	RISKS/CHALLENGES
• Lessens excavation	• Steeper grades
•	• Reduces usage of existing pavment in this area
•	•
•	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 2,200,000	$ -	$ 2,200,000
PROPOSED ALTERNATIVE:	$ 1,600,000	$ -	$ 1,600,000
TOTAL (Baseline less Proposed)	$ 600,000	$ -	**$ 600,000**
			SAVINGS

VALUE ENGINEERING PROPOSAL CV-22
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Increase the grades from Sta 537+00 to 545+00

DISCUSSION/JUSTIFICATION:

Using the maximum grade of 6% on both sides of vertical curve at Sta 540+00 will increase the elevation of the proposed roadway by approximately 20 feet at Sta 540+00. This results in a smaller cut section from approximately Sta 537+00 to Sta 544+00. This will result in a reduction in excavation of approximately 120,000CY.

IMPLEMENTATION CONSIDERATIONS:

None apparent.

VALUE ENGINEERING PROPOSAL CV-22
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Increase the grades from Sta 537+00 to 545+00

DESIGN ELEMENT	**Markup**	**BASELINE ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Earthwork		CY	440000	5.00	2,200,000	320000	5.00	1,600,000
					2,200,000			**1,600,000**
							(BASELINE LESS PROPOSED)	**600,000**

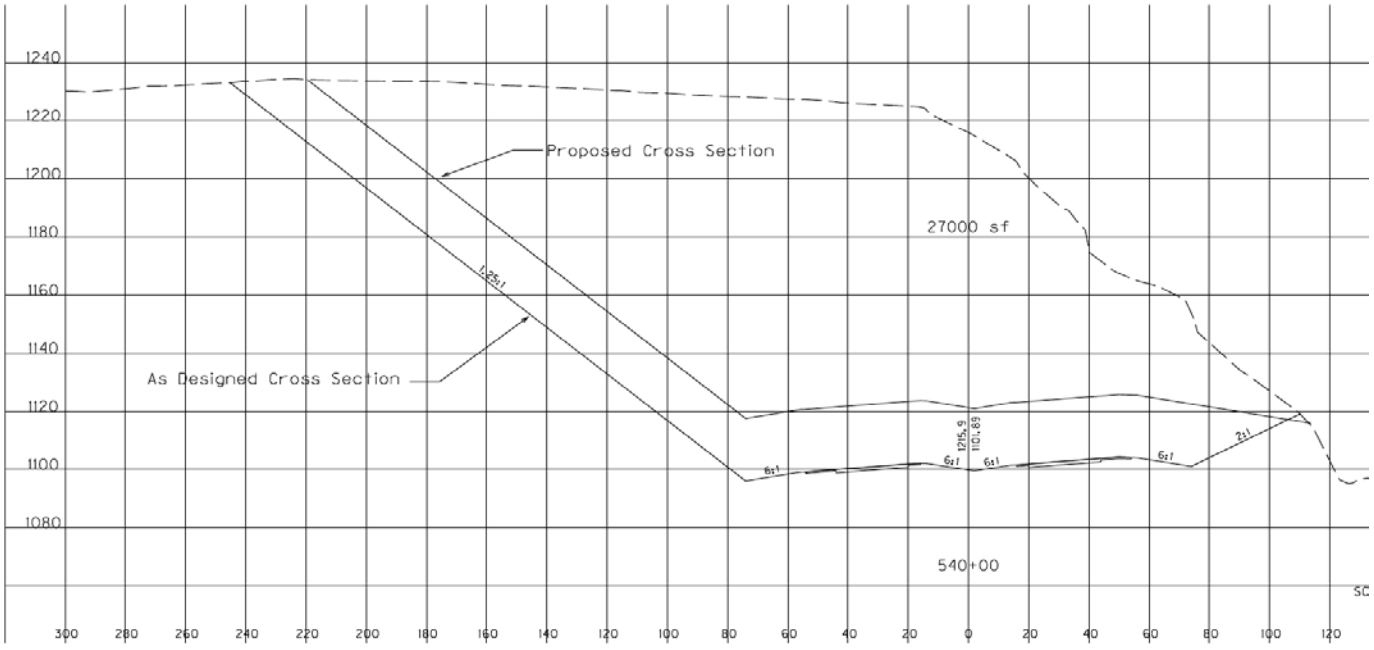
*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL CV-22
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Increase the grades from Sta 537+00 to 545+00

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL CV-23
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE:	Realign Bedwell Road over mainline at Sta 380+00 and eliminate twin mainline bridges at KY 3034
FUNCTION:	**Convey Vehicles**

BASELINE ASSUMPTION:

Twin mainline bridges are proposed over KY 3034 at station 384+80 to connect residents to KY 3033. This is the only connection for these residents as both KY 3034 and Bedwell Road dead end.

PROPOSED ALTERNATIVE:

Connect Bedwell Road to KY 3033 at approximately Sta 16+00 (Bedwell Road) with a single bridge over the mainline instead of twin mainline bridges. Remove or safe load the existing wagon box under the mainline at Sta 384+80.

BENEFITS	RISKS/CHALLENGES
• One less bridge to build and maintain	• Profile grade of road over with vertical clearance requirement
• May not have to relocate the house and barn	• Will need additional right-of-way
• Removes 72in. pipe under KY 3034	•
•	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 1,470,000	$ -	$ 1,470,000
PROPOSED ALTERNATIVE:	$ 941,875	$ -	$ 941,875
TOTAL (Baseline less Proposed)	$ 528,125	$ -	**$ 528,125**
			SAVINGS

VALUE ENGINEERING PROPOSAL CV-23
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Realign Bedwell Road over mainline at Sta 380+00 and eliminate twin mainline bridges at KY 3034

DISCUSSION/JUSTIFICATION:

Access for the residents of Bedwell Road and KY 3034 must be provided. A connector road over the mainline may be less expensive than a mainline road over KY 3034. A connection to relocated Bedwell Road at approximately Sta 15+50 is appealing because the proposed profile grade is in a cut approximately 35ft. above the mainline at this location (mainline Sta 379+40). Parcel 69 is assumed to be a total take with the relocation of the Bedwell Road connector bridge over the mainline. Roadway costs of KY 3034 compared with the connector approach which is assumed nearly equal. A three span PCIB type 4 bridge, 29ft. wide and 215ft. long was assumed for the Bedwell Road connector bridge.

IMPLEMENTATION CONSIDERATIONS:

The profile grade to tie down to KY 3033 and maintain 17ft. of vertical clearance over mainline would be steep. A skewed alignment may help with the profile.

VALUE ENGINEERING PROPOSAL CV-23
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Realign Bedwell Road over mainline at Sta 380+00 and eliminate twin mainline bridges at KY 3034

DESIGN ELEMENT	**Markup**	**BASELINE ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Bridge		SF	11760	125	1,470,000	6235	125	779,375
Right-of-way parcel 69		ACRE		5,000		2.5	5,000	12,500
Relocation cost		LS		150,000		1	150,000	150,000
					1,470,000			**941,875**
							(BASELINE LESS PROPOSED)	**528,125**

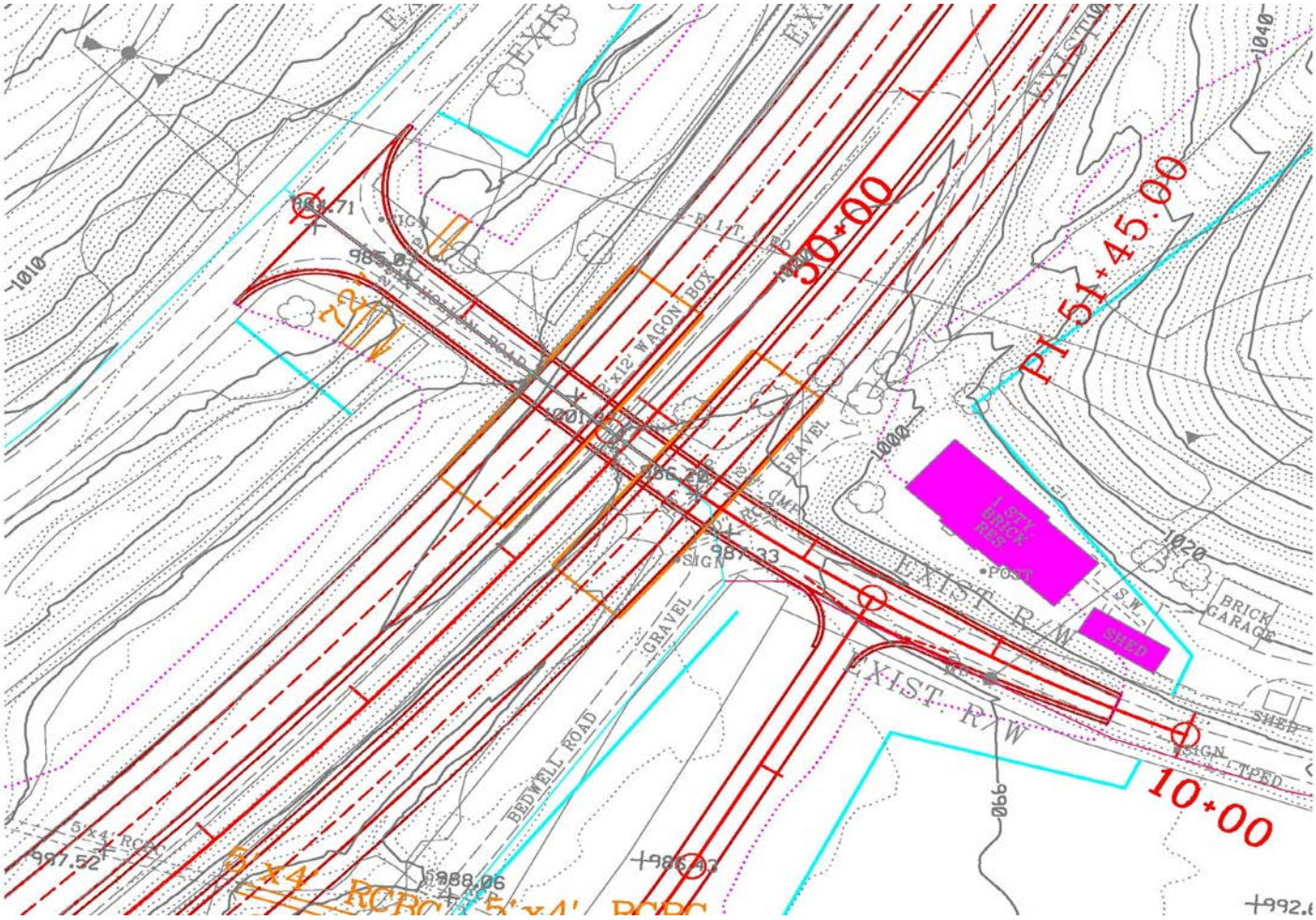
*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL CV-23
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Realign Bedwell Road over mainline at Sta 380+00 and eliminate twin mainline bridges at KY 3034

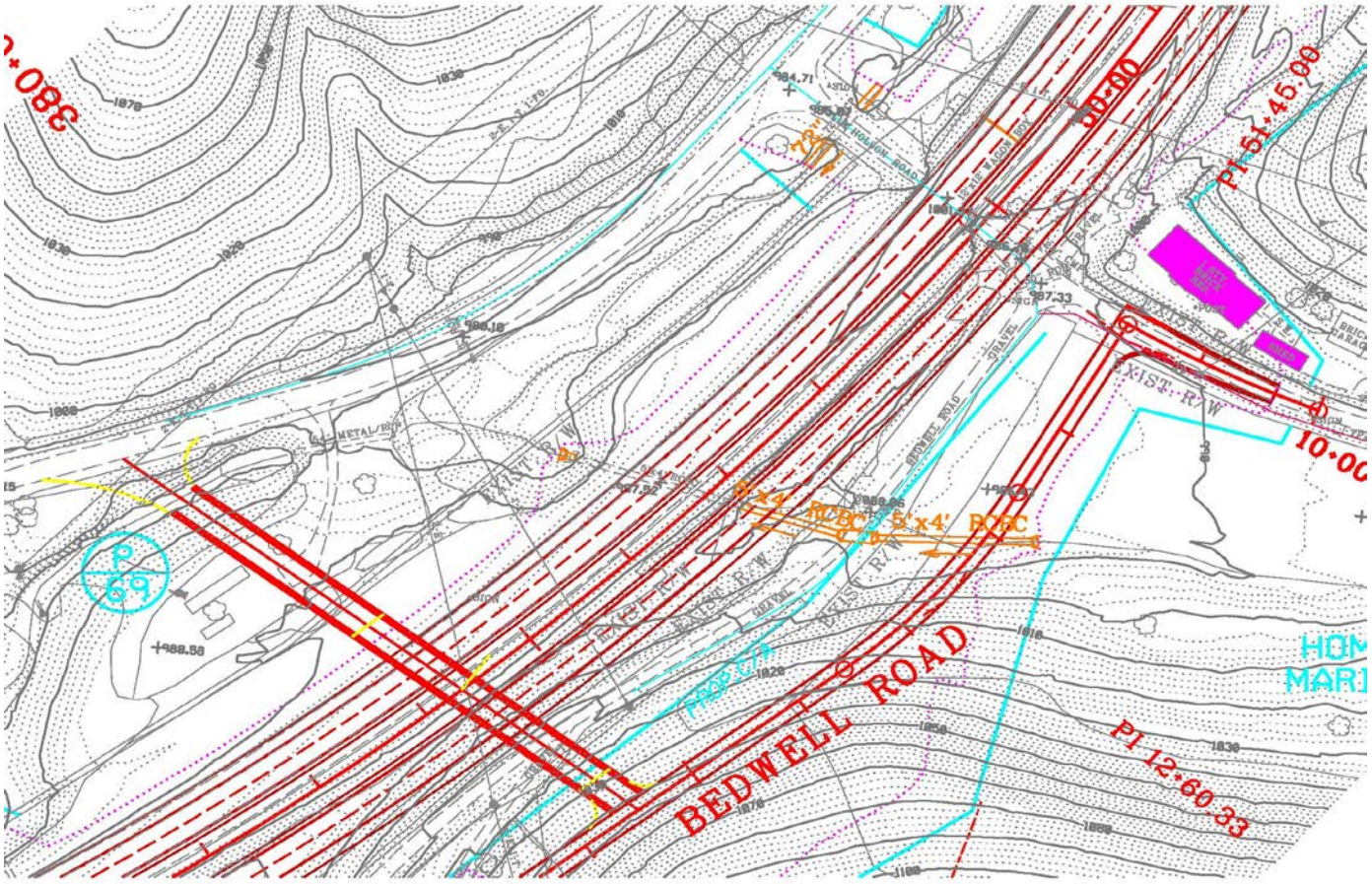
SKETCH OF BASELINE ASSUMPTION



VALUE ENGINEERING PROPOSAL CV-23
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Realign Bedwell Road over mainline at Sta 380+00 and eliminate twin mainline bridges at KY 3034

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL CV-26
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE:	Eliminate KY 1010 Interchange
FUNCTION:	**Convey Vehicles**

BASELINE ASSUMPTION:

A full diamond interchange is to be reconstructed at KY 1010.

PROPOSED ALTERNATIVE:

Eliminate the KY 1010 interchange.

BENEFITS	RISKS/CHALLENGES
• One less bridge to build and maintain	• Public acceptance of eliminating an existing interchange could be a problem
• Reduces earthwork and pavement	• Would create adverse travel for a few users
•	•
•	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 10,900,000	$ -	$ 10,900,000
PROPOSED ALTERNATIVE:	$ 1,300,000	$ -	$ 1,300,000
TOTAL (Baseline less Proposed)	$ 9,600,000	$ -	**$ 9,600,000**
			SAVINGS

VALUE ENGINEERING PROPOSAL CV-26
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Eliminate KY 1010 Interchange

DISCUSSION/JUSTIFICATION:

In reviewing the traffic volumes in the year 2040, there is a very large cost versus the current and proposed traffic volumes. This has led to the recommendation to eliminate the KY 1010 interchange. Peak hour traffic volumes on the ramps are: am/pm east bound off existing 0/0-2040 20/20; east bound on the existing 2/1-2040 20/20; west bound off the existing 0/1-2040 20/20; west bound on the existing 15/4-2040 20/20. The next interchange to the east is approximately 4 miles away. The total distance from the KY 1010 to KY 191 to KY 1010 bridge over the parkway would be approximately 14 miles, but if Hazel Green is the destination, it would only be an additional 6 miles. For any traffic from the south side of the parkway, the distance from KY 1010 to KY 1812 to KY 205 to KY 191 to the parkway to the KY 1010 overpass is approximately 24 miles.

Using the $9.6 million cost savings and the total of 730 vehicles a day using the ramps (80 vehicles in peak hour divided by a 11% K factor), represents a cost of $13,150 per vehicle for the 2040 volumes.

IMPLEMENTATION CONSIDERATIONS:

Public acceptance of eliminating an existing interchange.

VALUE ENGINEERING PROPOSAL CV-26
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Eliminate KY 1010 Interchange

DESIGN ELEMENT	**Markup**	**BASELINE ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Interchange cost from preliminary estimate		EA	1	10,900,000.00	10,900,000			
Bridge at KY 1010 over parkway		EA				1	1,300,000.00	1,300,000
					10,900,000			**1,300,000**
							(BASELINE LESS PROPOSED)	**9,600,000**

*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL CV-27
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE:	Consider using a 2+1 approach in lieu of 4 lanes
FUNCTION:	**Convey Vehicles**
BASELINE ASSUMPTION:	
Use a 4-lane typical section with a 40-foot grass median.	
PROPOSED ALTERNATIVE:	
This alternative proposes to use a 2+1 typical section.	

BENEFITS	**RISKS/CHALLENGES**
• Reduces earthwork	• No separation of traffic
• Revises bridge widths	• Requires legislative change to Kentucky Highway Plan
• Reduces pavement	•
• Reduces pipe extension work	•
• Reduces right of way acquisition	•
•	•
•	•
•	•

COST SUMMARY	**Initial Costs**	**O&M Costs**	**Total Life Cycle Cost**
BASELINE ASSUMPTION:	$ -	$ -	$ -
PROPOSED ALTERNATIVE:	$ (21,182,050)	$ -	$ (21,182,050)
TOTAL (Baseline less Proposed)	$ 21,182,050	$ -	**$ 21,182,050**
			SAVINGS

VALUE ENGINEERING PROPOSAL CV-27
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Consider using a 2+1 approach in lieu of 4 lanes

DISCUSSION/JUSTIFICATION:

The existing design proposes a typical section with 4 - 12ft. lanes and a 40ft. median. An alternative could be a 2+1 typical section that would consist of 3 lanes (2-lanes in one direction and 1-lane in the other direction, alternating with the grade of the roadway). This would reduce the footprint of the road resulting in savings in earthwork, pavement, pipe and bridges.

A shared four-lane highway, also known as 2+1, typically maintains a continuous three-lane cross section, and is striped in a manner to provide a passing lane in alternating directions throughout the section. This concept may be used to address operational deficiencies of two-lane highways prior to capacity being reached that would require a full four-lane highway. Shared four-lane highways have been shown to improve operational efficiency and reduce crashes over two-lane highways, and may present a cost effective alternative to four-lane divided highways.
A copy of the brochure from the state of Virginia is provided in the Proposed Sketch (2).

On two-lane highways, the Level of Service (LOS) is determined by two factors: travel speed and percent time spent following PTSF. The presence of passing lanes has been found to increase average travel speed by as much as 8 to 11 percent. The speed benefits of passing lanes also continue for approximately 2 miles downstream of the passing lane. Passing lanes also can reduce the PTSF by up to 62 percent, depending on traffic volume within the passing lane itself, with residual benefits many miles downstream of the passing lane. These improvements to travel speed and PTSF can improve the LOS and overall travel experience for the driving public.

NCHRP Research Project 20-7 evaluated the performance of shared four-lane highways and found that crash rates were significantly lower than conventional two-lane highways. It also noted a reduction in fatal and injury crashes as much as 55% on two-lane highways converted to a shared four-lane. Additionally, KYTC staff conducted a scanning tour in 2013 of two Missouri projects and found an overall crash reduction by over two-thirds and a reduction of head-on collisions by 100% on one project.

IMPLEMENTATION CONSIDERATIONS:

This would be a change from what was promised and may cause some political challenges. This would need to be approved by the Secretary.

This would be a change from what currently is in the Highway Plan. It will require acceptance by the governor and legislative leaders to move forward.

VALUE ENGINEERING PROPOSAL CV-27
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

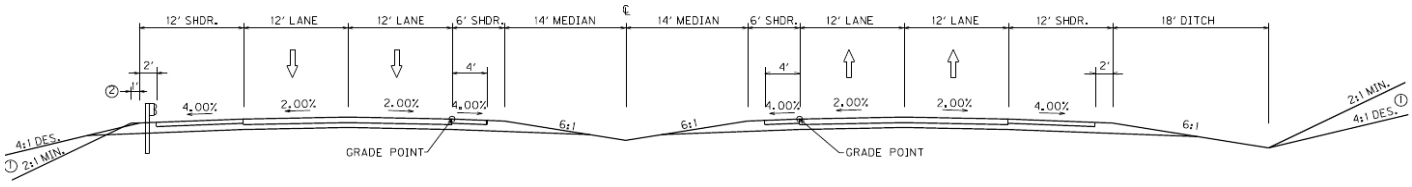
TITLE: Consider using a 2+1 approach in lieu of 4 lanes

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Earthwork reduction		Ton				-2291000	5.00	-11,455,000
Asphalt surf reduction		Ton				-5040	80.00	-403,200
Asphalt base reduction		Ton				-36300	70.00	-2,541,000
CS base reduction		Ton				-16900	26.50	-447,850
KY 191 bridge reduction		LS				1	-500,000	-500,000
KY 2491 bridge reduction		LS				1	-450,000	-450,000
KY 1812 bridge reduction		LS				1	-480,000	-480,000
KY 3034 bridge reduction		LS				1	-300,000	-300,000
KY 1010 bridge reduction		LS				1	-250,000	-250,000
KY 1419 bridge reduction		LS				1	-450,000	-450,000
Culvert/Pipe reduction		LS				1	-150,000	-150,000
Miscellaneous item reduction (20% of above Items)		LS				1	-3,485,000	-3,485,000
Right-of-way reduction		LS				1	-270,000.00	-270,000
								-21,182,050
							(BASELINE LESS PROPOSED)	**21,182,050**
								SAVINGS

VALUE ENGINEERING PROPOSAL CV-27
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Consider using a 2+1 approach in lieu of 4 lanes

SKETCH OF BASELINE ASSUMPTION

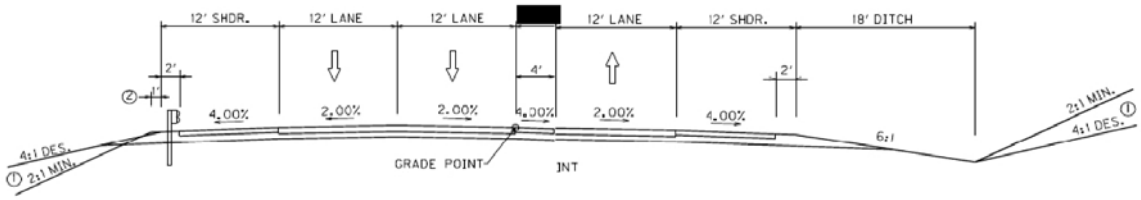


NORMAL SECTION

VALUE ENGINEERING PROPOSAL CV-27
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Consider using a 2+1 approach in lieu of 4 lanes

SKETCH OF PROPOSED ALTERNATIVE



Missouri 2+1

VALUE ENGINEERING PROPOSAL CV-27
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Consider using a 2+1 approach in lieu of 4 lanes

SKETCH OF PROPOSED ALTERNATIVE

Missouri 2+1

VALUE ENGINEERING PROPOSAL CV-27
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Consider using a 2+1 approach in lieu of 4 lanes

SKETCH OF PROPOSED ALTERNATIVE

Moving Across Missouri

More than 60 percent of Missouri's rural roads are two-lane highways. While these routes are adequate to handle the volume of traffic they serve both now and in the future, drivers often become frustrated with delays caused by the inability to pass a slower moving vehicle. In this situation, a driver must either contend with a travel delay or risk a potentially dangerous passing maneuver. Clearly, there is a real need to improve the safety and functionality of many two-lane routes.

Through innovation, MoDOT has designed an alternative roadway, called a "Shared Four-Lane" highway. This unique design provides a cost-effective solution to ease traffic flow, improve safety and reduce driver frustration.

Defining "Shared Four-Lane"

A shared four-lane highway consists of passing lanes along a conventional two-lane highway to better accommodate traffic volumes and improve safety. The passing lane alternates between both sides of the highway to give drivers periodic opportunities to pass.

Although MoDOT has used similar applications in limited fashion before, the first of these projects is scheduled for Route 5 between Camdenton and Lebanon. Its continuous nature will make it one of the first projects of its type in the U.S. These facilities are very common, and have been very successful, in Europe.

VALUE ENGINEERING PROPOSAL CV-27
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Consider using a 2+1 approach in lieu of 4 lanes

SKETCH OF PROPOSED ALTERNATIVE

Faster

A shared four-lane helps maintain a consistent traffic flow. It increases passing opportunities over long stretches of highway, reducing the time drivers spend behind a slower-moving vehicle.

Safer

The addition of a passing lane improves safety because it eliminates the need for a driver to cross into the oppos-ing lane of traffic to pass another vehicle. Rumble stripes between opposing lanes encourage drivers to remain safely in their lanes. In Europe fatal and severe injury crashes have been reduced by as much as 55 percent.

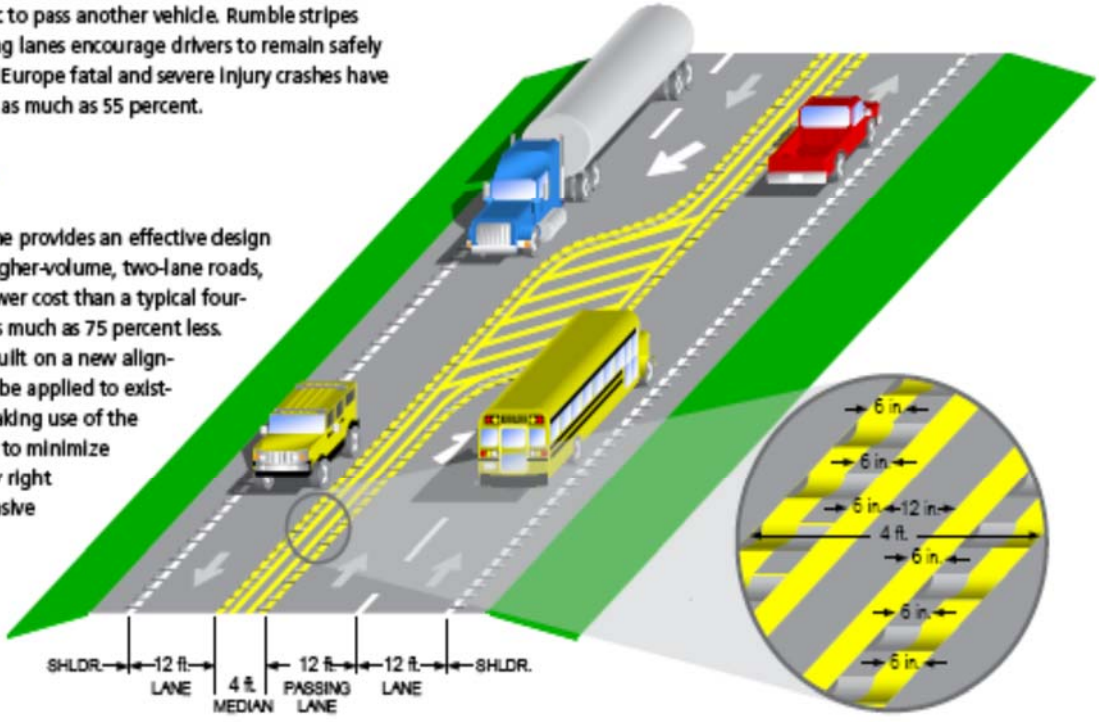
Cheaper

A shared four-lane provides an effective design alternative for higher-volume, two-lane roads, but at a much lower cost than a typical four-lane highway - as much as 75 percent less. While it can be built on a new align-ment, it can also be applied to exist-ing highways, making use of the existing roadbed to minimize the need for new right of way and extensive construction.

Wider

In most locations, MoDOT will design shared four-lane highways with:

- 12-foot lane widths, separated by a four-foot buffer
- Variable shoulder widths
- Left-turn lanes at major intersections
- A flexible design to fit the location



VALUE ENGINEERING PROPOSAL SS-02
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Extend the wagon box and eliminate the twin bridges at KY 3034

FUNCTION: **Span Space**

BASELINE ASSUMPTION:

Widen KY 3034, remove the existing wagon box, and install twin bridges to carry the mainline over the widened KY 3034.

PROPOSED ALTERNATIVE:

Leave the existing wagon box in place, install a new wagon box extension, and eliminate the proposed new mainline twin bridges.

BENEFITS	RISKS/CHALLENGES
• Eliminates two bridges	• Condition of the existing wagon box
• Shortens construction schedule	• Local resident opposition
• Existing wagon box can remain in place	• Restricts movement of farm equipment
• Relocation of the house and barn may not be needed	•
•	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 1,485,000	$ -	$ 1,485,000
PROPOSED ALTERNATIVE:	$ 225,000	$ -	$ 225,000
TOTAL (Baseline less Proposed)	$ 1,260,000	$ -	**$ 1,260,000**
			SAVINGS

VALUE ENGINEERING PROPOSAL SS-02
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Extend the wagon box and eliminate the twin bridges at KY 3034

DISCUSSION/JUSTIFICATION:

It does not appear that the widening of KY 3034 is justified based on the number of residents and users in the area. The few properties that exist south of the mainline on KY 3034 and Bedwell Road are currently served by a 12ft. x 12ft. wagon box. This box can be extended to ensure that the north/south access under the mainline is maintained. The proposed twin bridges would then not be required.

IMPLEMENTATION CONSIDERATIONS:

None apparent.

VALUE ENGINEERING PROPOSAL SS-02
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Extend the wagon box and eliminate the twin bridges at KY 3034

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
New KY 3034 bridge		LS	1	1,470,000.00	1,470,000			
Wagon box extension		LS				1	225,000.00	225,000
Removal of existing wagon box		LS	1	15,000.00	15,000			
					1,485,000			**225,000**
							(BASELINE LESS PROPOSED)	**1,260,000**

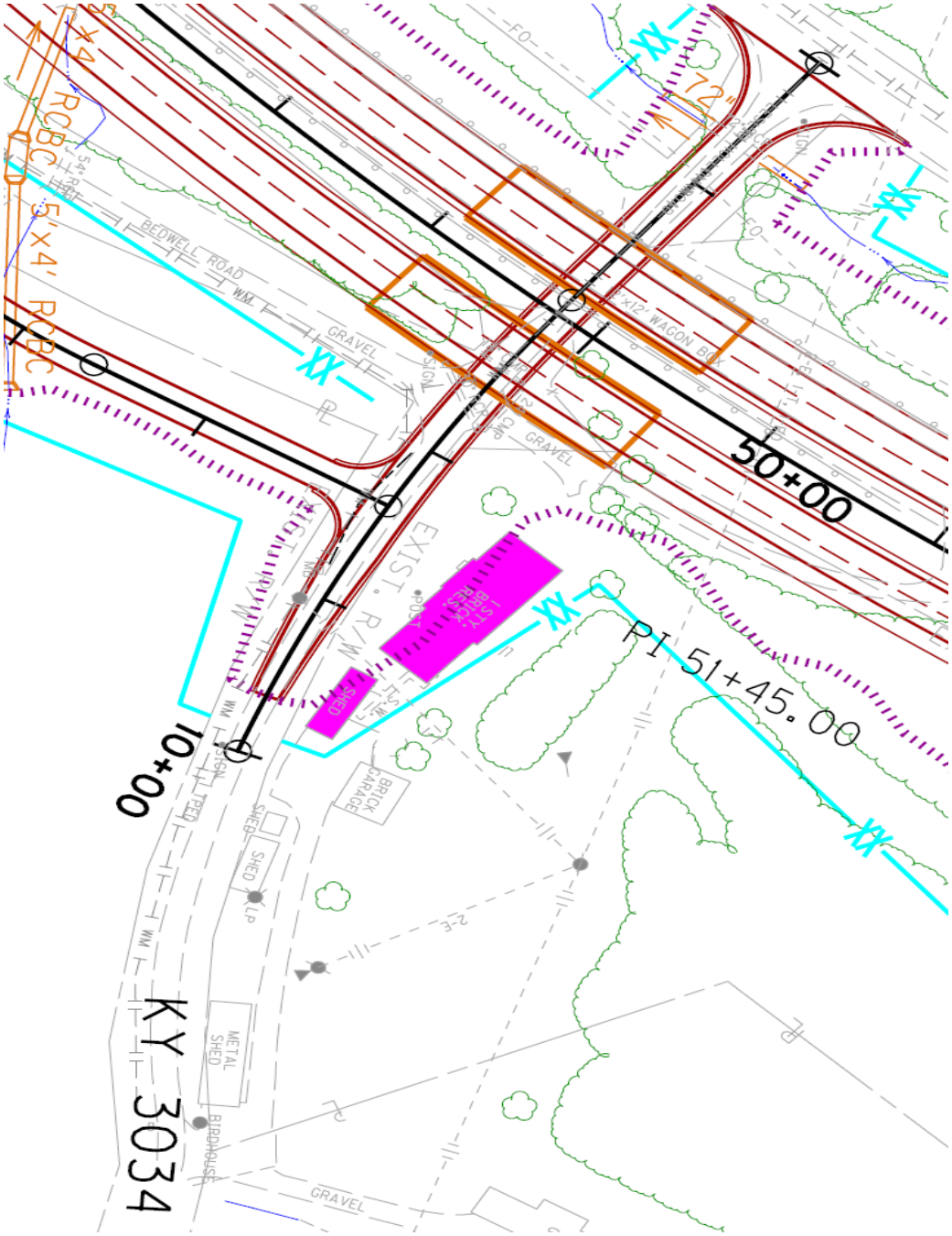
*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL SS-02
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Extend the wagon box and eliminate the twin bridges at KY 3034

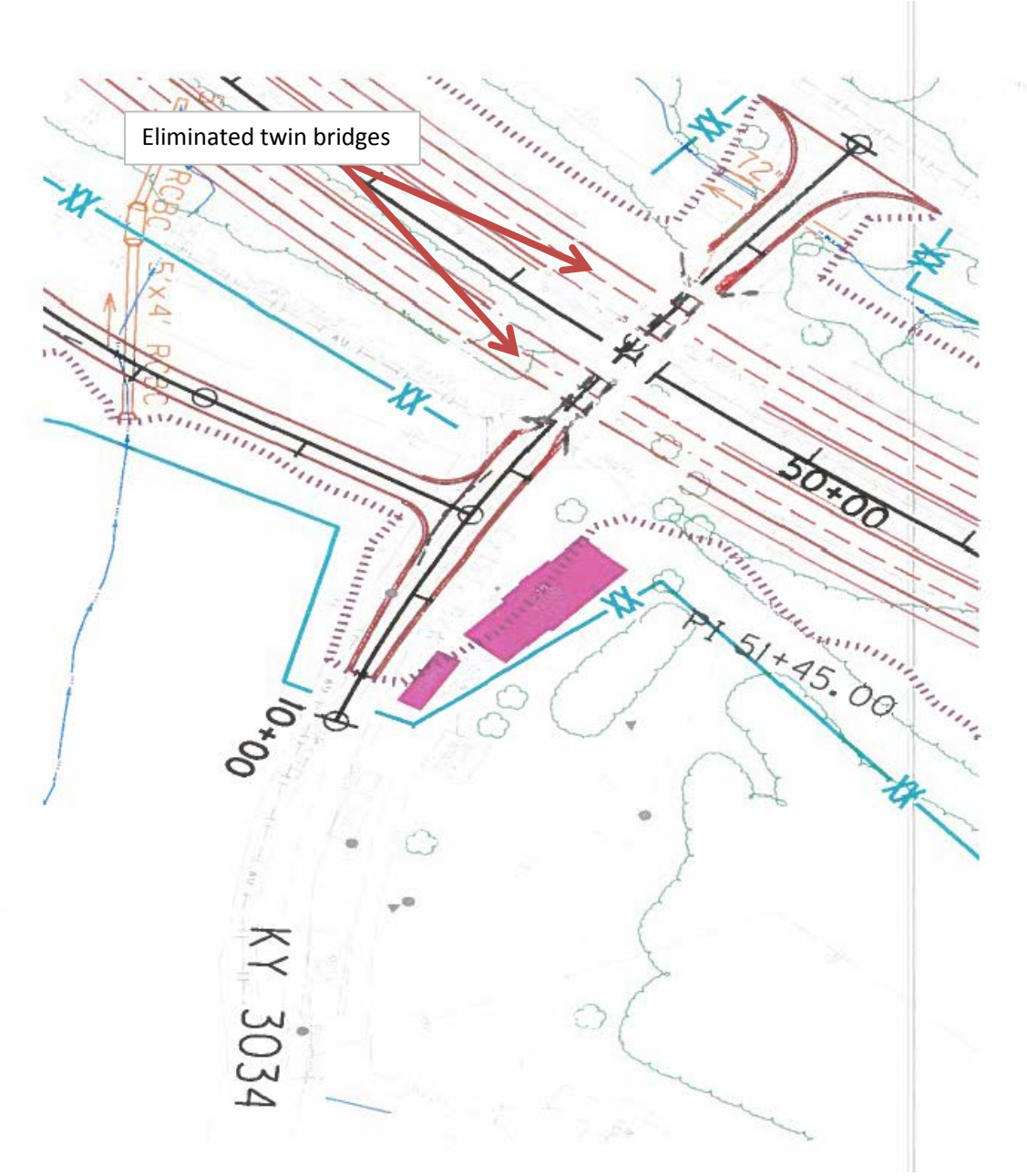
SKETCH OF BASELINE ASSUMPTION



VALUE ENGINEERING PROPOSAL SS-02
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Extend the wagon box and eliminate the twin bridges at KY 3034

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL SS-03
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Use precast arch in lieu of the twin bridges at KY 3034

FUNCTION: **Span Space**

BASELINE ASSUMPTION:

The current design widens KY 3034 by removing the existing wagon box, and installing twin bridges to carry the mainline over widened KY 3034.

PROPOSED ALTERNATIVE:

This alternative proposes to install a new precast concrete arch culvert, and eliminate the proposed new mainline twin bridges.

BENEFITS	RISKS/CHALLENGES
• Eliminates two bridges	• Potential issues with modular construction related to fit-up
• Shortens construction schedule	• Geotechnical (need fairly good foundation material)
• Retains widened KY 3034 as proposed	•
• Slightly reduces waste material	•
• May not need to relocate the house and barn	•
•	•
•	•
•	•

COST SUMMARY	Initial Costs	O&M Costs	Total Life Cycle Cost
BASELINE ASSUMPTION:	$ 1,470,000	$ -	$ 1,470,000
PROPOSED ALTERNATIVE:	$ 650,000	$ -	$ 650,000
TOTAL (Baseline less Proposed)	$ 820,000	$ -	**$ 820,000**
			SAVINGS

VALUE ENGINEERING PROPOSAL SS-03
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Use precast arch in lieu of the twin bridges at KY 3034

DISCUSSION/JUSTIFICATION:

This alternative proposes to have the mainline carried over the proposed widening of KY 3034 in a more cost-efficient manner than by using twin bridges. A precast concrete arch culvert will allow the project to acheive the same function while reducing cost. North/south access under the mainline is maintained, and with the precast arch, the proposed twin bridges could be eliminated. The precast arch will be inspected by KYTC prior to installation. It is important that the soils provide a medium grade base to keep the footing at a minimum.

Precast arch bridges are easy to install and proven to be durable with a variety of shapes, sizes and treatments for spans from 5ft. to 102 ft. The inherent strength, durability, cost-savings, and rapid installation of precast concrete bridges have made them a premier bridge technology. Prefabricated, modular concrete bridges require less material than cast-in-place structures, for a lower initial cost. Offsite fabrication ensures tight adherence to specifications, less onsite work, and quality control of modular units. Installation is fast — usually within days, compared to the weeks or even months required for cast-in-place construction. This minimizes road closings and detours. Precast concrete eliminates the costly maintenance of exposed bridge decks and bridge deck icing. Prefabricated bridge components ensure a long life cycle and low life cycle costs, requiring a large reduction in maintenance.

IMPLEMENTATION CONSIDERATIONS:

None apparent.

VALUE ENGINEERING PROPOSAL SS-03
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Use precast arch in lieu of the twin bridges at KY 3034

DESIGN ELEMENT	Markup	BASELINE ASSUMPTION				PROPOSED ALTERNATIVE		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
New KY 3034 bridges		LS	1	1,470,000.00	1,470,000			
Precast concrete arch		LS				1	650,000.00	650,000
					1,470,000			**650,000**
							(BASELINE LESS PROPOSED)	**820,000**

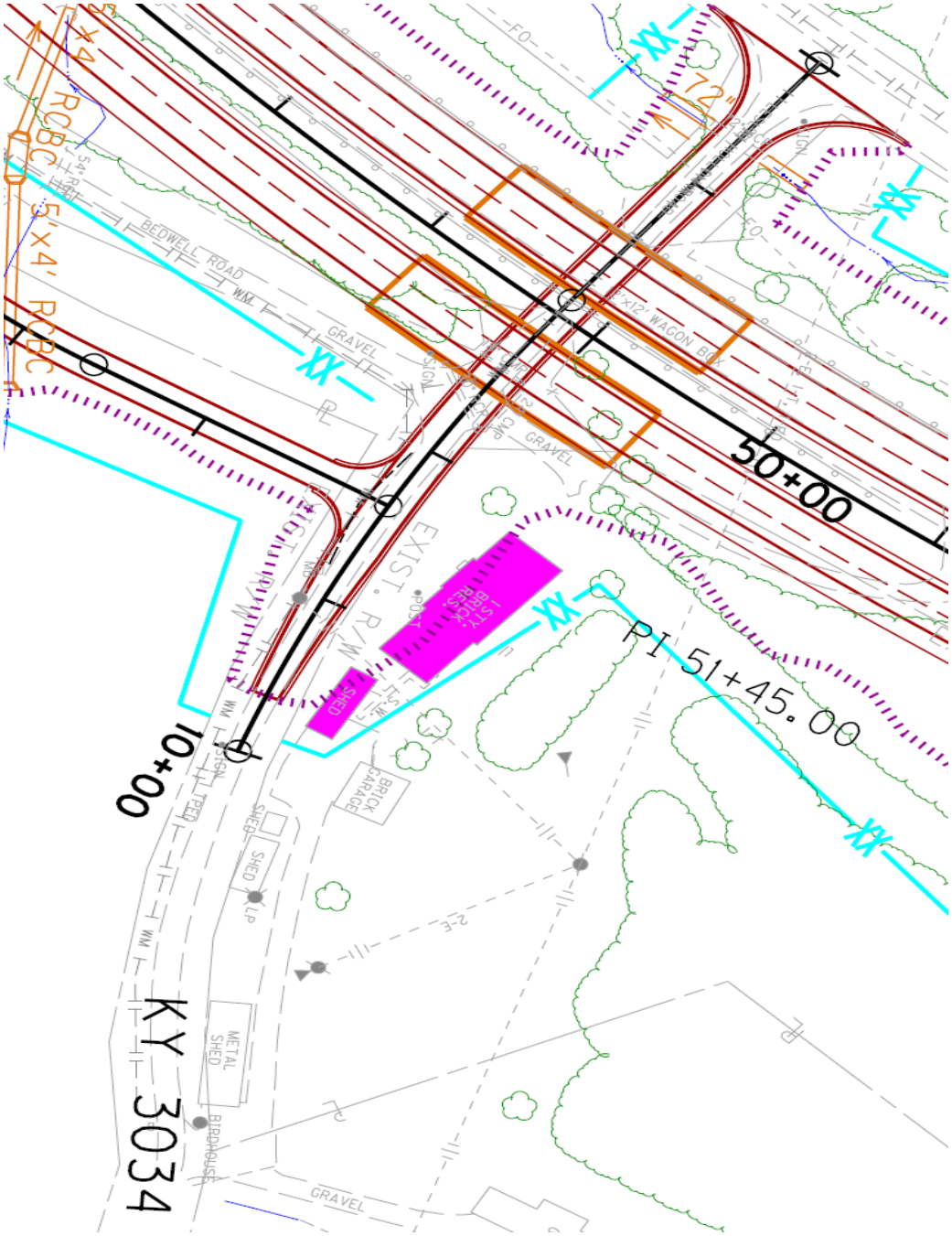
*Note: Costs are rounded to nearest thousand dollars.

SAVINGS

VALUE ENGINEERING PROPOSAL SS-03
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Use precast arch in lieu of the twin bridges at KY 3034

SKETCH OF BASELINE ASSUMPTION



VALUE ENGINEERING PROPOSAL SS-03
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Use precast arch in lieu of the twin bridges at KY 3034

SKETCH OF PROPOSED ALTERNATIVE

VALUE ENGINEERING PROPOSAL CW-01
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE:	Extend box culvert to relocate channel change
FUNCTION:	**Channel Water**

BASELINE ASSUMPTION:

The channel change for Trace Fork at the KY 191 interchange currently runs between the mainline and Ramp B.

PROPOSED ALTERNATIVE:

Extend the existing box culvert under ramp B and relocate the channel change south of Ramp B.

BENEFITS	RISKS/CHALLENGES
• Avoids the large box culvert under Ramp B	• Large cut slope
•	•
•	•
•	•
•	•
•	•
•	•
•	•

DROPPED

VALUE ENGINEERING PROPOSAL CW-01
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Extend box culvert to relocate channel change

DISCUSSION/JUSTIFICATION:

After further review this relocation will not work due to the extensive cuts that would be required. The terrain south of Ramp B consist of a steep hillside. Relocation of the channel would require the excavation of a significant amount a material. **This alternative is not recommended and should be dropped from further consideration based on the required cuts and the increase in excavation.**

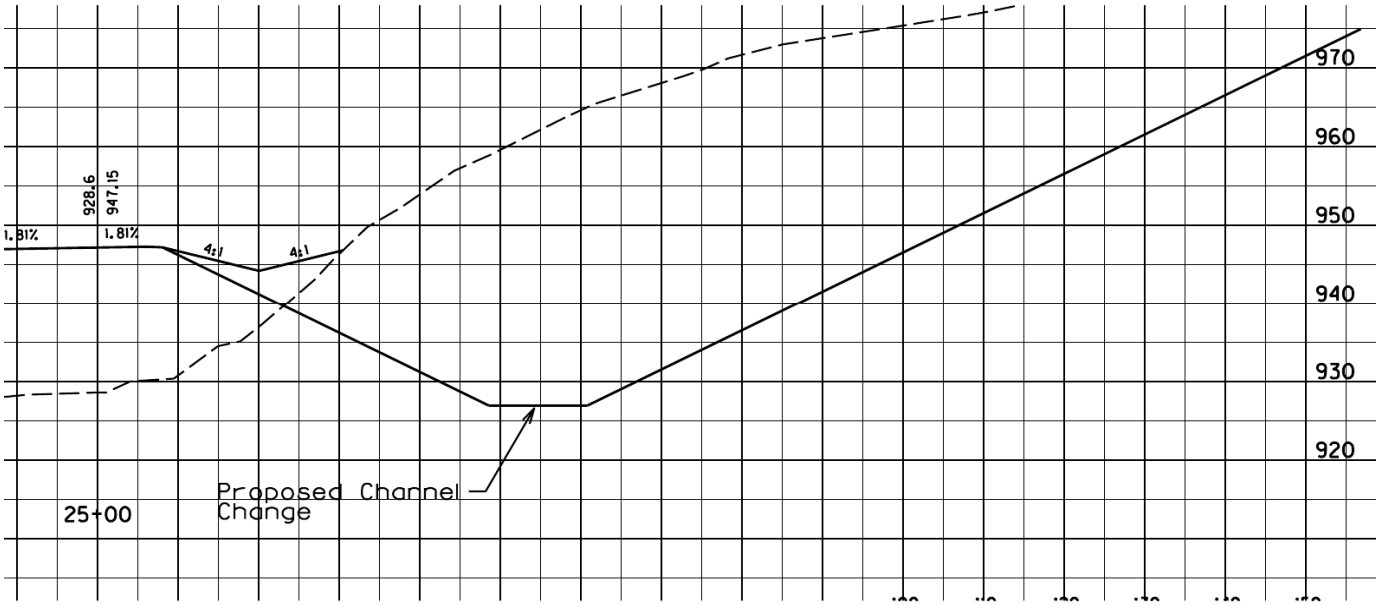
IMPLEMENTATION CONSIDERATIONS:

None apparent.

VALUE ENGINEERING PROPOSAL CW-01
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Extend box culvert to relocate channel change

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL AU-01
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE:	Use retaining wall at Sta 615+00 to stay away from electrical tower
FUNCTION:	**Accommodate Utilities**

BASELINE ASSUMPTION:

As currently designed, the cut slope right of station 615+00 impacts the utility tower.

PROPOSED ALTERNATIVE:

Use retaining walls to reduce the cut slope disturbance limits so that the tower is not affected.

BENEFITS	RISKS/CHALLENGES
• None apparent	• Does not reduce impacte
•	•
•	•
•	•
•	•
•	•
•	•
•	•

DROPPED

VALUE ENGINEERING PROPOSAL AU-01
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Use retaining wall at Sta 615+00 to stay away from electrical tower

DISCUSSION/JUSTIFICATION:

After further review, this modification will not reduce the cut slope limits enough to miss the tower which is more precisely located at station 616+50. Using .5 to 1 cut slopes (30ft. deep) combined with 18-foot benches and walls were investigated as a means to reduce the cut slope disturb limits. Two types of walls were investigated: rock nailed walls in the rock cut slopes and retaining walls to catch the overburden fill slopes. While there could be a reduction in the disturb limits, this reduction is not enough to miss the tower. **This alternative is not recommended and should be dropped from further consideration.**

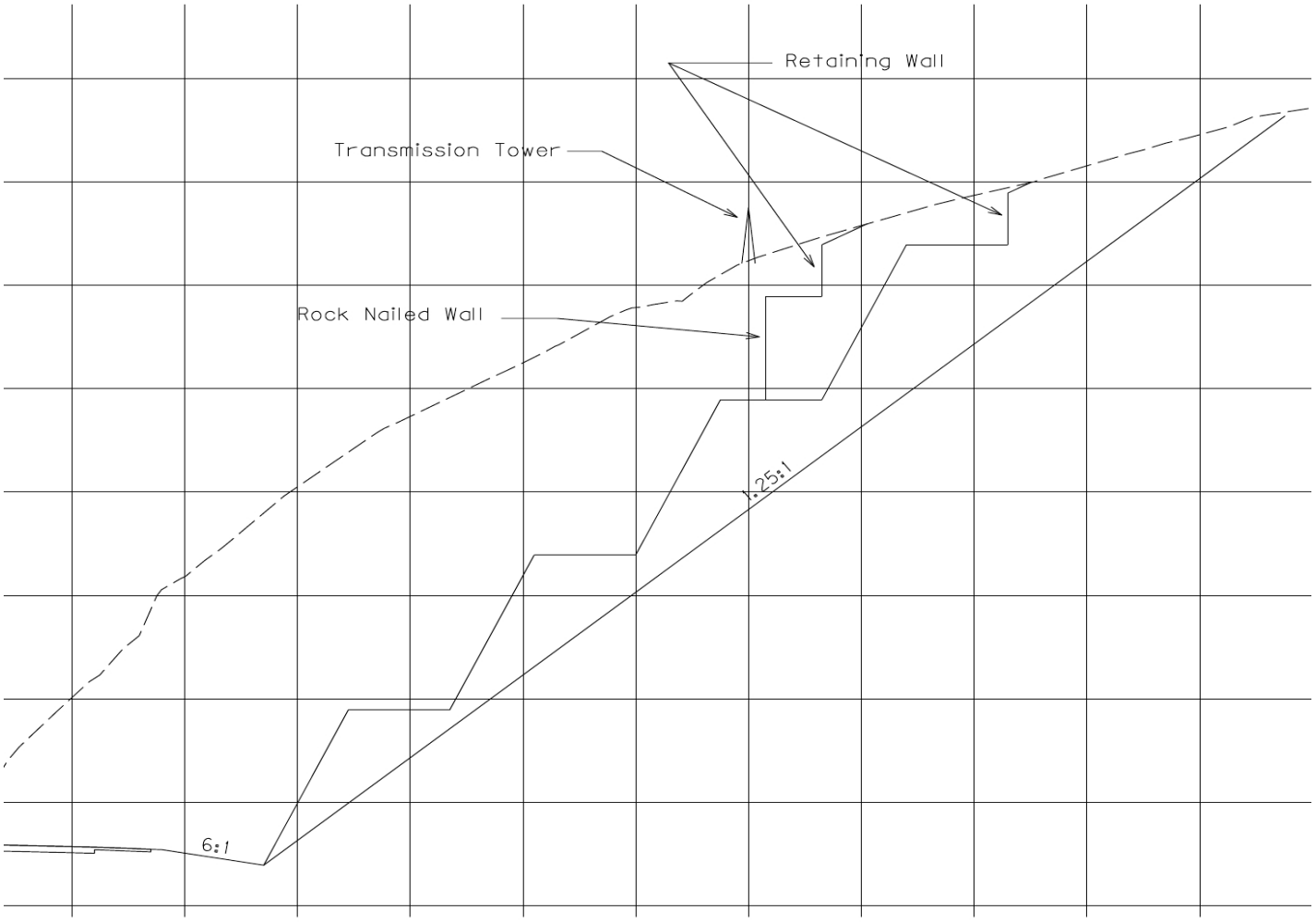
IMPLEMENTATION CONSIDERATIONS:

None apparent.

VALUE ENGINEERING PROPOSAL AU-01
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Use retaining wall at Sta 615+00 to stay away from electrical tower

SKETCH OF PROPOSED ALTERNATIVE



VALUE ENGINEERING PROPOSAL AU-06DS
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE:	Move the pier at KY 1812 to avoid the fiber optic cable
FUNCTION:	**Accommodate Utilities**

BASELINE ASSUMPTION:

The current plan shows pier 1 on the bridge over KY 1812 in conflict with an existing fiber optic line.

PROPOSED ALTERNATIVE:

Move pier ahead between the shoulder of KY 1812 and the existing fiber optic line to avoid relocation of the fiber optic if possible.

BENEFITS	RISKS/CHALLENGES
• Potential cost savings	• May have to use guardrail on KY 1812
•	•
•	•
•	•
•	•
•	•
•	•
•	•
•	•

DESIGN SUGGESTION

VALUE ENGINEERING PROPOSAL AU-06DS
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Move the pier at KY 1812 to avoid the fiber optic cable

DISCUSSION/JUSTIFICATION:

The bridge will be asymmetric, but the end span will still be in the Precast Concrete I-beam range. Moving the pier approximately 15ft. to 20ft. ahead may be enough. This would encroach on the clear zone for KY 1812 and will require guard rail to protect the pier spans of 82ft., 90ft., and 62ft. If the pier is in the ditch line, consideration may also be given to piping the ditch under the bridge. The bridge plans will need a "Do Not Disturb" or "Protect in Place" note for the fiber optic line.

IMPLEMENTATION CONSIDERATIONS:

None apparent.

VALUE ENGINEERING PROPOSAL M-01DS
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE:	Project to be delivered as a Design/Build for the entire 11 miles
FUNCTION:	**Miscellaneous**

BASELINE ASSUMPTION:

The current approach is to have the project delivered as a Design Bid Build. The design consultant will be selected to complete final design. Once final design is complete the project will be let for construction. Once let, successful bidder will complete construction. Any changes that need to be made due to unforeseen conditions will be handled by change order.

PROPOSED ALTERNATIVE:

This alternative proposes to have the 11-mile project be delivered using Design-Build.

BENEFITS	RISKS/CHALLENGES
• One point of contact improves communication for GEC and KYTC	• Funding approval
• Accelerated construction schedule since construction can begin before final design is complete	• Limits contractors able to bid on the project
• Eliminates typical change orders	•
• Allows for contractor input during design	•
•	•
•	•
•	•
•	•

DESIGN SUGGESTION

VALUE ENGINEERING PROPOSAL M-01DS
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Project to be delivered as a Design/Build for the entire 11 miles

DISCUSSION/JUSTIFICATION:

The GEC will benefit from the use of design-build on this section by only having one point of contact for design and construction of the project. Construction could begin during design rather than waiting until final design is complete. The greatest advantage of design-build is the ability to get real time feed back from the construction contractor about conditions encountered in the field. With the challenges in this area with the terrain and the approach to construction, i.e. blasting, traffic control, utility impacts, putting much of the risk on the D/B team will reduce some of the inherent risks to KYTC. The design team and contractor will be able to work closely together to resolve project issues before they occur in the field. This would help in some of the areas of concern identified with several design comments shown in the executive summary of this report to manage the potential for change orders after the bid, in design/bid/build approach. (See AU-02, AU-03, AU-04, AU-05, AU-07, M-03, M-04, M-05 and M-06) Unexpected geotechnical issues and utilities tend to generate the biggest suprises, however, KYTC would need to make sure that the D/B is held accountable for the work done during design.

District 12 has not experience large cost escalation issues due to change orders and this project is not schedule driven, so this project may not benefit from D/B.

IMPLEMENTATION CONSIDERATIONS:

Needs approval by the legislature.

VALUE ENGINEERING PROPOSAL M-02DS
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE:	Develop 3 construction packages and allow contractor to bid 1 or all 3
FUNCTION:	**Miscellaneous**

BASELINE ASSUMPTION:

Corridor to be split into two or three separate construction sections which will be let to bid independently, and possibly at different times.

PROPOSED ALTERNATIVE:

Divide the project into two separate construction sections at approximately mid-point. Use alternate bid/award method which involves letting both sections at the same time, with a total of three bid packages--one for each segment separately, and one combined (both segments together).

BENEFITS	RISKS/CHALLENGES
• More competitive bids	• Different from normal process
•	•
•	•
•	•
•	•
•	•
•	•
•	•

DESIGN SUGGESTION

VALUE ENGINEERING PROPOSAL M-02DS
Kentucky Transportation Cabinet
Mountain Parkway Corridor - Construction Sequence 4
Item #10-168.00
Wolfe County

TITLE: Develop 3 construction packages and allow contractor to bid 1 or all 3

DISCUSSION/JUSTIFICATION:

This alternative recommends dividing project into two construction segments (at approximately Sta 374+00), each containing one new interchange. Bid packages will be prepared for each segment independently, and a third bid package will be prepared for the entire project. All three will be advertised and let at same time with contractors being allowed to bid on one, two, or all three. The KY Transportation Cabinet will review the cumulative cost of the low bids for the two sections bid separately compared to the low bid for the package let as one project, and award Contract(s) based on most economical overall. This should allow for more competition resulting in less cost. Depending on how the project is bid, there will also be a reduction due to eliminating multiple mobilization and demobilization costs and the project should benefit from economies of scale. When putting together the packages, it may be beneficial to actually reduce the amount of construction time on the large package.

An additional benefit, letting the project at one time, with the same coordination and maintenance of traffic notes/requirements (i.e. blasting windows, land closures, etc.) should minimize concerns related to the traveling public.

IMPLEMENTATION CONSIDERATIONS:

Additional bid document preparation required.

APPENDICES

APPENDIX A
Study Participants

VE STUDY ATTENDEES
Mountain Parkway Corridor – Construction Sequence 4
Item #10-168.00
Wolfe County

March 2015					NAME	ORGANIZATION	POSITION	TELEPHONE		CELL	
9	10	11	12	13				E-MAIL			
X	X	X	X	X	Renee Hoekstra	RHA, LLC	Team Leader	602	493-1947	623	764-7490
								Renee@TeamRHA.com			
X	X			X	Marshall Carrier	KYTC	Project Manager KYTC Mountain Parkway	502	782-4872		
								Marshall.Carrier@ky.gov			
X	X	X	X	X	Shawn Russell	KYTC	Program Coordinator	502	782-4926		
								Shawn.Russell@ky.gov			
X	X	X	X	X	Duffy Ford	Qk4	VE TEAM: Roadway	502	585-2222	502	472-4796
								dford@qk4.com			
X	X	X	X	X	Bob Farley	HMB Professional Engineers	VE TEAM: Roadway	502	695-9800	502	330-0187
								bfarley@hmbpe.com			
X	X	X	X	X	Matt Moore	KYTC	VE TEAM: Operations & Construction	606	874-9561		
								Matthew.Moore@ky.gov			
X	X	X	X	X	Rodney Little	Qk4	VE TEAM: Constructability	606	425-4636	606	306-1458
								rlittle@qk4.com			
X	X	X	X	X	David Moses	Integrated Engineering	VE TEAM: Drainage	859	368-0145	859	619-8149
								David@int-engineering.com			
X	X	X	X	X	Bill Amrhein	Stantec	VE TEAM: Structures	859	233-2100	859	576-3767
								bill.amrhein@stantec.com			
X	X	X	X	X	David Kirby	HMB Professional Engineers	VE TEAM: Structures	502	695-9800		
								dkirby@hmbpe.com			

VE STUDY ATTENDEES
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March 2015					NAME	ORGANIZATION	POSITION	TELEPHONE		CELL	
9	10	11	12	13				E-MAIL			
X					Jeff Schaefer	HDR	Design Environmental Project Manager			502	592-0288
								Jeff.schaefer@hdrinc.com			
X				X	Joe Cochran	HDR	Design Program Manager			859	539-2630
								Joe.cochran@hdrinc.com			
X				X	Ben Edelon	HDR	Design Project Manager	859	629-4833		
								Ben.edelon@hdrinc.com			
X	X			X	Anthony Norman	KYTC	Lessons Learned Coordinator				
								Anthony.norman@ky.gov			
X				X	Darren Back	KYTC	KYTC D-10 Section Supervisor	606	666-8841		
								Darren.back@ky.gov			
	X			X	Glenn Kelly	Qk4	General Engineering Consultant	502	693-6278		
								gkelly@qk4.cxom			
X	X			X	Brent Sweger	KYTC	Branch Manager – Quality Assurance	502	782-4912		
								brent.sweger@ky.gov			
				X	Aric Skaggs	KYTC	D-10 Branch Manager	606	666-8841		
								Aric.skaggs@ky.gov			
				X	Duane Thomas	FHWA	Transportation Engineer	502	223-6749		
								Duane.thomas@dot.gov			

VE STUDY ATTENDEES
Mountain Parkway Corridor – Construction Sequence 4
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March 2015					NAME	ORGANIZATION	POSITION	TELEPHONE		CELL	
9	10	11	12	13				E-MAIL			
				X	Richard Sutherland	Stantec	Senior Principal	859	233-2100	859	333-1940
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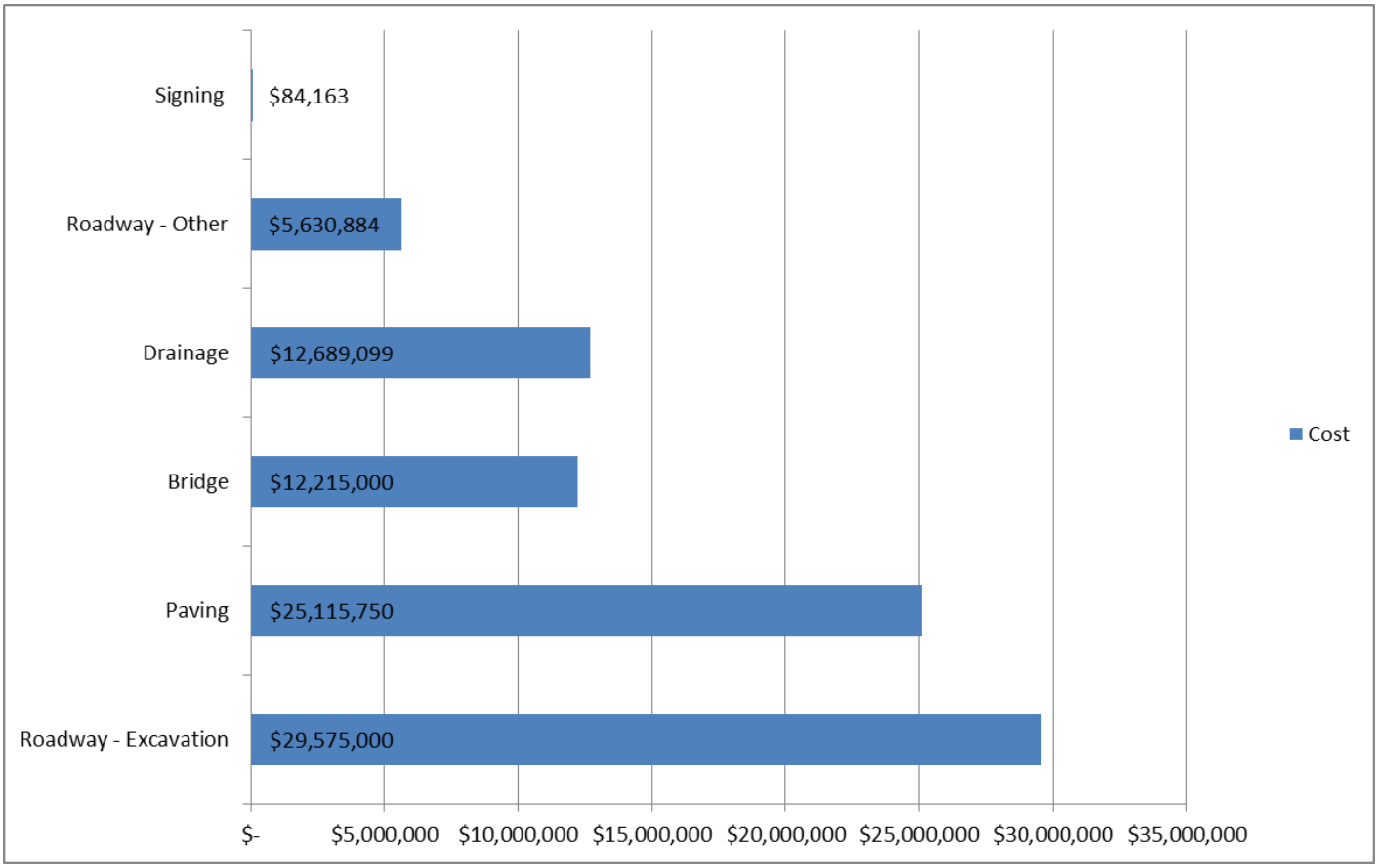
				X	Rokshad Khan	KYTC	EIT – Highway Design, Drainage	502	782-4893		
								Rokshad,.khan@ky.gov			
				X	David Kratt	Qk4	General Engineering Consultant	502	435-0382		
								dkratt@qk4.com			
				X	Ken Spry	HMB	PTC	502	229-9019		
								kspry@hmbpe.com			
				X	Bill Gulick	KYTC	Director, Division of Highway Design	502	782-4884		
								Bgulick@ky.gov			
				X	John Callihan	FHWA	Transportation Engineer	502	223-6757		
								John.calligan@dot.gov			
				X	Chris James	KYTC	Design Engineer – District 12	606	433-7791		
								Chris.james@ky.gov			

APPENDIX B
Pareto Cost Models

Appendix B – Cost Model

The project baseline is Alternative 2. The cost estimate is very general in nature given that this is an early design package. The following cost model represents the costs associated with this project and was used by the team to understand the largest cost impacts of the various project elements.

Work Item Description	Cost	% of Total	Comments
Roadway - Excavation	$ 29,575,000	34.7%	
Paving	$ 25,115,750	29.4%	
Bridge	$ 12,215,000	14.3%	
Drainage (includes $5M In-lieu fees)	$ 12,689,099	14.9%	
Roadway - Other	$ 5,630,884	6.6%	
Signing	$ 84,163	0.1%	
Total	**$ 85,309,896**	**100.0%**	



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 and functions of 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
Enhance Economy	***Higher Order***
Satisfy Stakeholders	***Higher Order***
Improve Connectivity	**Basic**
Convey Vehicles	Secondary
Manage Access	Secondary
Accommodate Utilities	Secondary
Salvage Pavement	Secondary
Separate Traffic	Secondary
Span Space	Secondary
Channel Water	Secondary
Meet Requirements	Secondary
Mitigate Environment	Secondary
Meet Budget	Secondary
Maintain Traffic	Secondary
Ensure Constructability	Secondary
Enhance Safety	Secondary
Build Project	Lower Order (Assumed)

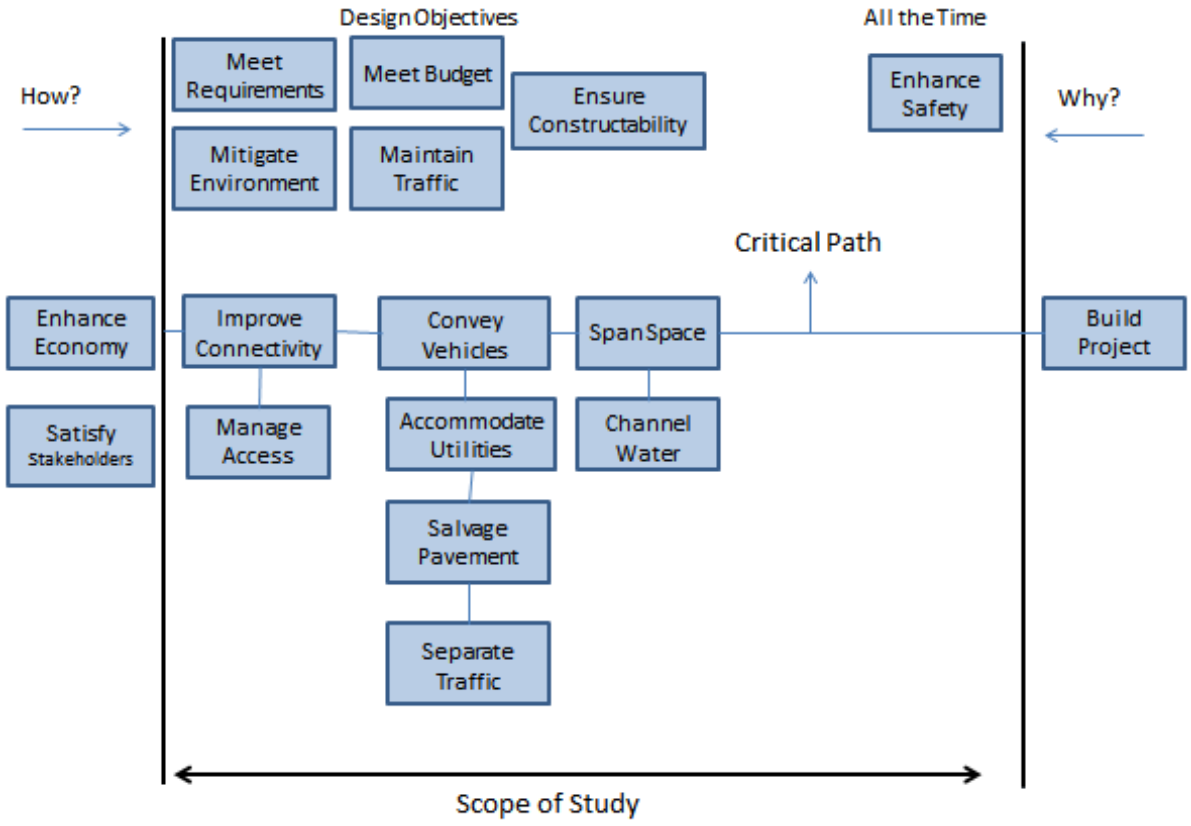
The definitions of the classifications are:

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 and design team 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 and driver expectations (permanent)
- Environmental – impacts to streams and cemeteries (interim and permanent)
- Constructability – ease of construction and maintenance of traffic

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)
- DC – Design Comment (No workbook)
- DS – Design Suggestion (Workbook)
- FF – 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.

Value Relationship		**Value Index = Function / Cost = F / 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

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Creative Idea List

No.	Description	Score
CV	**CONVEY VEHICLES**	
CV-01	Use retaining wall at KY 1419 (Sta 617+00 to 620+00) to eliminate part of the reconstruction	4
CV-02	Use barrier wall in lieu of 40-foot median (Sta 475+00 to 520+00)	3
CV-03	Use barrier wall in lieu of 40-foot median (Sta 641+00 to 645+00)	3
CV-04	Use barrier wall in lieu of 40-foot median the entire length of the project	5
CV-05	Use a loop ramp for Ramp B in lieu of a diamond ramp	4
CV-06	Tie in Bedwell Road to the south at KY 3034	4
CV-07	Use a Single Point Urban Interchange (SPUI) at KY 191 in lieu of a diamond interchange	2
CV-08	Straighten KY 1419 on the south side to reduce the skew	4
CV-09	Relocate KY 1419 to Sta 620+00 and cross over the mainline	4
CV-10	Bifurcate the roadway from Sta 536+00 to 544+00	4
CV-11	Bifurcate the roadway from Sta 176+00 to 197+00	4
CV-12	Bifurcate the roadway from Sta 570+00 to 590+00 on one side	4
CV-13	Bifurcate the roadway from Sta 402+00 to 465+00	4
CV-14	Do not pave Mountain Parkway Service Road	4
CV-15	Do not pave Bedwell Road	w/CV-14
CV-16	Do not pave Wendy Hills Drive	W/CV-14
CV-17	Leave the existing alignment at Sta 150+00 to 220+00 and go across country	5
CV-18	Leave the existing alignment from Sta 530+00 to 545+00 and go across country	5
CV-19	Straighten the skew at KY1812	4
CV-20	Improve KY 1010 exit Ramps A and D	4
CV-21	Reconfigure KY 191 traffic interchange	4
CV-22	Increase the grades from Sta 537+00 to 545+00	4
CV-23	Realign Bedwell Road over the mainline at Sta 380+00 and eliminate twin mainline bridges at KY 3034	5
CV-24	Move KY 191 traffic interchange to Sta 170+00	2
CV-25	Tunnel from Sta 536+00 to 545+00	FF
CV-26	Eliminate KY 1010 Interchange	4
CV-27	Consider using a 2+1 approach in lieu of 4 lanes	4
SS	**SPAN SPACE**	
SS-01	Eliminate KY 3034 bridge and buy out the residents	FF
SS-02	Extend the wagon box and eliminate the twin bridges at KY 3034	4
SS-03	Use precast arch at KY 3034 in lieu of the twin bridges at KY 3034	4
CW	**CHANNEL WATER**	
CW-01	Extend box culvert to relocate channel change	4
CW-02	Ensure that all of the boxes and culverts that are to be extended are inspected prior to final design	ABC
CW-03	Elevate Ramp E-F on KY 1010 to avoid the channel change	2
CW-04	Elevate Ramp A on KY 1010 to avoid the channel change	2

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Creative Idea List

No.	Description	Score
CW-05	Elevate Ramp C at KY 191 to avoid the channel change	2
CW-06	Move the channel change at Sta 145+00 directly across the mainline and have it dump into Trace Fork earlier	2
CW-07	Shift the alignment at Sta 315+00 to 325+00 to miss Landsaw Creek	2
CW-08	Ensure that the existing culverts and pipes are to be cleaned when extended	DC
AU	**ACCOMMODATE UTILITIES**	
AU-01	Use a retaining wall at Sta 615+00 to stay away from the electrical tower	4
AU-02	Have the contractor responsible for locating all utilities as part of the construction contract which transfers the risk from KYTC	DC
AU-03	Include a performance specification to allow the contractor to modify the design the stay away from the electrical tower at Sta 615+00	DC
AU-04	Ensure there are funds in the contract to pay the utility companies to move their utilities but by a certain time	DC
AU-05	Ensure that the water and sewer line relocations are included in the contractor's scope to eliminate potential delays and claims to the project	DC
AU-06	Move the pier at KY 1812 to avoid the fiber optic cable	DS
AU-07	Obtain information from the power company as to the potential restrictions that will be placed on the contractor when working around the tower or lines (i.e. blasting impacts)	DC
M	**MISCELLANEOUS**	
M-01	Project to be delivered as a Design/Build for entire 11 miles	DS
M-02	Develop 3 construction packages and allow the contractor to bid 1 or all 3	DS
M-03	If 3 contracts are used, ensure that the contractors are responsible for coordinating the blasting plans between the various contractors and ensure that the same times are given for blasting operations	DC
M-04	Ensure that the length of time allowable for road closures is identified and include a disincentive in the contract	DC
M-05	Have the contractor responsible for obtaining and managing the SWPPP	DC
M-06	Ensure that the pond at the Maintenance Service Road on the Tapley's property is not designated a "wetlands"	DC

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:

- Barrier wall needs to be revisited
- Design looks pretty good
- There appears to be quite a bit of excess soils on the project
- The VE team needs to focus on excavation impacts
- The VE team is able to consider 60 mph in lieu of 65 mph
- Need to understand the condition of the existing pipe and boxes
- The current design is in the preliminary stages
- The VE team needs to focus on minimal environmental impact
- The VE team needs bridge inspection reports
- Streams always have water
- Bifurcation is an option
- The design matched existing clearances on bridges even if they were above minimums
- The existing wagon box has horizontal restrictions
- The project needs to minimize impact to streams along the corridor
- No bike paths or pedestrian paths are required or planned
- Not limited to avoiding cemeteries
- It was noted by the VE team that there are differences in the structure costs from Alternative 1 to Alternative 2
- The current design uses as much of the existing pavement as possible and the pavement is in good shape
- Back slopes are a 1¼ :1
- There is a 6% grade tie-in to Sequence 1
- $5M in lieu fees are added to the cost for environmental mitigation (shown in the cost model)
- The VE team needs unit costs for sq. ft. for bridges

Risk Register

During the kick-off meeting, the project team identified the risk elements related to the overall project success. 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**			**Risk Response**	
Risk ID	**Description of Risk**	**Who does the risk affect?**	**Probability of Impact %**	**Severity of Impact (numeric)**	**Risk Rating**	**Avoid? Mitigate? Accept? Transfer?**	**Plan of action and risk champion/owner.**
1	Maintenance of traffic during construction related to blasting	Travelling Public, construction			**0.0**	Mitigate/Transfer	Disincentives will be needed; impacts construction; increases costs
2	Maintenance of traffic coordination between multiple construction packages	Travelling Public, construction			**0.0**	Mitigate/Transfer	Three projects at one time impacting the ability for the travelling public to get through the corridor; increases costs
3	Changing profiles when working on the existing roadway related to maintaining traffic	Design			**0.0**	Mitigate	Difficult to tie into the existing road and maintain traffic
4	Utilities not relocated in a timely manner	Construction			**0.0**	Mitigate	
5	Fiber optic line at the beginning of the project	Construction			**0.0**	Mitigate	
6	Relocating the power line at KY 1419 on the south side; also impact to construction related to driving piles	Schedule, construction			**0.0**	Mitigate/ Transfer	Concerns with the contractors ability to due construction at the bridge; need to define whether the line has the vertical clearance

Value Engineering Study
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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			Risk Response	
Risk ID	Description of Risk	Who does the risk affect?	Probability of Impact %	Severity of Impact (numeric)	Risk Rating	Avoid? Mitigate? Accept? Transfer?	Plan of action and risk champion/owner.
7	Overhead power line and the impact due to construction methods (i.e. blasting, Sta 431+50	Design/Construction			0.0	Mitigate/ Transfer	Concerns with the impact of blasting; vibration on the existing facilities
8	Changing the design speed from 65 to 60	Driver expectations; safety considerations			0.0	Avoid	The corridor should maintain a consistent speed

Constructability Comments

Additional comments were provided from Matt Moore in District 12. These comments provide some additional direction to the design team to help avoid potential negative impacts during construction.

- The Department should identify, permit and secure waste areas for contractor.
    - The waste areas do not have to be mandatory. We should allow the contractor to select and permit other areas at their expense. The intent is to insure the contractor has sufficient areas to dispose of the excess waste.
- The projects should be let during the times of the year when tree clearing is permitted. This will allow the Department to avoid paying into the Bat Conservation Funds.
    - If conflicts arise due to letting schedules, consider change ordering tree cutting to the other active projects.
- If the project is let before utilities are clear, insure the utility impact notes provide realistic expected clearance dates. For example, do not give an expected clearance date for an overhead utility of 3 months, when the District Utility Section does not have an agreement with the utility company (the agreement alone can take three months to obtain).
- Review the special notes to insure there are no ambiguities.
- Take blasting into consideration when deciding which homes to purchase.
    - If a home requires evacuation before blasting can occur, the Department should consider purchasing it.
- Ensure bid items for traffic bound base “maintenance stone” and geotechnical fabric for construction entrances, are added.

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