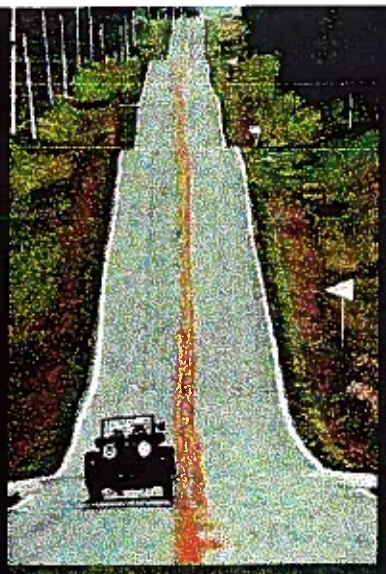
Value Engineering Study



FINAL REPORT

Widening of Parkway Extension
KY 9009, Campton to Salyersville
Wolfe-Morgan-Magoffin Counties
Study Date: August 17-21, 1998

for

Kentucky Transportation Cabinet (KTC)
Frankfort, Kentucky

September 1, 1998

DCM GROUP

DAMES & MOORE

A DAMES & MOORE GROUP COMPANY

WIDENING OF PARKWAY EXTENSION KY 9009, CAMPTON TO SALYERSVILLE
Wolfe - Morgan - Magoffin Counties
Item No. 10-126.00

VALUE ENGINEERING STUDY
for
Kentucky Transportation Cabinet
Division of Transportation Planning
Frankfort, Kentucky

Study Date: August 17 - 21, 1998

Final Report

September 4, 1998

Dames & Moore
A Dames & Moore Group Company

EXECUTIVE SUMMARY

This report documents the results of a value engineering study on the *Widening of Mountain Parkway Extension From Campton to Salyersville*. The study workshop was conducted at district office in Frankfort, KY, on 17 August, 1998, through 21 August 1998. The project was reviewed at the preliminary design phase. The value engineering study team was from Dames and Moore, the Kentucky Transportation Cabinet, and was led by a PE/CVS team leader from Dames and Moore. The project design firm is Balke Engineers, of Lexington, Kentucky. An oral presentation of the study results was made to representatives of the Kentucky Transportation Cabinet and the design team on Friday, 21 August, 1998.

The value engineering team's task was to provide recommendations for adding project value by reducing costs where possible, consistent with project quality and customer satisfaction.

The Project.
The subject of the value engineering study was the widening to four lanes the existing two lane Mountain Parkway Extension from vicinity of Campton to Salyersville, Kentucky, a distance of approximately 32 miles. In addition to widening, the project will bring the existing roadway up to current design standards.

Estimate of Construction Cost and the Budget.
The cost estimate furnished to the value engineering team consisted of a cost summary of the major items within the project for three alternatives and a preferred alternative. There was no detailed cost breakdown available for review by the VE team. The team did note a possible bridge estimate error, and presented a design comment relative to the anticipated bridge costs for the project. The total estimated construction cost for the project, based on the preferred alternative, is $268,921,222. The project budget will be developed after the preliminary study is completed.

Recommendations.
Recommendations for change to the design are put forth in this report. These recommendations represent, in the opinion of the study team, changes that will improve the overall project. A detailed writeup of each recommendation can be found in Section 3. Section 3 also includes a table that summarizes all recommendations.

Savings From Recommendations.
The study generated eleven ideas, of which four were developed as recommendations to be submitted for consideration by the owner and the design team. In addition to the recommended proposals, five design comments are presented which may result in additional savings. The total dollar amount represented by the recommended proposals is $54,489,435.00. All listed recommendations cannot be accepted together, as two recommendations, E1, Bifurcated Sections, and E3, Raise Profile, are mutually exclusive. The maximum savings will derive from the implementation of recommendations E1, Bifurcate Sections, G2, Detour Traffic, and I-11, Combine Interchange at KY15, and Quillin Chapel Road.

TABLE OF CONTENTS

Acknowledgments.
Robert Semones and Joette Fields of The Kentucky Transportation Cabinet Value Engineering Staff, added greatly to the success of the Value Engineering Study, by providing administrative support and coordination of activities throughout the study. The design team of Balke Engineers provided the value team with a thorough and enlightening presentation to clarify the design approach and answer team-member questions. All of the study participants joined together to create a positive atmosphere conducive to a successful effort. Following is a list of the value engineering team members that participated in this study:

Value Engineering Team Members

Name	Role	Firm Name	Phone
Joseph J. Waits, PE, CVS	Team Leader	Dames & Moore	334-666-5892
Benjamin A. Goodman, PE	Roadway Engineer	Dames & Moore	312-461-0267
C. W. Seymour, Jr.,LS	Right of Way Engineer	Dames & Moore	502-583-2723
George J. Schober, PE	Traffic Engineer	Dames & Moore	847-364-8800
Dallas Montgomery, RLS, PE	Construction Engineer	Dames & Moore	502-583-2723
Richard Wilson, PE	Geotechnical Engineer	KTC	502-564-2374
Tony Bowling, PE	construction Engineer	KTC	606-439-4858
Whaylon Coleman	Technical Recorder	Dames & Moore	502-672-3831
Robert Semones, PE	VE Coordinator	KTC	502-564-3280
Joette Fields	VE Administrative Assistant	KTC	502-564-3280

SECTION 1 - INTRODUCTION

This report documents the results of a value engineering study of the project: Widening of Parkway Extension from Compton to Salyersville, Ky. The study workshop was held at the Kentucky Transportation Cabinet Offices, Frankfort, Ky, on 16 August, 1998, through 21 August, 1998. At the time of the workshop the project was at the preliminary design stage. The study team consisted of a PE/CVS team leader, and team-members from Dames and Moore. The project design firm is Balke Engineers. The value engineering staff, KTC, coordinated and provided administrative support. Project documents and other material furnished to the value engineering team are listed in the Appendix for reference.

The Job Plan.
The study followed a five step job plan endorsed by SAVE International, the professional organization of value engineers in the United States.

Value Engineering
The following is a note to those persons unfamiliar with value engineering. Because there is a value engineering study, and because recommendations for changes to the design have been made, one should not assume that there is a problem with the existing design. There is nothing wrong with the existing design.

The value engineering team looks for ways to add value to the project by recommending alternatives that the team believes will lead to improvement. It must be understood that a VE team works from a different perspective than does the design team. The value engineering team represents a second opinion with the benefit of hindsight, and with the ability to challenge the owner's instructions to the designer.

In addition, VE Studies are done on designs in progress. Some recommendations will cover items that are still in a state of change, thus causing the recommendations, in certain cases, to be irrelevant. In other instances, the design team will already be intending to do the thing that the recommendation is suggesting.

In any event, the VE recommendations simply represent an attempt at a different way of looking at the problem to be solved, and are presented as additional ideas for consideration by both owner and designer.

Value Engineering studies serve to provide an added degree of certainty to the design.

VE recommendations for a change to the design serve to broaden the base of information open for consideration.

An absence of VE recommendations pursuant to certain portions of the project serves as a validation of the design of these portions of the project.

In either case, the project benefits.

The final decision as to the acceptance of these recommendations and suggestions rests ultimately with the owner and the designer.

Boundary of the Study

The limits of the study were as contained in the Mountain Parkway Extension Study, prepared by Balke Engineers, used by the value engineering team as the basis of the study. There were no constraints given to the team.

Study Objective

The objective of the value engineering study was to review and analyze the project documents to date by an independent professional group using accepted value engineering methodology, with the intent to reduce costs where feasible without reduction in project quality or customer satisfaction. Key considerations were:

- Function performance
- Technical feasibility
- Customer satisfaction
- Safety
- Reliability/Maintainability
- Project schedule
- Cost savings

Cost Estimate

The current cost estimate for the project consisted of a summary of major cost items for the project. A detailed cost estimate was not available to the team. Life cycle estimates were not a factor in any of the proposals.

Ideas and Recommendations
Part of the value methodology is to generate as many ideas as is practical, and to then evaluate each idea and select as candidates for further development, only those ideas that offer added value to the project. If an idea thus selected, turns out to work in the manner expected, that idea is put forth as a formal value engineering recommendation. Recommendations represent only those ideas that are proven, to the team's satisfaction.

Full documentation of all VE recommendations developed in this study are in Section 3 of this report. A full list of all VE ideas generated in this study is in Appendix B.

Design Suggestions.
Some ideas that did not make the selection for development as recommendations, were, never-the-less, judged worthy of further consideration. These ideas have been written up as "Design Suggestions". Documentation of all design suggestions can be found in Section 4.

SECTION 2 - PROJECT DESCRIPTION

The project will widen the Mountain Parkway Extension (KY 9009) from the vicinity of Campton, Ky, in Wolfe County, to Salyersville, Ky, in Magoffin county. The existing two-lane roadway will be widened to a four-lane roadway with a depressed median. The project includes the upgrading of the existing interchanges and the addition of four new interchanges.

The Mountain Parkway and its extension provide access for much of Eastern Kentucky to the west. It is the principle route to interstates 64 and 75 near Lexington. Currently KY 9009 (Mountain Parkway Extension) is operating at a level of service of "C" from KY 15 at Campton to KY 7 at Salyersville. Traffic for much of the facility is expected to double by the year 2025.

The proposed improvements for the project are based on AASHTO's "A Policy on Geometric Design of Highways and Streets" for freeways. The project is designed to meet a 110 KPH design speed with a maximum gradient of 7%. The traffic lanes will be 7.2 meters, with 3.6 meter shoulders and 5.4 meter depressed median and inside shoulders of 1.8 meters.

The project is currently in the preliminary design stage, and the value engineering study is based upon the Mountain Parkway Extension Study, KY 9009 (Campton to Salyersville), prepared by Balke Engineers of Lexington, KY.

SECTION 3 - VE RECOMMENDATIONS

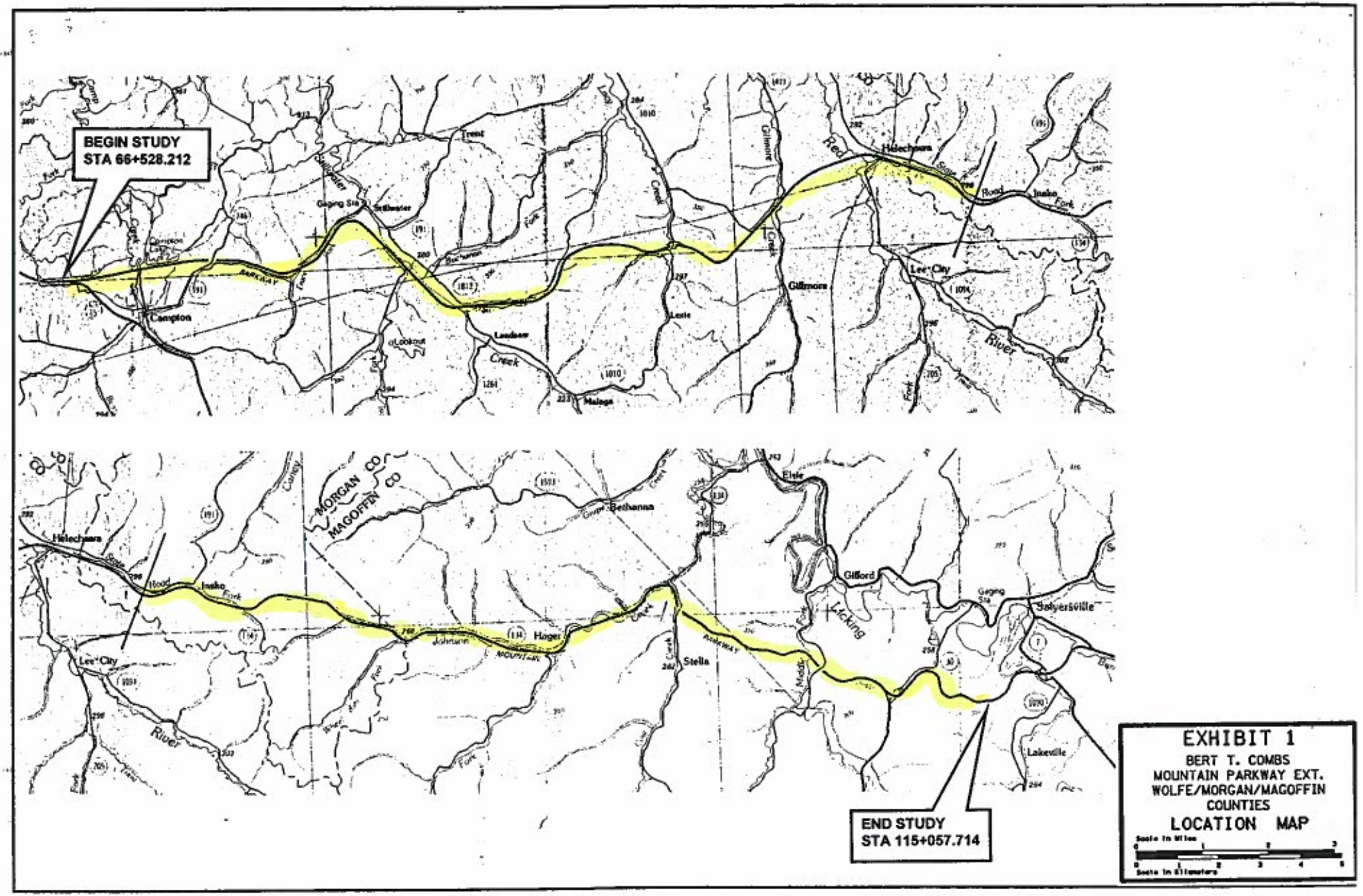
This section contains the complete team writeups of all recommendations to come out of this study. Each "recommendation" is marked by a unique identification number. This number is assigned from the Creative Idea List and is used throughout the report to uniquely refer to a given recommendation. The parent idea, from which the recommendation began can be determined from the Creative Idea List, where the recommendation number is shown adjacent to the corresponding parent idea.

Acceptance of Single Issues
An attempt has been made to develop each recommendation around a single issue. This simplifies the acceptance or rejection of the recommendation, and gives added flexibility to the implementation of the recommendations, in that several single issue recommendations can be combined as needed to achieve a desired result. When evaluating a recommendation, each part of the recommendation should be reviewed on an independent basis. There is no need to discard an entire recommendation because one part of the recommendation is unacceptable.. It is not necessary to accept or reject a recommendation in total. A recommendation can be accepted in part, or accepted with a specified partial modification.

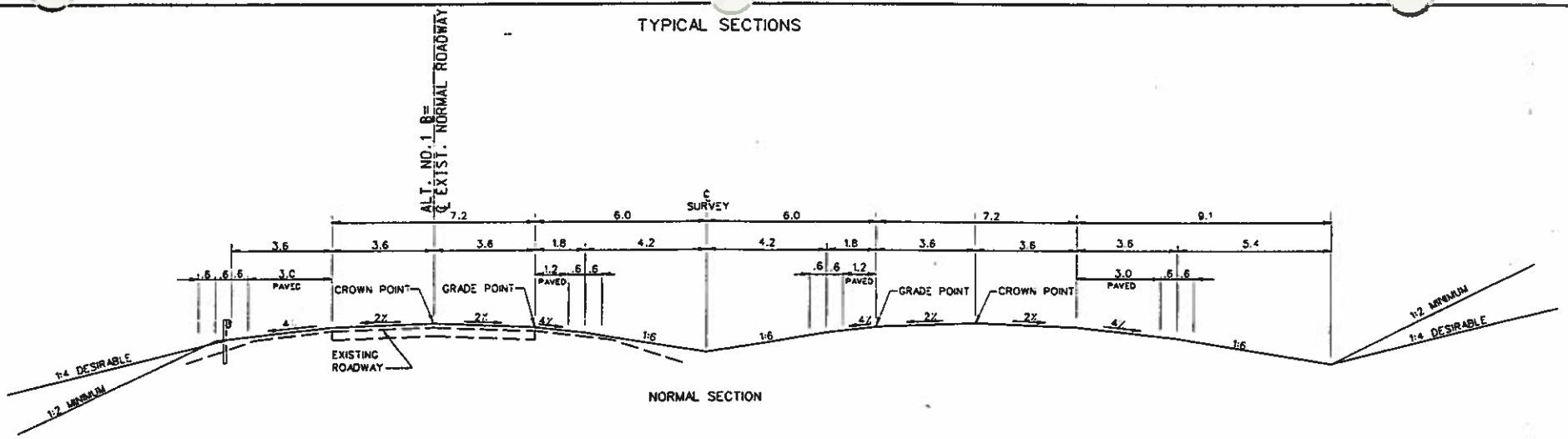
Combining Recommendations.
Usually all recommendations cannot be simultaneously accepted or combined. This is because some recommendations are mutually exclusive of one another, and the acceptance of one recommendation will automatically preclude the acceptance of certain others.

Summary of Recommendations.
A table titled "Summary of Recommendations" is included at the end of this section. This table offers a convenient overview of all recommendations along with economic data associated with each.

Organization of Recommendations.
The recommendations presented on the following pages are organized numerically by identification number. Each recommendation is documented by a separate writeup that includes a description of the recommendation, a list of advantages and disadvantages, sketches where appropriate, calculations, cost estimate, and the economic impact of the recommendation on the life cycle project in terms of savings or added cost.


BEGIN STUDY
STA 66+528.212
Campton
Lee City
Gilmore
Malone
Helechawa
Jeska Fork
Red
River
MORGAN CO
MAGOFFIN CO
Bethanna
Elsie
Gifford
Salyersville
Hager
Stella
Lakeville
Licking
END STUDY
STA 115+057.714
EXHIBIT 1
BERT T. COMBS
MOUNTAIN PARKWAY EXT.
WOLFE/MORGAN/MAGOFFIN
COUNTIES
LOCATION MAP

TYPICAL SECTIONS



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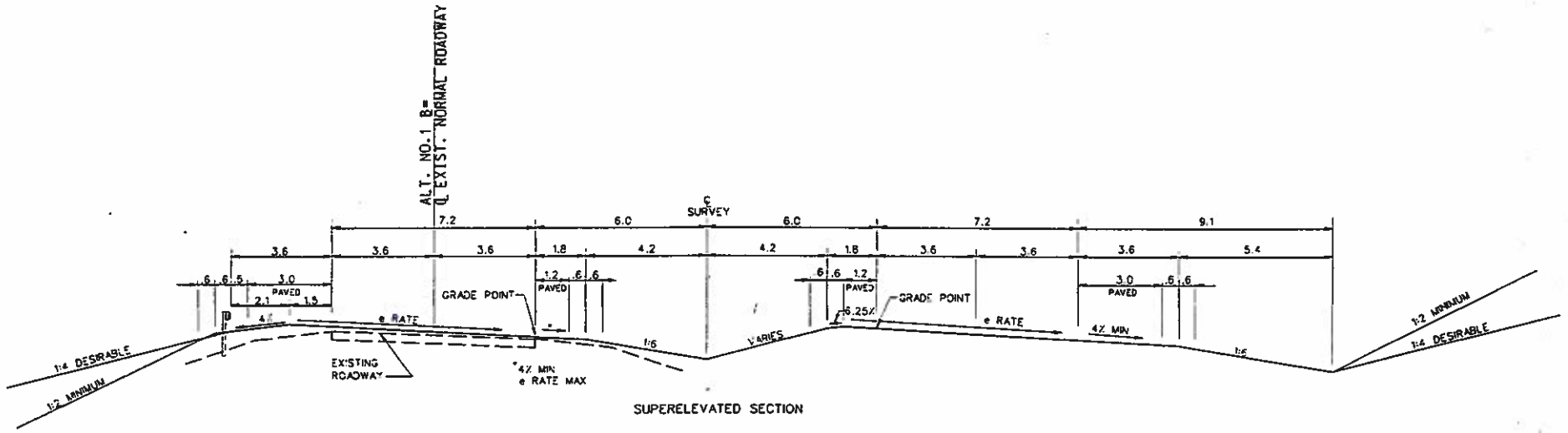


SUPERELEVATED SECTION

NOTE: THESE CROSS-SECTIONS ARE SUBJECT TO CHANGE DURING THE DESIGN PROCESS.

ALTERNATE NO. 1

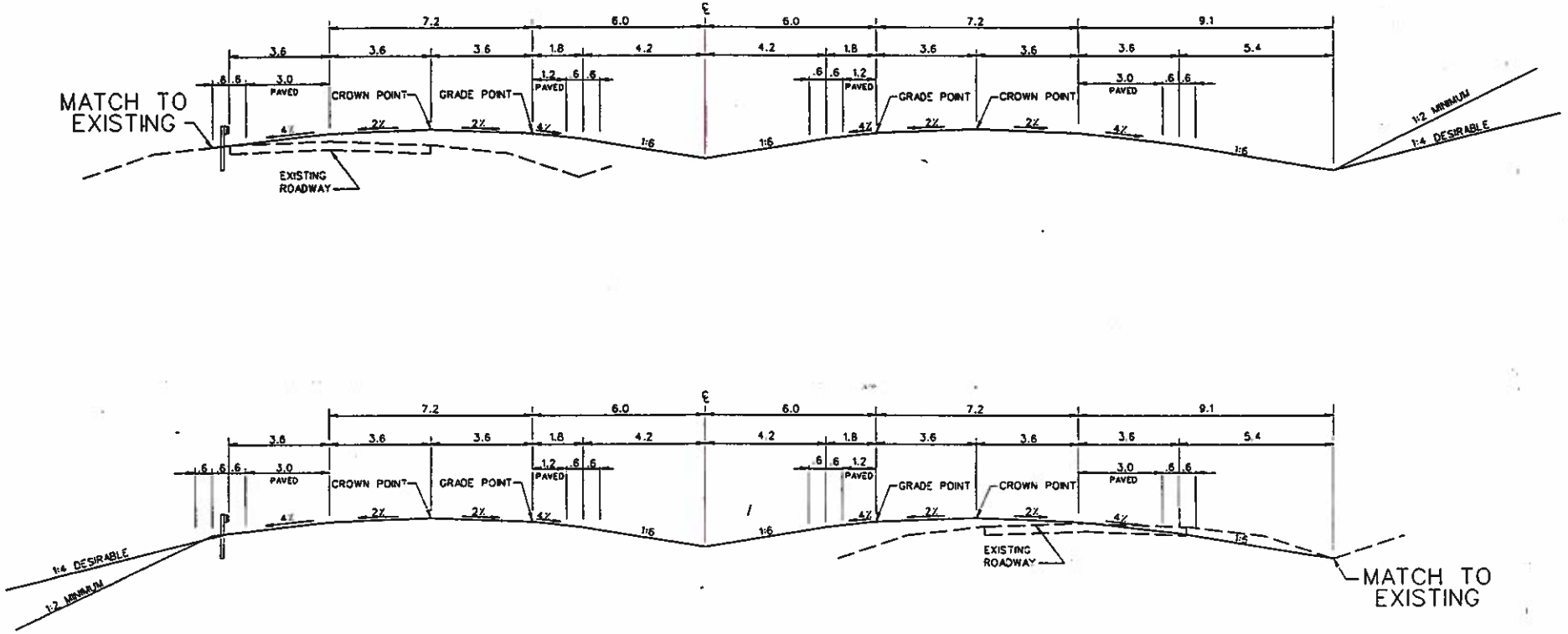
EXHIBIT 6

BERT T. COMBS MOUNTAIN PARKWAY EXT.
WOLFE/MORGAN/MAGOFFIN COUNTIES

PROPOSED TYPICAL SECTIONS

NOT TO SCALE

TYPICAL SECTIONS



NOTE: THESE CROSS-SECTIONS ARE SUBJECT TO CHANGE DURING THE DESIGN PROCESS.

PERFERRED ALTERNATE

ALIGNMENTS SHIFTED SO EDGE OF PROPOSED DRIVING LANE IS AT EXISTING CROWN POINT.

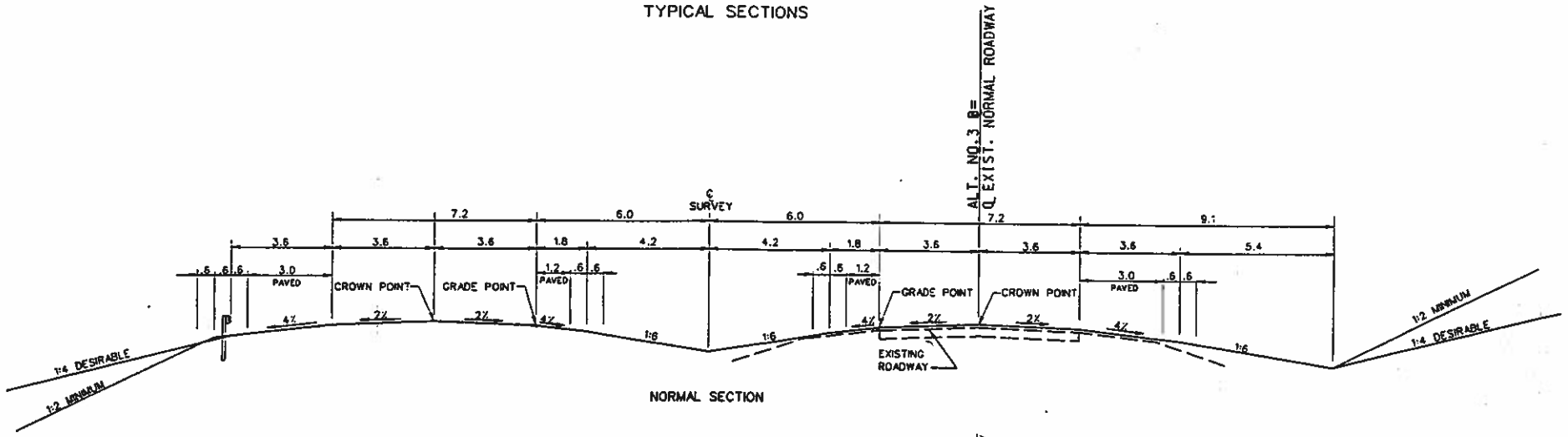
EXHIBIT 6C

BERT T. COMBS MOUNTAIN PARKWAY EXT.
WOLFE/MORGAN/MAGOFFIN COUNTIES

PROPOSED TYPICAL SECTIONS

NOT TO SCALE

TYPICAL SECTIONS



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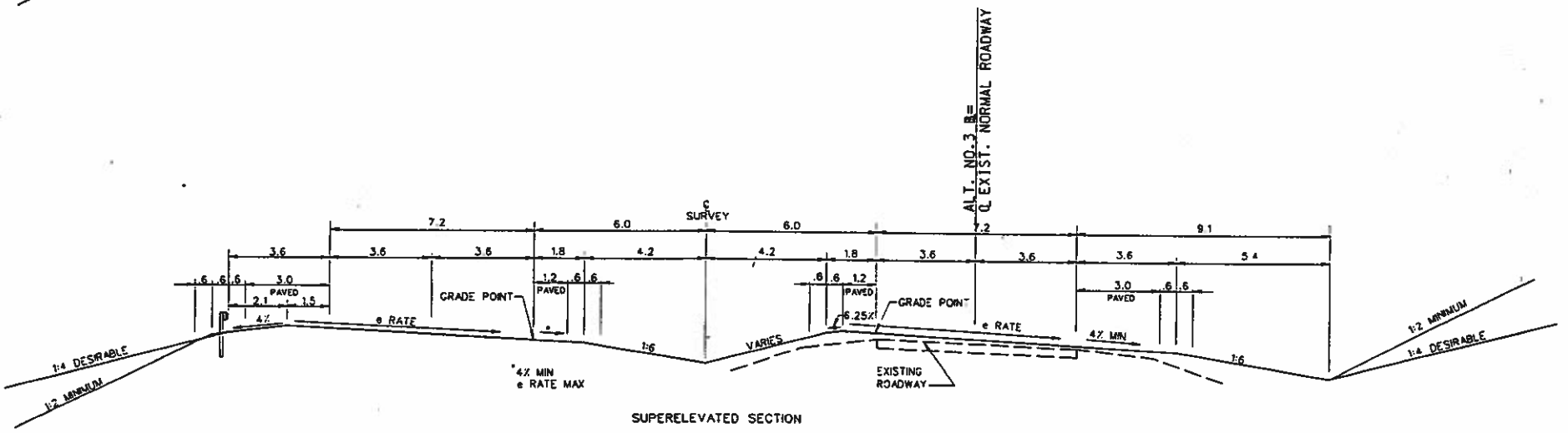


SUPERELEVATED SECTION

NOTE : THESE CROSS-SECTIONS ARE SUBJECT TO CHANGE DURING THE DESIGN PROCESS.

ALTERNATE NO. 3

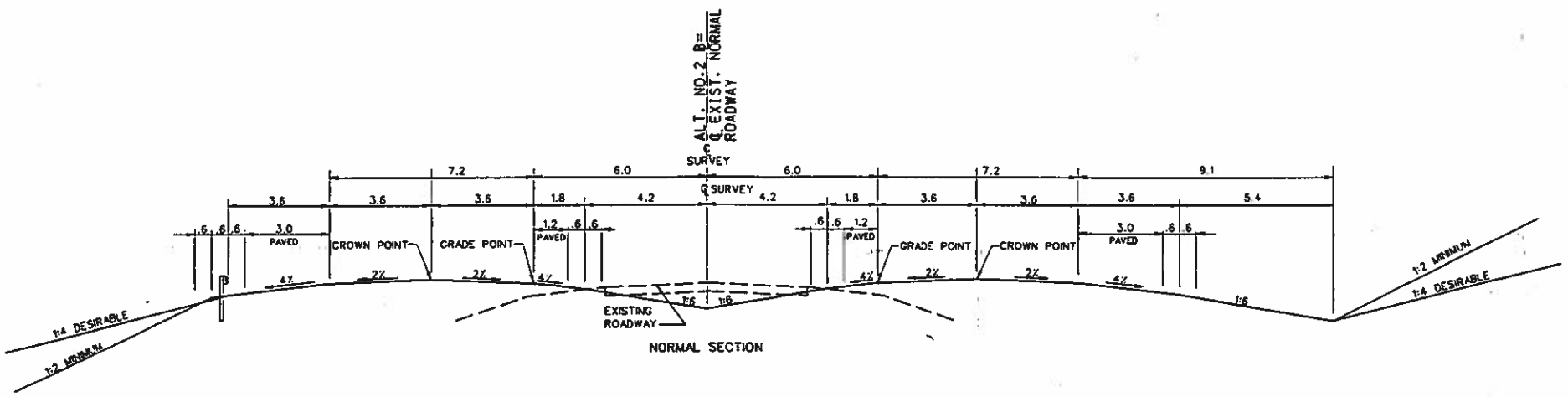
EXHIBIT 6B

BERT T. COMBS MOUNTAIN PARKWAY EXT.
WOLFE/MORGAN/MAGOFFIN COUNTIES

PROPOSED TYPICAL SECTIONS

NOT TO SCALE

TYPICAL SECTIONS



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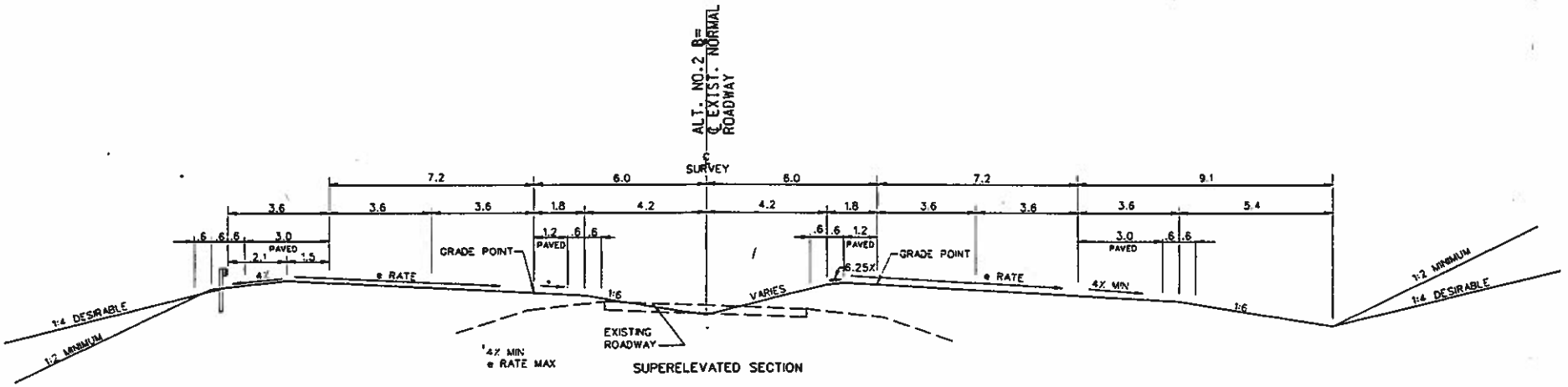


SUPERELEVATED SECTION

NOTE : THESE CROSS-SECTIONS ARE SUBJECT TO CHANGE DURING THE DESIGN PROCESS.

ALTERNATE NO. 2

EXHIBIT 6A

BERT T. COMBS MOUNTAIN PARKWAY EXT.
WOLFE/MORGAN/MAGOFFIN COUNTIES

PROPOSED TYPICAL SECTIONS

NOT TO SCALE

SUMMARY OF RECOMMENDATIONS

FORM 26 AUGUST 1998

The following table offers a convenient overview of all recommendations and the potential savings for each. Proposal E4, to raise the profile grades of the roadway, is developed as an independent proposal for the existing plan, and is not considered in Proposal E1, Bifurcate Sections. The reason for this approach is that if for some reason the bifurcate proposal is disapproved, then strong consideration could be given to raising the roadway profile, as presented in E3. However, it is pointed out that if the bifurcate alternative is approved, then there is additional savings potential in also raising profiles in selected locations.

No.	**RECOMMENDATION**	SAVINGS	MAX SAVINGS
E1	Bifurcate Sections	27,410,948	27,410,948
E4	Raise Profile	8,252,000	----------
G2	Detour Traffic	24,400,000	24,400,000
I11	Combine Interchanges/KY15/Quillin	2,678,487	2,678,487
	Total	----------	54,489,435

VALUE ENGINEERING RECOMMENDATION #E1

VALUE ENGINEERING RECOMMENDATION #E1

FORM 26 AUGUST 1998

PROJECT: Widening of Parkway Extension Ky 9009, Campton to Salyersville

LOCATION: Ky. 9009, Campton to Salyersville

STUDY DATE: August 17 - August 21, 1998

TEAM MEMBER RESPONSIBLE FOR WRITEUP: George J. Schober and C.W. Seymour Jr.

FUNCTION OF COMPONENT BEING CHANGED: Establish Grade

DESCRIPTIVE TITLE OF RECOMMENDATION: Bifurcate sections

ORIGINAL DESIGN: The original design provided for parallel east-bound and west-bound lanes at the same profile grade. This alignment was proposed to prevent disruption of the nearby blue-line streams running beside the project in many locations. Alignment changes were made at three locations cutting through steep hills removing many curves and improving the level of service. Large amounts of excavation are necessary to achieve this design.

RECOMMENDED CHANGE: Bifurcation of the alignment for a limited section of the roadway. A separate line and grade will be required for each direction of traffic, in the bifurcated sections. This would allow one set of lanes to be higher and thereby reduce the amount of excavation. This procedure would not be practical throughout the whole project but where applicable, it could substantially reduce the overall project cost. Our recommended design proposed bifurcation of approximately 48% of the total alignment. Further detailed design studies may increase the length of the bifurcation and further reduce earthwork costs.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	122,010,948	0	122,010,948
RECOMMENDED DESIGN	94,664,000	0	94,664,000
ESTIMATED SAVINGS OR (COST)	27,410,948	0	27,410,948

VALUE ENGINEERING RECOMMENDATION #E1

FORM 23 AUGUST 1998

ADVANTAGES:

1. Reduced excavation
2. Increased embankment
3. Reduce waste materials
4. Reduce construction time
5. Reduce overall cost.
6. Minimize environmental impact
7. More aesthetically pleasing

DISADVANTAGES:

1. Increases design cost
2. Increases Guard rails
3. May increase drainage cost

JUSTIFICATION: The great majority of the earthwork for the Preferred Alternative, as shown in the Scoping study, is related to only one pair of the proposed lanes. This volume of excavation is disproportionately high for a two lane facility. Bifurcation of the alignment will allow the two halves of the proposed roadway to be divided both horizontally and vertically, allowing each half to be located to minimize excavation. This procedure significantly reduces the earthwork which is approximately 45% of the total cost of the project. While reducing the earthwork, the overall safety and level of service can remain unchanged. Roadway grades will remain well within the maximum values for this project, and in several cases, the proposed grades for half of the roadway can be reduced.

This recommendation has the added benefit of further minimizing the impacts to the environment, resulting in less tree removal, preserving the habitat for native species of flora and fauna. In addition, the resulting alignments will be more aesthetically pleasing in areas where the opposing traffic is out of view.

Note: This is a stand alone recommndation and if this recommendation is implemnted, then Recommendation E4 cannot be totally implemented, but may be partially implemented. See Pg 11.

VALUE ENGINEERING RECOMMENDATION #E1

FORM 23 MARCH 1998

COST ESTIMATE - FIRST COST

Cost Item	Units	Unit Cost		Original Design		Recommended Design	
		$/Unit	Source Code	Num of Units × 1000	Total $ × 1000	Num of Units × 1000	Total $ × 1000
Excavation	CU.M.	4.93	1	24,741	122,011	19,033	93,832
Guard Rail	M.	40.00	8*	0	0	20,800	832
Totals					122,011		94,664

SOURCE CODE:
1 Project Cost Estimate
2 CES Data Base
3 CACES Data Base
4 Means Estimating Manual
5 Richardson's
6 Vendor Lit or Quote (list name / details)
7 Professional Experience (List job if applicable)
8 Other Sources (specify)

* KTC Bid Tab Sheet (1996) Rounded

Sumary of Cut reduction Due to Bifurcation of Proposed Alignment

Bifurcation Section	Reduction in Cut Volume (CM)	Reduction in Cost ($@ $4.93/CU.M)
1		$0
2	580400	$2,861,372
3	654400	$3,226,192
4	171800	$846,974
5	946175	$4,664,643
6	48750	$240,338
7	112500	$554,625
8	325000	$1,602,250
9	15000	$73,950
10	68750	$338,938
11	318750	$1,571,438
12	81250	$400,563
13	30000	$147,900
14	45000	$221,850
15	252450	$1,244,579
16	50000	$246,500
17	112500	$554,625
18a	1200000	$5,916,000
18	37500	$184,875
19	118750	$585,438
20	12500	$61,625
21	526349	$2,594,901
Total (rounded)	5,708,000	$28,140,000

Prefered Alternative Excavation Volume	24,740,929
Prefered Alternative Excavation Cost	$122,010,948
Additional Guardrail Length	20,800
Additional Guardrail Cost	$832,000
Recommended Design Volume of Excavation	19,032,929
Recommended Design Cost for Excavation (@4.93/Cu. M)	$93,832,340

Bifurcation Cut Fill Differential Volumes

Bifurcation 18a
Station Range

108200 Begin Bifurcation 18a
110300 End Bifurcation 18a

108200 Left
110000 Left

Reduction of Approx. 500 sq meters of end area for length of section

Area	Length	Volume
500	1800	900000 Cu. Meters

109400 right
110000 right

Reduction of Approx. 500 sq meters of end area for length of section

Area	Length	Volume
500	600	300000 Cu. Meters
Total		1200000

Bifurcation 17
Station Range

103750 Begin Bifurcation 17
104200 End Bifurcation 17

Reduction of Approx. 25 sq meters of end area for length of section

Area	Length	Volume
250	450	112500 Cu. Meters

Bifurcation 16
Station Range

100850 Begin Bifurcation 16
101250 End Bifurcation 16

Reduction of Approx. 5500 sq meters of end area for length of section

Area	Length	Volume
125	400	50000 Cu. Meters

Bifurcation Cut Fill Differential Volumes

Bifurcation 20
Station Range
111900
112150

Reduction of Approx. 50 sq meters ave. end section for length of section

Area	Length	Volume
50	250	12500 Cu. Meters

Bifurcation 19
Station Range
110850
110800 Bridge location
111800

Reduction of Approx. 125 sq meters of end area for length of section

Area	Length	Volume
125	950	118750 Cu. Meters

Bifurcation 18
Station Range
106800 Begin Bifurcation 18
107400 End Bifurcation 18

Reduction of Approx. 125 sq meters of end area for length of section

Area	Length	Volume
62.5	600	37500 Cu. Meters

Bifurcation Cut Fill Differential Volumes

Bifurcation 15
Station Range

96650 Begin Bifurcation 15
98000 End Bifurcation 15

Reduction of Approx. 187 sq meters of end area for length of section

Area	Length	Volume
187	1350	252450 Cu. Meters

Bifurcation 14
Station Range

95700 Begin Bifurcation 14
96300 End Bifurcation 14

Reduction of Approx. 75 sq meters of end area for length of section

Area	Length	Volume
75	600	45000 Cu. Meters

Bifurcation 13
Station Range

95200 Begin Bifurcation 13
95400 Bridge 15 N/A
95600 End Bifurcation 13

Reduction of Approx. 75 sq meters of end area for length of section

Area	Length	Volume
75	400	30000 Cu. Meters

Bifurcation 12
Station Range

93300 Begin Bifurcation 12
93950 End Bifurcation 12

Reduction of Approx. 125 sq meters of end area for length of section

Area	Length	Volume
125	650	81250 Cu. Meters

Bifurcation Cut Fill Differential Volumes

Bifurcation 7

Station Range

83900 Begin Bifurcation 7

84800 End Bifurcation 7

Reduction of Approx. 125 sq meters of end area for length of section

Area	Length	Volume
125	900	112500 Cu. Meters

Bifurcation 6

Station Range

82850 Begin Bifurcation 6

83500 End Bifurcation 6

Reduction of Approx. 75 sq meters of end area for length of section

Area	Length	Volume
75	650	48750 Cu. Meters

Bifurcation Cut Fill Differential Volumes

Bifurcation 21 (Station 113000 to 11500)

113000 Begin Bifurcation 21
115000 End Bifurcation 21

Station	Grade Change (Meters)	Prevous Prop Elev.	Vertical Cut Reduction (Meters)	Cut Reduction End Area (Sq. Meters)	Cut Volume (Cu. Meters)	Vertical Fill Addition (meters)	Fill Addition (Sq. Meters)	Fill Volume (Cu. Meters)
113000	2		2	94			0	
113050	4		4	196	7250		0	0
113100	6		6	306	12550		0	0
113150	8		8	424	18250		0	0
113200	10		10	550	24350		0	0
113250	12		12	684	30850		0	0
113300	14		14	826	37750		0	0
113350	16		16	976	45050		0	0
113400	18		18	1134	52750		0	0
113450	20			0	28350	16	976	24400
113500	22			0	0	22	1474	61250
113550	21.21	299.5		0	0	22	1448	73057
113600	20.42	299.1		0	0	21	1414	71555
113650	19.63	298.6		0	0	21	1389	70064
113700	18.84	298.2		0	0	21	1355	68586
113750	18.05	297.7	13	754	18850	7	364	42970
113800	17.26	297.3	20	1297	51265		0	9100
113850	16.47	296.8	20	1272	64217		0	0
113900	15.68	296.3	12	684	48901	7	364	9100
113950	14.89	295.8	10	550	30850	9	486	21250
114000	14.1	295.4	4	196	18650	14	826	32800
114050	13.31	295		0	4900	18	1159	49630
114100	12.52	294.5		0	0	18	1136	57371
114150	11.73	294.4		0	0	17	1080	55395
114200	10.94	294.7		0	0	16	995	51868
114250	10.15	295.5		0	0	15	874	46710
114300	9.36	296.6		0	0	13	737	40272
114350	8.57	297.8		0	0	11	601	33442
114400	7.78	299	5	223	5569	4	196	19916
114450	6.99	300.2	3	144	9169	3	144	8500
114500	6.2	301.4	2	114	6444	2	114	6444
114550	5.41	302.3	2	70	4588	2	70	4588
114600	4.62	302.9	2	70	3488	2	70	3488
114650	3.83	303.2	0	11	2027	0	11	2027
114700	3.04	303.4		0	283		0	283
114750	2.25	303.1		0	0		0	0
114800	1.46	302.17		0	0		0	0
114850	0.67	302		0	0		0	0
114900	-0.12	301		0	0		0	0
114950	-0.91	299.8		0	0		0	0
115000	-1.7	298.3		0	0		0	0
					526349			864064

Bifurcated Section
Calculations-Total Bifurcation Length
Calculations-Additional Guardrail Length/Cost

Station	Description	Length of Bifurcation
66528	Beginning	
67400	Beg. Bifurcation 1	
68050	End Bifurcation 1	650
68275	Begin Bifurcation 2	
68750	Bridge 1 MP 43.770	
69650	End Bifurcation 2	1375
70490	Bridge 2	
72600	Bridge 3	
72700	Box Culvert 4	
72850	Begin Bifurcation 3	
74400	End Bifurcation 3	1550
76350	Bridge 5	
76450	Begin Bifurcation 4	
77250	End Bifurcation 4	800
77900	Box Culvert 6	
78000	Bridge 7	
79400	Begin Bifurcation 5	
82650	End Bifurcation 5	3250
82850	Begin Bifurcation 6	
83500	End Bifurcation 6	650
83600	Box Culvert 8	
83900	Bridge 9	
83900	Begin Bifurcation 7	
84800	End Bifurcation 7	900
85300	Begin Bifurcation 8	
86600	End Bifurcation 8	1300
86750	Box Culvert 10	
87150	Begin Bifurcation 9	
87350	Bridge 11	
87350	End Bifurcation 9	200
88950	Begin Bifurcation 10	
89650	End Bifurcation 10	700
89800	Bridge 12	
90200	Bridge 13	
90600	Box Culvert 14	
90650	Begin Bifurcation 11	
93200	End Bifurcation 11	2550
93300	Begin Bifurcation 12	
93950	End Bifurcation 12	

Station	Description	Length of Bifurcation
95200	Begin Bifurcation 13	
95400	Bridge 15	
95600	End Bifurcation 13	400
95700	Begin Bifurcation 14	
96300	End Bifurcation 14	600
96650	Begin Bifurcation 15	
98000	End Bifurcation 15	1350
98100	Bridge 16	
99600	Bridge 17	
100850	Begin Bifurcation 16	
101250	End Bifurcation 16	400
101900	Bridge 18	
103750	Begin Bifurcation 17	
104200	End Bifurcation 17	450
104300	Bridge 19	
104600	Bridge 20	
105000	Bridge 21	
105400	Bridge 22	
105800	Bridge 23	
106200	Bridge 24	
106700	Bridge 25	
106800	Bridge 26	
106800	Begin Bifurcation 18	
107400	End Bifurcation 18	600
108200	End Bifurcation 18a	
110300	End Bifurcation 18a	2100
110400	Bridge 27	
110800	Bridge 28	
110850	Begin Bifurcation 19	
111800	End Bifurcation 19	1000
111900	Begin Bifurcation 20	
112150	End Bifurcation 20	250
112800	Bridge 29	
113000	Begin Bifurcation 21	
115000	End Bifurcation 21	2000

Meters of Bifurcation	23075 Meters
Meters of Guardrail (90% of Total)	20800 Meters
Unit Cost of Guardrail per meter	$40
Cost of Guardrail	$832,000
Total Project Length	48529 Meters
Percentage of Bifurcation	47.55%

Bifurcation Section #1 & #2

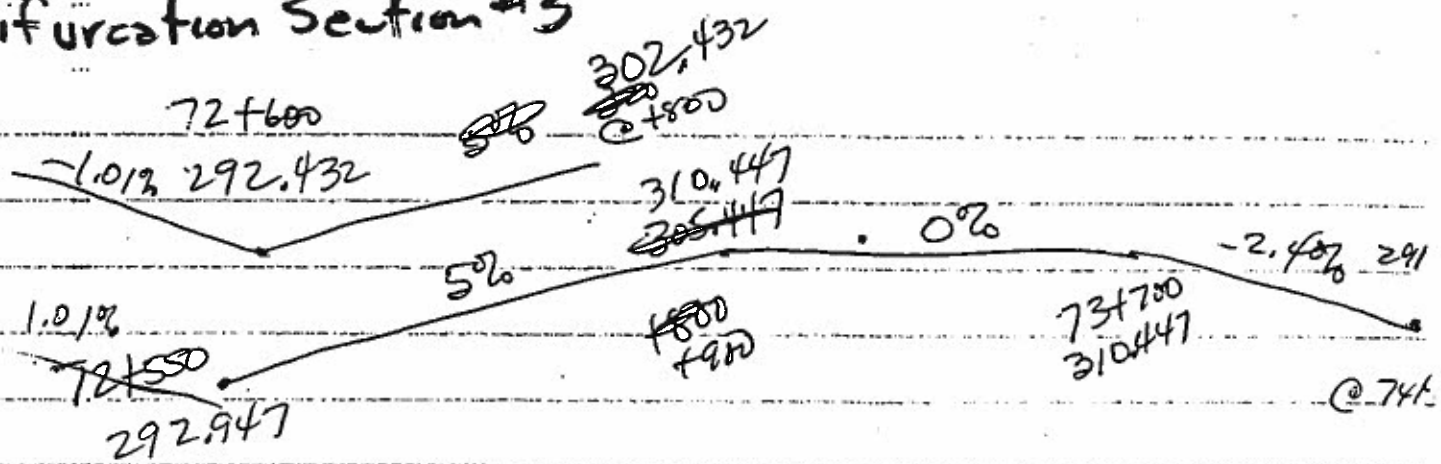
Volumes:

Area 67+400 +/- to 69+650 +/-

	0 @	67+400.	Volumes
Bif #1	-475 @	67+800	95,000
	-350 @	67+850	20,625
	-400 @	68+050	75,000
	0 @	68+275.	45,000
	-75	68+650	14,060
Bif #2	-125 @	68+700	5,000
	-575 @	69+100	140,000
	-450 @	69+250	76,900
	-375 @	69+400	61,900
	0 @	69+650.	46,900
			~~580,400~~

Sta. 67+400 to 69+650 ≈ 580,400 CUY less

Bifurcation Section #3



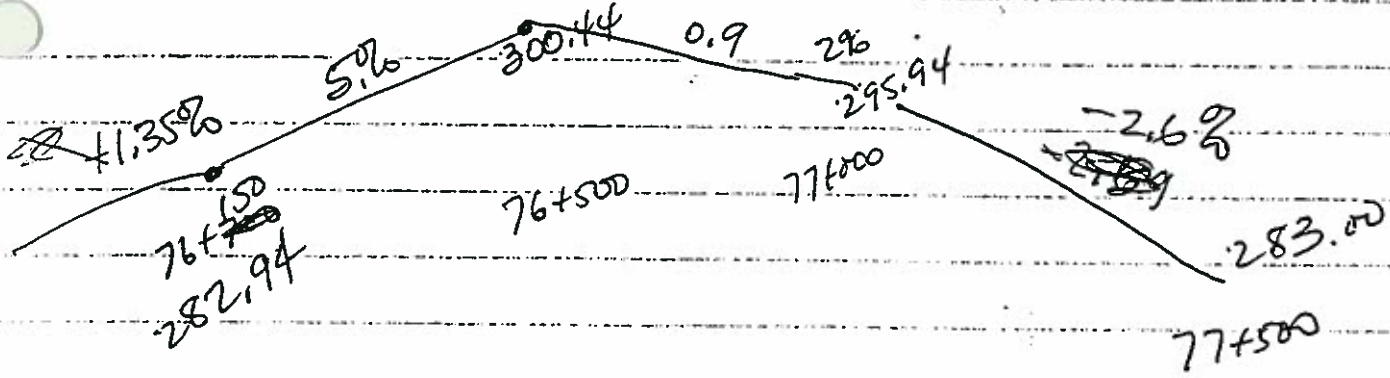
Bif #3

0	@	72+550	
-400	@	72+950	80,000
-100	@	73+050	30,000
-675	@	73+400	135,625
-650	@	73+600	132 500
0	@	74+50	276 250
			654,400

Sta. 72+550 to Sta 74+50 ≈ 654,400

Bifurcation Section #4

Sta. 76+~~00~~ 150 to Sta 77+500



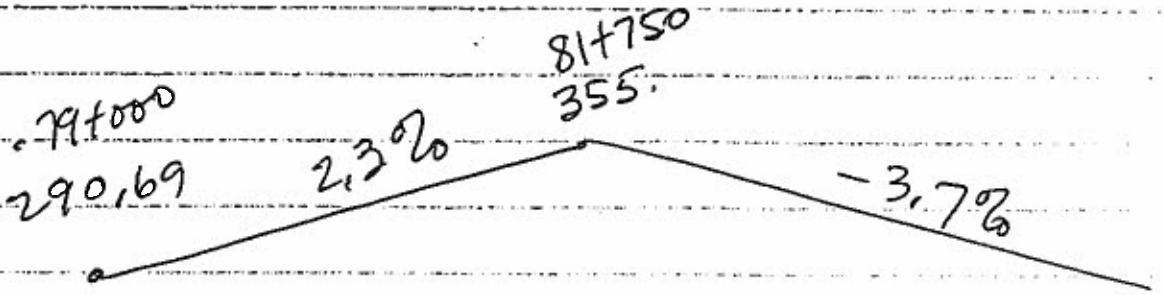
#4

0	@	76+150	
-300	@	76+500	52,500
-225	@	76+550	13,125
~~-200~~	@	76+700	31,900
-125	@	77+00	48,750
-125	@	77+100	12500
0	@	77+500	25,000
			171,775

Sta. 76+150 to 77+500 ≈ 171,800

Bifurcation Section #5

Sta. 79+000 to 83+000



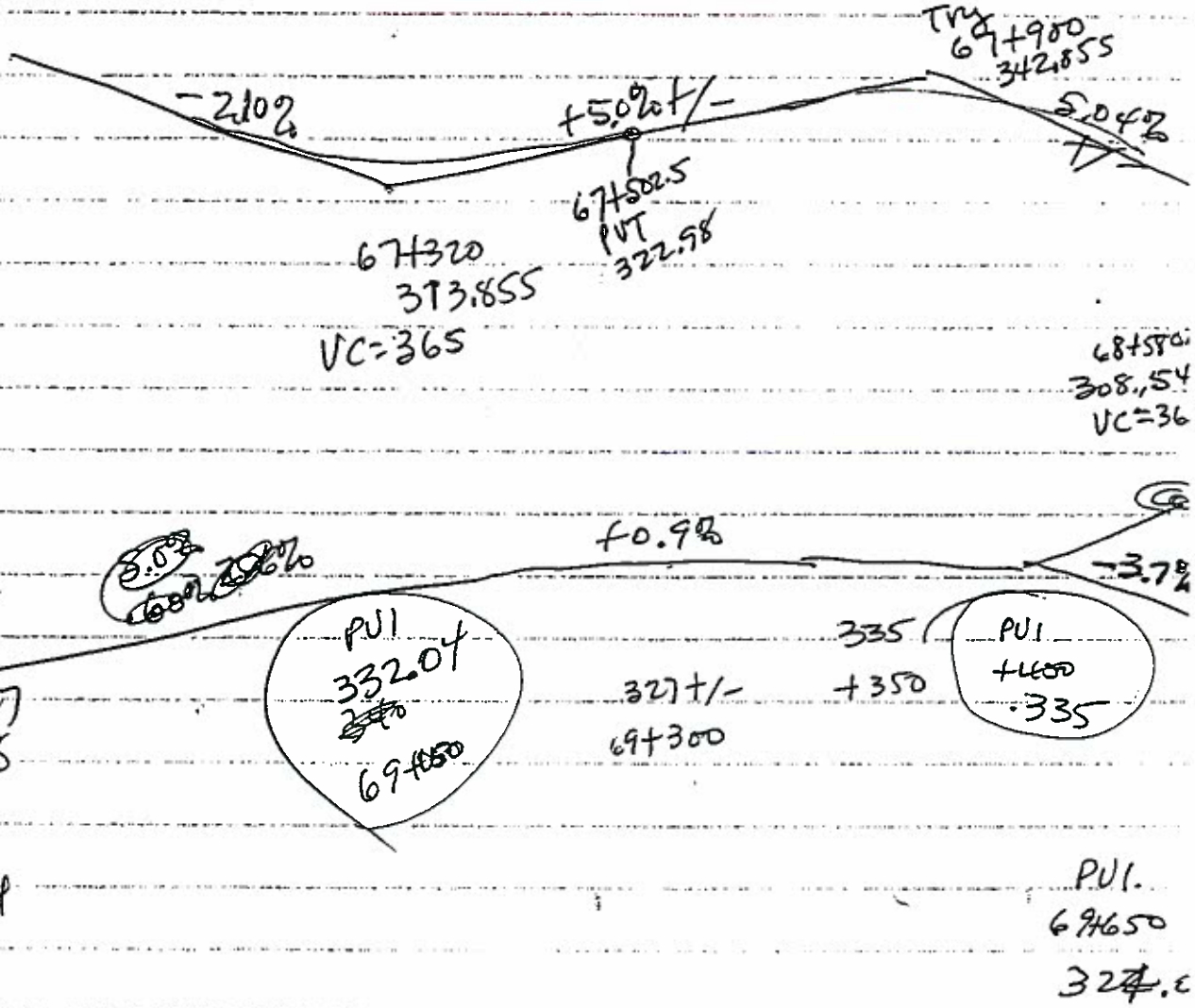
Bif. #5

0	@	79+000	
-65	@	79+250	6500
-200	@	79+500	39,750
-250	@	79+750	56,250
-250	@	80+000	62,500
0	@	80+050	6,250
-360	@	80+200	27,000
-510	@	80+600	174,000
-500	@	80+700	50,500
0	@	80+800	25,000
-275	@	80+850	6900
-100	@	81+050	37,500
-425	@	81+200	39,400
-325	@	81+400	75,000
-125	@	81+550	33 750
-475	@	81+750	60,000
-300	@	82+000	96,875
-300	@	82+500	150,000
			946,175

Sta. 79+000 to 83+000 ≈ 946,000

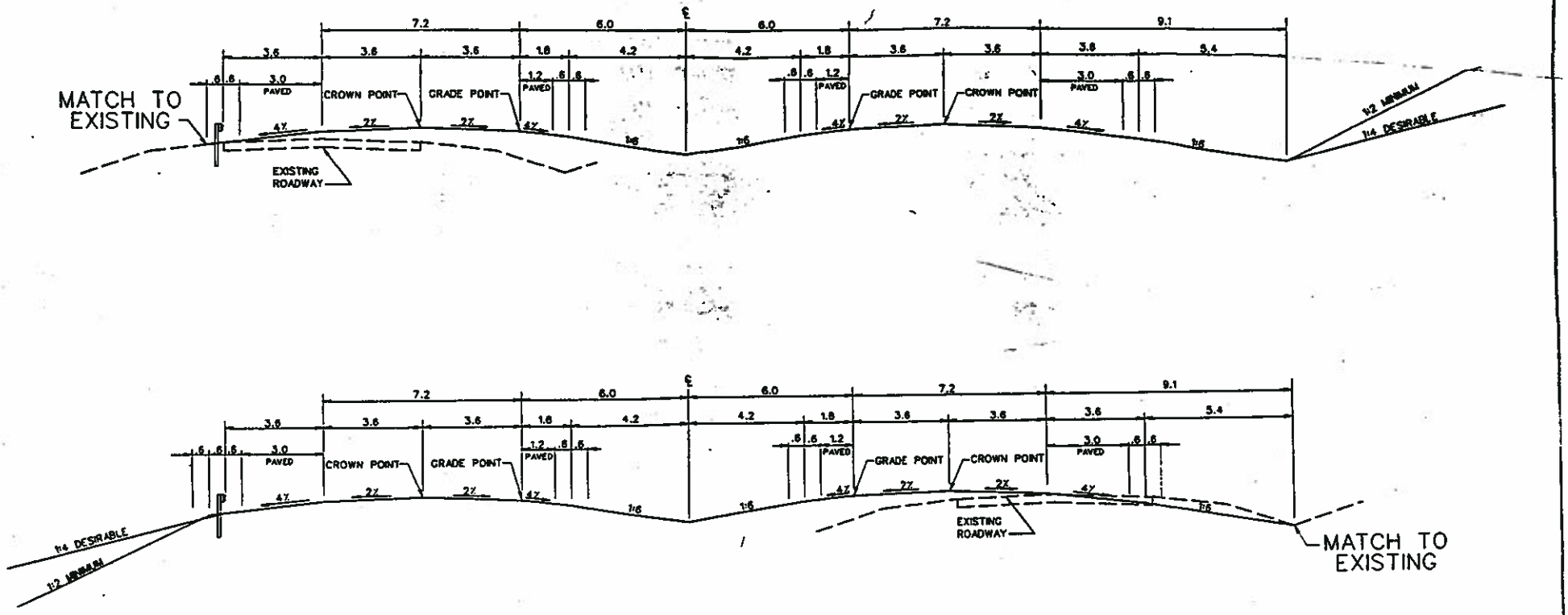
322855 prop

PG 67+500 = 319.255 wa



CALCULATIONS FOR VE STUDY
RECOMMENDATION E-1

TYPICAL SECTIONS



NOTE : THESE CROSS-SECTIONS ARE SUBJECT TO CHANGE DURING THE DESIGN PROCESS.

PERFERRED ALTERNATE

ALIGNMENTS SHIFTED SO EDGE OF PROPOSED DRIVING LANE IS AT EXISTING CROWN POINT.

EXHIBIT 6C

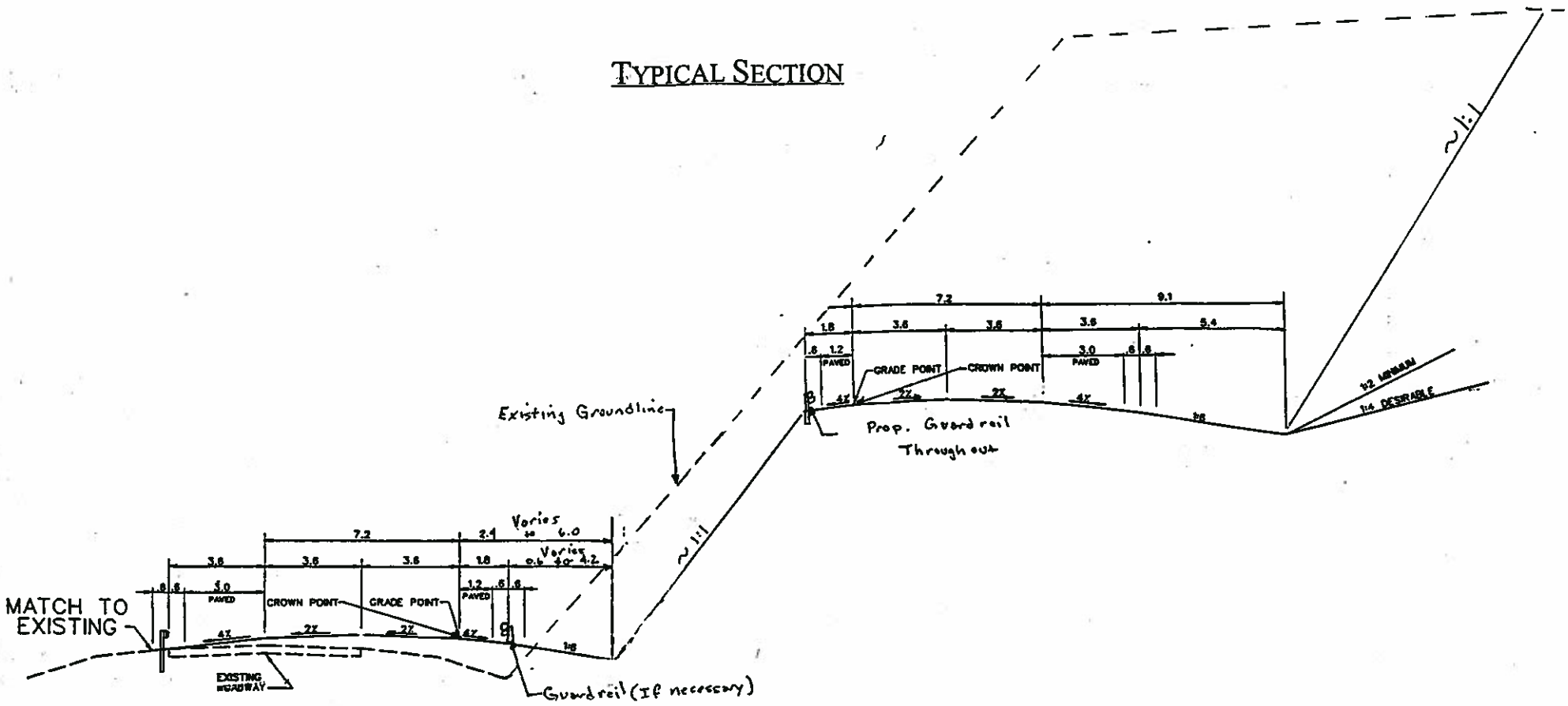
BERT T. COMBS MOUNTAIN PARKWAY EXT.
WOLFE/MORGAN/MAGOFFIN COUNTIES

PROPOSED TYPICAL SECTIONS

NOT TO SCALE

EXISTING TYPICAL SECTION
RECOMMENDATION E-1

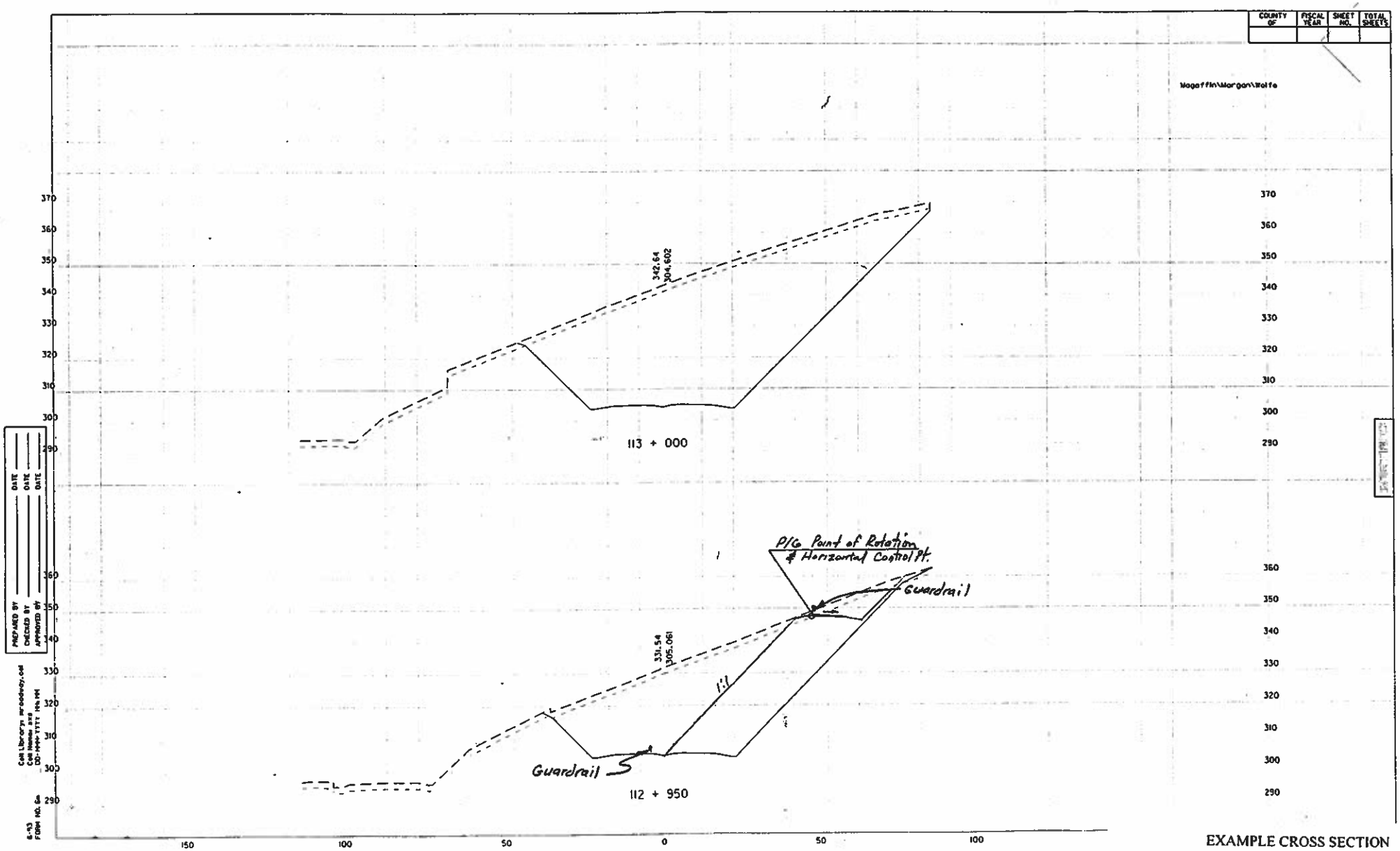
TYPICAL SECTION



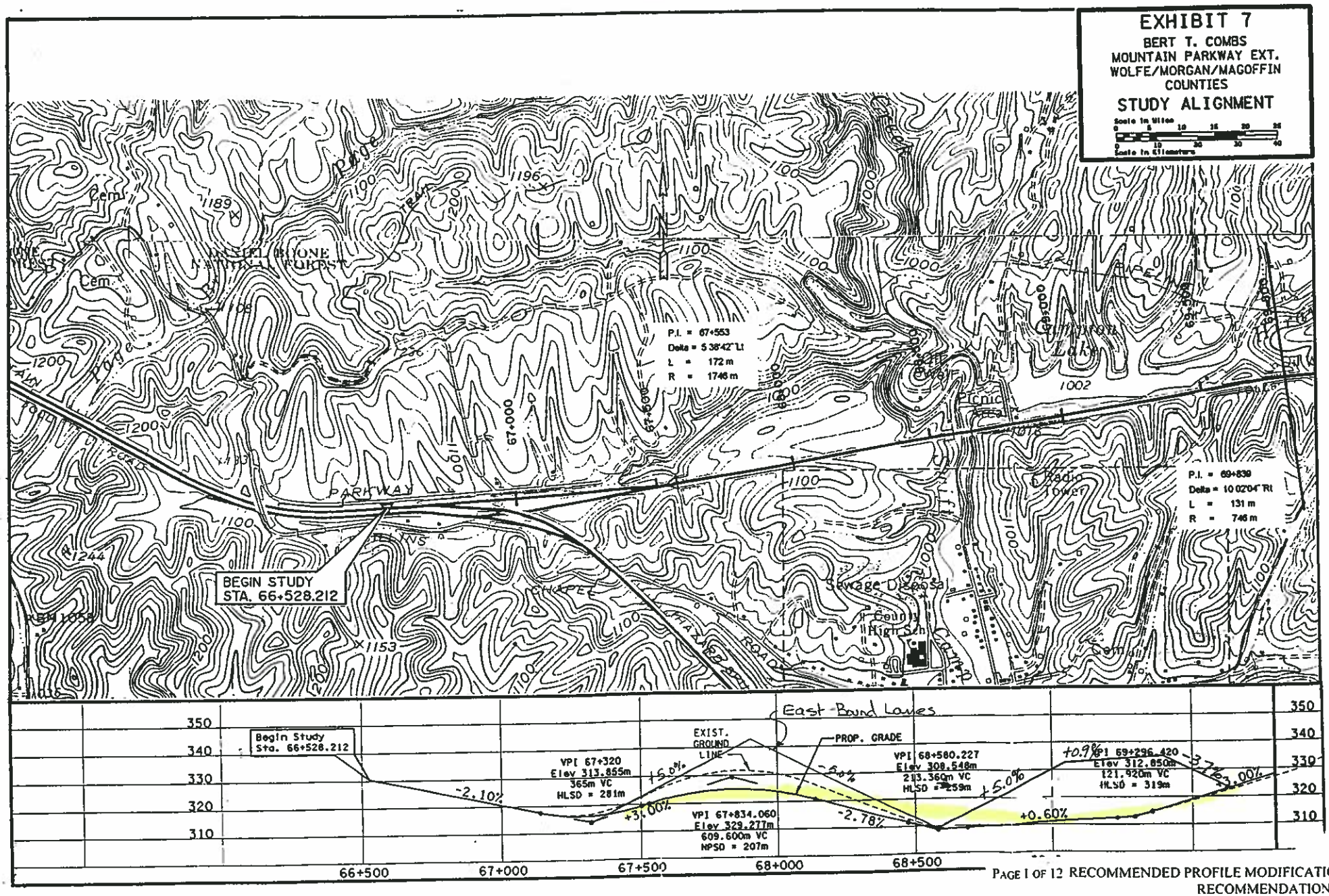
BIFURCATED SECTIONS OF PREFERRED ALTERNATIVE RECOMMENDATION E-1

NO SCALE

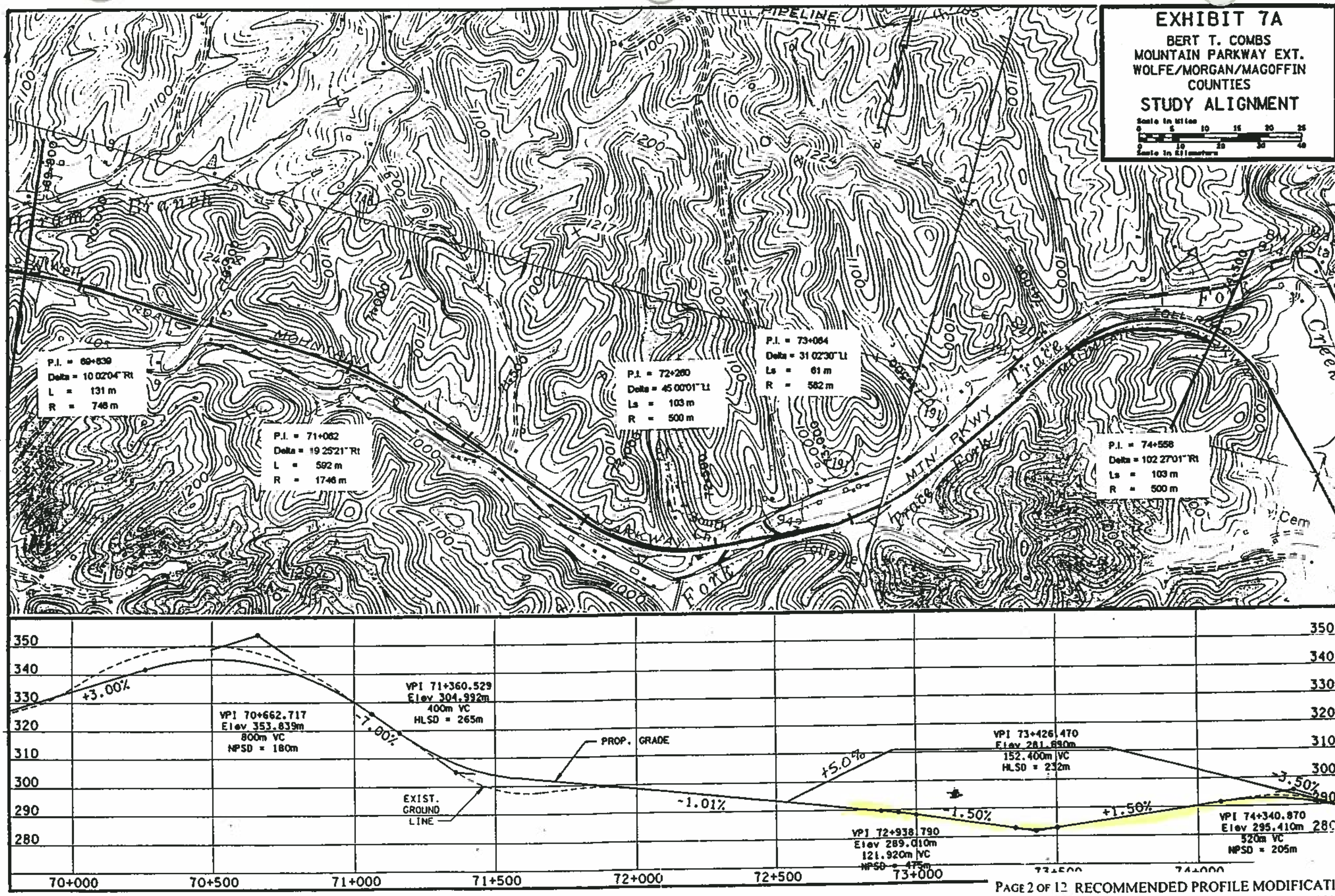
RECOMMENDED TYPICAL SECTIONS
RECOMMENDATION E-1



EXAMPLE CROSS SECTION
RECOMMENDATION E-1



PAGE 1 OF 12 RECOMMENDED PROFILE MODIFICATION
RECOMMENDATION E-



PAGE 2 OF 12 RECOMMENDED PROFILE MODIFICATIONS
RECOMMENDATION E-1

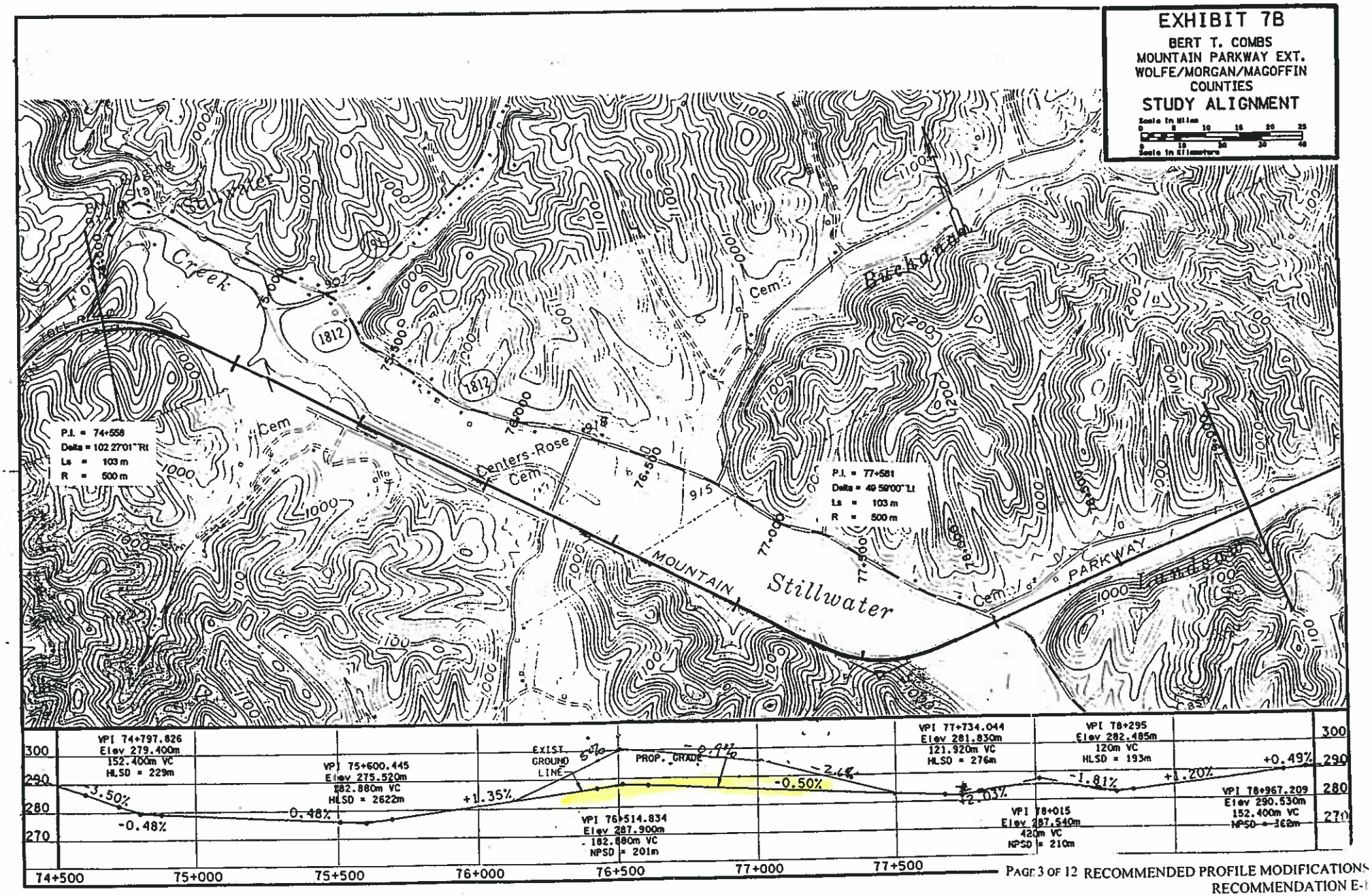
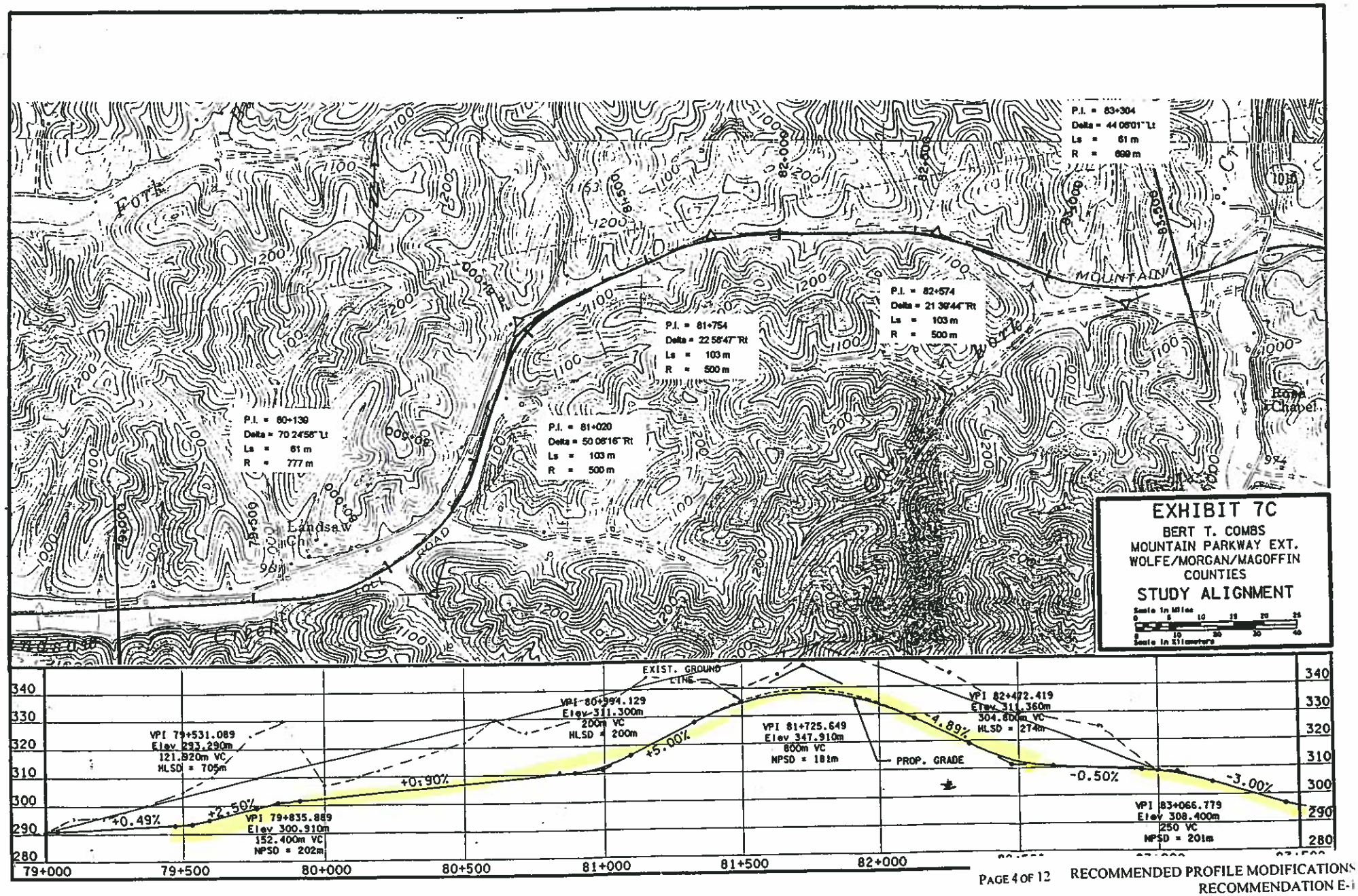


EXHIBIT 7B
BERT T. COMBS
MOUNTAIN PARKWAY EXT.
WOLFE/MORGAN/MAGOFFIN
COUNTIES
STUDY ALIGNMENT
Scale in Miles
Scale in Kilometers
Stillwater
Creek
Cem
Centers-Rose
MOUNTAIN
PARKWAY
P.I. = 74+558
Delta = 102 27'01" Rt
Ls = 103 m
R = 500 m
P.I. = 77+561
Delta = 49 58'00" Lt
Ls = 103 m
R = 500 m
VPI 74+797.826
Elev 279.400m
152.400m VC
HLSD = 229m
VPI 75+600.445
Elev 275.520m
182.880m VC
HLSD = 2622m
VPI 76+514.834
Elev 287.900m
182.880m VC
NPSD = 201m
VPI 77+734.044
Elev 281.830m
121.920m VC
HLSD = 276m
VPI 78+295
Elev 282.485m
120m VC
HLSD = 193m
VPI 78+967.209
Elev 290.530m
152.400m VC
NPSD = 362m
VPI 78+015
Elev 287.540m
420m VC
NPSD = 210m
EXIST GROUND LINE
PROP. GRADE
-3.50%
-0.48%
0.48%
+1.35%
-0.50%
-2.68%
+2.03%
-1.81%
+1.20%
+0.49%
300
290
280
270
74+500
75+000
75+500
76+000
76+500
77+000
77+500


P.I. = 80+139
Delta = 70 24'56" Lt
Ls = 61 m
R = 777 m
P.I. = 81+020
Delta = 50 08'16" Rt
Ls = 103 m
R = 500 m
P.I. = 81+754
Delta = 22 58'47" Rt
Ls = 103 m
R = 500 m
P.I. = 82+574
Delta = 21 39'44" Rt
Ls = 103 m
R = 500 m
P.I. = 83+304
Delta = 44 06'01" Lt
Ls = 61 m
R = 699 m
MOUNTAIN
ROAD
Lindsay Ch.
Bone Chapel
EXHIBIT 7C
BERT T. COMBS
MOUNTAIN PARKWAY EXT.
WOLFE/MORGAN/MAGOFFIN
COUNTIES
STUDY ALIGNMENT
EXIST. GROUND LINE
PROP. GRADE
VPI 79+531.089
Elev 293.290m
121.920m VC
NPSD = 705m
VPI 79+835.869
Elev 300.910m
152.400m VC
NPSD = 202m
VPI 80+994.129
Elev 311.300m
200m VC
HLSD = 200m
VPI 81+725.649
Elev 347.910m
800m VC
NPSD = 181m
VPI 82+472.419
Elev 311.360m
304.800m VC
HLSD = 274m
VPI 83+066.779
Elev 308.400m
250 VC
NPSD = 201m
+0.49%
+2.50%
+0.90%
+5.00%
-4.89%
-0.50%
-3.00%
340
330
320
310
300
290
280
79+000
79+500
80+000
80+500
81+000
81+500
82+000

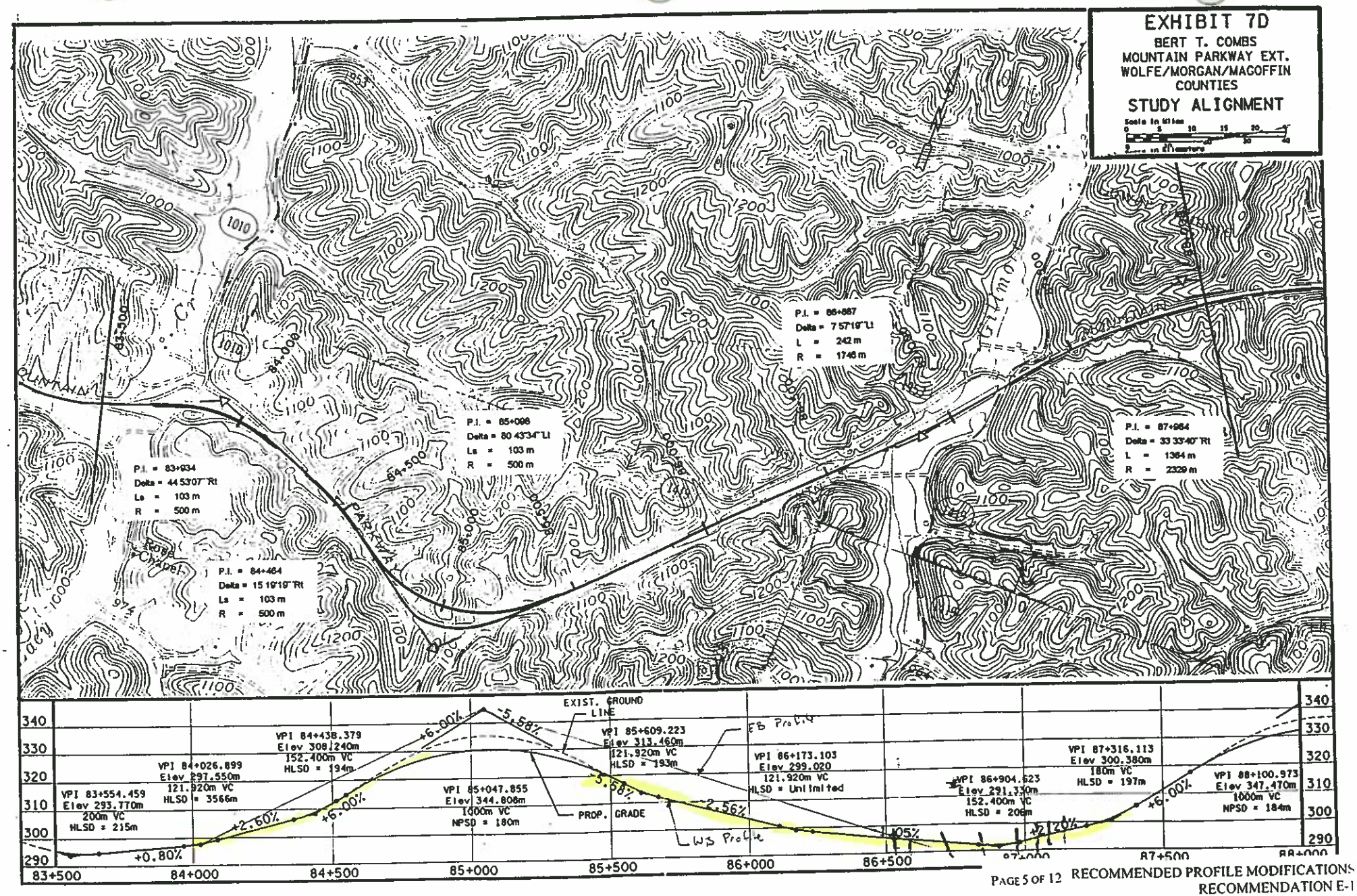


EXHIBIT 7D
BERT T. COMBS
MOUNTAIN PARKWAY EXT.
WOLFE/MORGAN/MAGOFFIN
COUNTIES
STUDY ALIGNMENT
P.I. = 83+934
Delta = 44 53'07" Rt
Le = 103 m
R = 500 m
P.I. = 84+464
Delta = 15 19'19" Rt
Le = 103 m
R = 500 m
P.I. = 85+098
Delta = 80 43'34" Lt
Ls = 103 m
R = 500 m
P.I. = 86+887
Delta = 7 57'19" Lt
L = 242 m
R = 1746 m
P.I. = 87+964
Delta = 33 33'40" Rt
L = 1364 m
R = 2329 m
PARKWAY
Rose Chapel
VPI 83+554.459
Elev 293.770m
200m VC
HLSD = 215m
VPI 84+026.899
Elev 297.550m
121.920m VC
HLSD = 3566m
VPI 84+438.379
Elev 308.240m
152.400m VC
HLSD = 194m
VPI 85+047.855
Elev 344.808m
1000m VC
NPSD = 180m
EXIST. GROUND LINE
VPI 85+609.223
Elev 313.460m
121.920m VC
HLSD = 193m
EB Profile
VPI 86+173.103
Elev 299.020
121.920m VC
HLSD = Unlimited
PROP. GRADE
WB Profile
VPI 86+904.623
Elev 291.330m
152.400m VC
HLSD = 206m
VPI 87+316.113
Elev 300.380m
180m VC
HLSD = 197m
VPI 88+100.973
Elev 347.470m
1000m VC
NPSD = 184m
+0.80%
+2.60%
+6.00%
+6.00%
-5.58%
-5.58%
-2.56%
-1.05%
+2.20%
+6.00%
340
330
320
310
300
290
83+500
84+000
84+500
85+000
85+500
86+000
86+500
87+000
87+500
88+000

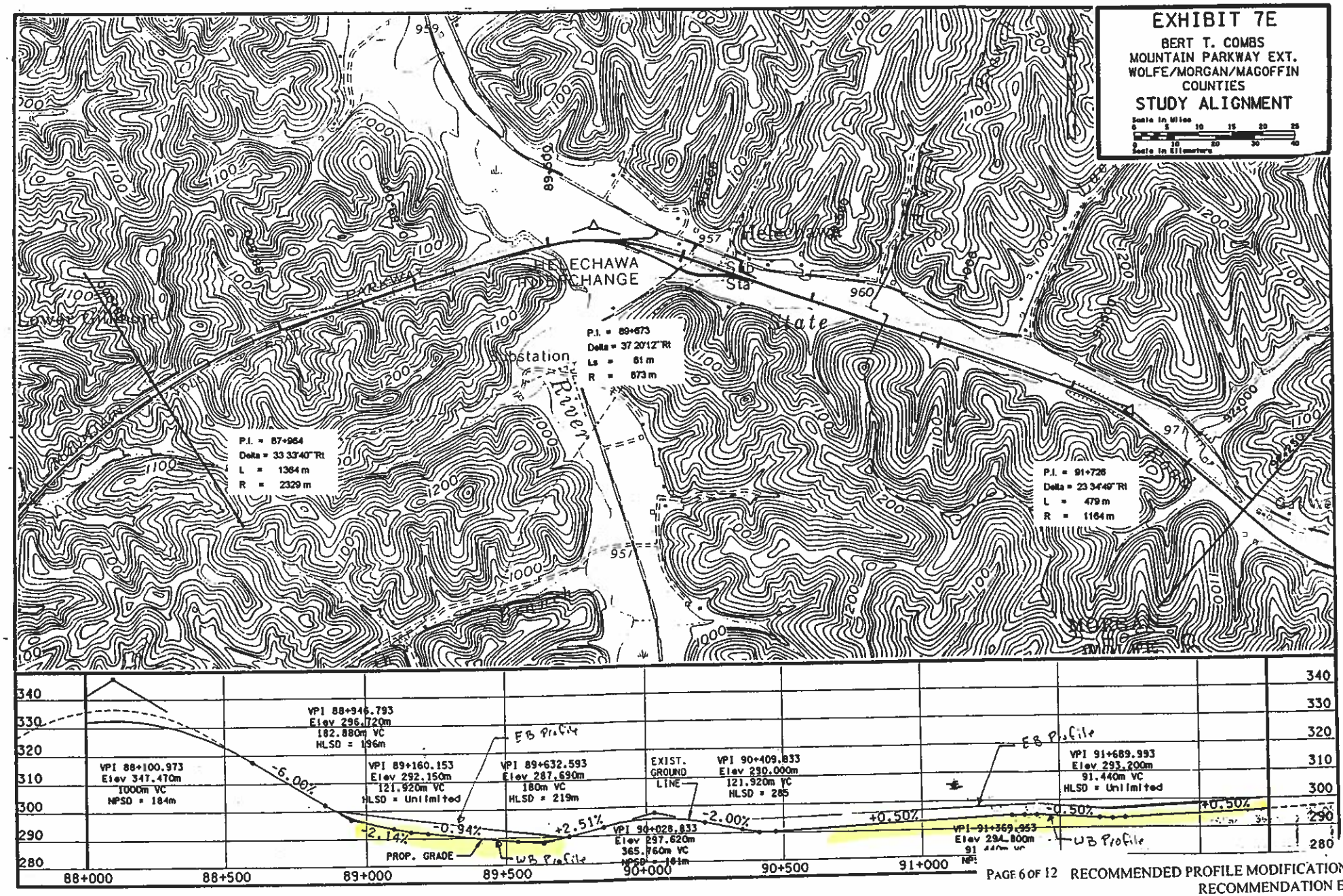
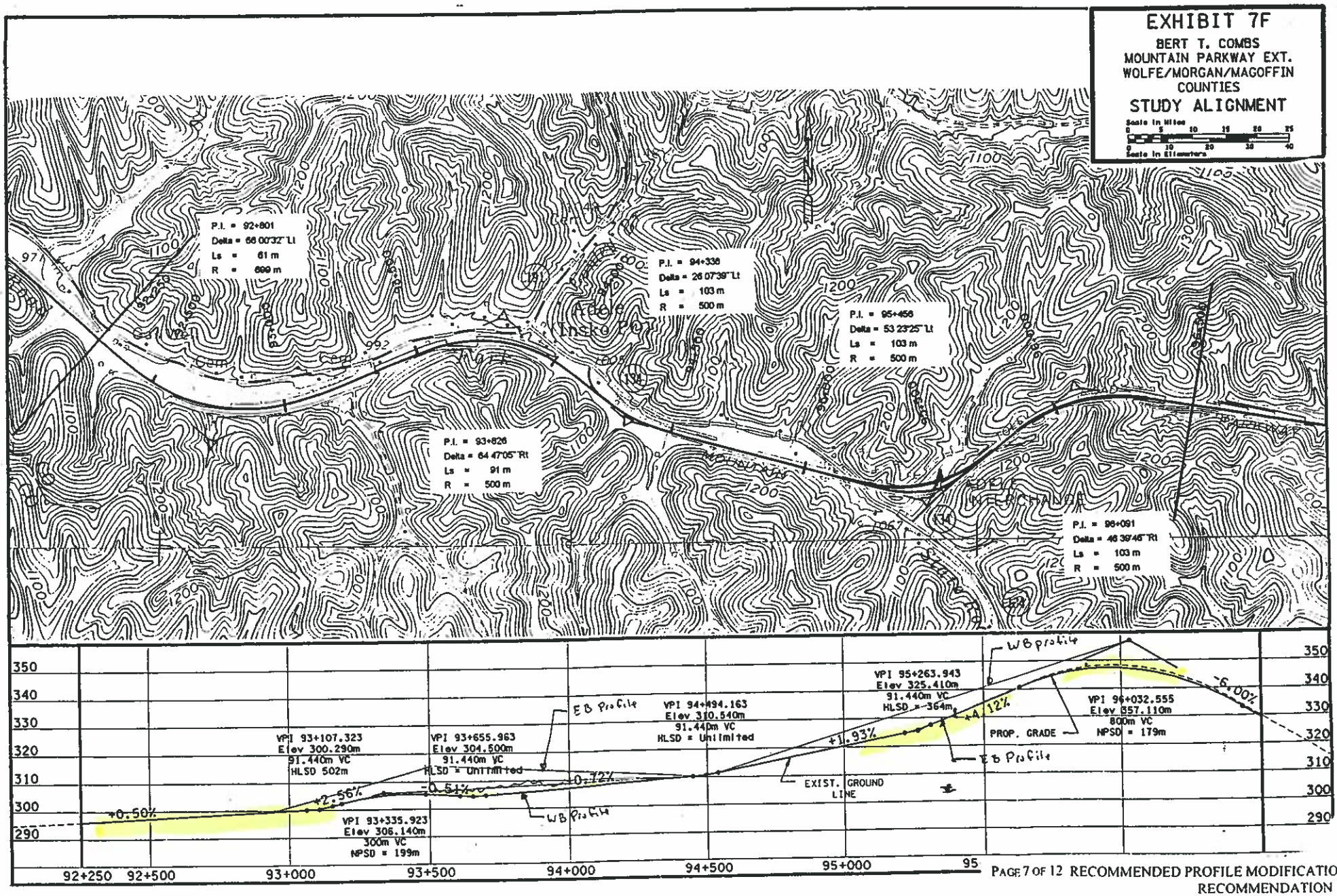


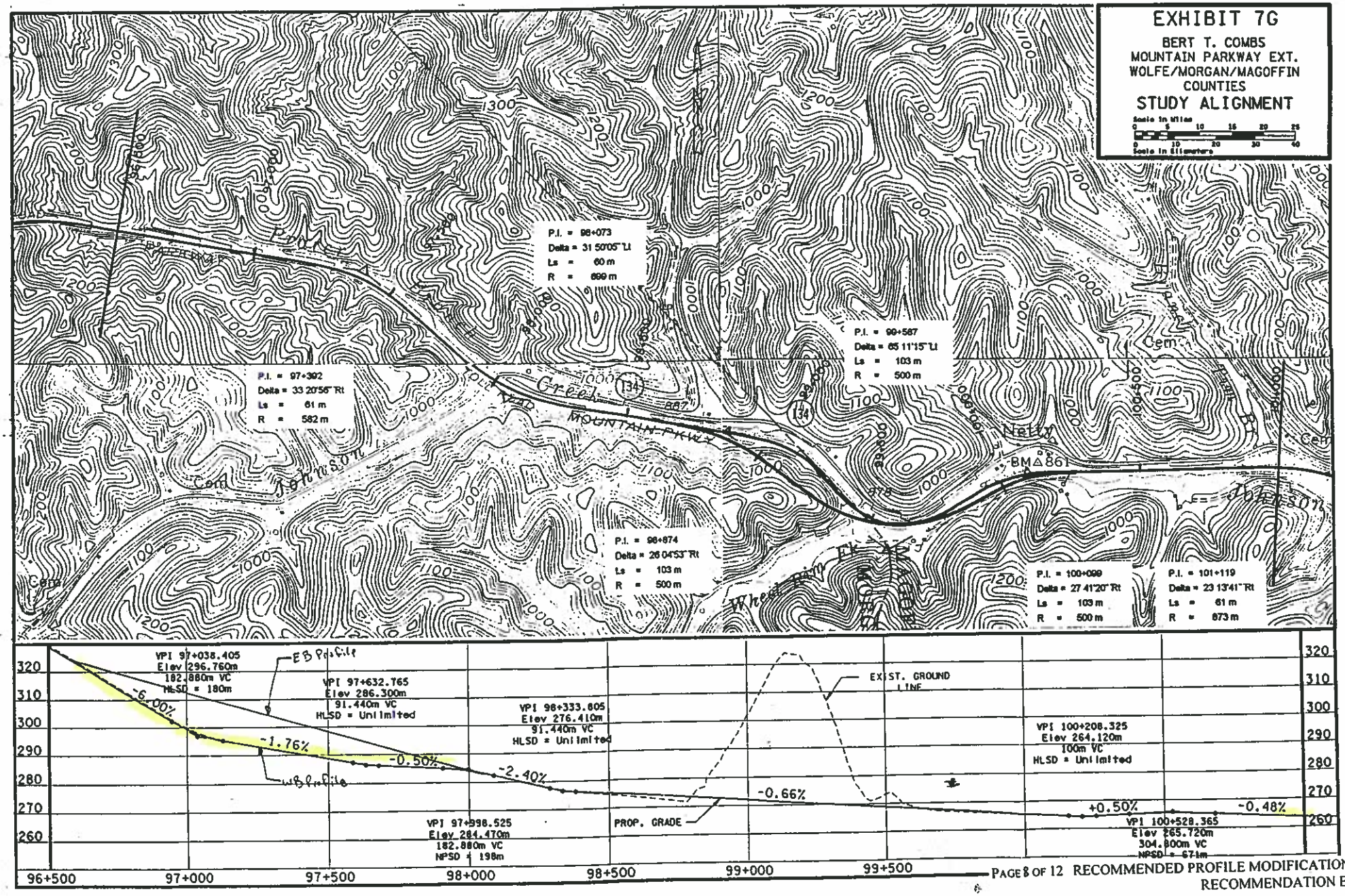
EXHIBIT 7E
BERT T. COMBS
MOUNTAIN PARKWAY EXT.
WOLFE/MORGAN/MAGOFFIN
COUNTIES
STUDY ALIGNMENT
HELECHAWA INTERCHANGE
P.I. = 87+964
Delta = 33 33'40" Rt
L = 1364 m
R = 2329 m
P.I. = 89+673
Delta = 37 20'12" Rt
Ls = 61 m
R = 873 m
P.I. = 91+726
Delta = 23 34'49" Rt
L = 479 m
R = 1164 m
VPI 88+100.973
Elev 347.470m
100.0m VC
NPSD = 184m
VPI 88+946.793
Elev 296.720m
182.880m VC
HLSD = 196m
VPI 89+160.153
Elev 292.150m
121.920m VC
HLSD = Unlimited
VPI 89+632.593
Elev 287.690m
180m VC
HLSD = 219m
EXIST. GROUND LINE
VPI 90+028.833
Elev 297.620m
365.760m VC
VPI 90+409.833
Elev 290.000m
121.920m VC
HLSD = 285
VPI 91+369.953
Elev 294.800m
VPI 91+689.993
Elev 293.200m
91.440m VC
HLSD = Unlimited
-6.00%
-2.14%
-0.94%
+2.51%
-2.00%
+0.50%
-0.50%
+0.50%
EB Profile
WB Profile
PROP. GRADE
340
330
320
310
300
290
280
88+000
88+500
89+000
89+500
90+000
90+500
91+000

EXHIBIT 7F

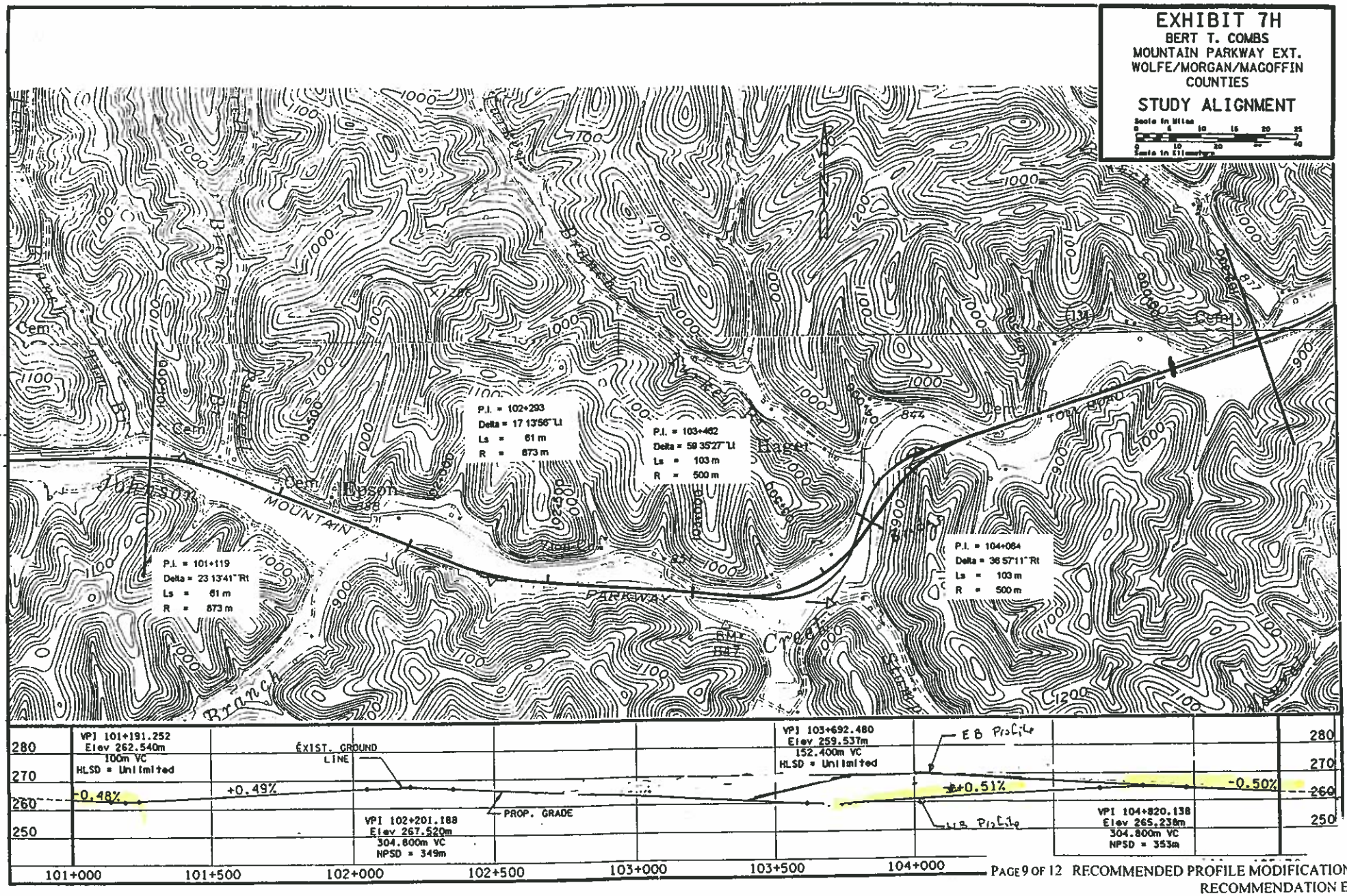
BERT T. COMBS
MOUNTAIN PARKWAY EXT.
WOLFE/MORGAN/MAGOFFIN
COUNTIES

STUDY ALIGNMENT

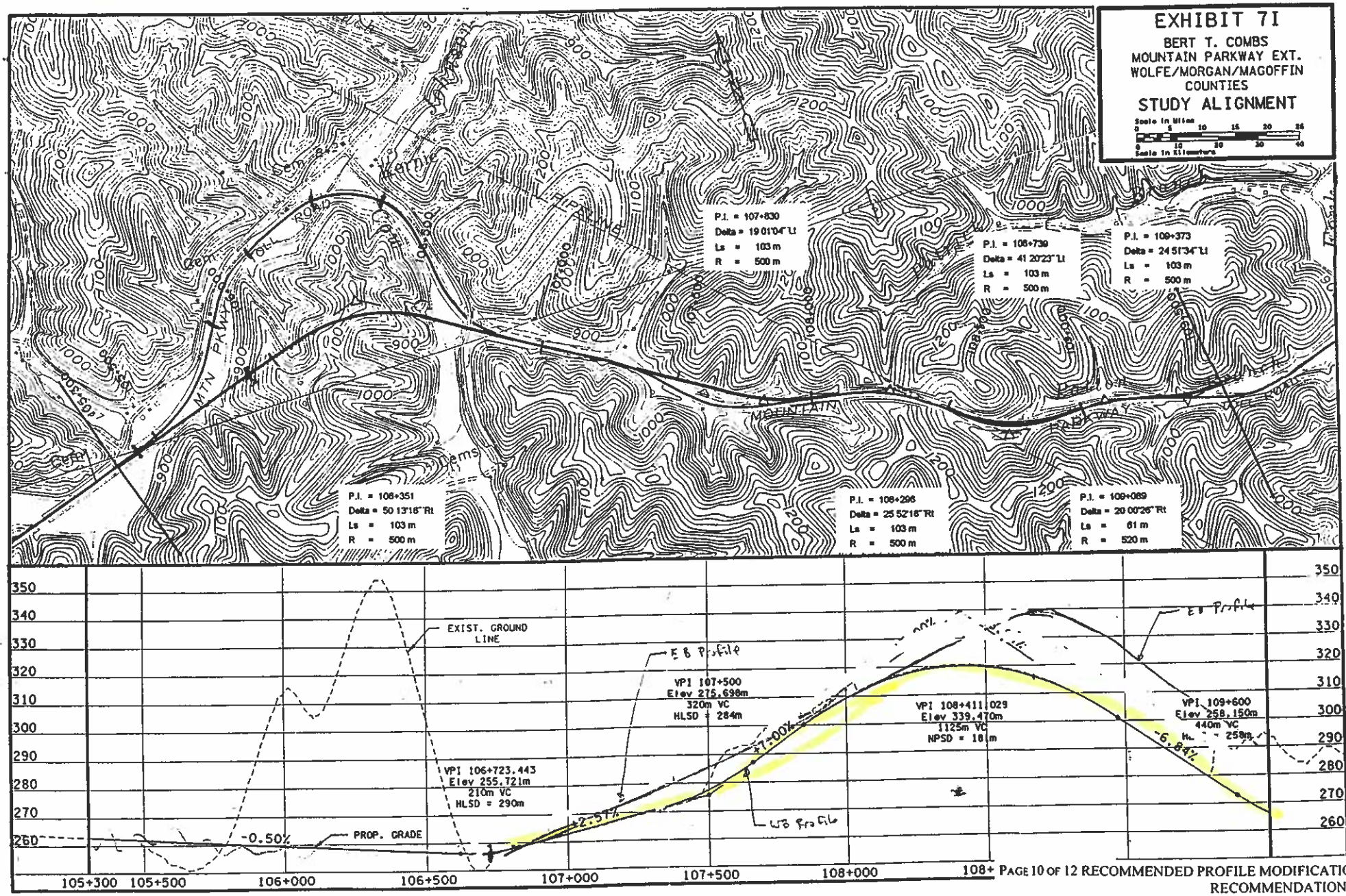




PAGE 8 OF 12 RECOMMENDED PROFILE MODIFICATIONS
RECOMMENDATION E-1



PAGE 9 OF 12 RECOMMENDED PROFILE MODIFICATIONS
RECOMMENDATION E-1



PAGE 10 OF 12 RECOMMENDED PROFILE MODIFICATIONS
RECOMMENDATION E-

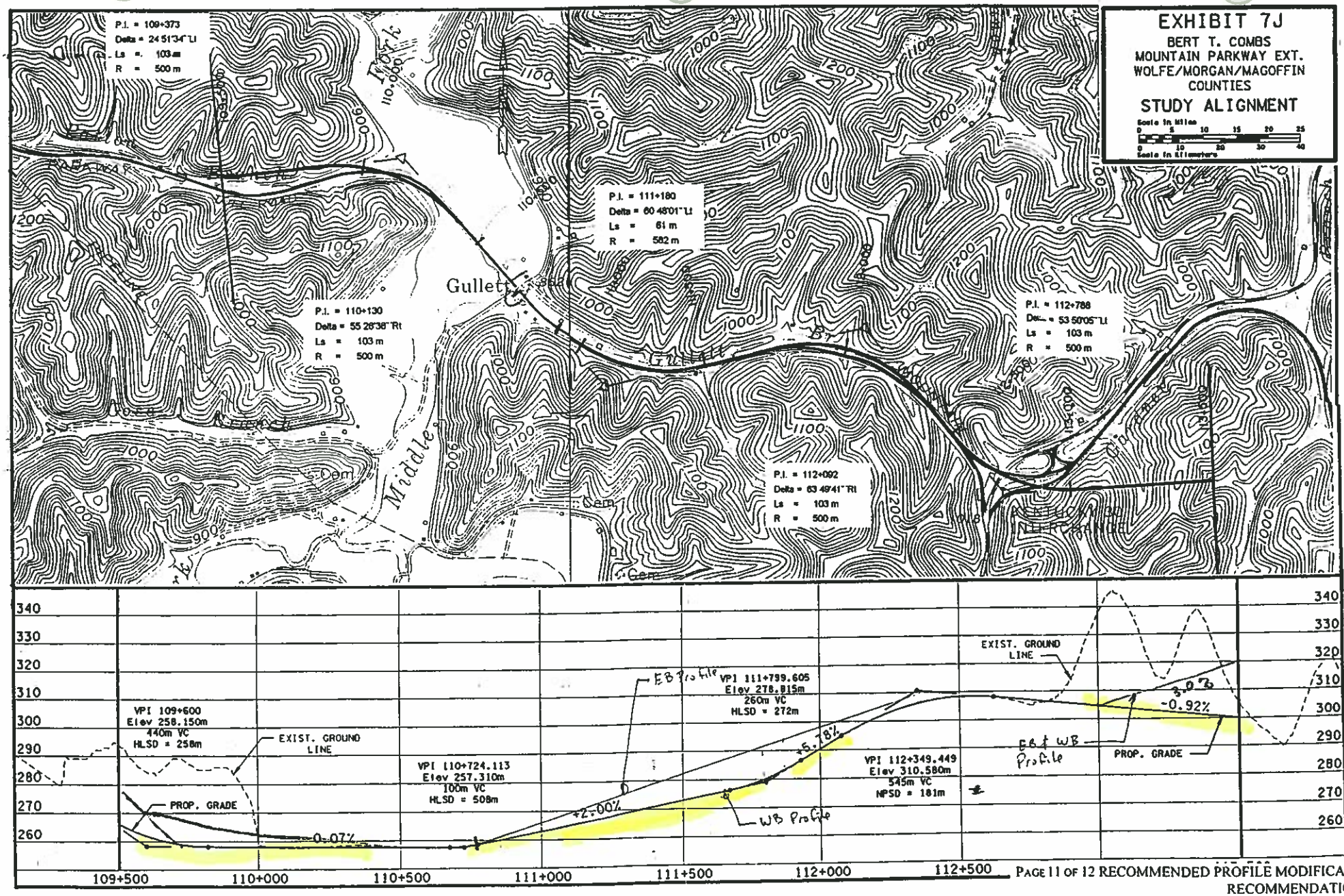


EXHIBIT 7J
BERT T. COMBS
MOUNTAIN PARKWAY EXT.
WOLFE/MORGAN/MAGOFFIN
COUNTIES
STUDY ALIGNMENT
P.I. = 109+373
Delta = 24°51'34" Lt
Ls = 103 m
R = 500 m
P.I. = 110+130
Delta = 55°28'38" Rt
Ls = 103 m
R = 500 m
P.I. = 111+180
Delta = 60°48'01" Lt
Ls = 61 m
R = 582 m
P.I. = 112+092
Delta = 63°49'41" Rt
Ls = 103 m
R = 500 m
P.I. = 112+788
Delta = 53°50'05" Lt
Ls = 103 m
R = 500 m
Gullett
Middle Fork
Cem
KENTUCKY
WEST VIRGINIA
VPI 109+600
Elev 258.150m
440m VC
HLSD = 258m
EXIST. GROUND LINE
PROP. GRADE
-0.07%
VPI 110+724.113
Elev 257.310m
100m VC
HLSD = 508m
EB Profile
VPI 111+799.605
Elev 278.815m
260m VC
HLSD = 272m
+2.00%
+5.78%
WB Profile
VPI 112+349.449
Elev 310.580m
545m VC
NPSD = 181m
EXIST. GROUND LINE
EB & WB Profile
PROP. GRADE
3.03
-0.92%
340
330
320
310
300
290
280
270
260
109+500
110+000
110+500
111+000
111+500
112+000
112+500

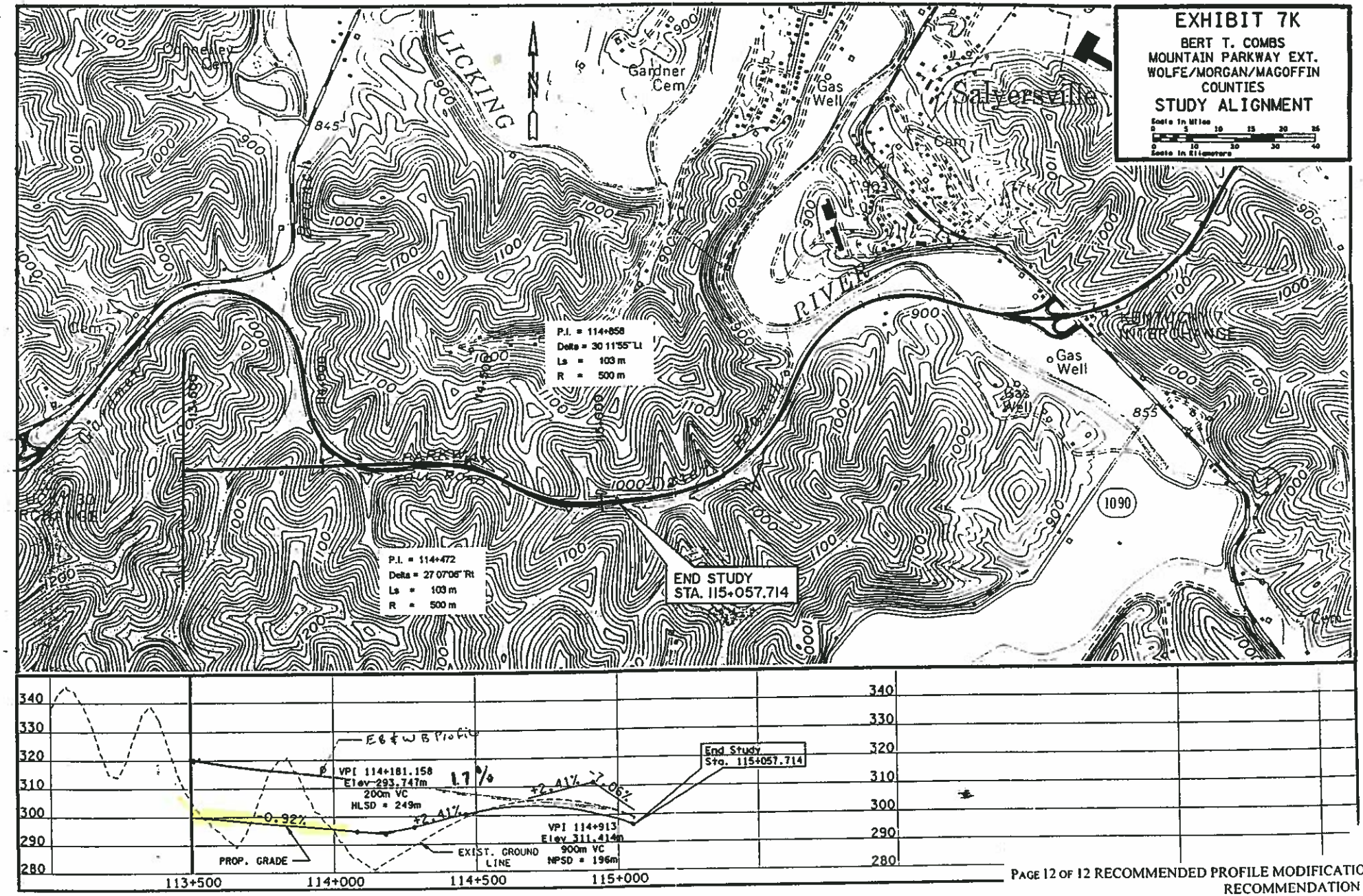


EXHIBIT 7K
BERT T. COMBS
MOUNTAIN PARKWAY EXT.
WOLFE/MORGAN/MAGOFFIN
COUNTIES
STUDY ALIGNMENT
Scale in Miles
Scale in Kilometers
LICKING
RIVER
Gardner Cem
Gas Well
Salversville
Cem
P.I. = 114+858
Delta = 30 11'55" Lt
Ls = 103 m
R = 500 m
P.I. = 114+472
Delta = 27 07'06" Rt
Ls = 103 m
R = 500 m
END STUDY
STA. 115+057.714
INTERCHANGE
Gas Well
1090
340
330
320
310
300
290
280
E & W B Profile
VPI 114+181.158
Elev 293.747m
200m VC
HLSD = 249m
1.7 %
+2.41%
-2.06%
-0.92%
+2.41%
VPI 114+913
Elev 311.414m
900m VC
NPSD = 196m
End Study
Sta. 115+057.714
PROP. GRADE
EXIST. GROUND LINE
113+500
114+000
114+500
115+000

VALUE ENGINEERING RECOMMENDATION #E4

VALUE ENGINEERING RECOMMENDATION #E4

FORM 26 AUGUST 1998

PROJECT: Widening of Parkway Extension Ky 9009, Campton to Salyersville

LOCATION: Ky. 9009, Campton to Salyersville

STUDY DATE: August 17 - August 21, 1998

TEAM MEMBER RESPONSIBLE FOR WRITEUP: Benjamin Goodman

FUNCTION OF COMPONENT BEING CHANGED: Establish Grade

DESCRIPTIVE TITLE OF RECOMMENDATION: Raise profile

ORIGINAL DESIGN: Existing pavement will be removed in order to accommodate the proposed pavement structure.

RECOMMENDED CHANGE: Raise the profile grade line by the thickness of the proposed pavement structure. The need for the removal of the existing pavement will be eliminated, and wasted material will be reduced.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	$122,011,000	$0.00	$122,011,000
RECOMMENDED DESIGN	$113,759,000	$0.00	$113,759,000
ESTIMATED SAVINGS OR (COST)	$8,252,000	$0.00	$8,252,000

ESTIMATED SAVINGS OR (COST)	$8,252,000	$0.00	$8,252,000

VALUE ENGINEERING RECOMMENDATION #E4

FORM 23 AUGUST 1998

ADVANTAGES:

1. Reduce waste material
2. Reduce excavation

DISADVANTAGES:

1. May increase cost of traffic control
2. May increase material handling cost
3. May increase length or the proposed drainage structures

JUSTIFICATION: The project generates large amounts of waste. This procedure would reduce the excavation and as a result, amount of waste.

Note: This is a stand alone recommendation and if this recommendation is implemented, then Recommendation E1 cannot be implemented. See Pg 11.

VALUE ENGINEERING RECOMMENDATION #E4

FORM: 23 MARCH 1998

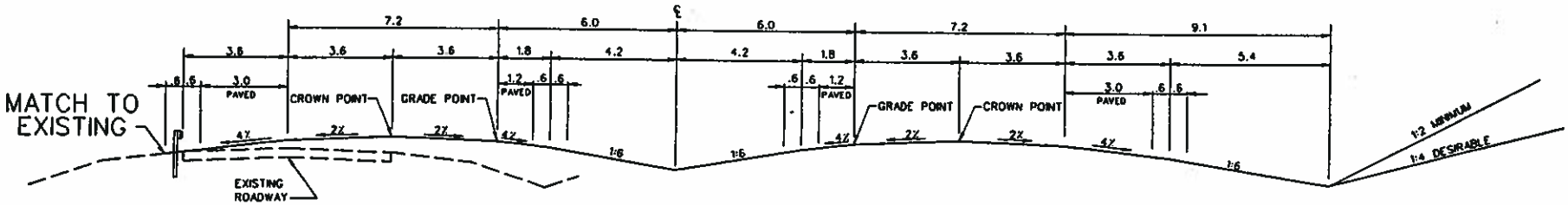
COST ESTIMATE - FIRST COST

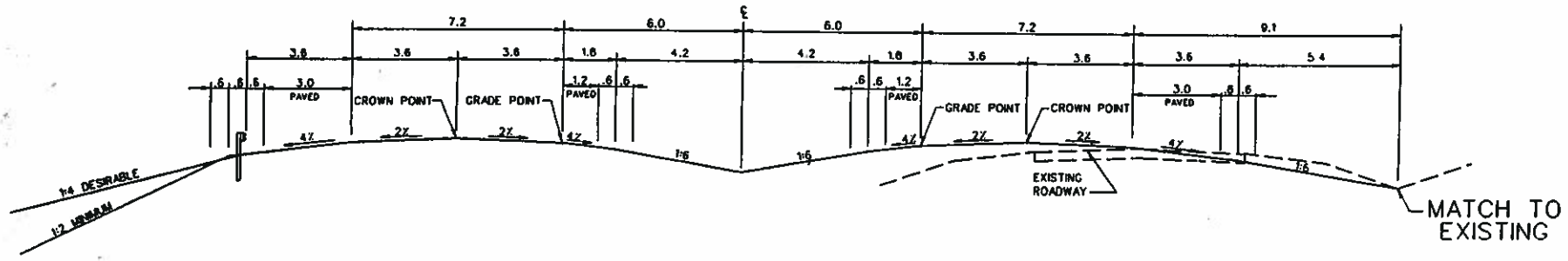
Cost Item	Units	Unit Cost		Original Design		Recommended Design	
		$/Unit	Source Code	Num of Units × 1000	Total $ × 1000	Num of Units × 1000	Total $ × 1000
Excavation	M^3	4.93	1	2,479	122,011	23,075	113,759

SOURCE CODE:

1 Project Cost Estimate
2 CES Data Base
3 CACES Data Base
4 Means Estimating Manual
5 Richardson's
6 Vendor Lit or Quote (list name / details)
7 Professional Experience (List job if applicable)
8 Other Sources (specify)

TYPICAL SECTIONS





NOTE : THESE CROSS-SECTIONS ARE SUBJECT TO CHANGE DURING THE DESIGN PROCESS.

PERFERRED ALTERNATE

ALIGNMENTS SHIFTED SO EDGE OF PROPOSED DRIVING LANE IS AT EXISTING CROWN POINT.

EXHIBIT 6C

BERT T. COMBS MOUNTAIN PARKWAY EXT.
WOLFE/MORGAN/MAGOFFIN COUNTIES

PROPOSED TYPICAL SECTIONS

TYPICAL SECTIONS

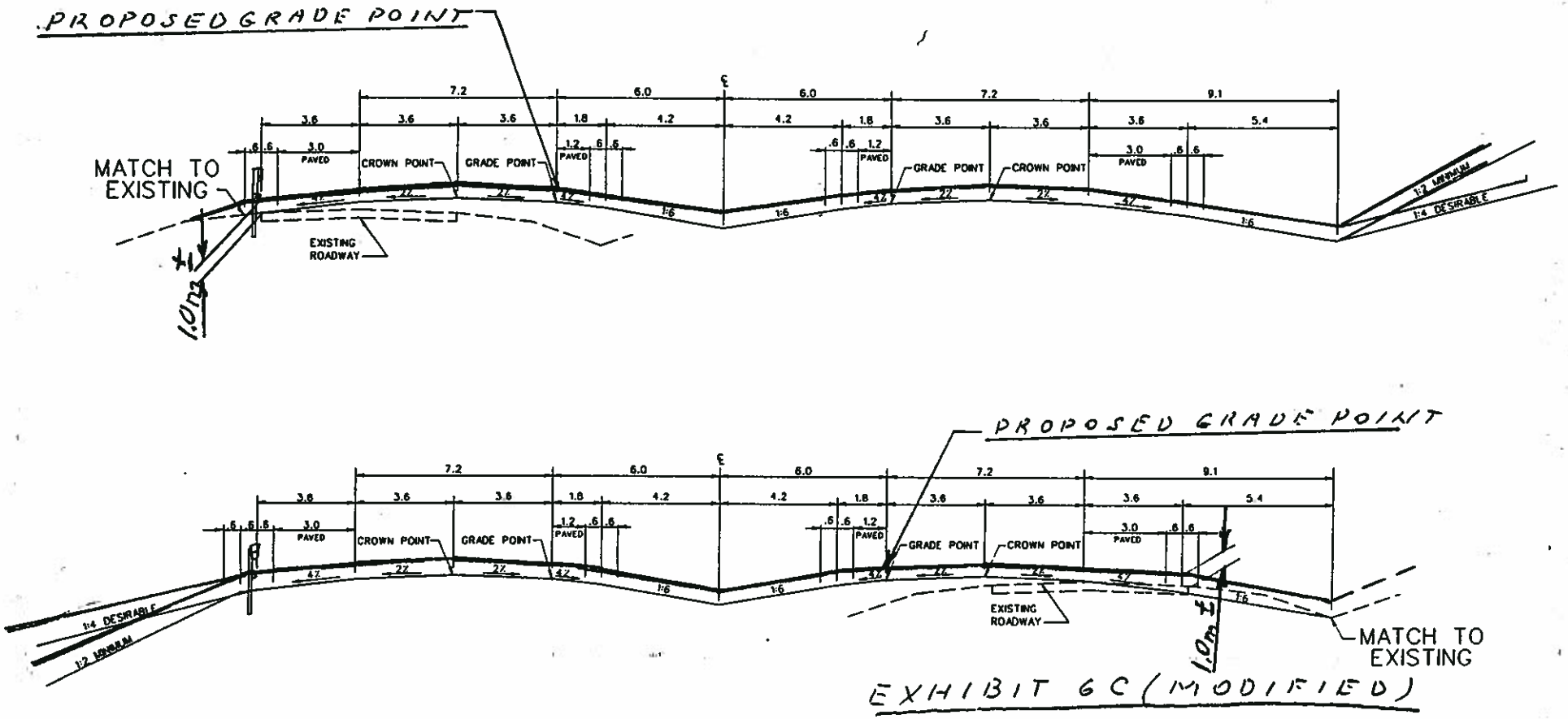


EXHIBIT 6C (MODIFIED)

NOTE : THESE CROSS-SECTIONS ARE SUBJECT TO CHANGE DURING THE DESIGN PROCESS.

PERFERRED ALTERNATE

ALIGNMENTS SHIFTED SO EDGE OF PROPOSED DRIVING LANE IS AT EXISTING CROWN POINT.

EXHIBIT 6C

BERT T. COMBS MOUNTAIN PARKWAY EXT. WOLFE/MORGAN/MAGOFFIN COUNTIES

PROPOSED TYPICAL SECTIONS

13 R.W.

HAZELET + ERDAL, INC.
Consulting Engineers

Cont. No. ______ Sheet No. 1 of 3
Made By BZG. Date 08/14/98
Chkd. By ______ Date ______

3E RAISE PROFILE
EXCAVATION REDUCTION

LOCATION STA.	LOCATION STA	Length	Width	Area	Thickness	Volume	Comments
68+000	69+600	1600	40	64,000	1.0±	64,000	
70+000	70+600	600	44	26,400	1.0±	26,400	
70+600	70+800	200	20	4,000	1.0±	4,000	
70+800	71+500	700	20	14000	0.6±	8,400	
72+800	74+500	1700	44	74,800	1.0±	74,800	
74+500	75+500	1000	20	20,000	1.0±	20,000	
75+500	75+800	300	40	12,000	1.0±	12,000	
76+400	77+800	1400	44	61,600	1.0±	61,600	
77+800	78+300	500	20	10,000	1.0±	10,000	
78+300	78+800	500	44	22,000	1.0±	22,000	
					Sum Total	303,200 m³	

Additional Fill (Embankment)

LOCATION STA.	LOCATION STA.	Length	Width	Area	Thickness	Volume	Comments
69+600	70+000	400	40	16,000	1.0±	16,000	
70+600	70+800	200	20	4,000	1.0	4,000	
70+800	71+500	700	20	14,000	0.6	8,400	
71+500	72+200	700	40	28,000	0.6	16,800	
74+500	75+500	1000	20	20,000	1.0	20,000	
77+800	78+300	500	20	10,000	1.0	10,000	
86+600	86+800	200	20	4000	1.0±	4,000	
87+400	87+800	400	20	8000	1.0±	8,000	
88+450	88+600	150	20	3000	1.0±	3,000	
94+700	95+100	400	20	8,000	1±00	8,000	
98+500	98+900	400	20	8,000	1.0±	8,000	
99+800	100+200	400	20	8,000	1.0±	8,000	
101+400	101+900	500	20	10,000	1.0±	10,000	
103+300	103+600	300	20	6,000	1.0±	6,000	
105+000	105+500	500	20	10,000	1.0±	10,000	
105+600	105+775	175	40	7,000	1.0	7,000	
106+575	106+750	175	20	3500	1.0	3,500	
114+000	114+500	500	35	17,500	1.0	17,500	
				Total		168,200	Reduce WASTE by 168,200 m³.

HAZELET + ERDAL, INC.
Consulting Engineers

3E RAISE PROFILE

ADDITIONAL EMBANKMENT

Cont. No. _____ Sheet No. 30 of 32
Made By BZG Date 08/19/98
Chkd. By _____ Date _____

3RW

HAZELET + ERDAL, INC.
Consulting Engineers

Cont. No. ______ Sheet No. 2 of 3
Made By B.Z.G. Date 08/19/98
Chkd. By ______ Date ______

3E RAISE PROFILE

EXCAVATION REDUCTION

LOCATION STA	LOCATION STA	Length m	Width Average m	Area m^2	Approx. Thickness m	Volume	Comments
78+800	83+300	4500	40	180,000	1.0 ±	180,000	
83+600	86+600	3000	44	132,000	1.0 ±	132,000	
86+600	86+800	200	20	4,000	1.0 ±	4,000	
86+800	87+400	600	44	26,400	1.0 ±	26,400	
87+400	87+800	400	20	8,000	1.0 ±	8,000	
87+800	88+450	650	44	28,600	1.0 ±	28,600	
88+450	88+600	150	20	3,000	1.0 ±	3,000	
88+600	89+400	800	44	35,200	1.0 ±	35,200	
90+500	94+700	4200	40	168,000	1.0 ±	168,000	
94+700	95+100	400	20	8,000	1.0 ±	8,000	
95+300	98+500	3300	40	132,000	1.0 ±	132,000	
98+500	98+900	400	20	8,000	1.0 ±	8,000	
98+900	99+800	900	44	39,600	1.0 ±	39,600	
99+800	100+200	400	20	8,000	1.0 ±	8,000	
100+200	101+400	1200	44	52,800	1.0 ±	52,800	
101+400	101+900	500	20	10,000	1.0 ±	10,000	
101+900	103+300	1900	44	83,600	1.0 ±	83,600	
103+300	103+600	300	20	6,000	1.0 ±	6,000	
103+600	105+000	1400	44	61,600	1.0 ±	61,600	
105+000	105+500	500	20	10,000	1.0 ±	10,000	
105+775	106+575	800	44	35,200	1.5 ±	52,800	
106+575	106+750	175	20	3,500	1.0	3,500	
106+750	110+000	3250	44	143,000	1.0	143,000	
110+500	111+000	500	44	22,000	0.7	15,400	
111+000	112+500	1500	44	66,000	1.0	66,000	
112+800	114+000	1200	44	52,800	1.0	52,800	
114+500	115+057	557	44	24,500	1.0	24,500	
					Sub.	1,352,800	

Total 1,666,000 m^3 of Excavation Reduction

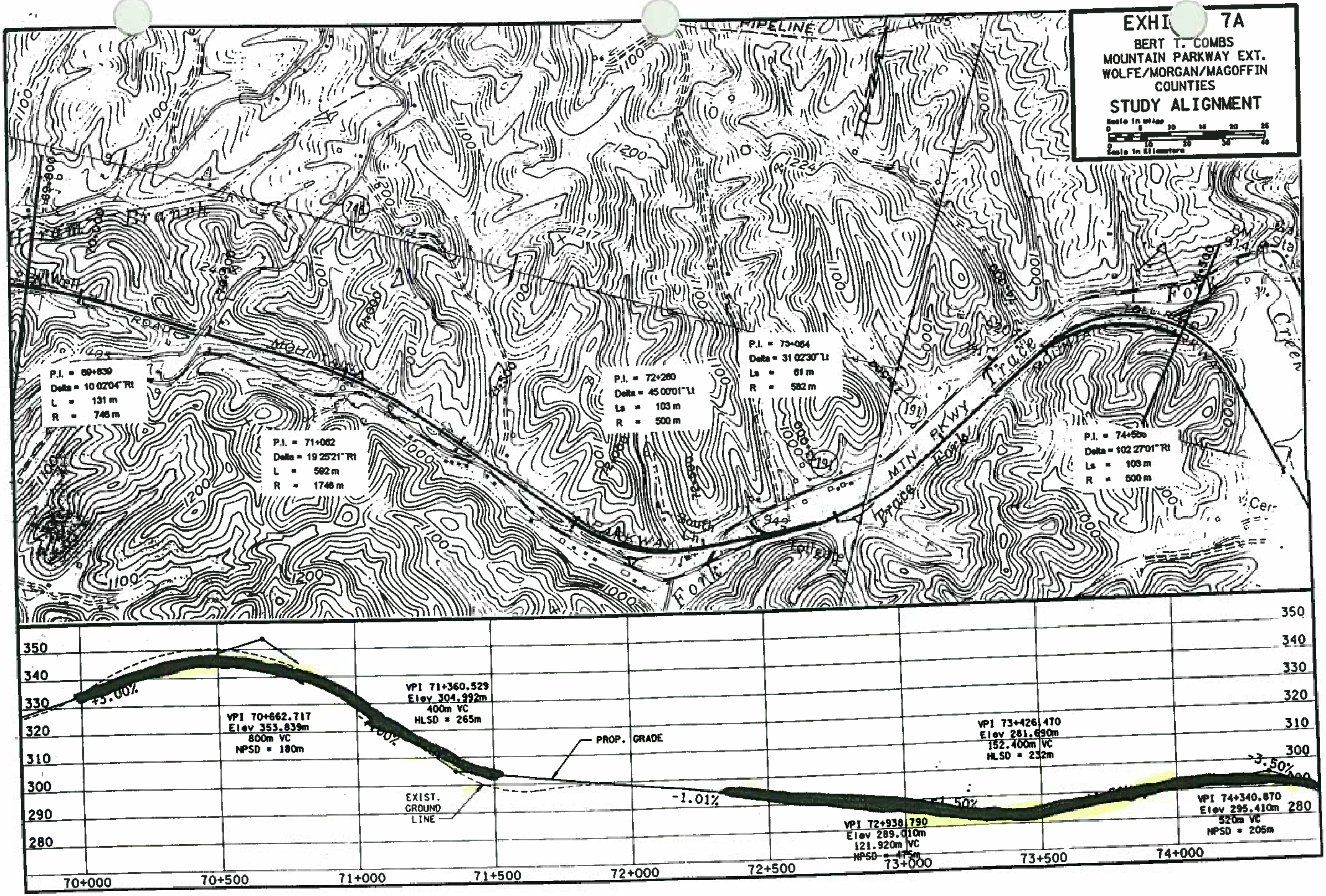
Saving $8,330,000

49

EXHIBIT 7

BERT T. COMBS
MOUNTAIN PARKWAY EXT.
WOLFE/MORGAN/MAGOFFIN
COUNTIES

STUDY ALIGNMENT


EXHI 7A
BERT T. COMBS
MOUNTAIN PARKWAY EXT.
WOLFE/MORGAN/MAGOFFIN
COUNTIES
STUDY ALIGNMENT
Scale in Miles
Scale in Kilometers
PIPELINE
P.I. = 69+839
Delta = 10 02'04" Rt
L = 131 m
R = 746 m
P.I. = 71+062
Delta = 19 25'21" Rt
L = 592 m
R = 1746 m
P.I. = 72+280
Delta = 45 00'01" Lt
Ls = 103 m
R = 500 m
P.I. = 73+064
Delta = 31 02'30" Lt
Ls = 61 m
R = 582 m
P.I. = 74+566
Delta = 102 27'01" Rt
Ls = 103 m
R = 500 m
MTN PKWY
Creek
VPI 70+662.717
Elev 353.839m
800m VC
NPSD = 180m
VPI 71+360.529
Elev 304.992m
400m VC
HLSD = 265m
PROP. GRADE
EXIST. GROUND LINE
-1.01%
VPI 72+938.790
Elev 289.010m
121.920m VC
VPI 73+426.470
Elev 281.690m
152.400m VC
HLSD = 232m
VPI 74+340.870
Elev 295.410m
520m VC
NPSD = 205m
+5.00%
-3.50%
70+000
70+500
71+000
71+500
72+000
72+500
73+000
73+500
74+000

51

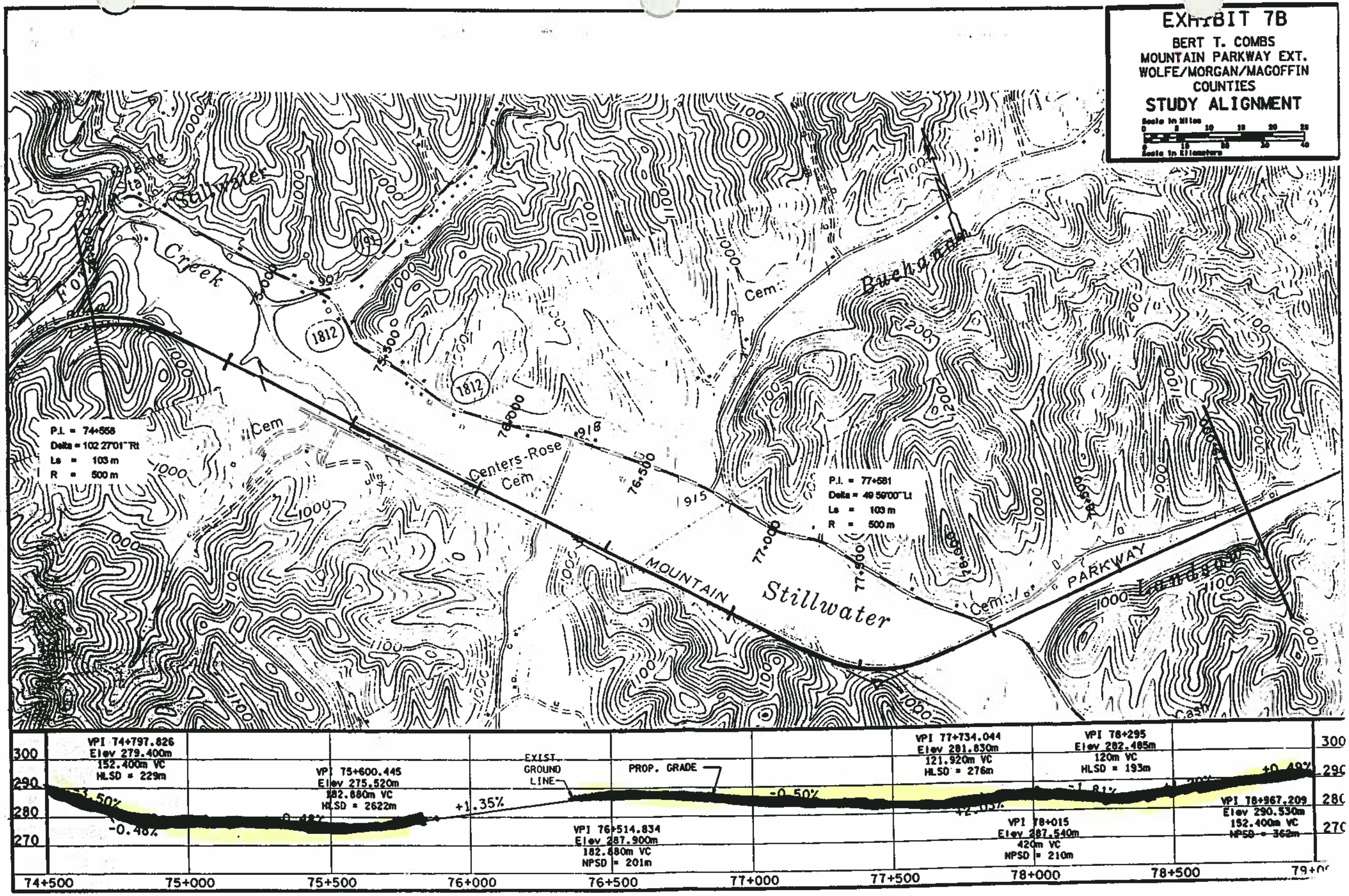


EXHIBIT 7B
BERT T. COMBS
MOUNTAIN PARKWAY EXT.
WOLFE/MORGAN/MAGOFFIN
COUNTIES
STUDY ALIGNMENT
Creek
Stillwater
1812
Cem
Centers-Rose Cem
Buchanan
MOUNTAIN
PARKWAY
P.I. = 74+558
Delta = 102 27'01" Rt
Ls = 103 m
R = 500 m
P.I. = 77+581
Delta = 49 59'00" Lt
Ls = 103 m
R = 500 m
75+500
76+000
76+500
77+000
77+500
78+000
78+500
VPI 74+797.826
Elev 279.400m
152.400m VC
HLSD = 229m
VPI 75+600.445
Elev 275.520m
182.880m VC
HLSD = 2622m
EXIST. GROUND LINE
PROP. GRADE
VPI 76+514.834
Elev 287.900m
182.880m VC
NPSD = 201m
VPI 77+734.044
Elev 281.830m
121.920m VC
HLSD = 276m
VPI 78+015
Elev 287.540m
420m VC
NPSD = 210m
VPI 78+295
Elev 282.485m
120m VC
HLSD = 193m
VPI 78+967.209
Elev 290.530m
152.400m VC
NPSD = 362m
-0.48%
+1.35%
-0.50%
+0.49%
300
290
280
270
74+500
75+000
75+500
76+000
76+500
77+000
77+500
78+000
78+500

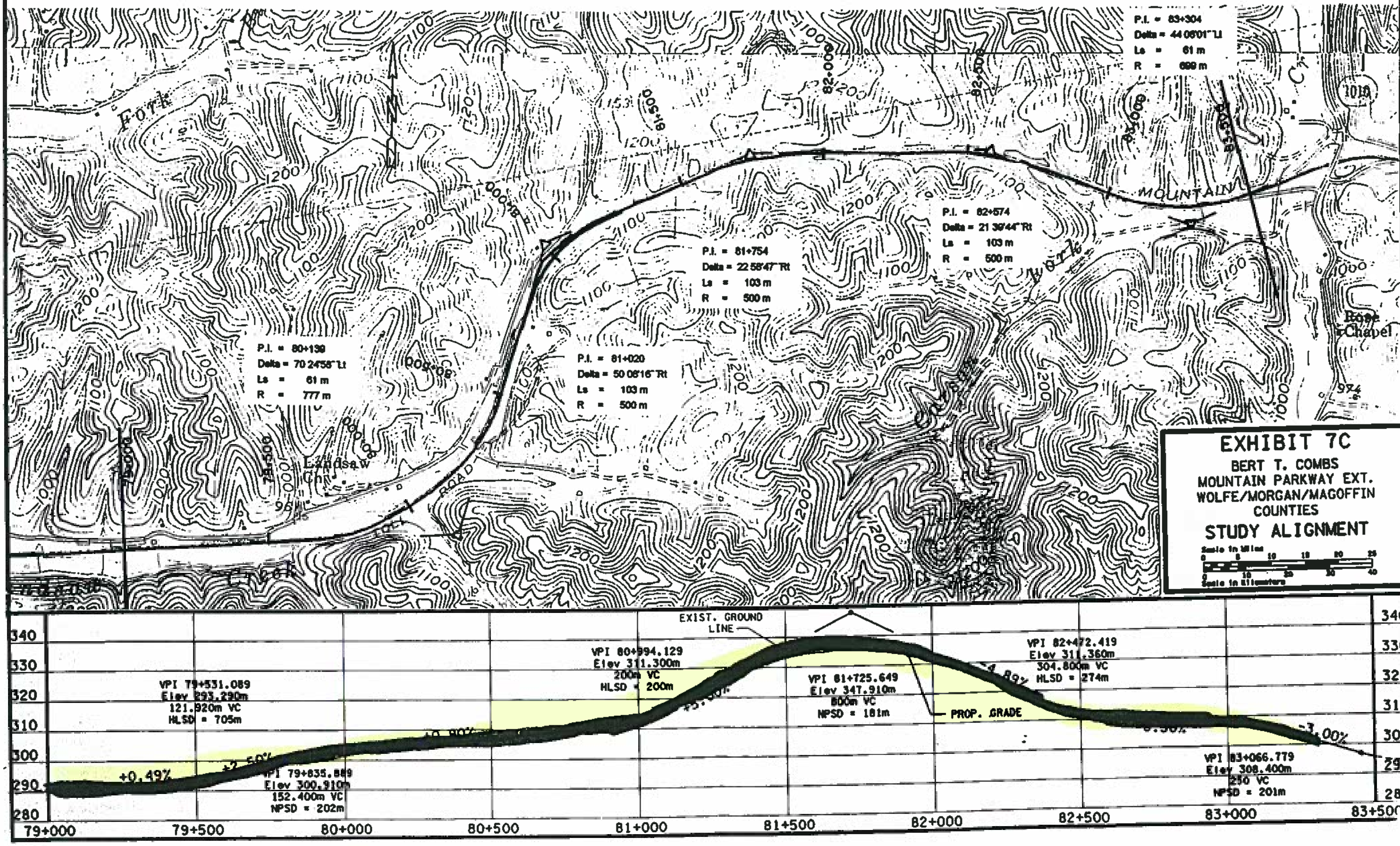


EXHIBIT 7C
BERT T. COMBS
MOUNTAIN PARKWAY EXT.
WOLFE/MORGAN/MAGOFFIN
COUNTIES
STUDY ALIGNMENT
P.I. = 80+139
Delta = 70 24'55" Lt
Ls = 61 m
R = 777 m
P.I. = 81+020
Delta = 50 08'16" Rt
Ls = 103 m
R = 500 m
P.I. = 81+754
Delta = 22 58'47" Rt
Ls = 103 m
R = 500 m
P.I. = 82+574
Delta = 21 39'44" Rt
Ls = 103 m
R = 500 m
P.I. = 83+304
Delta = 44 08'01" Lt
Ls = 61 m
R = 699 m
Landsaw Chr.
Rose Chapel
MOUNTAIN
ROAD
Fork
Creek
1010
EXIST. GROUND LINE
PROP. GRADE
VPI 79+531.089
Elev 293.290m
121.920m VC
HLSD = 705m
VPI 79+835.889
Elev 300.910m
152.400m VC
NPSD = 202m
VPI 80+994.129
Elev 311.300m
200m VC
HLSD = 200m
VPI 81+725.649
Elev 347.910m
800m VC
NPSD = 181m
VPI 82+472.419
Elev 311.360m
304.800m VC
HLSD = 274m
VPI 83+066.779
Elev 308.400m
250 VC
NPSD = 201m
+0.49%
-3.00%
79+000
79+500
80+000
80+500
81+000
81+500
82+000
82+500
83+000
83+500

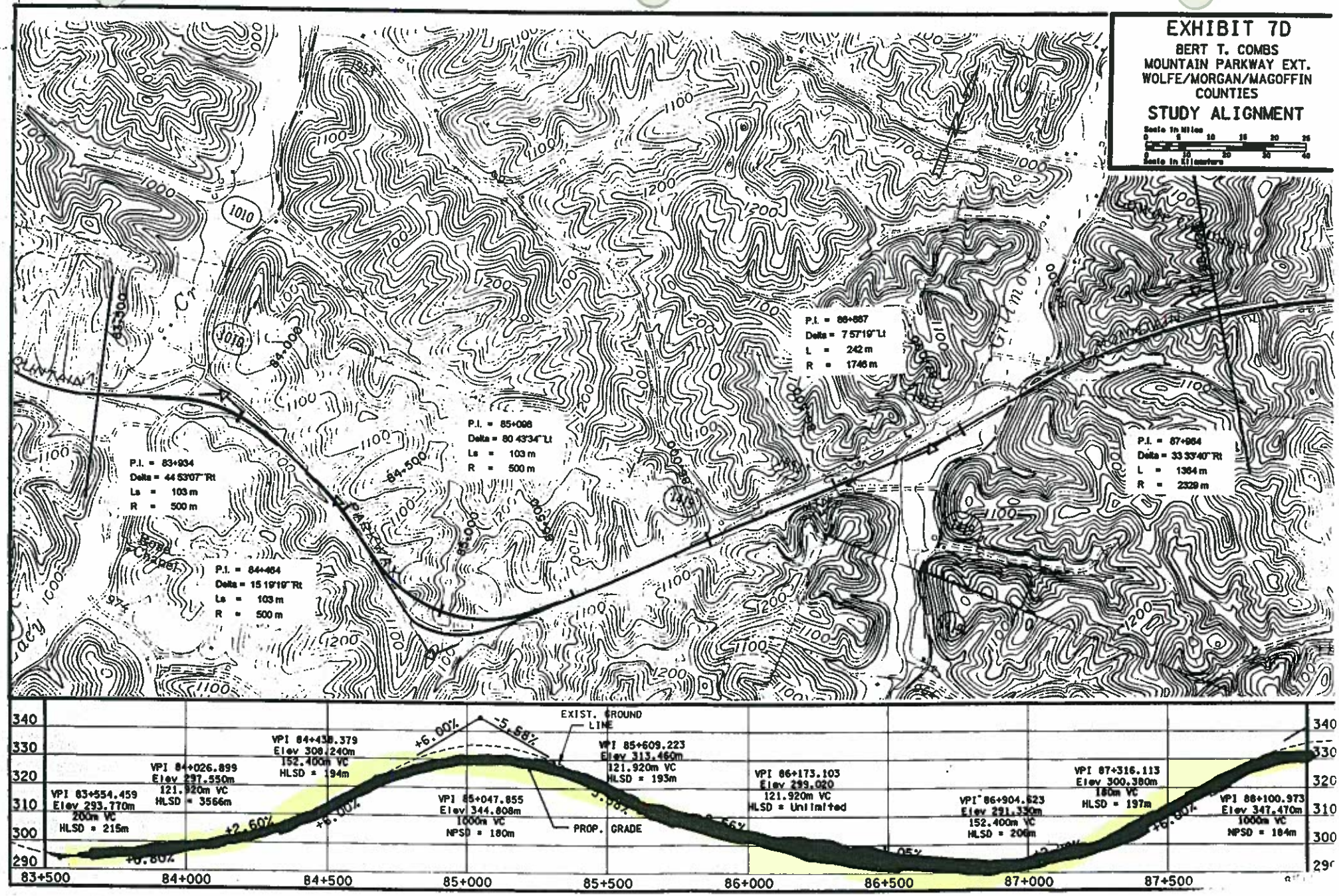


EXHIBIT 7D
BERT T. COMBS
MOUNTAIN PARKWAY EXT.
WOLFE/MORGAN/MAGOFFIN
COUNTIES
STUDY ALIGNMENT
Scale in Miles
Scale in Kilometers
P.I. = 83+934
Delta = 44 53'07" Rt
Ls = 103 m
R = 500 m
P.I. = 84+464
Delta = 15 19'19" Rt
Ls = 103 m
R = 500 m
P.I. = 85+098
Delta = 80 43'34" Lt
Ls = 103 m
R = 500 m
P.I. = 86+887
Delta = 7 57'19" Lt
L = 242 m
R = 1746 m
P.I. = 87+864
Delta = 33 33'40" Rt
L = 1364 m
R = 2329 m
Bond Chapel
MOUNTAIN PARKWAY
EXIST. GROUND LINE
PROP. GRADE
VPI 83+554.459
Elev 293.770m
200m VC
HLSD = 215m
VPI 84+026.899
Elev 297.550m
121.920m VC
HLSD = 3566m
VPI 84+438.379
Elev 308.240m
152.400m VC
HLSD = 194m
VPI 85+047.855
Elev 344.808m
1000m VC
NPSD = 180m
VPI 85+609.223
Elev 313.460m
121.920m VC
HLSD = 193m
VPI 86+173.103
Elev 299.020
121.920m VC
HLSD = Unlimited
VPI 86+904.623
Elev 291.330m
152.400m VC
HLSD = 200m
VPI 87+316.113
Elev 300.380m
180m VC
HLSD = 197m
VPI 88+100.973
Elev 347.470m
1000m VC
NPSD = 184m
+6.80%
+2.60%
+6.00%
+6.00%
-5.68%
-5.05%
+6.80%
340
330
320
310
300
290
83+500
84+000
84+500
85+000
85+500
86+000
86+500
87+000
87+500

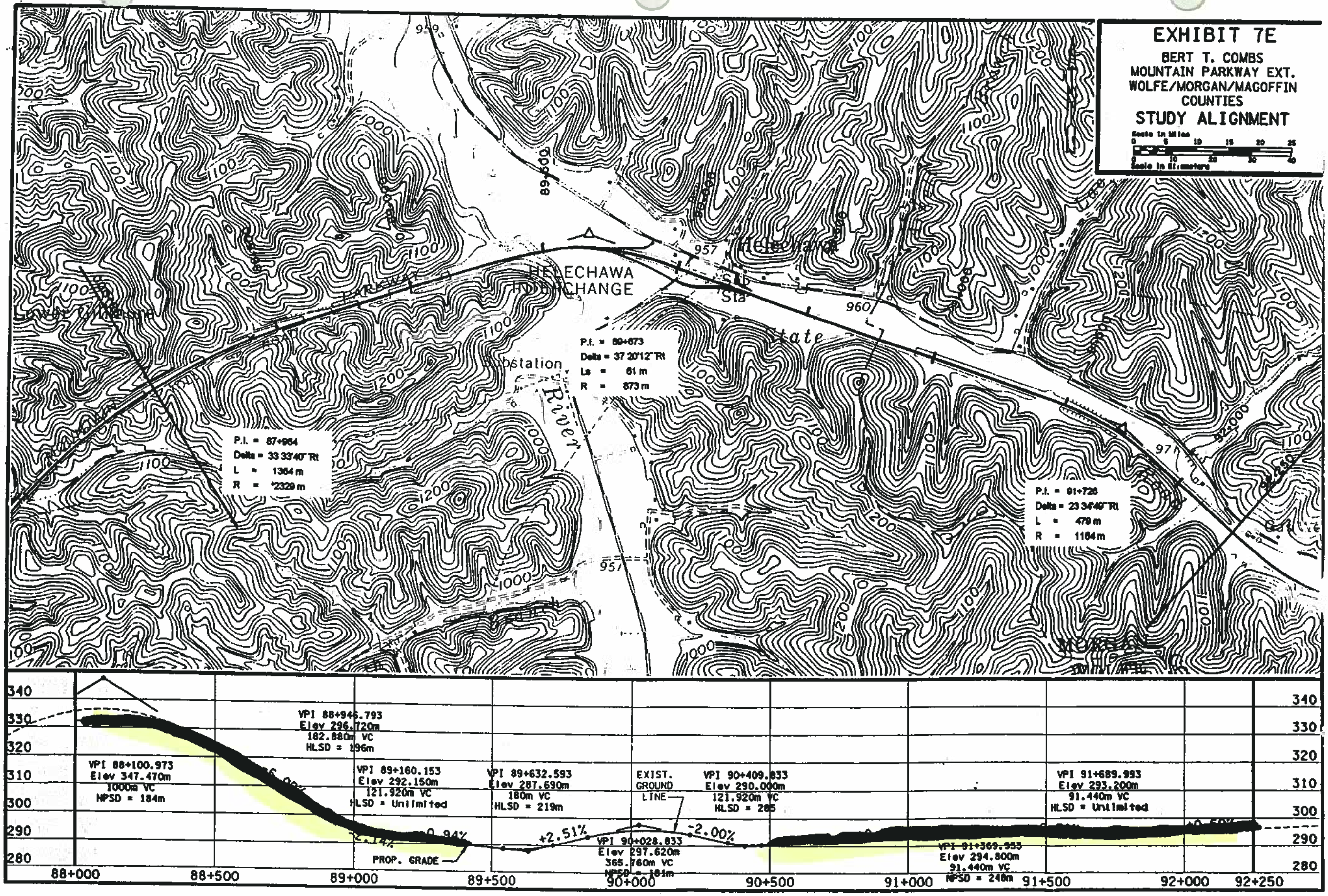


EXHIBIT 7E
BERT T. COMBS
MOUNTAIN PARKWAY EXT.
WOLFE/MORGAN/MAGOFFIN
COUNTIES
STUDY ALIGNMENT
HELECHAWA
INTERCHANGE
Substation
River
P.I. = 87+964
Delta = 33 33'40" Rt
L = 1364 m
R = 2329 m
P.I. = 89+673
Delta = 37 20'12" Rt
Ls = 61 m
R = 873 m
P.I. = 91+728
Delta = 23 34'40" Rt
L = 479 m
R = 1164 m
VPI 88+100.973
Elev 347.470m
1000m VC
NPSD = 184m
VPI 88+946.793
Elev 296.720m
182.880m VC
HLSD = 196m
VPI 89+160.153
Elev 292.150m
121.920m VC
HLSD = Unlimited
VPI 89+632.593
Elev 287.690m
180m VC
HLSD = 219m
VPI 90+028.833
Elev 297.620m
365.760m VC
VPI 90+409.833
Elev 290.000m
121.920m VC
HLSD = 265
VPI 91+369.953
Elev 294.800m
91.440m VC
NPSD = 248m
VPI 91+689.993
Elev 293.200m
91.440m VC
HLSD = Unlimited
EXIST.
GROUND
LINE
PROP. GRADE
+2.51%
-2.00%
88+000
88+500
89+000
89+500
90+000
90+500
91+000
91+500
92+000
92+250

55

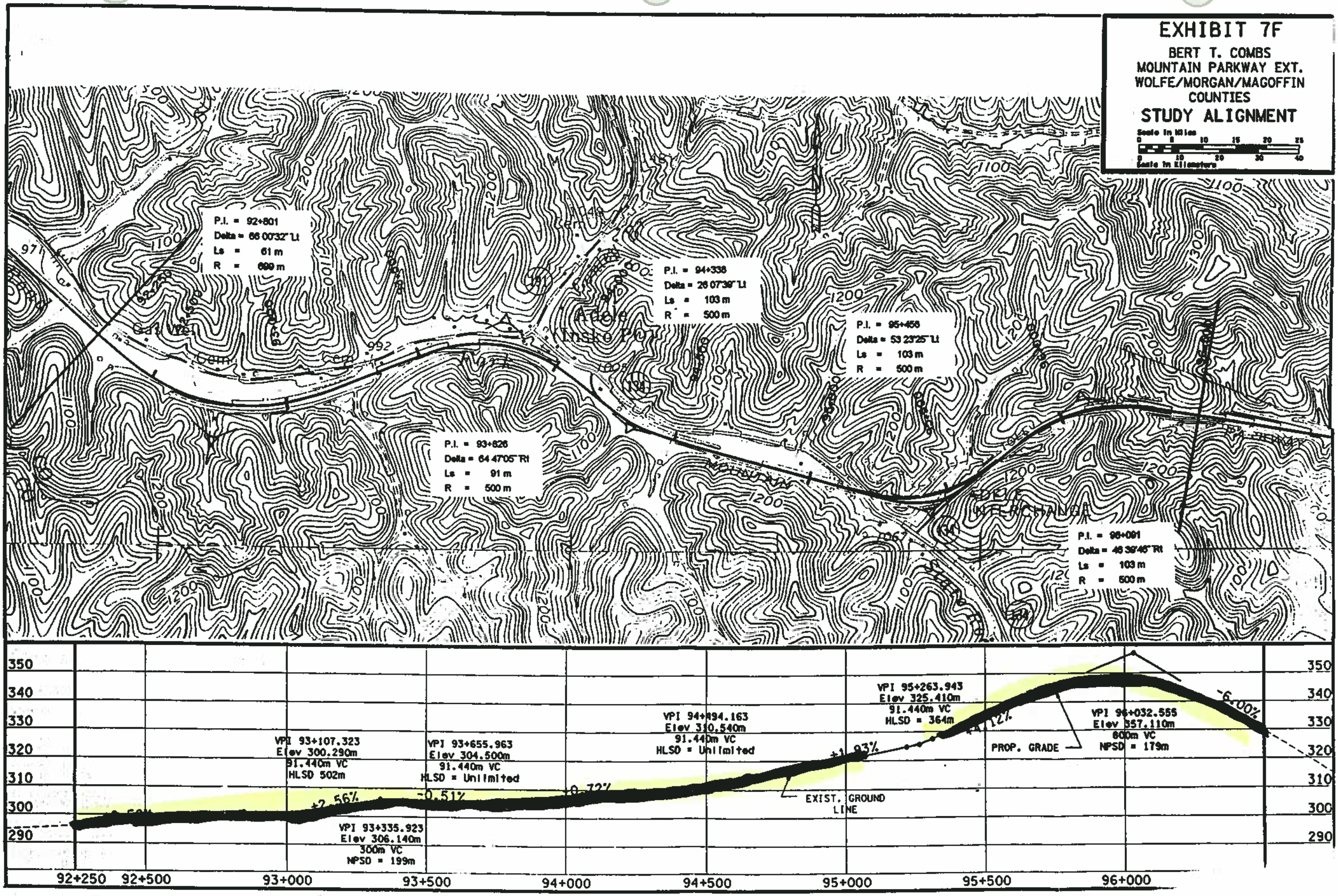


EXHIBIT 7F
BERT T. COMBS
MOUNTAIN PARKWAY EXT.
WOLFE/MORGAN/MAGOFFIN
COUNTIES
STUDY ALIGNMENT
Scale In Miles
Scale In Kilometers
P.I. = 92+801
Delta = 66 00'32" Lt
Ls = 61 m
R = 699 m
P.I. = 93+826
Delta = 64 47'05" Rt
Ls = 91 m
R = 500 m
P.I. = 94+338
Delta = 26 07'39" Lt
Ls = 103 m
R = 500 m
P.I. = 95+456
Delta = 53 23'25" Lt
Ls = 103 m
R = 500 m
P.I. = 96+091
Delta = 46 39'46" Rt
Ls = 103 m
R = 500 m
Adele
INTERCHANGE
VPI 93+107.323
Elev 300.290m
91.440m VC
HLSD 502m
VPI 93+335.923
Elev 306.140m
300m VC
NPSD = 199m
VPI 93+655.963
Elev 304.500m
91.440m VC
HLSD = Unlimited
VPI 94+494.163
Elev 310.540m
91.440m VC
HLSD = Unlimited
VPI 95+263.943
Elev 325.410m
91.440m VC
HLSD = 364m
VPI 96+032.555
Elev 357.110m
600m VC
NPSD = 179m
+2.56%
-0.51%
+0.72%
+1.93%
+4.12%
-6.00%
PROP. GRADE
EXIST. GROUND LINE
350
340
330
320
310
300
290
92+250
92+500
93+000
93+500
94+000
94+500
95+000
95+500
96+000

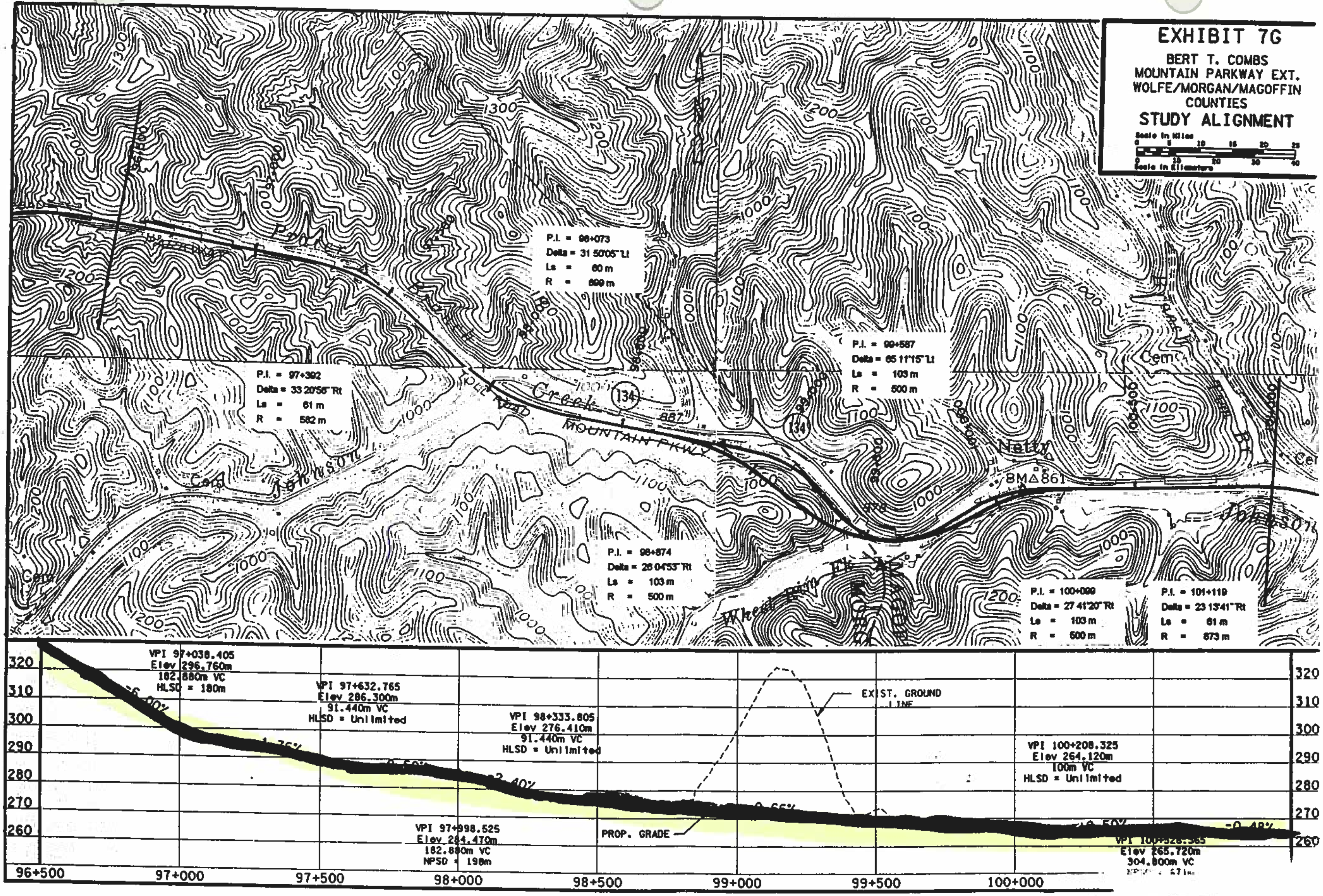


EXHIBIT 7G
BERT T. COMBS
MOUNTAIN PARKWAY EXT.
WOLFE/MORGAN/MAGOFFIN
COUNTIES
STUDY ALIGNMENT
P.I. = 97+392
Delta = 33 20'56" Rt
Ls = 61 m
R = 582 m
P.I. = 98+073
Delta = 31 50'05" Lt
Ls = 60 m
R = 699 m
P.I. = 98+874
Delta = 26 04'53" Rt
Ls = 103 m
R = 500 m
P.I. = 99+587
Delta = 65 11'15" Lt
Ls = 103 m
R = 500 m
P.I. = 100+099
Delta = 27 41'20" Rt
Ls = 103 m
R = 500 m
P.I. = 101+119
Delta = 23 13'41" Rt
Ls = 61 m
R = 873 m
MOUNTAIN PKWY
BM△861
VPI 97+038.405
Elev 296.760m
182.880m VC
HLSD = 180m
VPI 97+632.765
Elev 286.300m
91.440m VC
HLSD = Unlimited
VPI 97+998.525
Elev 284.470m
182.880m VC
NPSD = 198m
VPI 98+333.805
Elev 276.410m
91.440m VC
HLSD = Unlimited
VPI 100+208.325
Elev 264.120m
100m VC
HLSD = Unlimited
Elev 265.720m
304.800m VC
EXIST. GROUND LINE
PROP. GRADE
96+500
97+000
97+500
98+000
98+500
99+000
99+500
100+000

57

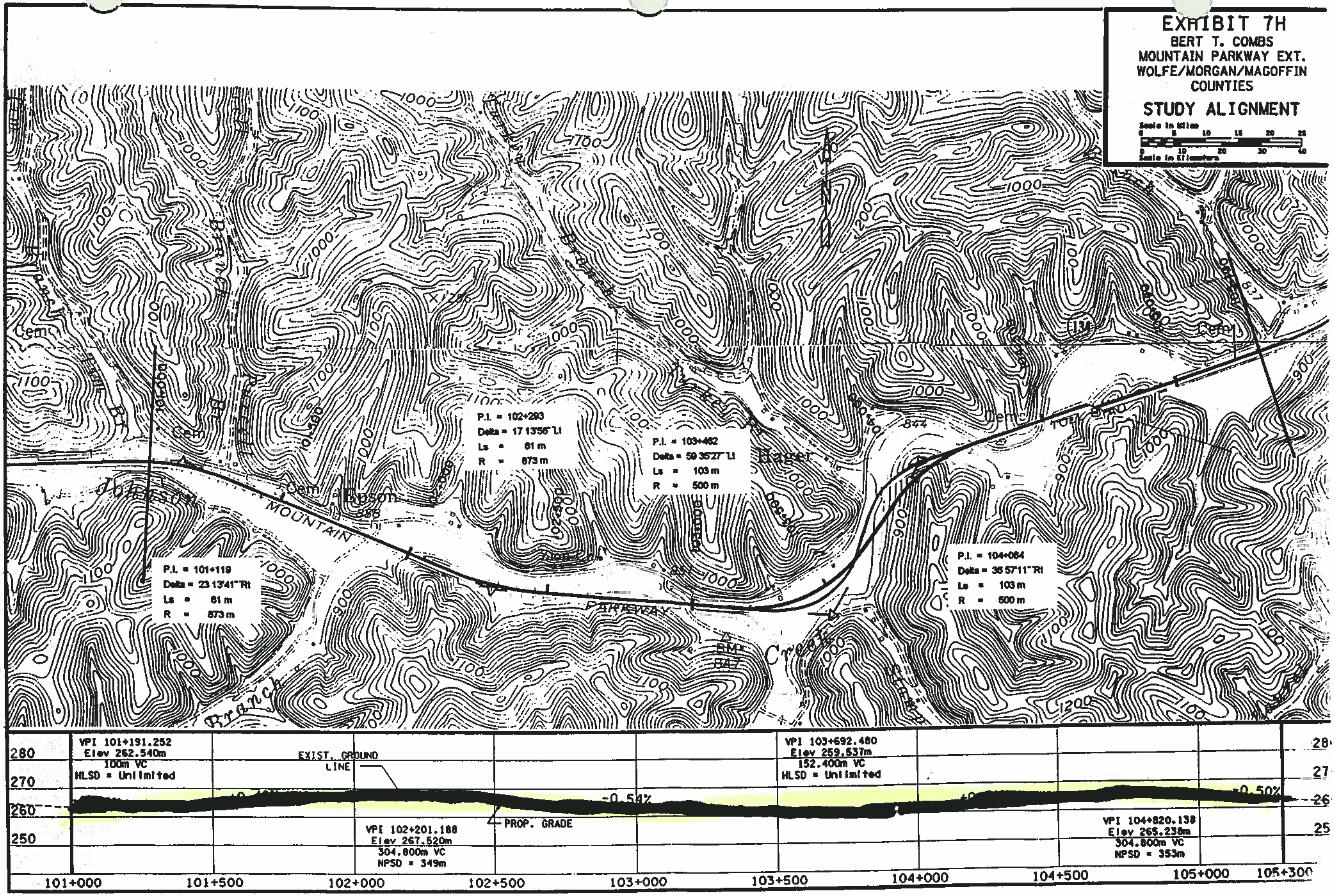


EXHIBIT 7H
BERT T. COMBS
MOUNTAIN PARKWAY EXT.
WOLFE/MORGAN/MAGOFFIN
COUNTIES
STUDY ALIGNMENT
Scale in Miles
Scale in Kilometers
P.I. = 101+119
Delta = 23 13'41" Rt
Ls = 61 m
R = 873 m
P.I. = 102+293
Delta = 17 13'56" Lt
Ls = 61 m
R = 873 m
P.I. = 103+462
Delta = 59 35'27" Lt
Ls = 103 m
R = 500 m
P.I. = 104+064
Delta = 36 57'11" Rt
Ls = 103 m
R = 500 m
MOUNTAIN
PARKWAY
Creek
Branch
Cem
VPI 101+191.252
Elev 262.540m
100m VC
HLSD = Unlimited
EXIST. GROUND LINE
VPI 102+201.188
Elev 267.520m
304.800m VC
NPSD = 349m
PROP. GRADE
-0.54%
VPI 103+692.480
Elev 259.537m
152.400m VC
HLSD = Unlimited
VPI 104+820.138
Elev 265.238m
304.800m VC
NPSD = 353m
-0.50%
280
270
260
250
101+000
101+500
102+000
102+500
103+000
103+500
104+000
104+500
105+000
105+300

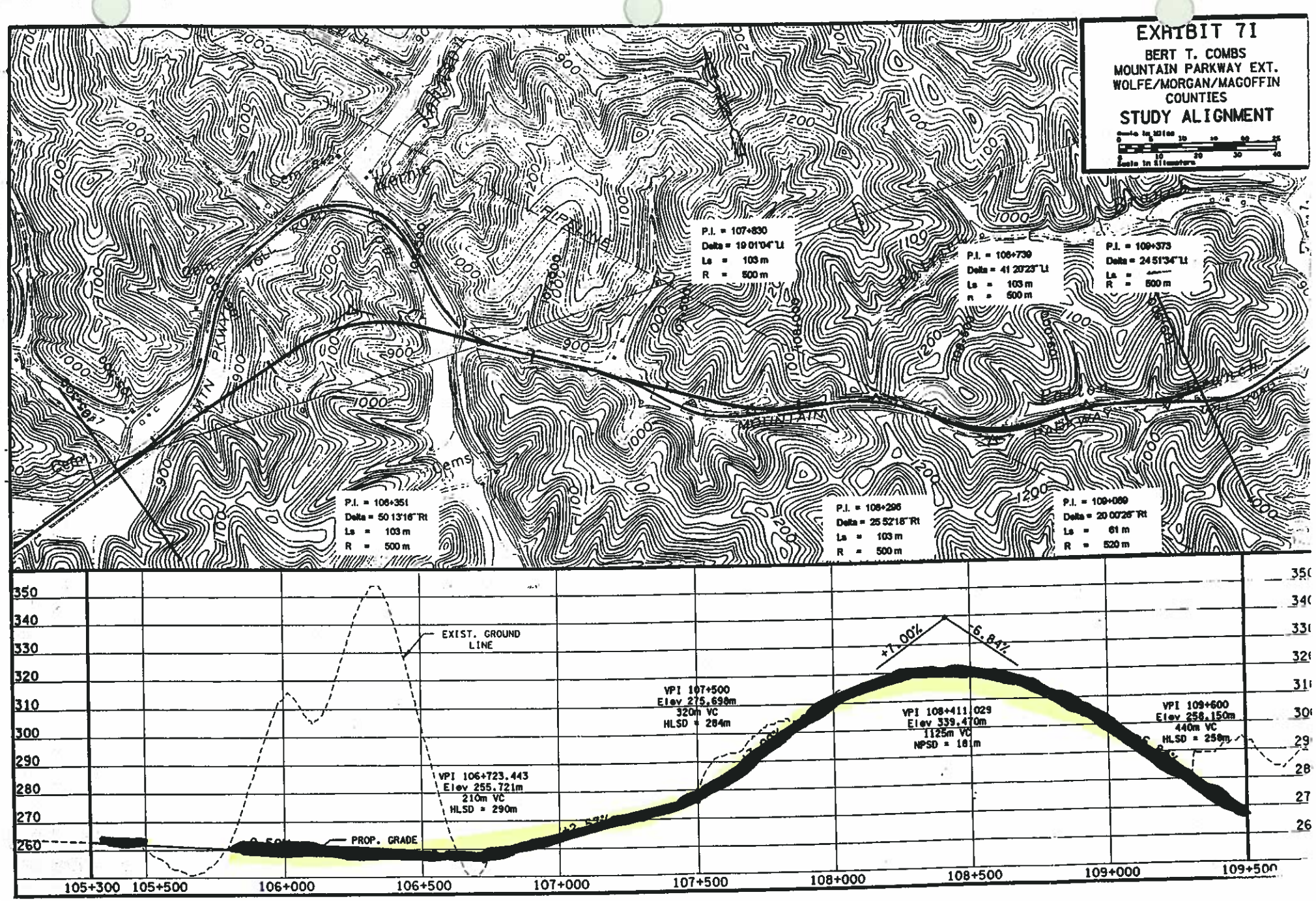


EXHIBIT 7I
BERT T. COMBS
MOUNTAIN PARKWAY EXT.
WOLFE/MORGAN/MAGOFFIN
COUNTIES
STUDY ALIGNMENT
P.I. = 107+830
Delta = 19 01'04" Lt
Ls = 103 m
R = 500 m
P.I. = 108+739
Delta = 41 20'23" Lt
Ls = 103 m
R = 500 m
P.I. = 109+373
Delta = 24 51'34" Lt
R = 500 m
P.I. = 106+351
Delta = 50 13'16" Rt
Ls = 103 m
R = 500 m
P.I. = 108+295
Delta = 25 52'16" Rt
Ls = 103 m
R = 500 m
P.I. = 109+089
Delta = 20 00'26" Rt
Ls = 61 m
R = 520 m
MTN PKWY
MOUNTAIN
PARKWAY
EXIST. GROUND LINE
PROP. GRADE
VPI 106+723.443
Elev 255.721m
210m VC
HLSD = 290m
VPI 107+500
Elev 275.698m
320m VC
HLSD = 284m
VPI 108+411.029
Elev 339.470m
1125m VC
NPSD = 181m
VPI 109+600
Elev 258.150m
440m VC
HLSD = 250m
+1.00%
-6.84%
350
340
330
320
310
300
290
280
270
260
105+300
105+500
106+000
106+500
107+000
107+500
108+000
108+500
109+000
109+500

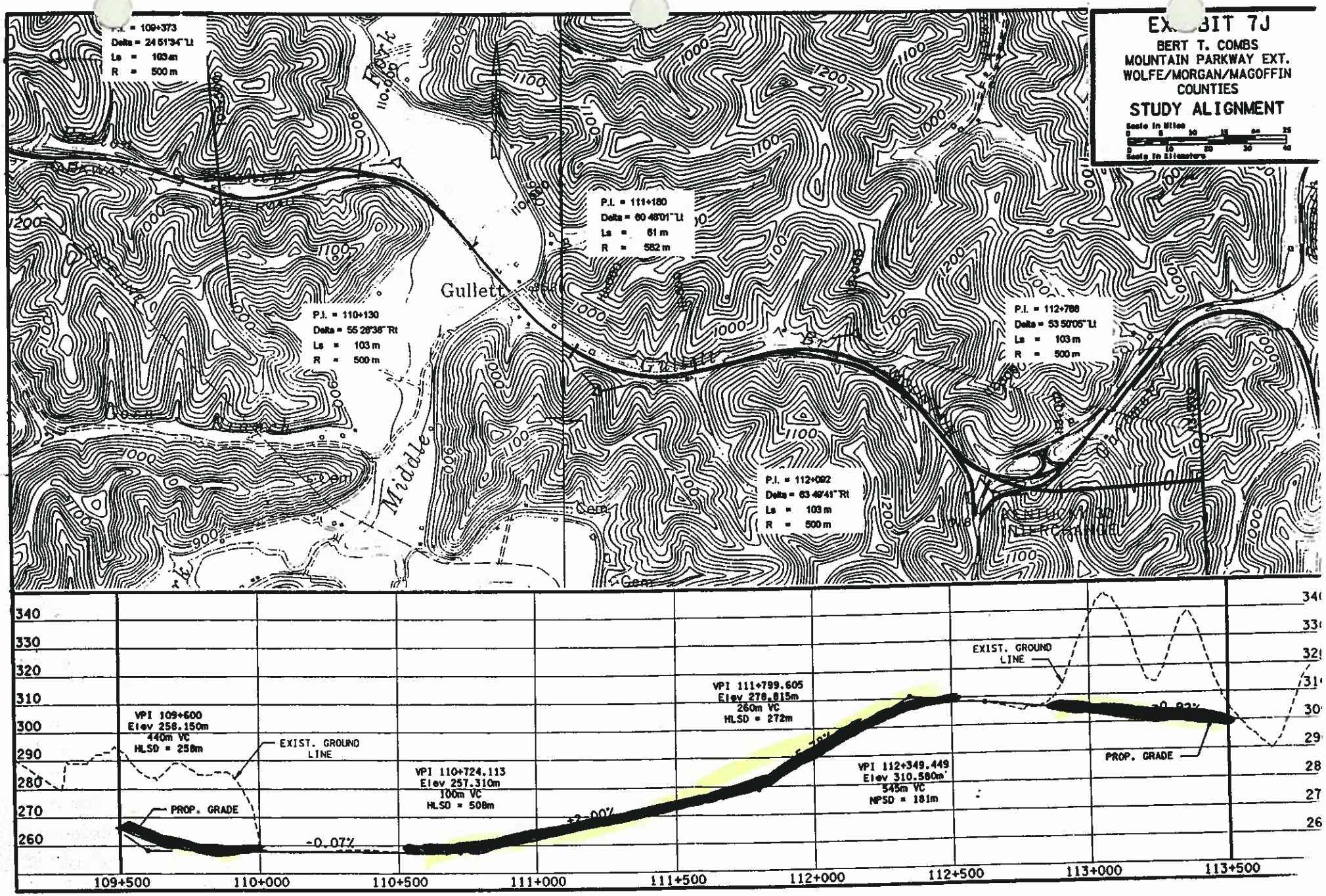


EXHIBIT 7J
BERT T. COMBS
MOUNTAIN PARKWAY EXT.
WOLFE/MORGAN/MAGOFFIN
COUNTIES
STUDY ALIGNMENT
P.I. = 109+373
Delta = 24 51'34" Lt
Ls = 103 m
R = 500 m
P.I. = 110+130
Delta = 55 28'36" Rt
Ls = 103 m
R = 500 m
P.I. = 111+180
Delta = 60 48'01" Lt
Ls = 61 m
R = 582 m
P.I. = 112+092
Delta = 63 49'41" Rt
Ls = 103 m
R = 500 m
P.I. = 112+788
Delta = 53 50'05" Lt
Ls = 103 m
R = 500 m
Gullett
Middle
Cem
VPI 109+600
Elev 258.150m
440m VC
HLSD = 258m
EXIST. GROUND LINE
PROP. GRADE
-0.07%
VPI 110+724.113
Elev 257.310m
100m VC
HLSD = 508m
+2.00%
VPI 111+799.605
Elev 278.815m
260m VC
HLSD = 272m
VPI 112+349.449
Elev 310.580m
545m VC
NPSD = 181m
EXIST. GROUND LINE
PROP. GRADE
340
330
320
310
300
290
280
270
260
109+500
110+000
110+500
111+000
111+500
112+000
112+500
113+000
113+500

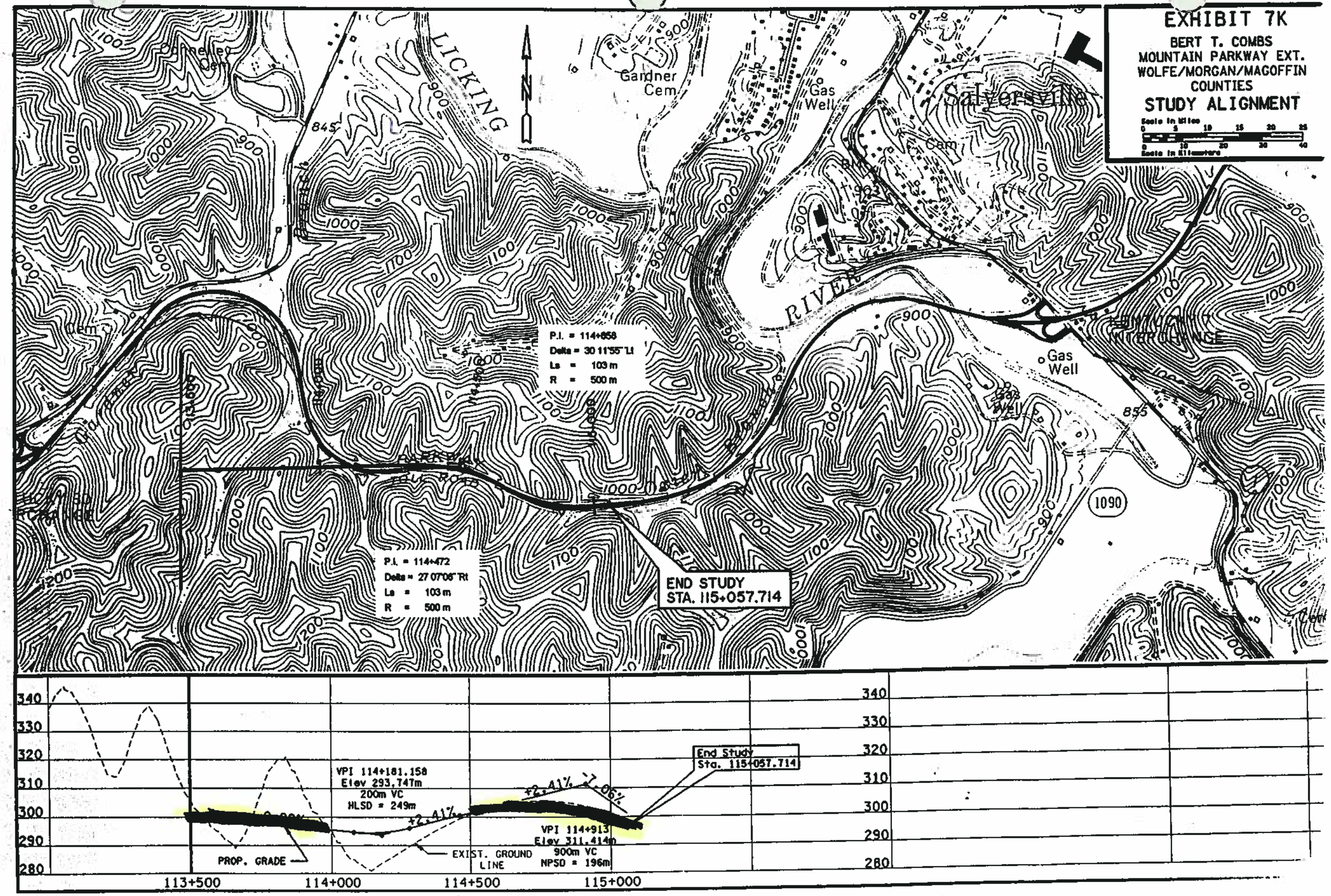


EXHIBIT 7K
BERT T. COMBS
MOUNTAIN PARKWAY EXT.
WOLFE/MORGAN/MAGOFFIN
COUNTIES
STUDY ALIGNMENT
Scale in Miles
Scale in Kilometers
LICKING
RIVER
Gardner Cem
Gas Well
Salyersville
Cem
P.I. = 114+858
Delta = 30 11'55" Lt
Ls = 103 m
R = 500 m
P.I. = 114+472
Delta = 27 07'06" Rt
Ls = 103 m
R = 500 m
END STUDY
STA. 115+057.714
1090
855
845
End Study
Sta. 115+057.714
VPI 114+181.158
Elev 293.747m
200m VC
HLSD = 249m
VPI 114+913
Elev 311.414m
900m VC
NPSD = 196m
+2.41%
-7.06%
PROP. GRADE
EXIST. GROUND LINE
340
330
320
310
300
290
280
113+500
114+000
114+500
115+000

VALUE ENGINEERING RECOMMENDATION #G2

VALUE ENGINEERING RECOMMENDATION #G2

FORM 26 AUGUST 1998

PROJECT: Widening of Parkway Extension Ky 9009, Campton to Salyersville

LOCATION: Ky. 9009, Campton to Salyersville

STUDY DATE: August 17 - August 21, 1998

TEAM MEMBER RESPONSIBLE FOR WRITEUP: Tony Bowling

FUNCTION OF COMPONENT BEING CHANGED: Maintain and control traffic

DESCRIPTIVE TITLE OF RECOMMENDATION: Detour traffic utilizing adjoining roads.

ORIGINAL DESIGN: Maintain and control traffic within project limits. Utilizing the existing roadway for traffic while constructing the new roadway then transferring the traffic to the new roadway and reconstructing the existing roadway.

RECOMMENDED CHANGE: Completely remove the traffic from the construction area by utilizing the existing adjacent state roads. The proposed route could be divided up into six independent segments that could use local roads to tie into the proposed route and allow the public to travel safely away from the construction site.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	122,000,000		122,000,000
RECOMMENDED DESIGN	97,600,000		97,600,000
ESTIMATED SAVINGS OR (COST)	24,400,000		24,400,000

VALUE ENGINEERING RECOMMENDATION #G2

FORM 23 AUGUST 1998

ADVANTAGES:

1. Reduces construction time
2. Reduces unit prices
3. Improves safe traffic flow
4. Allows more flexible construction activities
5. Allows more flexible design consideration
6. Increases driver satisfaction
7. Decreases M.O.T. costs

DISADVANTAGES:

1. Increases travel distance .
2. Increases traffic on local roads
3. Requires creation of temporary ties between local roads and project
4. Requires post construction repairs

JUSTIFICATION: Detouring traffic should lower unit prices, reduce construction time, and improve traffic safety with minimal inconvenience to the public.

VALUE ENGINEERING RECOMMENDATION #G2

FORM: 23 MARCH 1998

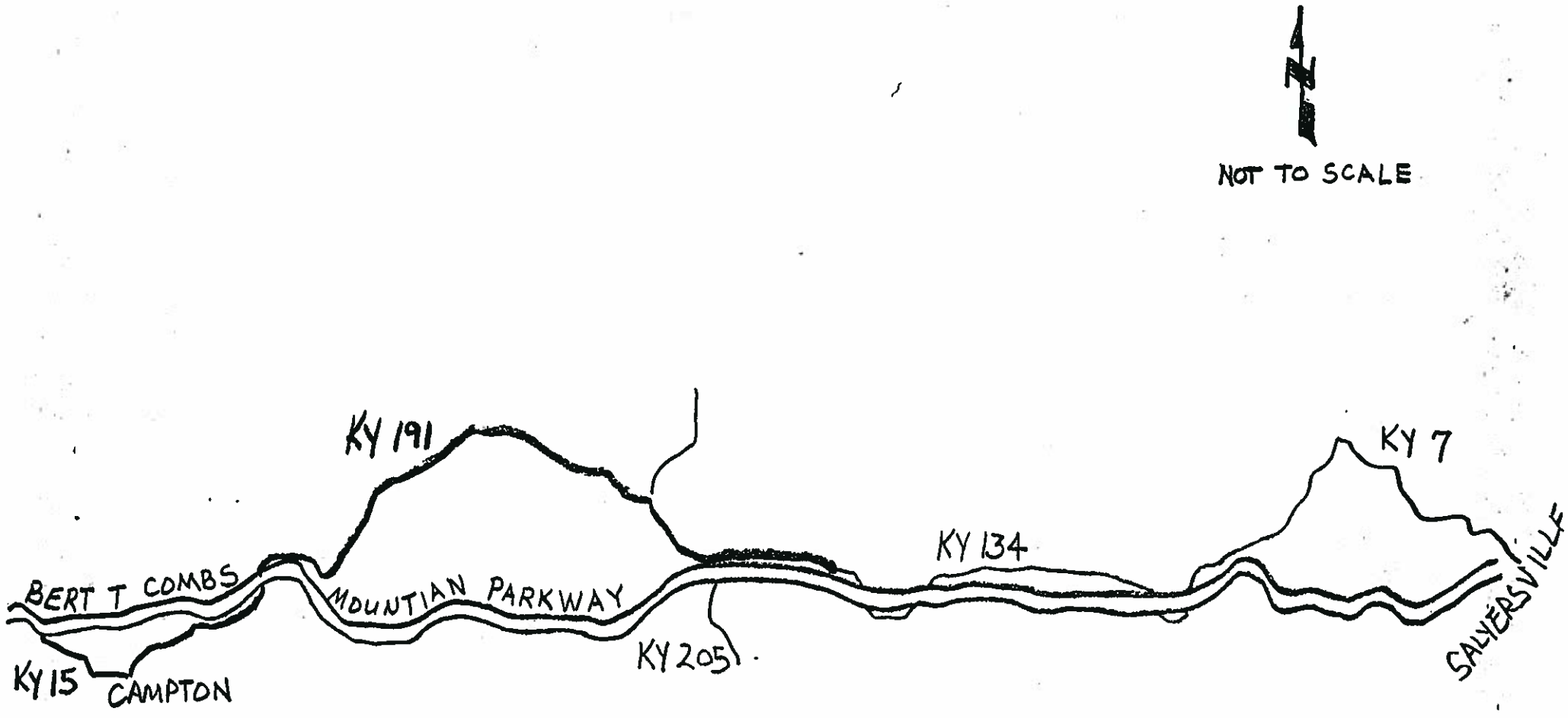
COST ESTIMATE - FIRST COST

Cost Item	Units	Unit Cost		Original Design		Recommended Design	
		$/Unit	Sou-rce Code	Num of Units	Total $ MIL	Num of Units	Total $ MIL
Original Excavation	cm	5.00	Design	24.4	122		
Proposed Excavation	cm	4.00	Est.			24.4	97.6
Totals					122.0		97.6

SOURCE CODE:

1 Project Cost Estimate
2 CES Data Base
3 CACES Data Base
4 Means Estimating Manual
5 Richardson's
6 Vendor Lit or Quote (list name / details)
7 Professional Experience (List job if applicable)
8 Other Sources (specify)

VALUE ENGINEERING RECOMMENDATION G2



SKETCH OF BERT T COMBS MOUNTAIN PKWY

ORIGINAL DESIGN: MAINTENANCE OF TRAFFIC EXISTING RDWY

RECOMMENDATION: DETOUR TRAFFIC THRU ADJOINING RDWYS

0 5 10 15 20 25 30

DETOUR ROUTE	DESC	PKWY(MILES)	
KY 15 SPUR - KY 191	DWNTN	3.5	
KY 191 → 191 → KY 191 / KY 1812	PARALLELS	2.8	
KY 191 / KY 1812 → 191 → KY 1010 (EXIT 53)		5.5	(5.5)
→ KY 205 HELECHAWA	PLUS 2	4.0	(9.5)
KY 205 → 191 → 134 → KERNIE	PARALLELS	10.6	
KERNIE → SALYERSVILLE / KY 134 → KY 7	PLUS 4	6.7	

VALUE ENGINEERING RECOMMENDATION #I11

VALUE ENGINEERING RECOMMENDATION #I11

FORM 26 AUGUST 1998

PROJECT: Widening of Parkway Extension Ky 9009, Campton to Salyersville

LOCATION: Ky. 9009, Campton to Salyersville

STUDY DATE: August 17 - August 21, 1998

TEAM MEMBER RESPONSIBLE FOR WRITEUP: R. T. Wilson

FUNCTION OF COMPONENT BEING CHANGED: Provide Access

DESCRIPTIVE TITLE OF RECOMMENDATION: Combine interchange at KY15 and Quillin Chapel Road

ORIGINAL DESIGN: As proposed the new interchange for KY15, will be constructed less that 1 mile east of the existing KY15, interchange.

RECOMMENDED CHANGE: Eliminate the proposed interchange for KY15, and modify the existing interchange at KY15 to handle the traffic load.

SUMMARY OF COST ANALYSIS			
	First Cost	**O & M Costs (Present Worth)**	**Total LC Cost (Present Worth)**
ORIGINAL DESIGN	14,093,000	0	14,093,000
RECOMMENDED DESIGN	11,414,513	0	11,414,513
ESTIMATED SAVINGS OR (COST)	2,678,487	0	2,678,487

VALUE ENGINEERING RECOMMENDATION #I11

FORM 23 AUGUST 1998

ADVANTAGES:

1. Combine traffic movements of Quillin Chapel Road and KY15
2. Combine 2 interchanges in close proximity to one another increases traffic safety
3. Easier and cheaper to modify ramps and roadways of Quillin Chapel than construct new ramps, roadways, and bridges.
4. Allows for raising the Mountain Parkway grade thus reducing excavation
5. Maintains level of service
6. Maintains access to all three roadways Mtn. Pkwy, KY 15, and Quillin Chapel
7. Provides better connection of KY15 to Industrial Park

DISADVANTAGES:

1. No free flow movement from Parkway to KY15
2. Requires improvements to existing interchange ramps
3. Requires constructing a connecting roadway from KY15 south to the existing interchange

JUSTIFICATION: Upgrading the existing interchange at Chapel Hill provides for a more economical design by eliminating the proposed interchange, utilizing more of KY15 and freeing up the Mountain Parkway for a wider range of grade tolerance. Also constructing two interchanges less than 1 mile apart increases traffic congestion and decreases safety.

VALUE ENGINEERING RECOMMENDATION #I11

FORM: 23 MARCH 1998

COST ESTIMATE - FIRST COST

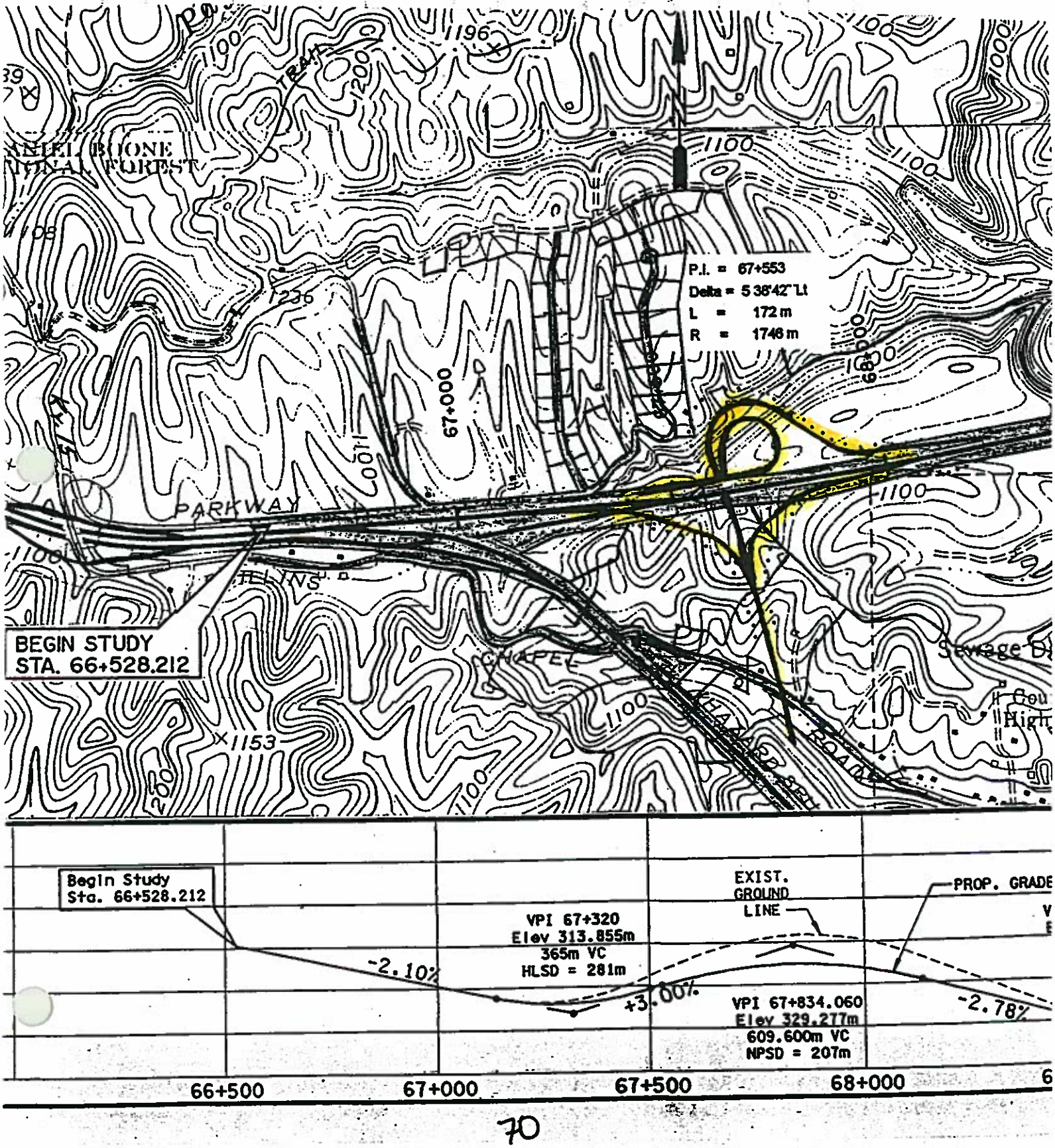
Cost Item	Units	Unit Cost		Original Design		Recommended Design	
		$/Unit	Source Code	Num of Units	Total $	Num of Units	Total $
Excavation	Meters^3	$4.00	8			2,753,784	$11,015,136
DGA Base	Ton	$15.01	8			4,023	$60,385
BIT Base	Ton	$35.27	8			7,510	$264,883
Surface	Ton	$32.92	8			2,251	$74,109
Original Design	LS			$14,093,000			
TOTAL COST				$14,093,000			$11,414,513

SOURCE CODE:
1 Project Cost Estimate
2 CES Data Base
3 CACES Data Base
4 Means Estimating Manual
5 Richardson's
6 Vendor Lit or Quote (list name / details)
7 Professional Experience (List job if applicable)
8 Other Sources (specify)

VALUE ENGINEERING RECOMMENDATION # I-11

FORM: 23 MARCH 1998

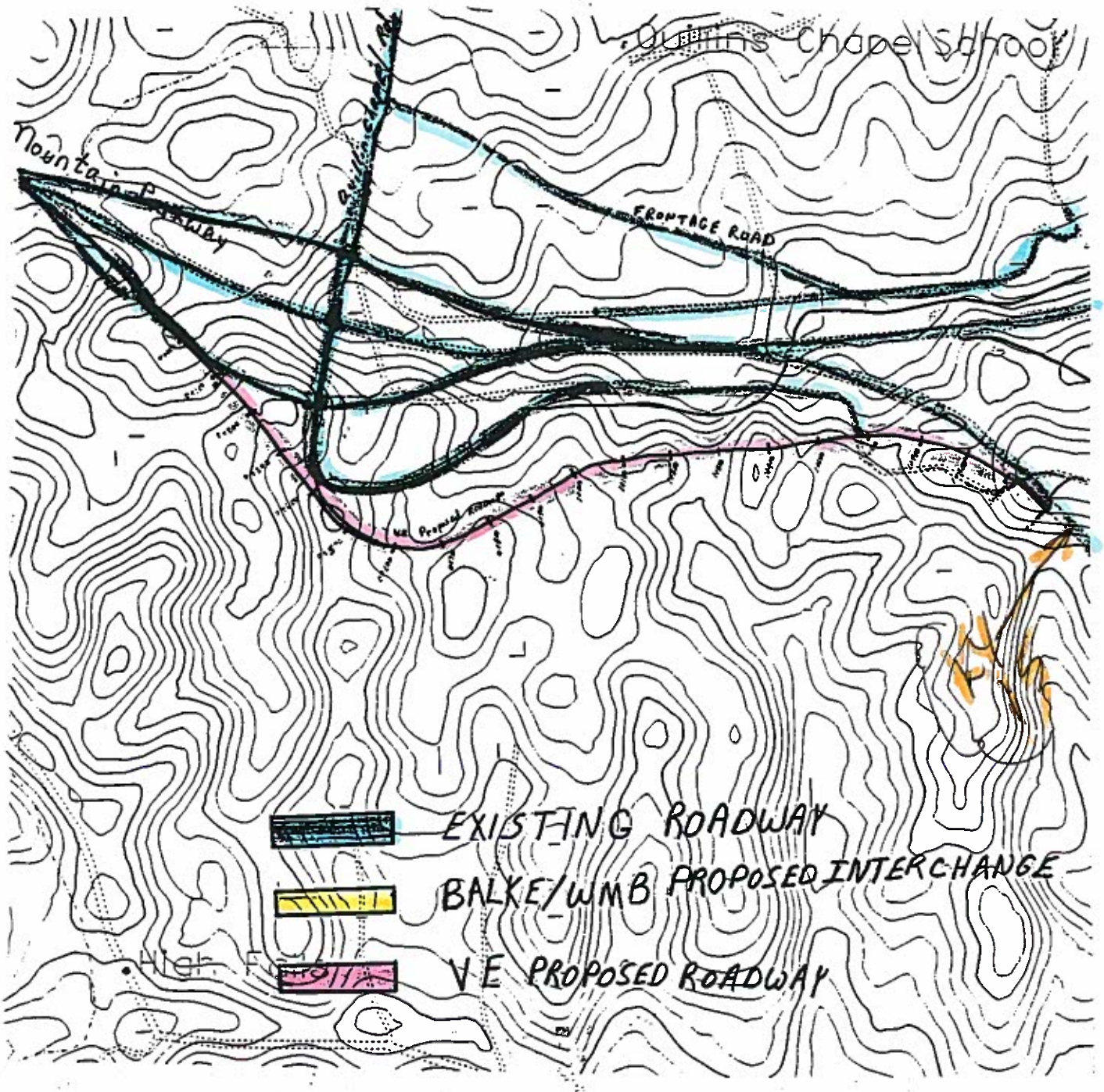
SKETCH OF ORIGINAL DESIGN



VALUE ENGINEERING RECOMMENDATION

FORM: 23 MARCH 1998

SKETCH OF RECOMMENDED DESIGN



CWB 8-20-98

VALUE ENGINEERING RECOMMENDATION

FORM: 23 MARCH 1998

CALCULATIONS

(Length) 2000 m of ROADWAY (width) 13.4 m template for lanes & shoulder = (Area) 26822 meters²

DGA = .1 m x 26,822 m² / surface area = 2682 m³ of DGA 1.5 t/m³ = 4,023 tons

4,023 x 15.01 = $60,385

Bit Base .1 m x 26822 m² / surface area = 2682 m³ of Bit Base 2.8 t/m³ = 7510 tons

7,510 tons x 35.27/ton = 264,888 ok

1¼" surface depth

Surface .03 m x 26822 m² surface area = 804 m³ of surface 2.8 t/m³ = 2251 ton

2,251 tons x 32.92 = 74,109

Excavation 2,753,784 m³ x 4.00 m³ = $11,015,136

EWS 8-22-98

FOR RAMP

USE 84" WIDTH @ BOTTOM

	A'm	BP+P	A.P.S. C'm	A(B+C)
0+00	24	84 1.54	3.6	2880 ·
1+00	25		37.5	3038 ·
2+00	35		52.5	4778 ·
3+00	28		42	3528 ·
4+00	23		34.5	2726 ·
5+00	29		43.5	3698 ·
6+00	16		24	1728 ·
7+00	23		34.5	2726 ·
8+00	28		42	3528 ·
9+00	16		24	1728 ·
10+00	20		30	2280 ·
11+00	16		24	1728 ·

ST. 34366 CU. FT.

CWS
8-28-98

	A	B	A·P F	C	A(B+C)	L
12+00	19	84	1.5	28.5	7138	·
13+00	22			33	2574	·
14+00	26			39	3198	·
15+00	22			33	2574	·
16+00	20			30	2280	·
17+00	20			30	2280	·
18+00	19			28.5	2138	·
19+00	14			21	1470	·
20+00	7			10.5	662	·

ST 19314 ✓

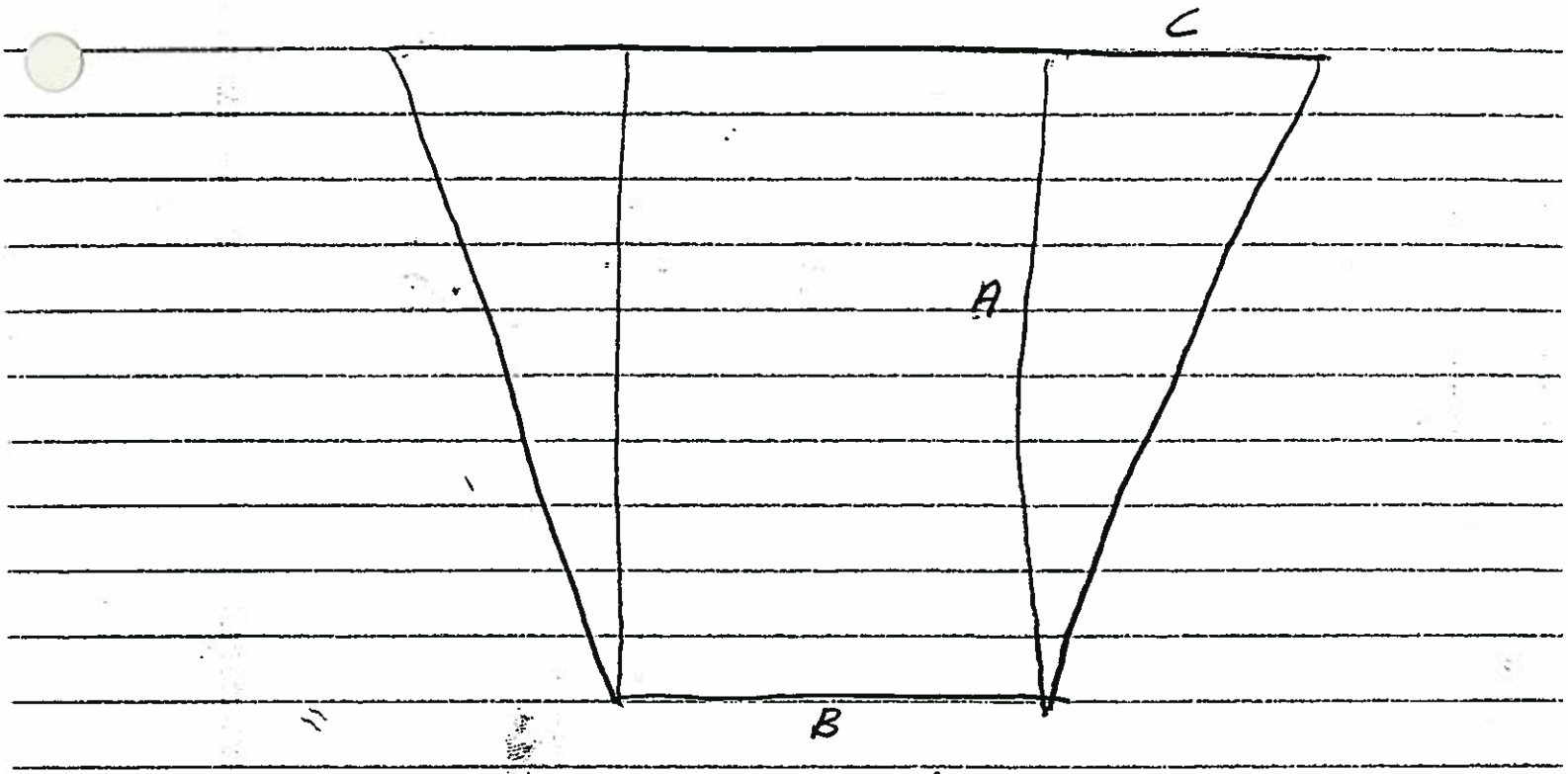
TOTAL 34366 ✓

53,680 ✓

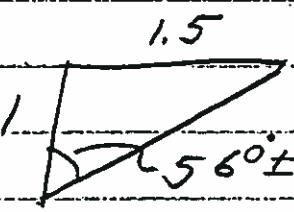
TOTAL CUBIC METERS ✓ ✓

53680 × 0.513 × 100m = 2,753,784 cu-m

✓ CWS 8-20-98



$A \times B + C \times B = A(B+C)$ ✓



$\tan 56° = C/A$

$A \cdot \tan 56° = C$

ADJUSTMENT FACTOR FOR Am + BFt @ 0400

84 Ft x .3048 = 25.6 m.

A	B	C	A(B+C)
24 m.	25.6 m.	36.	1478.

ADJUSTMENT FACTOR

1478/2880 = 0.513.

SECTION 4 - DESIGN SUGGESTIONS and COMMENTS.

Design Suggestions and Comments are presented in this section.

Design Suggestions are ideas that were, in the opinion of the team, good ideas, but were, for any of several reasons, not selected for development and writeup as a formal recommendation. Design Suggestions, by definition, have not been developed (proven) through team development and writeups. The team presents these ideas for further consideration by the owner and designer.

Design Comments are notes to the designer. These notes document various thoughts that come up during the course of the study. Some refer to possible problems. Some are suggested items that might need further study. Some are questions that the designer might want to explore. Many of these comments will most likely be things of which the designer is already aware. Because the study is done on a design in progress, there is never any way of knowing for sure the designer's intent. The comments are presented, in any event, with the thought that there might be a few comments that aid the designer in some way.

Design Comments (B8)
Revise Bridge Construction Cost

The cost to construct the 48 bridge structures (24 for each direction of traffic) is estimated at $33, 416,000, excluding engineering and contingency fees. Total length of the 24 bridges is 4177 feet, so total length for all 48 bridges is 2 × 4177 feet = 8354 feet. Approximate bridge width will be 48 feet and a current reasonable construction cost for these types of structures, excluding bridge MP 43.770, is $60 sq/ft. So construction cost, for all 24 structures, would be estimated at:

$$8354\text{ft} \times 48\text{ft} \times \$60/\text{ft}^2 = \$24{,}059{,}520, \approx 24{,}060{,}000$$

Bridge MP43.770 should have a higher unit cost since its substructure is quite tall. Additional cost of construction could be $20 sq./ft

$$275 \times 2 \times 48\text{ft} \times \$20/\text{ft}^2 = 528{,}000$$

Revised estimated construction cost= $24,060,000 +$528,000 = $24,588,000

Estimated plan Cost =	$33,416,000
Revised estimated cost =	$24,588,000
	$8,828,000

Design Comments (E-3)
Shift Alignment In Certain Areas

The grade and the alignment could be revised to reduce the excavation in two areas where the roadway was moved to improve geometrics. The roadway in first area, between station 105 + 500 and station 107 + 50, could be raised approximately twenty (20) meters, revising the alignment and reducing the excavation.

A similar situation exists at the second location, station 112 + 500 to station 114 + 500. Again the roadway could be raised and the alignment modified reducing the excavation. While the total dollar savings was not computed, it is a significant amount.

Design Comments (E-6)
Project Break Points

The project should be divided into contracts that allow the adjoining roads to influence the break points based on maintenance of traffic needs.

Design Comments (G-5)
Recycling Existing Bituminous Pavement

The existing bituminous pavement to be removed during construction may be recycled by adding the required components, such as an aggregate and liquid asphalt. Produced mix may be used as bituminous base and binder courses.

While it may not reduce the cost of proposed pavement, it will reduce the amount of waste by, approximately, 80,000 -100,000 m^3.

Design Comments (G-10)
Provide Relocation Utility

The only utility known to run longitudinally throughout the project length is the fiber optic line owned by AT&T. This phone line is approximately 25% below ground and 75% pole mounted. It is anticipated that the majority of this utility will require relocation due to the proposed roadway widening. This facility is located on AT&T owned property outside of the existing right-of-way. This property will need to be acquired to accommodate the proposed roadway improvement. The cost of the acquisition of right-of-way, to clear the new adjacent land and relocate this facility will be substantial.

In anticipation of this, we recommend that provision be made within the proposed right-of-way to accommodate the relocation of this utility. Providing an area within the proposed right-of-way to relocate this facility will eliminate the cost of property acquisition and clearing. Providing empty ducts for the relocation within the roadway reconstruction contract would allow the Transportation Cabinet greater control over the relocation costs of this facility.

We further recommend that future utility extensions be investigated and provided for within the right-of-way. The additional cost of providing areas, and possibly facilities such as empty ducts, can be recovered through leasing agreements or easement purchase.

It is not apparent if the cost of the relocation of this facility has been incorporated in the cost estimate for the Preferred Alternative. If not, the cost of this relocation should be added to the cost estimate for Utility Relocation.

It is anticipated that the following items will be required for the relocation of the facility under the Preferred Alternative are:

Property Acquisition = 48529 meters x 7 meters wide = 339703 sq. meters
Clearing = 50% of 339703 sq. meters = 169851 sq. meters
Fiber optical cable in conduit = 48529 meters @ $33/meter = $1,664,000

It is anticipated that the following items will be required for the relocation of the facility if area is provided within the right-of-way as recommended above:

Fiber optical cable in conduit = 48529 meters @ $33/meter = $1,664,000

APPENDICES

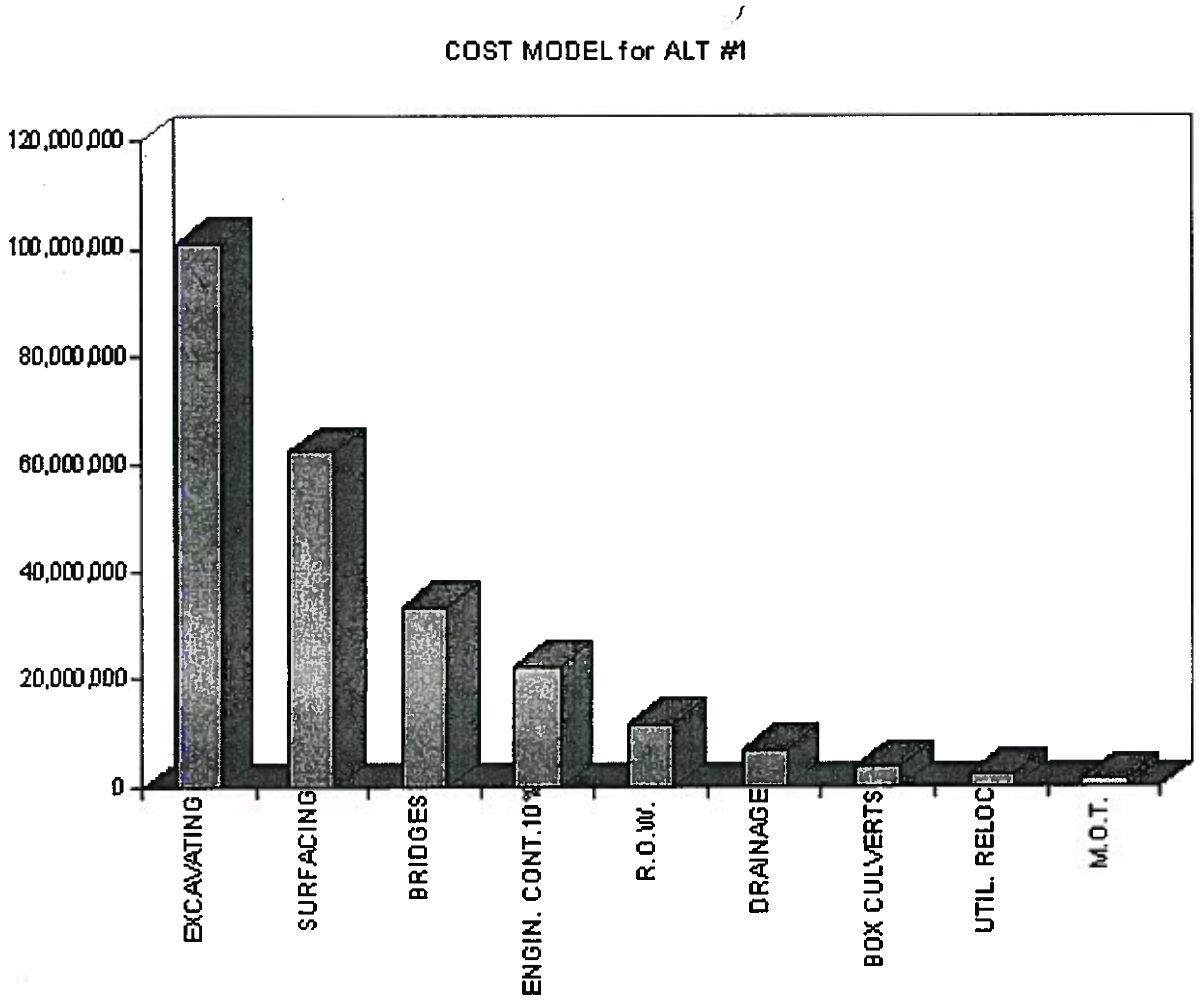
CONTENTS

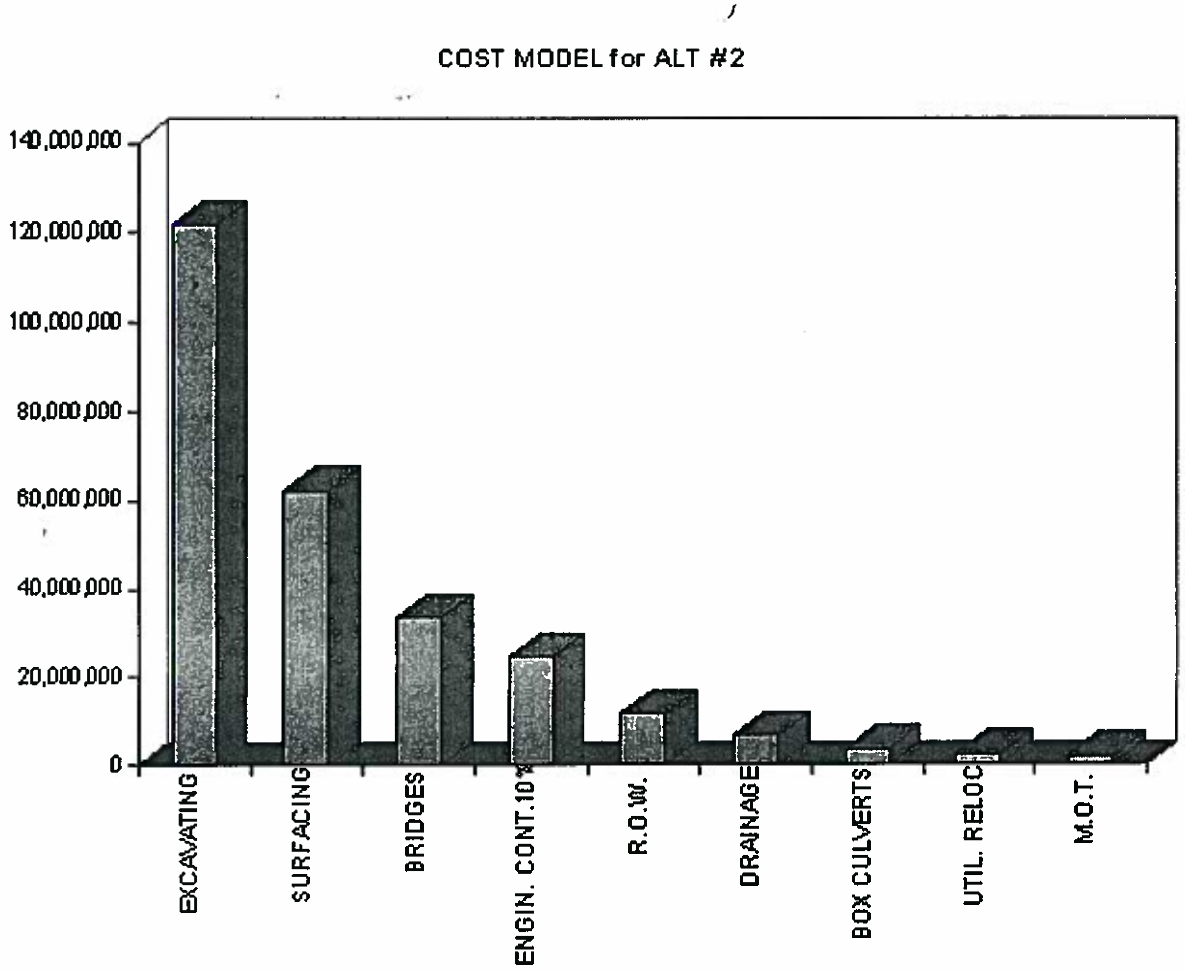
APPENDIX A.

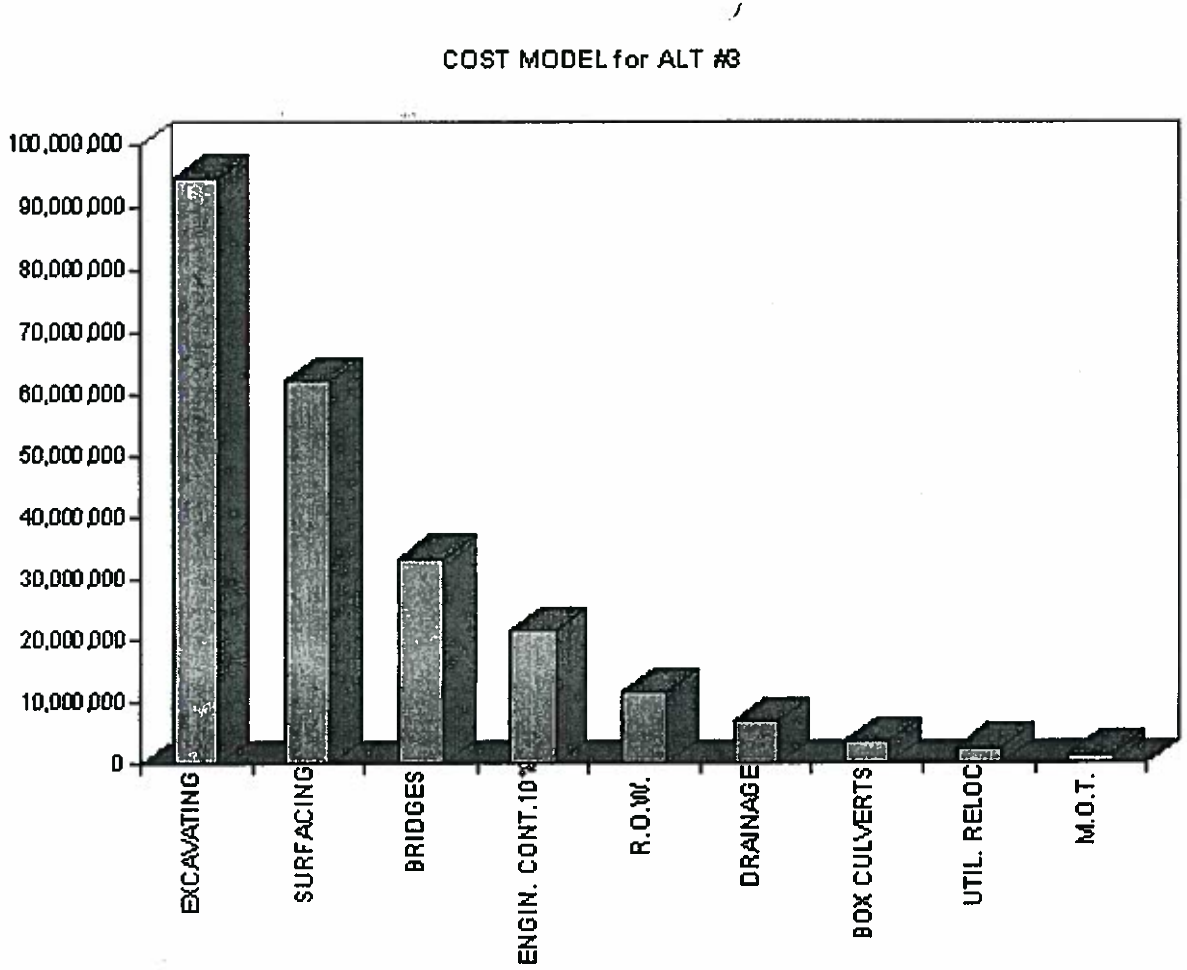
COST ESTIMATE

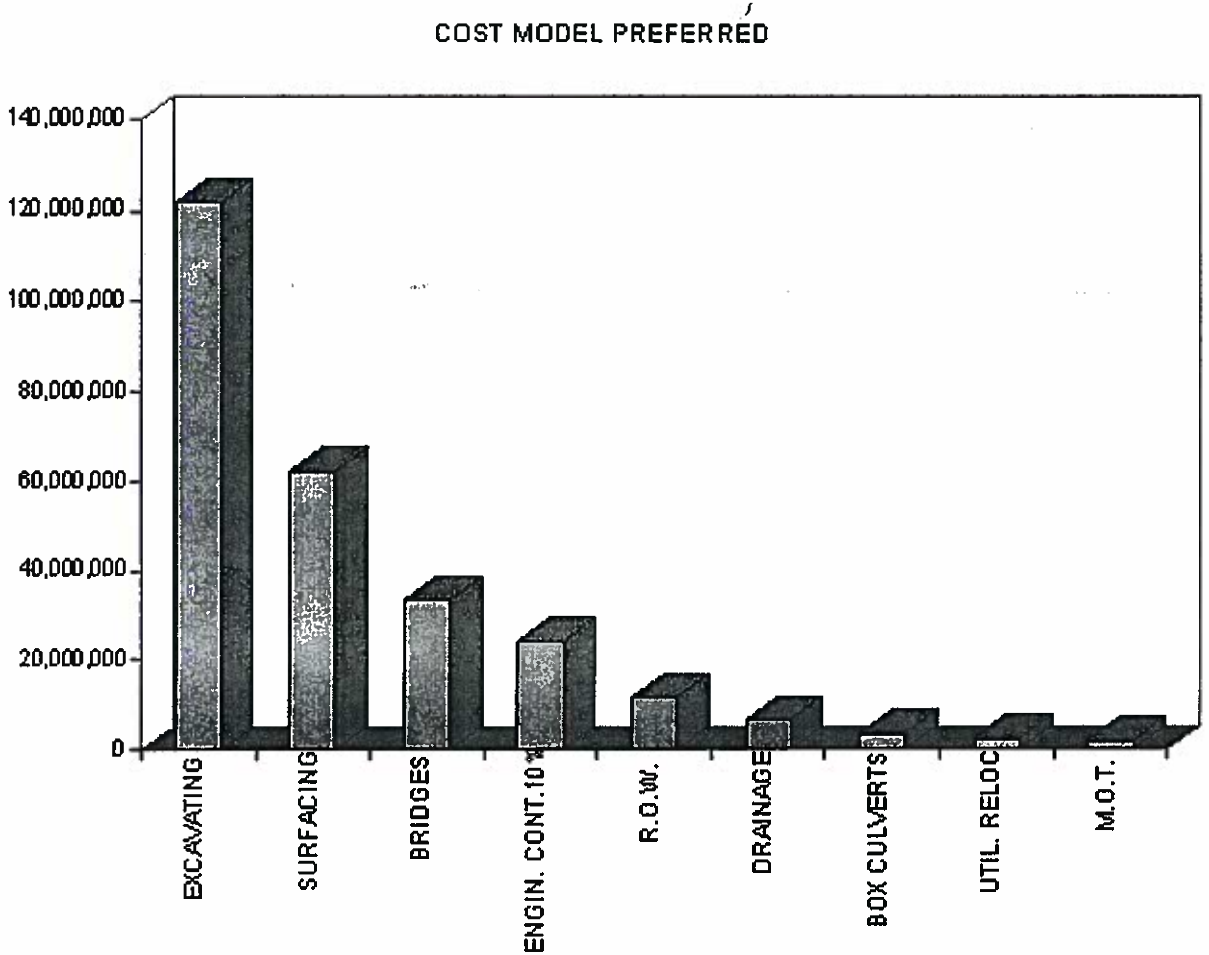
MOUNTAIN PARKWAY EXT. ITEM 10-126.000

ALT. NO.	EXCAVATION	SURFACING	DRAINAGE	BRIDGES	BOX CULVERTS	R.O.W. ACQUISITION	UTIL. RELOC.	M.O.T.	ENGINEERING	TOTAL COST
1	101,068,663	62,276,890	6,850,000	33,416,000	3,688,000	11,732,000	2,500,000	1,500,000	22,303,155	$245,334,708
2	121,909,859	62,276,890	6,850,000	33,416,000	3,688,000	11,732,000	2,500,000	2,000,000	24,437,275	$268,810,024
3	94,753,005	62,276,890	6,850,000	33,416,000	3,688,000	11,732,000	2,500,000	1,500,000	21,671,590	$238,387,485
Pre-ferred	122,010,948	62,276,890	6,850,000	33,416,000	3,688,000	11,732,000	2,500,000	2,000,000	24,447,384	$268,921,222


COST MODEL for ALT #1
120,000,000
100,000,000
80,000,000
60,000,000
40,000,000
20,000,000
0
EXCAVATING
SURFACING
BRIDGES
ENGIN. CONT.10%
R.O.W.
DRAINAGE
BOX CULVERTS
UTIL. RELOC
M.O.T.


COST MODEL for ALT #2
140,000,000
120,000,000
100,000,000
80,000,000
60,000,000
40,000,000
20,000,000
0
EXCAVATING
SURFACING
BRIDGES
ENGIN. CONT.10%
R.O.W.
DRAINAGE
BOX CULVERTS
UTIL. RELOC
M.O.T.


COST MODEL for ALT #3
100,000,000
90,000,000
80,000,000
70,000,000
60,000,000
50,000,000
40,000,000
30,000,000
20,000,000
10,000,000
0
EXCAVATING
SURFACING
BRIDGES
ENGIN. CONT.10%
R.O.W.
DRAINAGE
BOX CULVERTS
UTIL. RELOC
M.O.T.


COST MODEL PREFERRED
140,000,000
120,000,000
100,000,000
80,000,000
60,000,000
40,000,000
20,000,000
0
EXCAVATING
SURFACING
BRIDGES
ENGIN. CONT.10%
R.O.W.
DRAINAGE
BOX CULVERTS
UTIL. RELOC
M.O.T.

APPENDIX B.

As a part of the "Information Phase" of the study, the team analyzed the high cost areas of the project, to identify high cost-low value items of the project to focus on during the study. It can be seen in the function analysis table below, that the major item for concern is the excavation, with a value index of 1.22 (a value index which exceeds 1.0 causes concern). The team thus targeted "Excavation" as the area of focus for maximum savings and added value.

FUNCTION ANALYSIS, HIGH COST AREAS

ITEM	FUNCTION		TYPE	COST	WORTH	C/W, Value Index
	NOUN	VERB				
Excavation	Establish	Grade	B	122.0	188.0	1.22
Surfacing	Support	Road	B	62.3	62.3	1.00
Bridges	Span	Obstructions	B	33.4	30.0	1.11
Row	Provide	Area	B	11.7	10.0	1.17
Drainage	Remove	Water	B	6.9	6.9	1.0
Culvert	Remove	Water	B	3.7	3.7	1.0
Relocations	Remove	Obstacles	B	2.5	5.0	.50
M.O.T.	Maintain	Flow	B	2.0	1.5	1.33

APPENDIX B continued.

PROJECT FUNCTIONS

FUNCTIONS	TYPE[1]
Upgrade Standards	B
Accommodate Traffic	B
Satisfy Customer	RS
Maintain Safety	RS
Assure Quality	RS
Assure Convenience	RS
Minimize Maintenance	S
Construct Improvements	S
Secure ROW	S
Excavate Materials	S
Place Materials	S
Shape Roadway	S
Place Pavement	S
Install Drainage	S
Construct Bridges	S
Maintain Traffic	S
Dispose (of) Excess (excavated materials)	S
Construct Interchange	S

[1]B=Bridge, RS=Required Secondary, S=Secondary

APPENDIX C.

Upon completion of the of the "Information Phase" of the study, the VE team began the "Speculation Phase" of the study. The following list of ideas were compiled by the team as potentially worthwhile ideas to pursue and carry forward to the "Analysis Phase" of the study. We emphasize that during this phase of the study, the team is encouraged to be creative,and non-critical. Evaluation of ideas and judgement of the various thoughts is in the next phase (Analysis) of the VE methodology.

CREATIVE IDEA LIST[1]

B8	Review bridge cost estimate for accuracy
E1	Bifurcate sections
E3	Swift alignment in certain area.
E4	Raise profile approximately 1 meter
E5	Recycle existing pavement
E7	Modify typical section
G10	Provide utility relocation within row
G2	Detour traffic to eliminate interference in work areas
G6	Reconsider project breakpoints
G9	Reduce row
I11	Eliminate interchange at KY15

[1]B=Bridge, E=Excavation, G=General, I=Interchange

APPENDIX D.

REFERENCE DOCUMENTS	
DATE	TITLE
8/18/98	Project Scoping Report Perry Breathitt Wolf (KY15)
8/17/98	Mountain Parkway Extension Study (KY9009)
8/19/98	Quillin Chapel Road Interchange(Final Plans)
8/20/98	Pavement Design for US460 KY705 to KY205
8/20/98	1995 Average Unit Bids
8/18/98	Interchange Feasibility Study Bent T. Combs
1996	Avg. Unit Price of Metric Projects
4/94	Interchange Feasibility Study
7/97	Pavement Design
8/8/97	Traffic date for Interchanges (1997 and 2025)
5/29/98	Traffic date for Interchanges (1997 and 2025)
8/19/98	General HWY.. Map - Wolfe, Morgan, Magoffin Ctys.
8/19/98	Cost Estimate - Balke Engineers
8/12/98	Mountain Parkway Traffic Forecast
8/18/98	Working Cross-Sections - Balke Engineers

APPENDIX E.

FORM 20 AUG, 1998

WORKSHOP ATTENDANCE (PARTICPANTS)

Attendees				Participation							
				Meetings			Study Sessions(1)				
Name	Organization and Address (Organization first, with complete address underneath)	Tel # and FAX. (Tel first with FAX underneath)	Role in wk shop	Intro	Mid Wk Rev	Out Brief	Day 1	Day 2	Day 3	Day 4	Day 5
Dallas E. Montgomery	BRW H&E	502-583-2727	Conser. Eng.	X	X	X	X	X	X	X	X
Benjamin A. Goodman	BRW H&E	312-461-0267	Roadway Eng.	X	X	X	X	X	X	X	X
C. W. Seymour, Jr.	BRW H&E	502-583-2723	R/W Eng.	X	X	X	X	X	X	X	X
George J. Schober	BRW Inc.	847-364-8800	Traffic Eng.	X	X	X	X	X	X	X	X
Tony Bowling	KY DOT D - 10 Construction	606-666-8841	Resident Eng.	X	X	X	X	X	X	X	X
R. T. Wilson	KY DOT Geotechnical	502-564-2374	Geotechnical	X	X	X	X	X	X	X	X
Robert Semones	KY DOT Design	502-564-3280	Gathering Info.	X	X	X	X	X	X	X	X
Whaylon Coleman	Dames & Moore	502-672-3831	Tech. Recorder		X		X	X	X	X	X
Joe Waits	Dames & Moore	334-666-5892	Team Leader	X	X	X	X	X	X	X	X

Attendees Role in this workshop (column 4 of the form). Use more than one description if appropriate.
C = Consultant, D = Designer, DM = Design Manager, FM = Facility Manager, FO = Facility Operator, Ob = Observer,
Ow = Owner, PM = Project Manager, PrM = Program Manager, TM = Team Member, U = User

Note: (1) X = Present most of the day. O = Present, but not most of the day. FORM 20 AUGUST, 1998

APPENDIX F.

CONSULTATION RECORD			
NAME	SUBJECT	ORG.	TELEPHONE
Rod Wells	Detour Bridges	KYDOT	606-666-8844
Jay Watts	Detour Road	KYDOT	606-743-3812
Brian Billings	Detour Road	KYDOT	606-634-3943

APPENDIX G.
V. E. STUDY OPENING BRIEFING (DAY 1)
WIDENING OF PARKWAY EXTENSION
CAMPTON TO SALYERSVILLE
AUGUST 17, 1998

Gilbert Newman	Balke Engineers	606-271-7545
Roger Foster	Balke Engineers	606-271-7545
Karing Siahkovhi	Balke Engineers	606-271-7545
George Schober	BRW Inc.	847-364-8800
Diane Castle	Div. Of Operation CO Frankfort	502-564-4550
Joe Waits	Dames & Moore	334-666-5897
Daryl Greer	KTC- Hwy.. Design	502-583-2723
Stuart Goodpaster	KYTC Bridge Design	502-564-4560
Robert Semones	KYTC Hwy.. Design	502-564-3280
Joette Fields	KYTC Hwy.. Design	502-564-3280
Jim Bauer	KYTC Co. R/W & u	502-564-3210
R.T. Wilson	KYTC Div of Material Geotech	502-564-2374
Tony Bowling	KYTC D - 10	606-439-4858
Brent Weddington	KYTC D - 10 Design	606-666-8841
Benjamin Goodman	BRW - H & E	312-481-0267
Dallas Montgomery	BRW- H & E	502-583-2723
C.W..Seymour Jr.	BRW - H & E	502-583-2723

The value engineering team traveled to the Natural Bridge State Park on Sunday, 16 August, 1998, and spent the night at "Lil Abner" Motel in preparation for the design team briefing and site visit on Monday morning.

Robert Semones, VE Coordinator for KTC, opened the meeting at 9:30 AM in the dining room conference room at the Natural Bridge State park. After introductions, he welcomed the participants

and explained the project to be value engineered during the week. He introduced Joe Waits, VE consultant and team leader, representing Dames and Moore. Joe explained the VE process to be followed by the VE team during the week-long study. He emphasized the "VE Job Plan" and the classic VE methodology used by VE teams. He further emphasized that the team would be looking for alternatives which would add "value" to the project by reducing cost while maintaining project quality and customer satisfaction.

Gilbert Newman, representing Balke Engineers, design engineers for the project, then briefed the team on the details of the project.

- Used digitized Quad Sheets, no aerial photos available.
- The existing roadway does not meet current design standards.
- Basically follows streams which minimizes excavation.
- Design avoids streams to minimize environmental impact.
- Looked at four alternatives. #4 is preferred. Minimizes work on the stream side.

Roger Foster, also of Balke Engineers, then briefed the group. Roger discussed the route and proposed solutions from the beginning to the end of the project.

- Max grade is 7%. Average is 3-4%.
- 250 properties in ROW.
- No problems noted with utilities or historic preservation.
- Fiber optic cable will be involved. Some gas lines and electrical transmission lines.
- Concept avoids "blue line streams"
- Cemetery may be in ROW.
- No sliding problems noted.
- Slopes- 1.25 to 1.0.
- Sandstone/shale cuts up to 300'.
- 19 million plus cm excavation quantity.
- No problems anticipated with MOT during construction. Crossovers and bridges required.
- No disposal areas for excavated material.
- Material suitable for subgrade down
- Subgrade up will require haul distance up to 30 miles
- Asphalt pavement throughout

The meeting ended with a general discussion to clarify issues unclear to the VE team. The group was then taken on a tour of the site, which was completed at approximately 2 pm.

APPENDIX H.

PRESENTATATION CONFERENCE

Wolfe-Morgan-Magoffm Counfies

Mountain Parkway Extension

Widening from Campton to Salyersville

August 21, 1998

A presentation conference for the subject value engineering study was held on the 1st floor training room of the KYTC headquarters in Frankfort, Kentucky, at 10:00am on Friday, August 21, 1998. The meeting was opened by Robert Semones, who welcomed the attendees and expressed his appreciation for their attendance participation in the VE program. He introduced attendees and explained the project goals for the VE study. Joe Waits, team leader for the study, explained the VE process and the team activities for the week-long study. He emphasized that there was much for the team to do in the 5-day compressed schedule, which prevented the development of as much detail as the team would like. However, he pointed out, the team did have several potentially "value adding" ideas to present which could result in impressive savings. He expressed thanks to the design team and the value engineering staff for a job well done.

Each of the four recommendations as well as the list of design comments were presented by team members. A discussion followed, with the team answering questions to clarify proposals.

ATTENDEES

Joe Waits	Dames and Moore	334-666-5892
C. W Seymour	BRW- Hazelet and Erdal	502-583-2723
Robert Semones	KYTC Design	502-564-3280
Joette Fields	KYTC Design	502-564-3280
Dallas Montgomery	BRW- H&E	502-583-2723
Tony Bowling	KYTC- D-10 Const	606-666-8841
Daryl Greer	KYTC- Hwy Design	502-564-3280
Roger Foster	Balke Eng.	606-271-7545
Gilbert Newman	Balke Eng.	606-271-7545
Karim Slahkoohi	Balke Eng.	606-271-7545
George Schober	BRW	847-364-8800
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Jim Smith	HMB	502-695-9800
Larry Irish	KYTC Traffic	502-564-3020
Greg Smith	KYTC R/W UTIL	502-564-3210
Ben Goodman	BRW/ H& E	312-461-0267
David Kratt	KYTC C. O. Des	502-564-3280
W. Modele	D-10 Precast	606-666-8841
Brent Weddington	D-10 Precast	606-666-8841
Rokshad Faizi Khan	D-10 Design	606-666-8841

Any questions or comments regarding this report should be sent to

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END OF REPORT