

Value Engineering Study



FINAL REPORT

KY 15 - KY 28 to HADDIX

Item #10-285.00 and #10-286.00

Study Date: November 16 - 20, 1998

for

Kentucky Transportation Cabinet (KTC)

Frankfort, Kentucky

December 7, 1998



DAMES & MOORE

A DAMES & MOORE GROUP COMPANY

VE 199804

**KY 15 - KY 28 to HADDIX
Item #10-285.00 and #10-286.00**

**VALUE ENGINEERING STUDY
for
KENTUCKY TRANSPORTATION CABINET
FRANKFORT, KENTUCKY**

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EXECUTIVE SUMMARY

This report documents the results of a value engineering study of the Reconstruction of KY 15, from the vicinity of KY28 to Haddix, KY. The value engineering study team consisted of BRW, Inc., an affiliate firm of Dames & Moore, and KYTC personnel under the leadership of a PE/CVS team leader from Dames & Moore, Inc. The study was for, and under the direction of the Transportation cabinet.

Project Description

The project is the reconstruction of KY 15 from the vicinity of Ky 28 to Haddix, KY. The existing KY 15 roadway is primarily a two-lane facility with passing lanes at steep grades. The project adds two lanes and upgrades the roadway to current design standards. The value engineering study focused on a segment of KY 15 from the beginning of the project at Station 10 + 100, near KY28, to Station 27 + 741, near Haddix, KY.

Estimate of Construction Cost

The value engineering team was furnished a cost estimate prepared by the design agent, WMB, Inc., dated 20 October, 1998. The total estimated cost of the preferred alternatives, including 10% engineering and contingencies, is \$163,271,377.

Recommendations

The value engineering recommendations are presented in Section 3 of the report. The proposals presented are the result of an intensive effort by the Value Engineering Team, and are intended to reduce project costs where possible consistent with project requirements and design standards. Ideas are developed by the VE team in concept only, with final design and approval by the design team and the Kentucky Transportation Cabinet.

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 WMB, Inc. 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

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Darrin Beckett, PE	Geotech- KYTC	502-564-2374
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SECTION 1 - INTRODUCTION

This report documents the results of a value engineering study of a segment of KY 15 - KY 28 to Haddix, Kentucky. The study was conducted during the period 16-20 November 1998, at the Kentucky Transportation Cabinet (KYTC) Offices, Frankfort, Kentucky.

The study was under the direction of Mr. Robert Semones, KYTC Value Engineering Manager. The study team consisted of personnel from Dames and Moore, Inc., and the KYTC. The team leader was a PE/CVS from Dames and Moore, Inc. The subject of the study was Phase I design documents, prepared by WMB, Inc. for the KYTC.

The Job Plan.

The study followed a five-step job plan endorsed by SAVE International, the professional organization of value specialists.

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 is called primarily to look for ways to add value to the project by suggesting 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 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.

Cost Estimate.

The current estimate of construction cost was used as a base line for study. For the study to be valid, the base line estimate must be reasonable. Not only must there be a reasonable estimate of total cost of construction, but there must also be a true breakdown of intermediate parts of the estimate. Most VE recommendations compare the life cycle cost of the recommendation to the life cycle cost of the corresponding part of the existing design. To show a realistic comparison between the cost of the recommendation, and the cost of the part of the design being altered, it is important that the cost breakdown in the existing estimate, for this design part, reflect a true picture of the part.

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 can be found in Section 3 of this report. A full list of all VE ideas generated in this study can be found in Appendix B.

Design Suggestions.

Some ideas that did not make the selection for development as recommendations, were, nevertheless, 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.

Summary of Decisions.

At the end of this report, in Appendix F, there is a place to record the owner's and designer's response to recommendations put forth in this study. As decisions regarding recommendations are made, these decisions can be recorded here for future reference, thus making this report complete in that it contains both the recommendations, and the response to those recommendations.

SECTION 2 - PROJECT DESCRIPTION

The Value Engineering Study covers project numbers 10-285 and 10-286, a KY 15 segment, beginning at KY 28 north of Hazard, Kentucky, and ending in the vicinity of Haddix, Kentucky, (Stations 10 + 100 to 27 - 741). See the location drawings on the following pages.

The existing roadway is a Rural or Urban type. There are two lanes with passing lanes on the hills. Rural sections of KY 15 have two 12-foot lanes with 10-foot shoulders, and 6-foot ditches. In areas with passing lanes there are three 12-foot lanes with 10-foot shoulders.

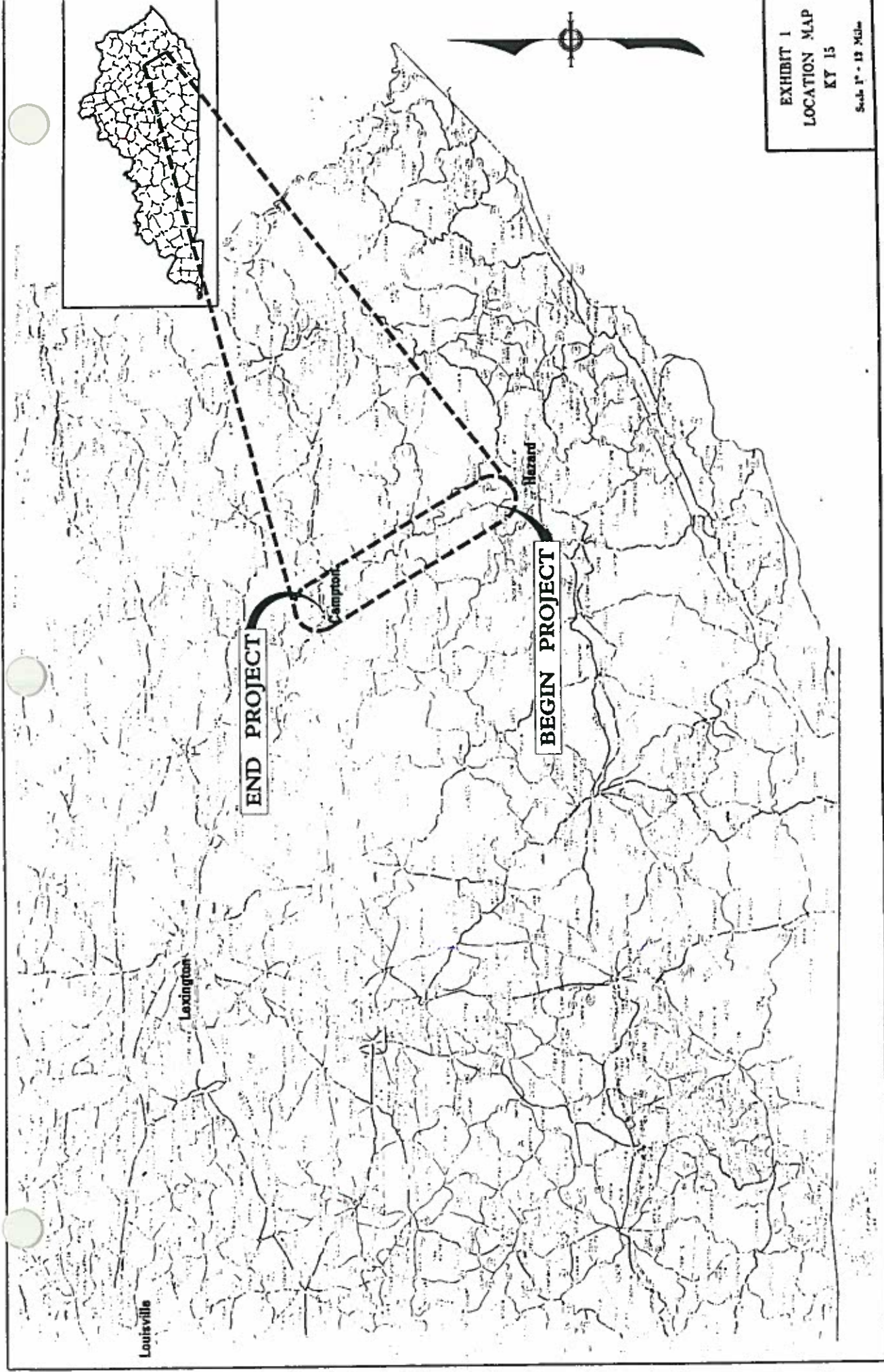
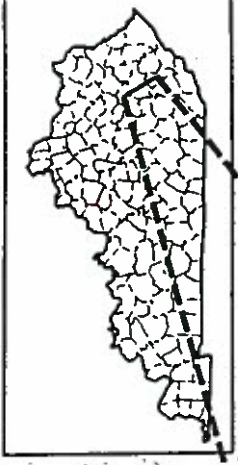
The existing horizontal alignment follows the meanders of the North Fork of the Kentucky River and the larger creeks, creating numerous curves and restricted passing. Maximum horizontal curve is 6.5 degrees and the vertical alignment has a maximum vertical grade of six percent.

The proposed project for widening and upgrading of the roadway is as follows:

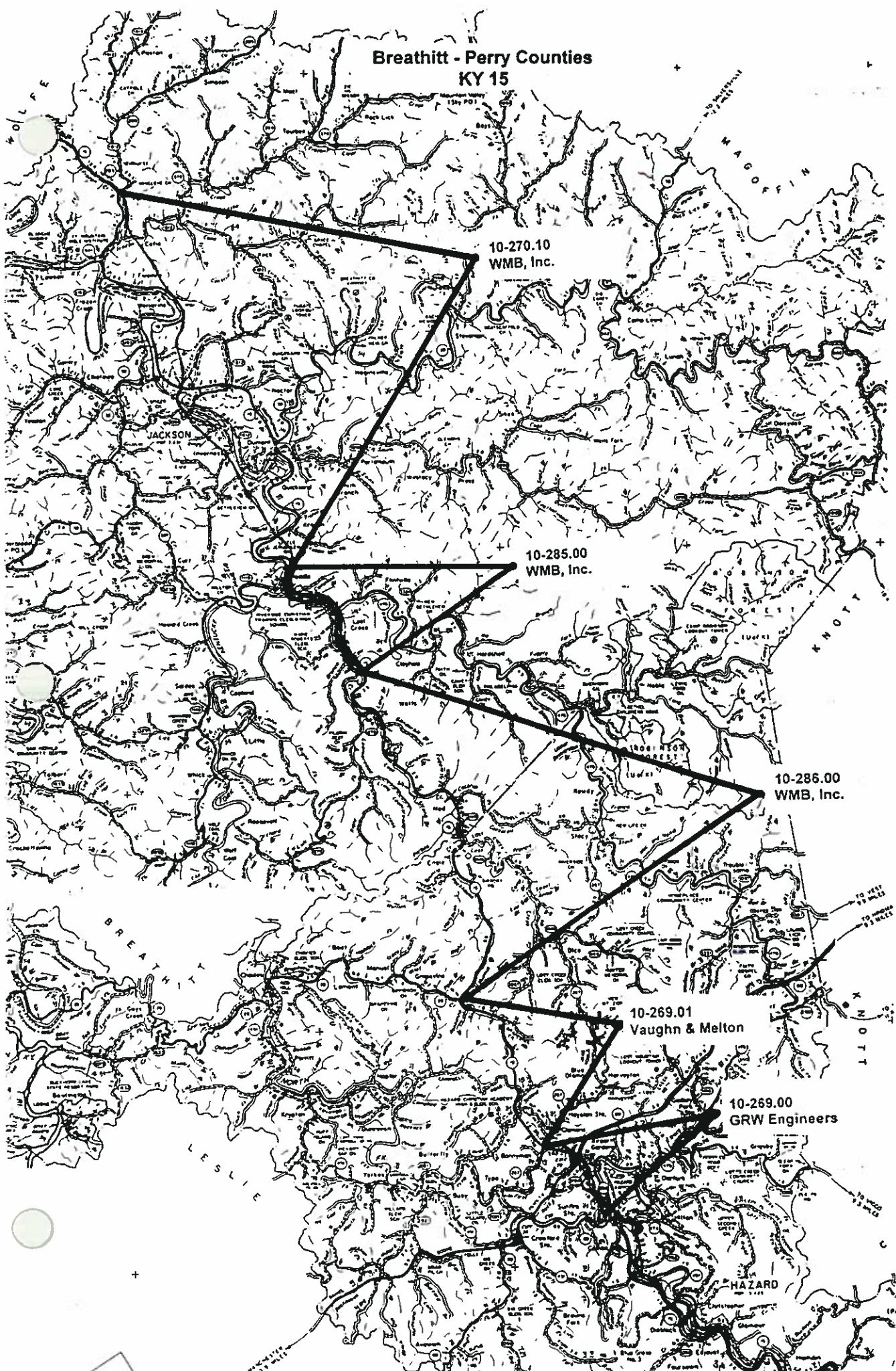
Length:	10.96 miles
Design Speed:	60 mph
No. of Lanes:	4
Pavement Width:	24 feet
Shoulder Width:	12 feet
Ditch Width/Slope:	18 feet at 6:1
Median Width/Type:	40 feet depressed
Min. Bridge Widths:	38 feet
Design Year:	2015

The proposed roadway generally follows the existing alignment and has a 60 mph design speed with two 12-foot traffic lanes in each direction, 11-foot shoulders, and 18-foot ditches on a 6 to 1 slope. The minimum clear roadway width for all new structures would be the same as the approach roadway width. A 40-foot depressed median would be used to separate the directions of travel. The maximum allowable curve would be 4.75 degrees, and a maximum vertical grade of 6 percent would be allowable.

EXHIBIT 1
LOCATION MAP
KY 15
Scale 1" = 12 Miles



Breathitt - Perry Counties
KY 15



10-270.10
WMB, Inc.

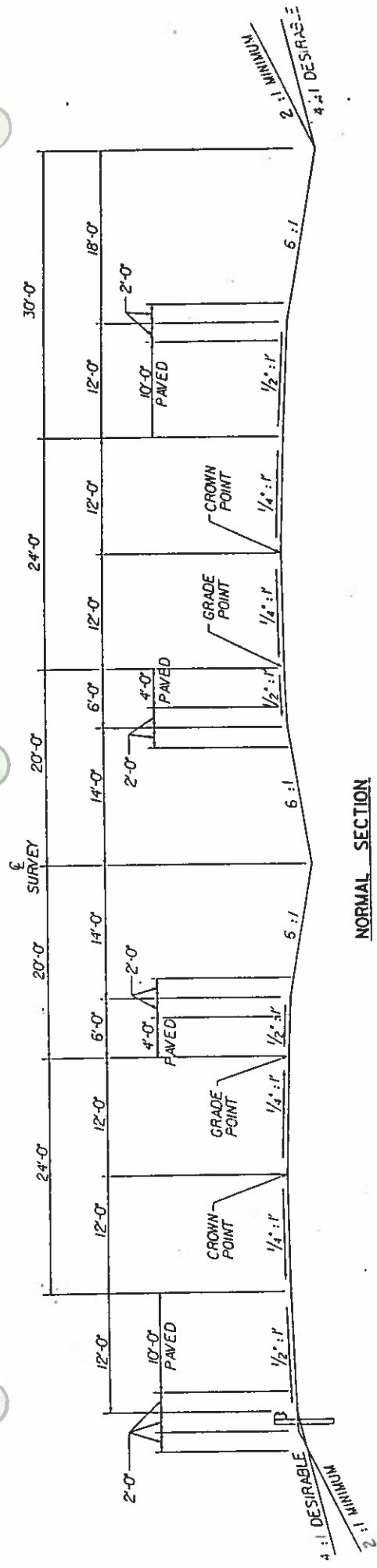
10-285.00
WMB, Inc.

10-286.00
WMB, Inc.

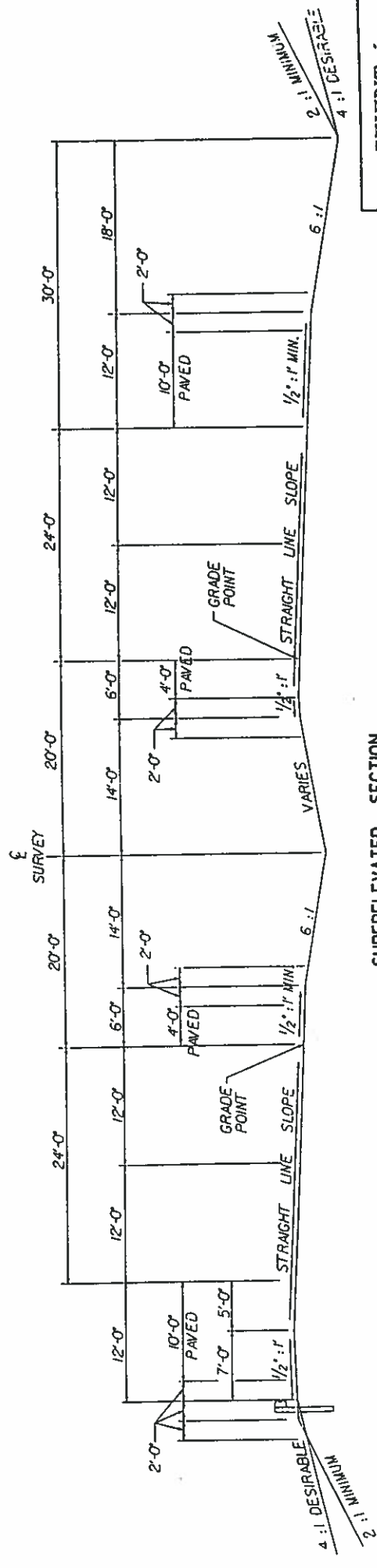
10-269.01
Vaughn & Melton

10-269.00
GRW Engineers

TYPICAL SECTIONS



NORMAL SECTION



SUPERELEVATED SECTION

EXHIBIT 5
TYPICAL
SECTIONS
KY 15
HAZARD - CAMPTON ROAD
NOT TO SCALE

SECTION 3 - SUMMARY OF 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” 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.

SUMMARY OF RECOMMENDATIONS

The following table offers a convenient overview of all recommendations and a potential savings for each. Recommendations 1 and 1a and 3 and 3a are mutually exclusive and only one of these recommendations can be implemented.

Number	Title	Original Cost	VE Recommendation Cost	Savings
1.	Raise grade in major cut areas/full diamond interchange.	\$121,606,212	\$109,917,658	\$11,688,554
1a.	Raise grade in major cut areas/half diamond interchange.	\$121,606,212	\$110,564,45	\$11,041,754
2.	Bifurcation.	\$103,640,000	\$101,508,000	\$2,132,000
3.	Reduce median width in cut areas.	\$103,640,000	\$96,061,400	\$7,578,000
3a.	Reduce median width/with barriers	\$103,640,000	\$89,697,800	\$13,942,200

VALUE ENGINEERING RECOMMENDATION #1

VALUE ENGINEERING RECOMMENDATION #1

PROJECT: Item No. 10-285.0 & 10-286.0

LOCATION: KY15 from KY28 to Haddix, Perry-Breathitt Counties

STUDY DATE: November 16, 1998 through November 20, 1998

TEAM MEMBER RESPONSIBLE FOR WRITE UP: Brian R. Billings

FUNCTION OF COMPONENT BEING CHANGED: Vertical alignment.

DESCRIPTIVE TITLE OF RECOMMENDATION: Raise grade of vertical alignment in areas of large excavation. These areas include:

Area 1 - approximate Station 10+200 through approximate Station 14+000,

Area 2 - prior to equation - approximate Station 24+500 through approximate Station 27+500,

Area 3 - after the equation - approximate Station 24+500 through approximate Station 27 +900.

ORIGINAL DESIGN:

Area 1: Following table summarizes vertical alignment:

Vertical Alignment Component	Grade(%)	Station	Elev.(m)	Length(m)
Back Tangent	-2.44266			
PVI #1		10+200	318	100
Tangent	-0.8334			
PVI #2		10+500	315.5	350
Tangent	5.4375			
PVI #3		11+300	359	950
Tangent	-3.0303			
PVI #4		12+125	334	325
Tangent	4.83528			
Alignment between Alternate 9 and Alternate 2 overlaps Tangent.				
PVI #5		12+950	373.8	1300
Tangent	-6			
PVI #6		13+825	321.3	200
Forward Tangent	-2.595			

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs	Total LC Costs
ORIGINAL DESIGN	\$121,606,212		\$121,606,212
RECOMMENDED DESIGN	\$109,917,658		\$109,917,658
ESTIMATED SAVINGS OR (COST)	\$11,688,554		\$11,688,554

VALUE ENGINEERING RECOMMENDATION # 1

Area 2: Following table summarizes vertical alignment:

Vertical Alignment Component	Grade(%)	Station	Elev.(m)	Length(m)
Back Tangent	0.5			
PVI #1		25+550	239.2	150
Tangent	1.787			
PVI #2		26+300	252.6	500
Tangent	-2.012			
PVI #3		27+150	235.5	150
Forward Tangent	-0.556			

Area 3: Following table summarizes vertical alignment:

Vertical Alignment Component	Grade(%)	Station	Elev.(m)	Length(m)
Back Tangent	1.06			
PVI #1		24+550	235.5	200
Tangent	3.4			
PVI #2		26+450	300.1	900
Tangent	-2.42			
PVI #3		27+800	267.43	250
Forward Tangent	1.6			

RECOMMENDED CHANGE: The VE Team recommends raising the grades through major cut areas to reduce the amount of roadway excavation quantities. The following areas have been selected because they are not constrained to follow the existing corridor.

Area 1: Raising the grades in this area requires the modification of the at-grade intersection at approximate Station 10+500 to a separated-grade diamond intersection(see Figure 1). The at-grade intersection at Station 12+100 would be closed on the left and the approach to the right would have to be relocated. Following table summarizes an approximate vertical alignment. The final vertical alignment requires further study and evaluation.

Vertical Alignment Component	Grade(%)	Station	Elev.(m)	Length(m)
Back Tangent	-2.44266			
PVI #1		10+300	315.557	400
Tangent	6			
PVI #2		11+200	369.557	1000
Tangent	-3.6			
PVI #3		12+020	340	500
Tangent	4.78			
PVI #4		12+900	382	1000
Tangent	-5.93			
PVI #5		14+000	316.758	300
Forward Tangent	-2.595			

VALUE ENGINEERING RECOMMENDATION # 1

Area 2: Following table summarizes an approximate vertical alignment. The final vertical alignment requires further study and evaluation.

Vertical Alignment Component	Grade(%)	Station	Elev.(m)	Length(m)
Back Tangent	0.5			
PVI #1		25+400	238.45	200
Tangent	2.5			
PVI #2		26+330	261.7	600
Tangent	-3.2			
PVI #3		27+150	235.5	200
Forward Tangent	-0.556			

Area 3: Following table summarizes an approximate vertical alignment. The final vertical alignment requires further study and evaluation.

Vertical Alignment Component	Grade(%)	Station	Elev.(m)	Length(m)
Back Tangent	1.06			
PVI #1		24+550	235.5	300
Tangent	4.4			
PVI #2		26+340	314.26	900
Tangent	-3.2			
PVI #3		27+800	267.43	250
Forward Tangent	1.6			

VALUE ENGINEERING RECOMMENDATION # 1

ADVANTAGES:

1. Reduction in quantity of Roadway Excavation,
2. Reduction in area for Clearing and Grubbing,
3. Reduction in Right-of-way needed,
4. Matches existing vertical alignment between approximate Station 12+000 -13+000
5. Allows further manipulation with intersection of existing KY15

DISADVANTAGES:

Steeper grades in vertical alignment,

1. Drainage impact/ fill areas.

JUSTIFICATION:

Roadway Excavation constitutes 67% of total construction costs in the preliminary estimates. The VE team felt this could be reduced by changing grades in areas of the projects that were not constrained by the vertical alignment of the existing corridor. These areas were defined previously in this report. They are discussed separately below:

Area 1 - This area had constraints of the at-grade intersections at approximate Station 10+500 and approximate Station 12+100. Raising the grade through this section saves approximately 1694317.5 cubic meters of roadway excavation. There are additional costs associated with changing the at-grade intersection to a separated-grade diamond intersection at approximate Station 10+500. These costs are summarized in the calculations. The improvement of the facility from an at-grade to a separated-grade intersection is an improvement that cannot be quantified in construction costs. These benefits are summarized in Design Comment #4 included in this report. Changing to the separated-grade intersection reduces the constraints of the at-grade intersection and allows the grades to be raised throughout the entire area. These changes work in conjunction for a total saving of \$5,027,270 for this area.

Area 2 Raising the grade through this section saves approximately 491591 cubic meters of roadway excavation. This constitutes a total savings of \$1,966,364 for this area without any reduction in the design standards.

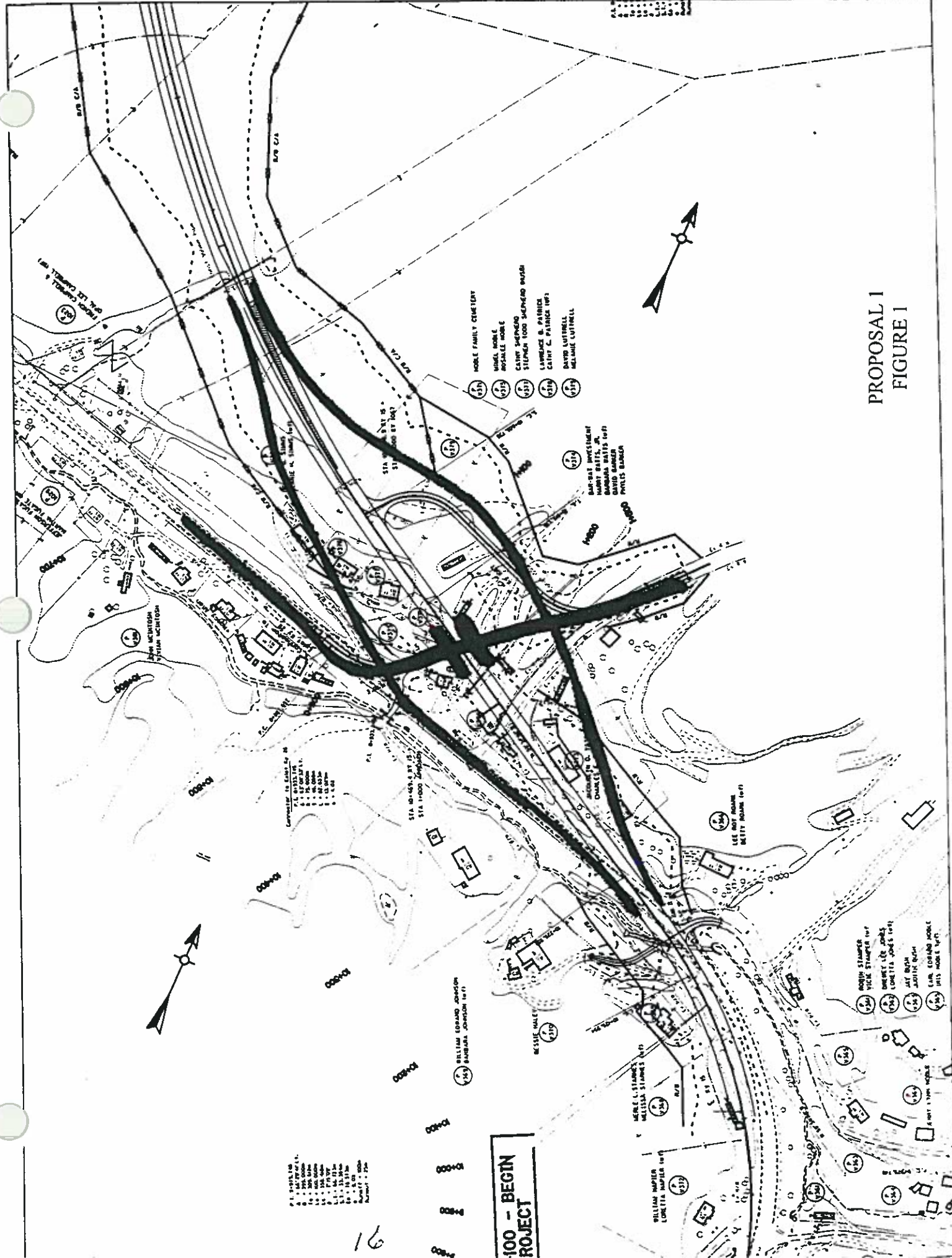
VALUE ENGINEERING RECOMMENDATION # 1

Area 3 Raising the grade through this section saves approximately 1,116,046 cubic meters of roadway excavation. This constitutes a total savings of \$4,464,184 for this area without any reduction in the design standards.

VALUE ENGINEERING RECOMMENDATION #1

COST ESTIMATE - FIRST COST

Cost Item	Units	Unit Cost	Source Code	Original Design		Recommended Design	
		\$/Unit		Num of Units	Total \$	Num of Units	Total \$
Excavation	Cu.M.	4		20,735,410	\$ 82,941,640	17,433,456	\$ 69,733,824
10+400 Twin Span PCIB Bridge	LP SUM	646800				1	\$ 646,800
DGA	M TON	12.76		494,888	\$ 6,314,771	500,888	\$ 6,391,331
BASE	M TON	30.76		365,902	\$ 11,255,146	369502	\$ 11,365,882
SURFACE	M TON	31.62		44,096	\$ 1,394,316	44816	\$ 1,417,082
Excavation	Cu.M.	6		3,283,390	\$ 19,700,340	3393790	\$ 20,362,740
Totals					121606211.9		109917658.3



PROPOSAL 1
FIGURE 1

100 - BEGIN
PROJECT

- 1. 100' x 100'
- 2. 100' x 100'
- 3. 100' x 100'
- 4. 100' x 100'
- 5. 100' x 100'
- 6. 100' x 100'
- 7. 100' x 100'
- 8. 100' x 100'
- 9. 100' x 100'
- 10. 100' x 100'
- 11. 100' x 100'
- 12. 100' x 100'
- 13. 100' x 100'
- 14. 100' x 100'
- 15. 100' x 100'
- 16. 100' x 100'
- 17. 100' x 100'
- 18. 100' x 100'
- 19. 100' x 100'
- 20. 100' x 100'

16

VALUE ENGINEERING RECOMMENDATION # 1

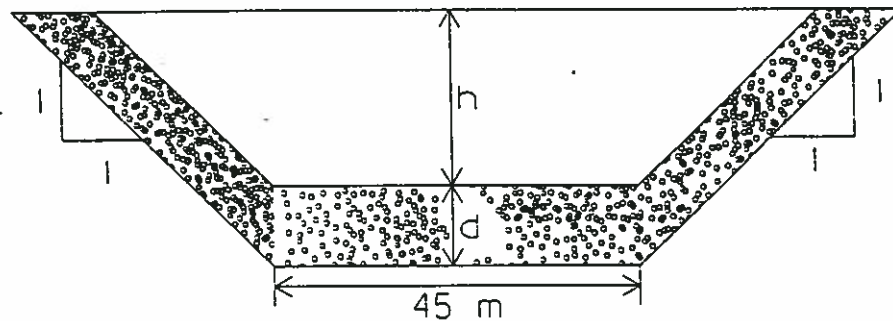
CALCULATIONS

EXPLANATION OF VOLUME CALCULATIONS:

In the scope of and time allowed to prepare a VE Recommendation that require extensive volume calculations, we employed a method to give a “rough” approximation of the amount of roadway excavation that could be reduced. We employed a standard template that modeled the shape of a trapezoid (see Figure 3). This template was applied to the centerline stations along a projected alignment profile that went through a “cut” section. We are aware that this does not take into account areas that represent “side-hill” excavation. This method was employed to determine if there would be enough savings that would warrant further study and consideration.

VALUE ENGINEERING RECOMMENDATION # 1

EQUATIONS DERIVED FOR AVERAGE END AREA CALCULATIONS



Difference in area
between WMB & VE

Note: Rock slopes assumed 1:1

EQUATIONS USED FOR AREA CALCULATIONS

$$\text{WMB END AREA} = 45 \cdot (h + d) + (h + d)^2$$

$$\text{V.E. END AREA} = 45 \cdot h + h^2$$

VALUE ENGINEERING RECOMMENDATION #1

ROADWAY EXCAVATION REDUCTION CALCULATIONS

AREA 1 Approximate Stations 10+200 through Stations 13+500

Station	"d" (m)	"h" (m)	WMB area	VE area	Reduction (m ²)	C.M. (m ³)
10+240	0	0	0	0	0	5760
10+300	3	8	616	424	192	9735
10+340	4.5	8	718.75	424	294.75	8842.5
10+400	0	0	0	0	0	
10+470	8.5	1	517.75	46	471.75	111507.5
10+600	12.5	21	2629.75	1386	1243.75	62293.75
10+650	13	19	2464	1216	1248	89180
10+720	13	21	2686	1386	1300	62692.5
10+780	13.5	0	789.75	0	789.75	11846.25
10+810	0	0	0	0	0	
10+900	0	0	0	0	0	25200
10+950	16	1	1054	46	1008	107870
11+020	17	30	4324	2250	2074	140720
11+100	19	6	1750	306	1444	333300
11+250	15	70	11050	8050	3000	237000
11+370	10	20	2250	1300	950	47500
11+470	0	0	0	0	0	

VALUE ENGINEERING RECOMMENDATION #1

ROADWAY EXCAVATION REDUCTION CALCULATIONS

AREA 1 Approximate Stations 10+200 through Stations 13+500

Station	"d" (m)	"h" (m)	WMB area	VE area	Reduction (m ²)	C.M. (m ³)
11+600	0	0	0	0	0	6300
11+650	4	7	616	364	252	15172.5
11+710	3.5	12	937.75	684	253.75	17625
11+770	2.5	43	4117.75	3784	333.75	18471.25
11+840	2	25	1944	1750	194	10670
11+950	0	0	0	0	0	12900
12+050	3	19	1474	1216	258	33537.5
12+150	6.5	6	718.75	306	412.75	10318.75
12+200	0	0	0	0	0	
12+500	6	2	424	94	330	78600
12+700	8	2	550	94	456	48900
12+800	9	2	616	94	522	57600
12+900	9	8	1054	424	630	56700
13+000	8	5	754	250	504	42587.5
13+100	6.5	1	393.75	46	347.75	22087.5
13+200	2	0	94	0	94	9400
13+400	0	0	0	0	0	

Total quantity reduction of Roadway Excavation **1694317.5**

Unit Cost: \$ 4.00

Total Saving in roadway excavation for Area 1 **\$ 6,777,270.00**

VALUE ENGINEERING RECOMMENDATION #1

ROADWAY EXCAVATION REDUCTION CALCULATIONS

AREA 2 Approximate Stations 25+400 through Stations 27+100 - Prior to Equation :

Station	"d" (m)	"h" (m)	WMB area	VE area	Reduction (m ²)	C.M. (m ³)
25+500	0	0	0	0	0	10180.5
25+600	3.3	6.7	550	346.39	203.61	41648
25+700	4.1	52.2	5703.19	5073.84	629.35	57759.5
25+800	4.2	38	3679.84	3154	525.84	50062.5
25+900	5.3	19.7	1750	1274.59	475.41	54850.5
26+000	6	26.3	2496.79	1875.19	621.6	31080
26+100	0	0	0	0	0	27832
26+200	5.6	24.4	2250	1693.36	556.64	61060
26+300	7.8	16.2	1656	991.44	664.56	73478.5
26+400	7.9	24.5	2507.76	1702.75	805.01	40250.5
26+500	0	0	0	0	0	
26+800	0	0	0	0	0	15394.5
26+900	3.3	22.5	1826.64	1518.75	307.89	21694.5
27+000	1.4	21.8	1582.24	1456.24	126	6300
27+100	0	0	0	0	0	

Total quantity reduction of Roadway Excavation	491591
Unit Cost:	\$ 4.00
Total Saving in roadway excavation for Area 2	\$ 1,966,364.00

VALUE ENGINEERING RECOMMENDATION #1

ROADWAY EXCAVATION REDUCTION CALCULATIONS

AREA 3 Approximate Stations 24+400 through Stations 27+800 - After Equation :

Station	"d" (m)	"h" (m)	WMB area	VE area	Reduction (m ²)	C.M. (m ³)
24+760	0	0	0	0	0	3734.4
24+800	2.4	15.2	1101.76	915.04	186.72	29723.5
24900	3.5	34	3093.75	2686	407.75	67675.5
25000	4.6	78	10539.76	9594	945.76	85268
25100	6	37.8	3889.44	3129.84	759.6	60352
25200	6.8	7	811.44	364	447.44	8948.8
25240	0	0	0	0	0	12787.2
25300	7.4	2.6	550	123.76	426.24	63464
25400	8.8	21	2229.04	1386	843.04	42152
25500	0	0	0	0	0	
26100	0	0	0	0	0	90787.5
26200	13.5	38	4969.75	3154	1815.75	106993.75
26250	14	58.5	8518.75	6054.75	2464	106450
26300	13	40	5194	3400	1794	133399.5
26400	11.7	9	1359.99	486	873.99	21849.75
26450	0	0	0	0	0	

VALUE ENGINEERING RECOMMENDATION #1

ROADWAY EXCAVATION REDUCTION CALCULATIONS

AREA 3 Approximate Stations 24+400 through Stations 27+800 - After Equation :

Station	"d" (m)	"h" (m)	WMB area	VE area	Reduction (m ²)	C.M. (m ³)
26880	0	0	0	0	0	4322.5
26900	6.5	7.5	826	393.75	432.25	83525
27000	6.5	69.5	9196	7957.75	1238.25	110412.5
27100	5	72	9394	8424	970	69500
27200	4	28	2464	2044	420	14700
27270	0	0	0	0	0	

Total quantity reduction of Roadway Excavation	1116045.9
Unit Cost:	\$ 4.00
Total Saving in roadway excavation for Area 3	\$ 4,464,183.60

AREA 1

1 of 4

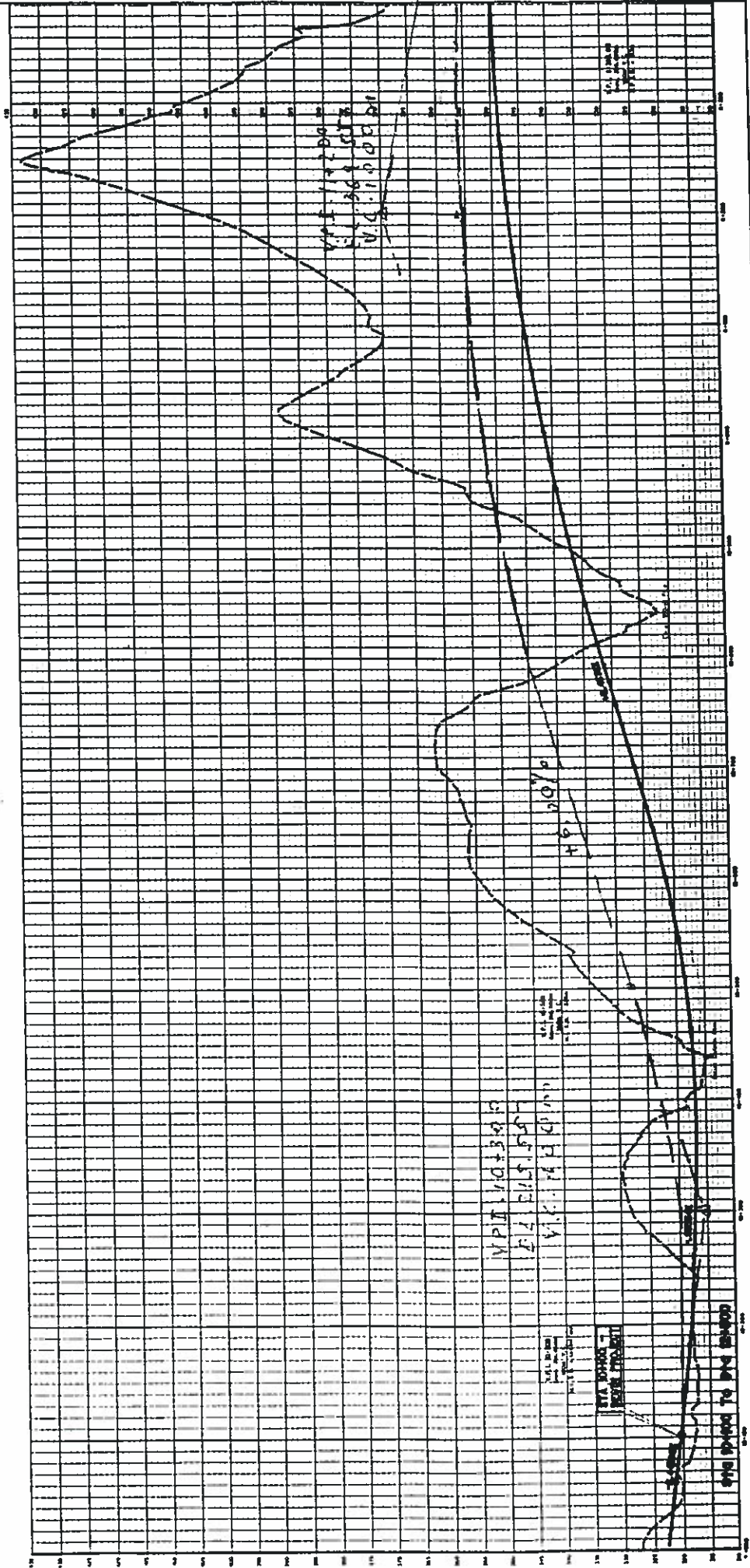
**PRELIMINARY PROFILE
ALTERNATE 9**

PERRY - BREATHITT COUNTIES
KY 16 GAZARD - CAMPTON ROAD
ITEM NO 90-246.00

SCALE: 1" = 100' VERT
1" = 100' HORIZ

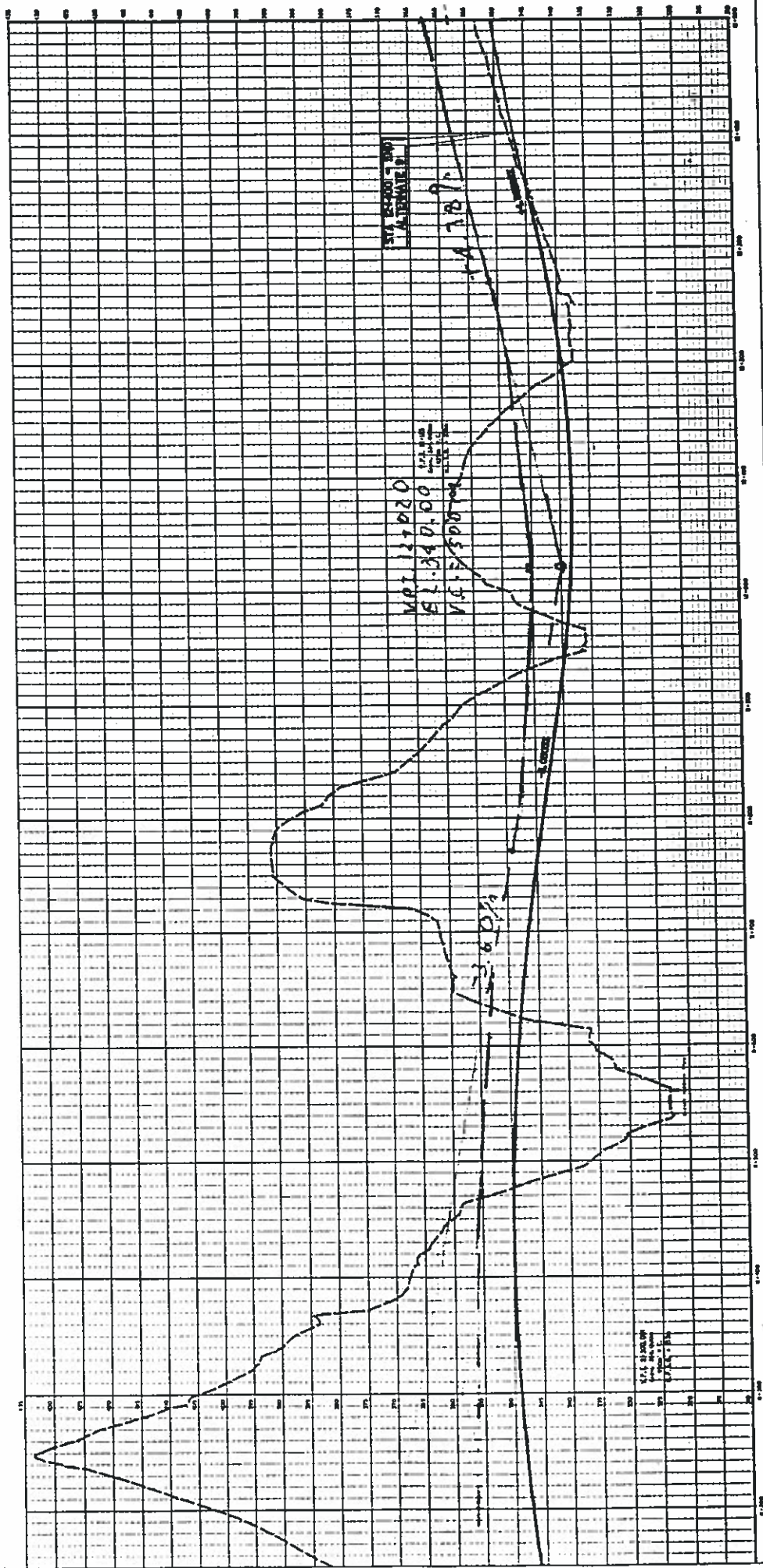
LEGEND

— ORIGINAL DESIGN
- - - V.E. RECOMMENDED



24

LEGEND
ORIGINAL DESIGN
V.E. RECOMMENDED

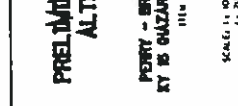
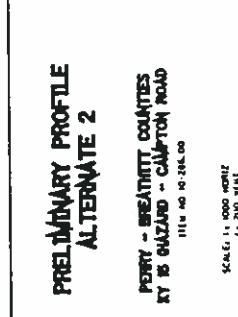
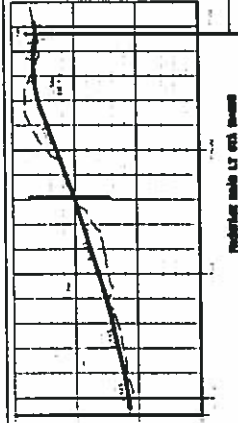
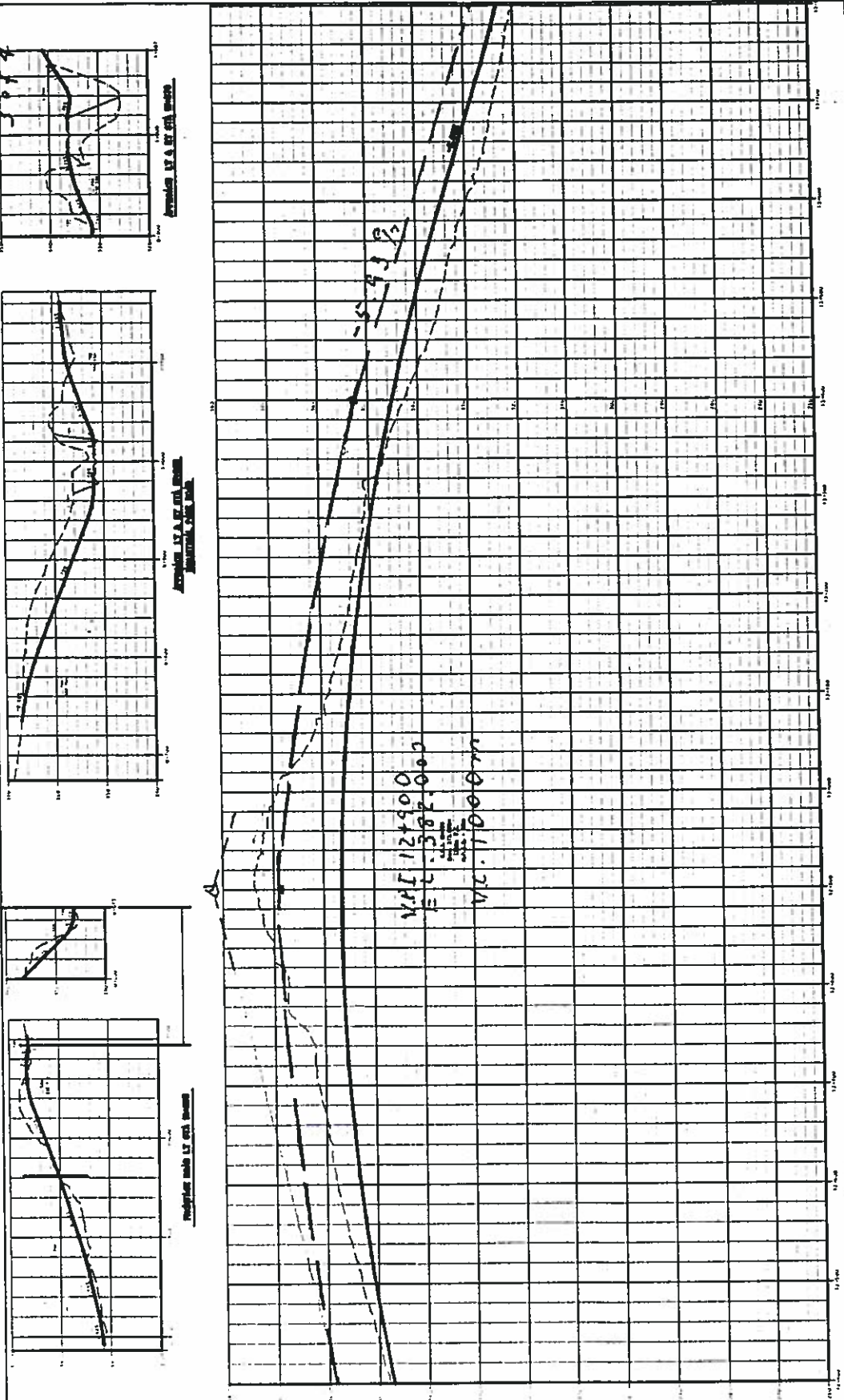


25

LEGEND
 ORIGINAL DESIGN
 V.E. RECOMMENDED



AREA 1



**PRELIMINARY PROFILE
 ALTERNATE 2**

PERRY - BREATHITT COUNTIES
 KY 15 HAZARD - CLAYTON ROAD

FILE NO. 10-284-00

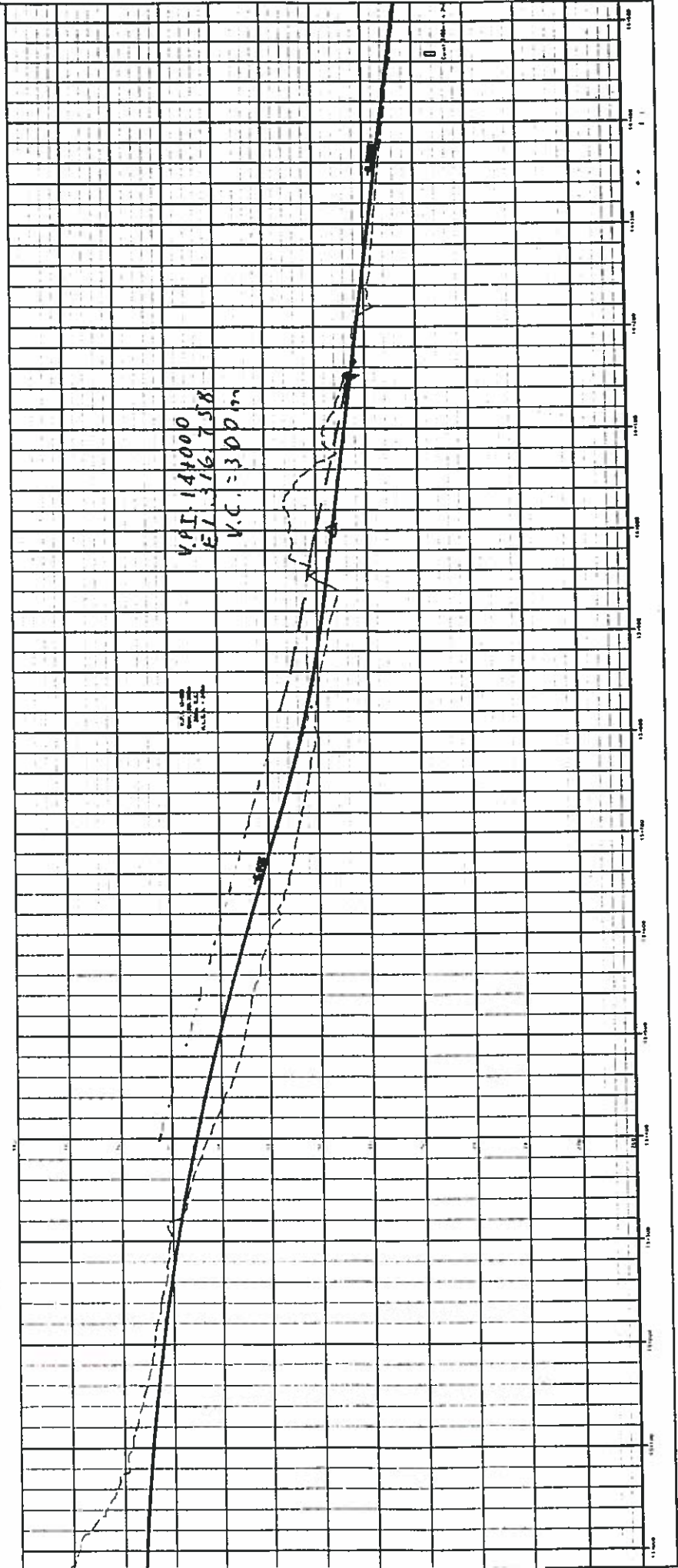
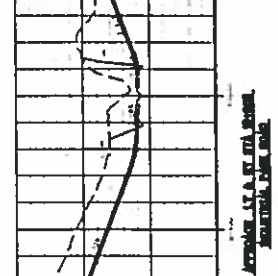
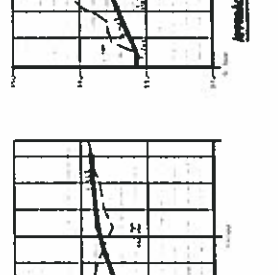
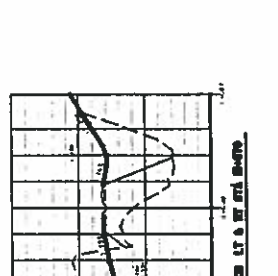
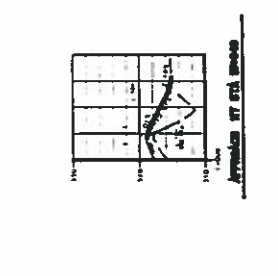
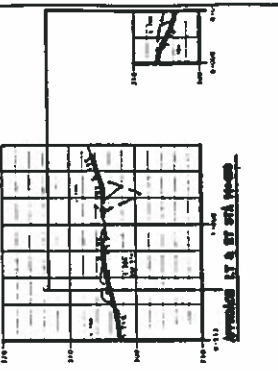
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 1" = 200' HORIZ.

Sta 12+200 To Sta 12+600

26

LEGEND
 ORIGINAL SIGN
 V.E. RECOMMENDED

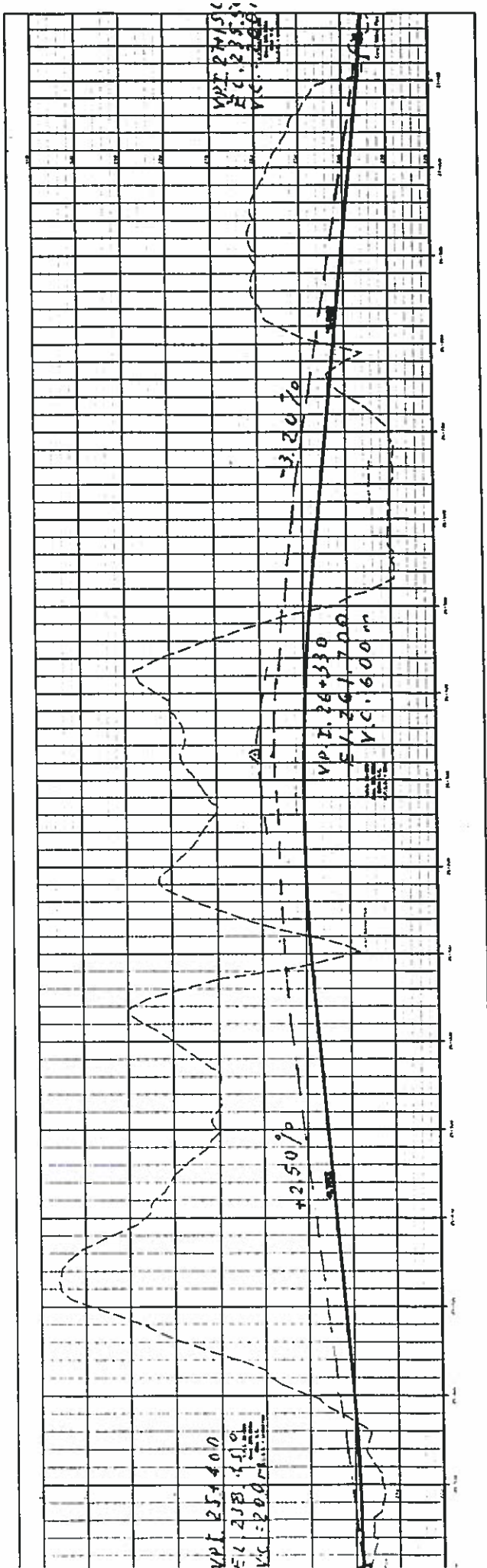
AREAL
 4084



LC

AREA 2.
1 of 1

LEGEND
—— ORIGINAL DESIGN
- - - V.E. RECOMMENDED



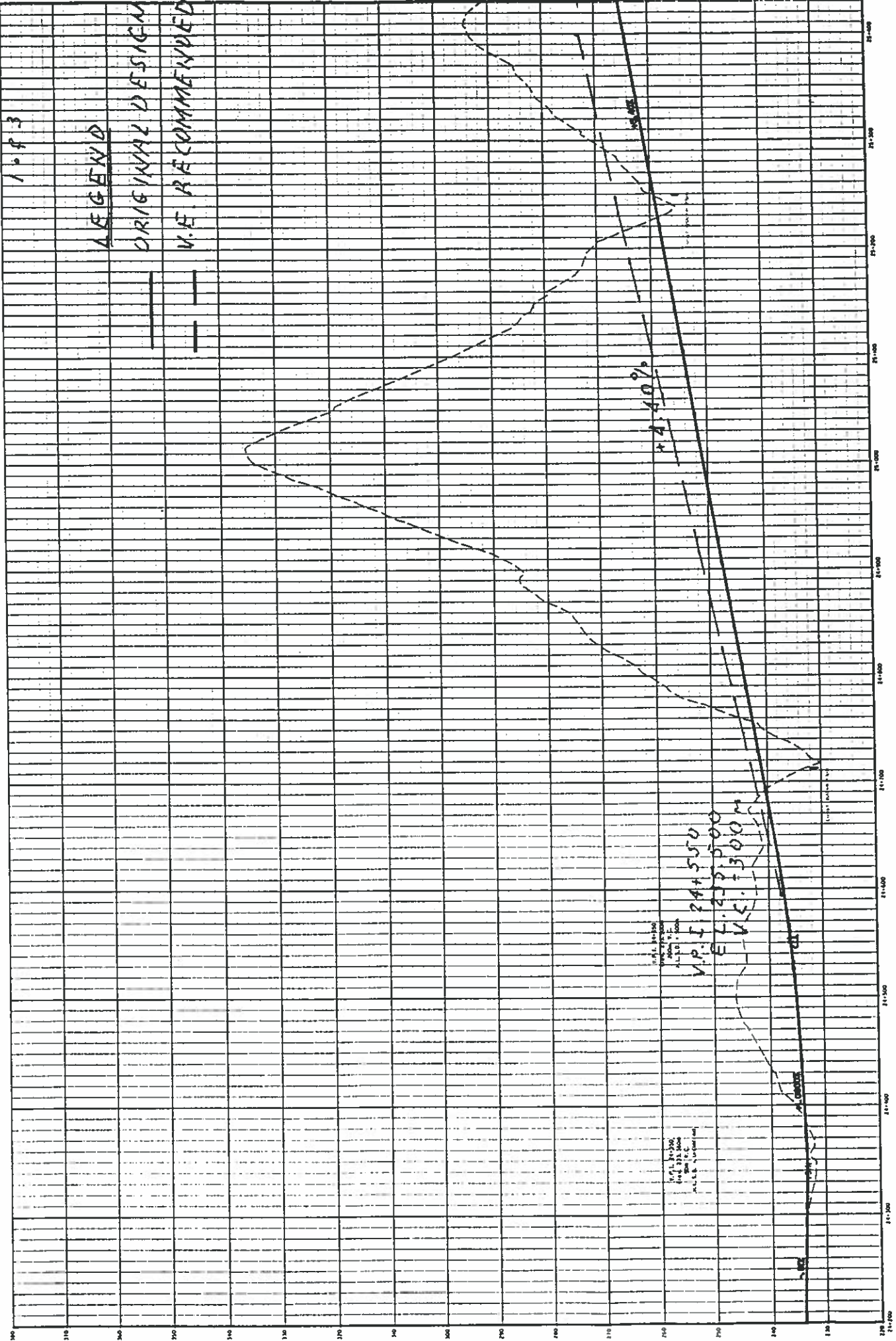
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LEGEND

ORIGINAL DESIGN

N.E. RECOMMENDED



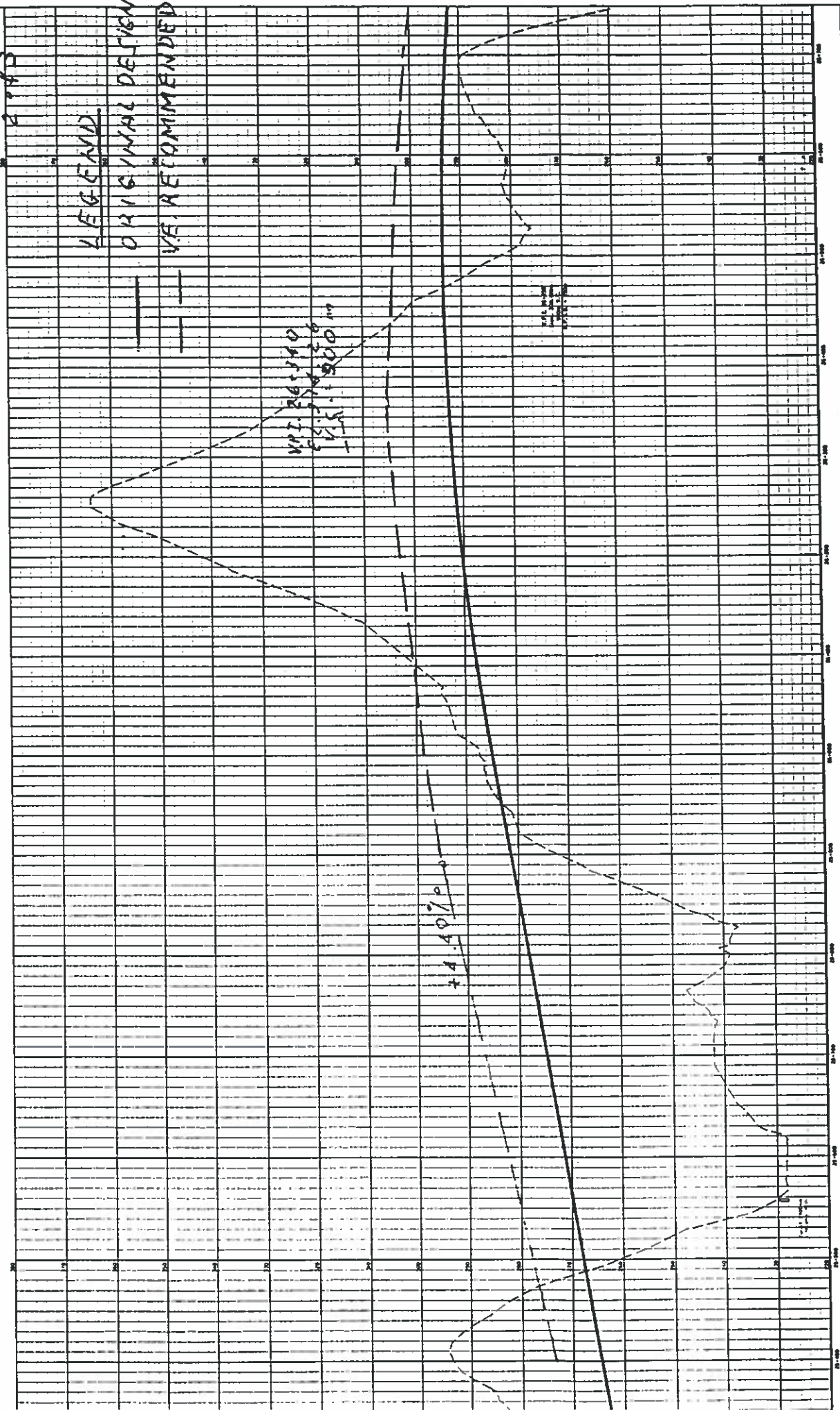
A.C.C. 100mm
A.C.C. 150mm

V.P. = 24+550
E.L. = 275.500
V.E. = 300M

4.40%

bc

AREA 3



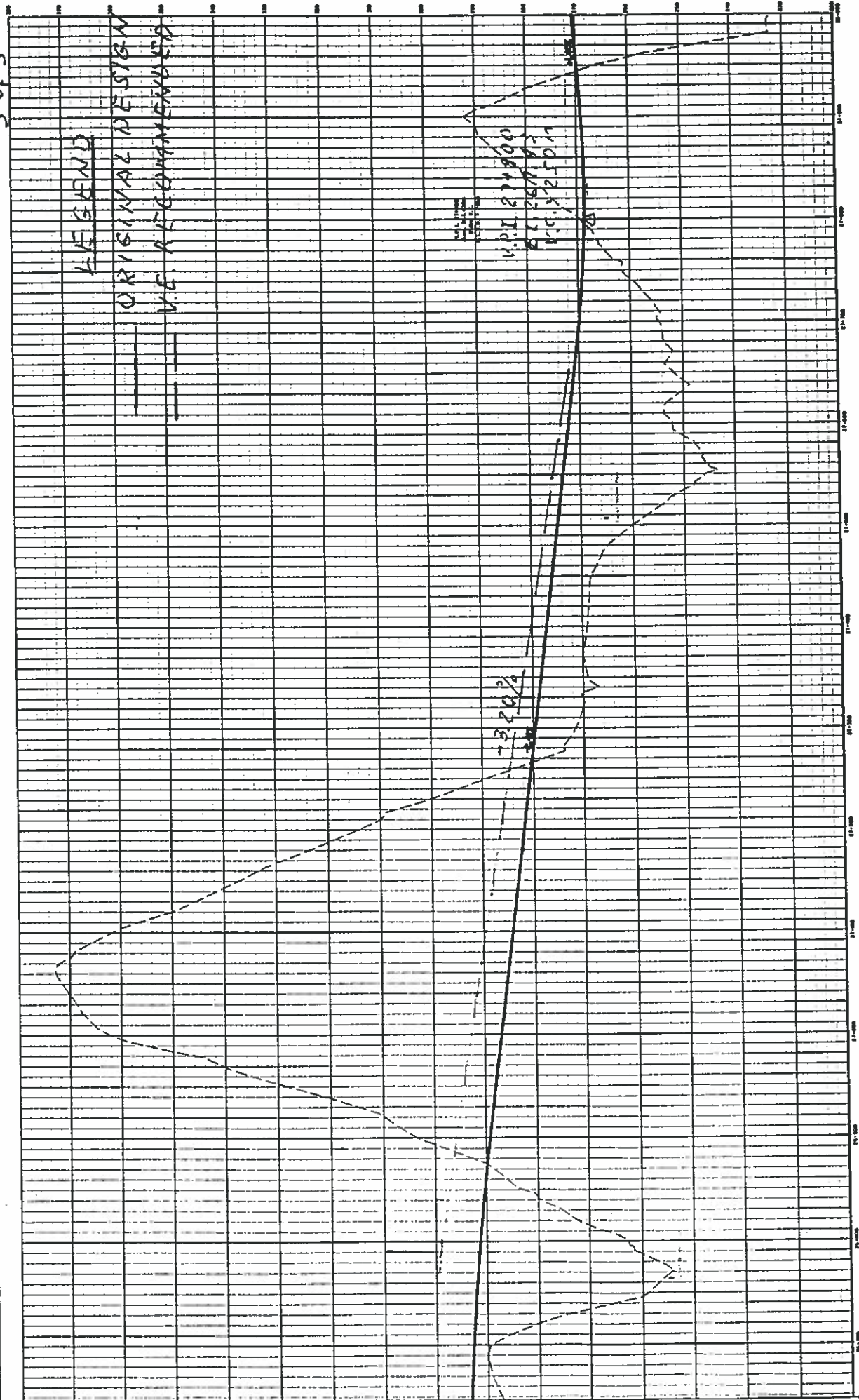
AREA.3

3 of 3

LEGEND

— ORIGINAL DESIGN

- - - V.E. RECOMMENDATION



VALUE ENGINEERING RECOMMENDATION #1A

VALUE ENGINEERING RECOMMENDATION # 1A

PROJECT: Raise grade/half diamond

LOCATION: KY15, Hazard to Campton

STUDY DATE: November 16, 1998 through November 20, 1998

TEAM MEMBER RESPONSIBLE FOR WRITE UP: Brian R. Billings

FUNCTION OF COMPONENT BEING CHANGED: Vertical alignment.

DESCRIPTIVE TITLE OF RECOMMENDATION: Raise grade of vertical alignment in areas of large excavation. These areas include:

Area 1 - approximate Station 10+200 through approximate Station 14+000,

Area 2 - prior to equation - approximate Station 24+500 through approximate Station 27+500,

Area 3 - after the equation - approximate Station 24+500 through approximate Station 27+900.

ORIGINAL DESIGN:

Area 1: Following table summarizes vertical alignment:

Vertical Alignment Component	Grade(%)	Station	Elev.(m)	Length(m)
Back Tangent	-2.44266			
PVI #1		10+200	318	100
Tangent	-0.8334			
PVI #2		10+500	315.5	350
Tangent	5.4375			
PVI #3		11+300	359	950
Tangent	-3.0303			
PVI #4		12+125	334	325
Tangent	4.83528			
Alignment between Alternate 9 and Alternate 2 overlaps Tangent.				
PVI #5		12+950	373.8	1300
Tangent	-6			
PVI #6		13+825	321.3	200
Forward Tangent	-2.595			

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs	Total LC Costs
ORIGINAL DESIGN	\$121,606,212		\$121,606,212
RECOMMENDED DESIGN	\$110,564,458		\$110,564,458
ESTIMATED SAVINGS OR (COST)	\$11,041,754		\$11,041,754

VALUE ENGINEERING RECOMMENDATION # 1A

Area 2: Following table summarizes vertical alignment:

Vertical Alignment Component	Grade(%)	Station	Elev.(m)	Length(m)
Back Tangent	0.5			
PVI #1		25+550	239.2	150
Tangent	1.787			
PVI #2		26+300	252.6	500
Tangent	-2.012			
PVI #3		27+150	235.5	150
Forward Tangent	-0.556			

Area 3: Following table summarizes vertical alignment:

Vertical Alignment Component	Grade(%)	Station	Elev.(m)	Length(m)
Back Tangent	1.06			
PVI #1		24+550	235.5	200
Tangent	3.4			
PVI #2		26+450	300.1	900
Tangent	-2.42			
PVI #3		27+800	267.43	250
Forward Tangent	1.6			

RECOMMENDED CHANGE: The VE Team recommends raising the grades through major cut areas to reduce the amount of roadway excavation quantities. The following areas have been selected because they are not constrained to follow the existing corridor.

Area 1: Raising the grades in this area requires the modification of the at-grade intersections at approximate Station 10+500 and approximate Station 12+100 to separated-grade half-diamond intersections (see Figures 1 & 2). Following table summarizes an approximate vertical alignment. The final vertical alignment requires further study and evaluation.

Vertical Alignment Component	Grade(%)	Station	Elev.(m)	Length(m)
Back Tangent	-2.44266			
PVI #1		10+300	315.557	400
Tangent	6			
PVI #2		11+200	369.557	1000
Tangent	-3.6			
PVI #3		12+020	340	500
Tangent	4.78			
PVI #4		12+900	382	1000
Tangent	-5.93			
PVI #5		14+000	316.758	300
Forward Tangent	-2.595			

VALUE ENGINEERING RECOMMENDATION # 1A

Area 2: Following table summarizes an approximate vertical alignment. The final vertical alignment requires further study and evaluation.

Vertical Alignment Component	Grade(%)	Station	Elev.(m)	Length(m)
Back Tangent	0.5			
PVI #1		25+400	238.45	200
Tangent	2.5			
PVI #2		26+330	261.7	600
Tangent	-3.2			
PVI #3		27+150	235.5	200
Forward Tangent	-0.556			

Area 3: Following table summarizes an approximate vertical alignment. The final vertical alignment requires further study and evaluation.

Vertical Alignment Component	Grade(%)	Station	Elev.(m)	Length(m)
Back Tangent	1.06			
PVI #1		24+550	235.5	300
Tangent	4.4			
PVI #2		26+340	314.26	900
Tangent	-3.2			
PVI #3		27+800	267.43	250
Forward Tangent	1.6			

VALUE ENGINEERING RECOMMENDATION # 1A

ADVANTAGES:

1. Reduction in quantity of Roadway Excavation,
2. Reduction in area for Clearing and Grubbing,
3. Reduction in Right-of-way needed,
4. Matches existing vertical alignment between approximate Station 12 + 000 - 13 + 000
5. Allows further manipulations with intersection of existing KY15

DISADVANTAGES:

Steeper grades in vertical alignment,

1. Drainage impact/ fill areas.

JUSTIFICATION:

Roadway Excavation constitutes 67% of total construction costs in the preliminary estimates. The VE team felt this could be reduced by changing grades in areas of the project that were not constrained by the vertical alignment of the existing corridor. These areas were defined previously in this report. They are discussed separately below:

Area 1

This area had constraints of the at-grade intersections at approximate Stations 10+500 and approximate Stations 12+100. Raising the grade through this section saves approximately 1694317.5 cubic meters of roadway excavation. There are additional costs associated with changing the at-grade intersections to a separated-grade half-diamond intersection at approximate Station 10+500 and approximate Station 12+100(see Figures 1 & 2). These costs are summarized in the calculations. The improvement of the facility from an at-grade to a separated-grade intersection is an improvement that cannot be quantified in construction costs. These benefits are summarized in Design Comment #4 included in this report. Changing to the separated-grade intersections reduces the constraints of at-grade intersections and allows the grade to be raised throughout this entire area. These changes work in conjunction for a total savings of \$4,283,450 for this area.

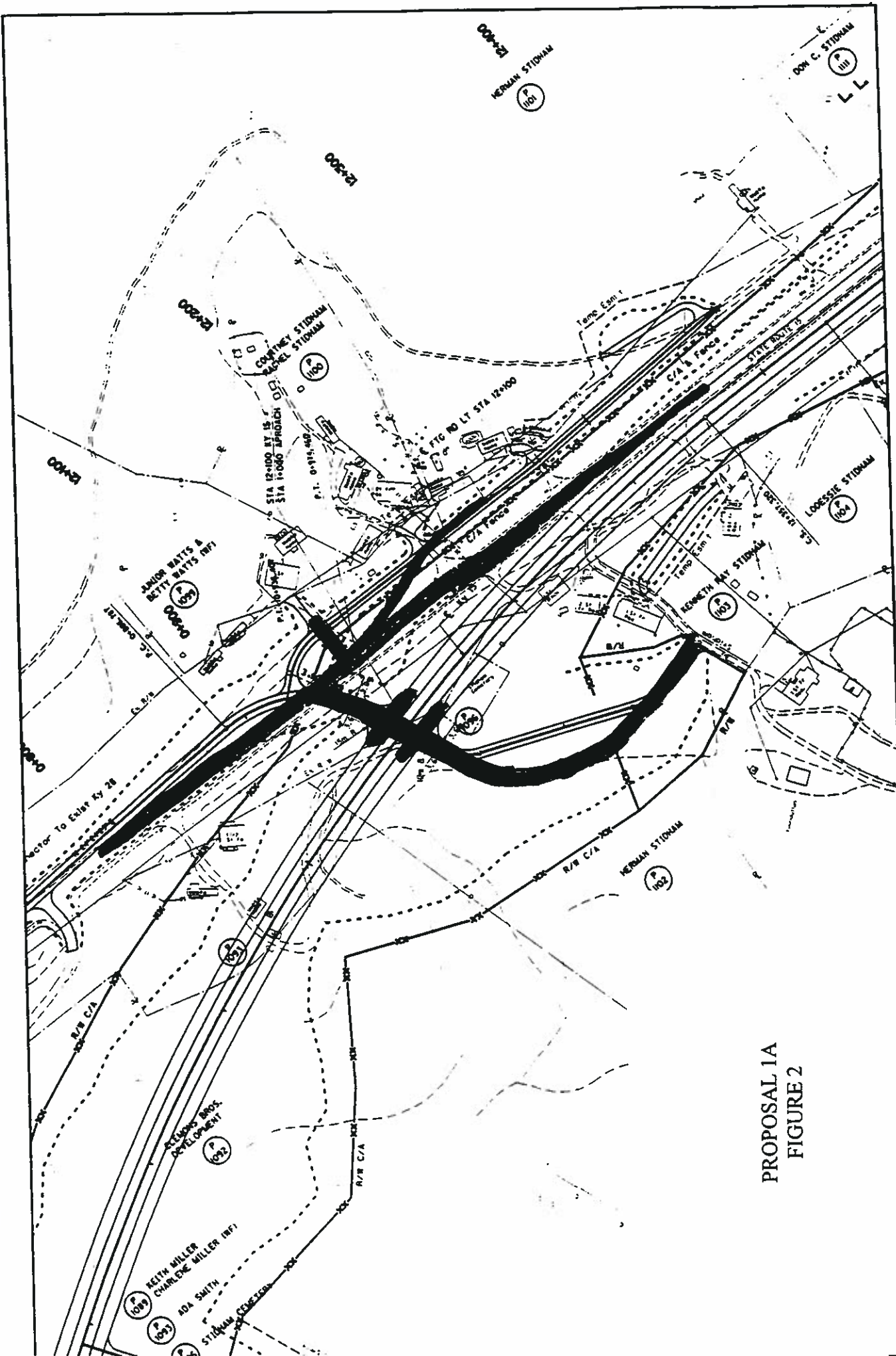
Area 2 Raising the grade through this section saves approximately 491591 cubic meters of roadway excavation. This constitutes a total savings of \$1,966,364 for this area without any reduction in the design standards.

VALUE ENGINEERING RECOMMENDATION # 1A

Area 3 Raising the grade through this section saves approximately 1,116,046 cubic meters of roadway excavation. This constitutes a total savings of \$4,464,184 for this area without any reduction in the design standards.

VALUE ENGINEERING RECOMMENDATION #1A
COST ESTIMATE - FIRST COST

Cost Item	Units	Unit Cost	Source Code	Original Design		Recommended Design	
		\$/Unit		Num of Units	Total \$	Num of Units	Total \$
Excavation	Cu.M.	4		20,735,410	\$82,941,640	17,433,456	\$69,733,824
10+400 Twin Span PCIB Bridge	LP SUM	646800		-	-	2	\$ 1,293,600
DGA	M TON	12.76		494,888	\$ 6,314,771	500,888	\$ 6,391,331
BASE	M TON	30.76		365,902	\$11,255,146	369502	\$11,365,882
SURFACE	M TON	31.62		44,096	\$ 1,394,316	44816	\$ 1,417,082
Excavation	Cu.M.	6		3,283,390	\$19,700,340	3393790	\$20,362,740
Totals					121606211.9		110564458.3



PROPOSAL 1A
FIGURE 2

110

VALUE ENGINEERING RECOMMENDATION # 1A

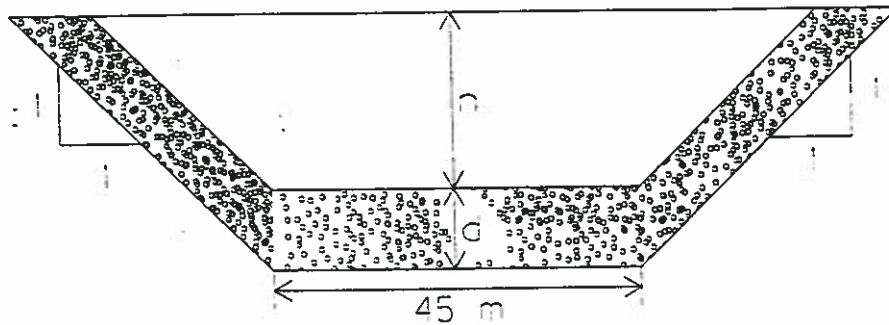
CALCULATIONS


EXPLANATION OF VOLUME CALCULATIONS:

In the scope of and time allowed to prepare a VE Recommendation that require extensive volume calculations, we employed a method to give a “rough” approximation of the amount of roadway excavation that could be reduced. We employed a standard template that modeled the shape of a trapezoid (see Figure 3). This template was applied to the centerline stations along a projected alignment profile that went through a “cut” section. We are aware that this does not take into account areas that represent “side-hill” excavation. This method was employed to determine if there would be enough savings that would warrant further study and consideration.

VALUE ENGINEERING RECOMMENDATION # 1A

EQUATIONS DERIVED FOR AVERAGE END AREA CALCULATIONS



 Difference in area between WMB & VE

Note: Rock slopes assumed 1:

EQUATIONS USED FOR AREA CALCULATIONS

$$\text{WMB END AREA} = 45 \cdot (n - c) - (n - c)^2$$

$$\text{V.E. END AREA} = 45 \cdot c - c^2$$

VALUE ENGINEERING RECOMMENDATION #1A

ROADWAY EXCAVATION REDUCTION CALCULATIONS AREA 1 Approximate Stations 10+200 through Stations 13+500

Station	"d" (m)	"h" (m)	WMB area	VE area	Reduction (m ²)	C.M. (m ³)
10+240	0	0	0	0	0	5760
10+300	3	8	616	424	192	9735
10+340	4.5	8	718.75	424	294.75	8842.5
10+400	0	0	0	0	0	
10+470	8.5	1	517.75	46	471.75	111507.5
10+600	12.5	21	2629.75	1386	1243.75	62293.75
10+650	13	19	2464	1216	1248	89180
10+720	13	21	2686	1386	1300	62692.5
10+780	13.5	0	789.75	0	789.75	11846.25
10+810	0	0	0	0	0	
10+900	0	0	0	0	0	25200
10+950	16	1	1054	46	1008	107870
11+020	17	30	4324	2250	2074	140720
11+100	19	6	1750	306	1444	333300
11+250	15	70	11050	8050	3000	237000
11+370	10	20	2250	1300	950	47500
11+470	0	0	0	0	0	

VALUE ENGINEERING RECOMMENDATION #1A

ROADWAY EXCAVATION REDUCTION CALCULATIONS AREA 1 Approximate Stations 10+200 through Stations 13+500

Station	"d" (m)	"h" (m)	WMB area	VE area	Reduction (m ²)	C.M. (m ³)
11+600	0	0	0	0	0	6300
11+650	4	7	616	364	252	15172.5
11+710	3.5	12	937.75	684	253.75	17625
11+770	2.5	43	4117.75	3784	333.75	18471.25
11+840	2	25	1944	1750	194	10670
11+950	0	0	0	0	0	12900
12+050	3	19	1474	1216	258	33537.5
12+150	6.5	6	718.75	306	412.75	10318.75
12+200	0	0	0	0	0	
12+500	6	2	424	94	330	78600
12+700	8	2	550	94	456	48900
12+800	9	2	616	94	522	57600
12+900	9	8	1054	424	630	56700
13+000	8	5	754	250	504	42587.5
13+100	6.5	1	393.75	46	347.75	22087.5
13+200	2	0	94	0	94	9400
13+400	0	0	0	0	0	

Total quantity reduction of Roadway Excavation **1694317.5**
Unit Cost: **\$ 4.00**
Total Saving in roadway excavation for Area 1 **\$ 6,777,270.00**

VALUE ENGINEERING RECOMMENDATION #1A

ROADWAY EXCAVATION REDUCTION CALCULATIONS AREA 2 Approximate Stations 25+400 through Stations 27+100 - Prior to Equation

Station	"d" (m)	"h" (m)	WMB area	VE area	Reduction (m ²)	C.M. (m ³)
25+500	0	0	0	0	0	10180.5
25+600	3.3	6.7	550	346.39	203.61	41648
25+700	4.1	52.2	5703.19	5073.84	629.35	57759.5
25+800	4.2	38	3679.84	3154	525.84	50062.5
25+900	5.3	19.7	1750	1274.59	475.41	54850.5
26+000	6	26.3	2496.79	1875.19	621.6	31080
26+100	0	0	0	0	0	27832
26+200	5.6	24.4	2250	1693.36	556.64	61060
26+300	7.8	16.2	1656	991.44	664.56	73478.5
26+400	7.9	24.5	2507.76	1702.75	805.01	40250.5
26+500	0	0	0	0	0	
26+800	0	0	0	0	0	15394.5
26+900	3.3	22.5	1826.64	1518.75	307.89	21694.5
27+000	1.4	21.8	1582.24	1456.24	126	6300
27+100	0	0	0	0	0	

Total quantity reduction of Roadway Excavation 491591
Unit Cost: \$ 4.00
Total Saving in roadway excavation for Area 2 \$ 1,966,364.00

VALUE ENGINEERING RECOMMENDATION #1 *A*

ROADWAY EXCAVATION REDUCTION CALCULATIONS

AREA 3 Approximate Stations 24+400 through Stations 27+800 - After Equation

Station	"d" (m)	"h" (m)	WMB area	VE area	Reduction (m ²)	C.M. (m ³)
24+760	0	0	0	0	0	3734.4
24+800	2.4	15.2	1101.76	915.04	186.72	29723.5
24900	3.5	34	3093.75	2686	407.75	67675.5
25000	4.6	78	10539.76	9594	945.76	85268
25100	6	37.8	3889.44	3129.84	759.6	60352
25200	6.8	7	811.44	364	447.44	8948.8
25240	0	0	0	0	0	12787.2
25300	7.4	2.6	550	123.76	426.24	63464
25400	8.8	21	2229.04	1386	843.04	42152
25500	0	0	0	0	0	
26100	0	0	0	0	0	90787.5
26200	13.5	38	4969.75	3154	1815.75	106993.75
26250	14	58.5	8518.75	6054.75	2464	106450
26300	13	40	5194	3400	1794	133399.5
26400	11.7	9	1359.99	486	873.99	21849.75
26450	0	0	0	0	0	

VALUE ENGINEERING RECOMMENDATION #1 *A*

ROADWAY EXCAVATION REDUCTION CALCULATIONS

AREA 3 Approximate Stations 24+400 through Stations 27+800 - After Equation

Station	"d" (m)	"h" (m)	WMB area	VE area	Reduction (m ²)	C.M. (m ³)
26880	0	0	0	0	0	4322.5
26900	6.5	7.5	826	393.75	432.25	83525
27000	6.5	69.5	9196	7957.75	1238.25	110412.5
27100	5	72	9394	8424	970	69500
27200	4	28	2464	2044	420	14700
27270	0	0	0	0	0	

Total quantity reduction of Roadway Excavation	1116045.9
Unit Cost:	\$ 4.00
Total Saving in roadway excavation for Area 3	\$ 4,464,183.60

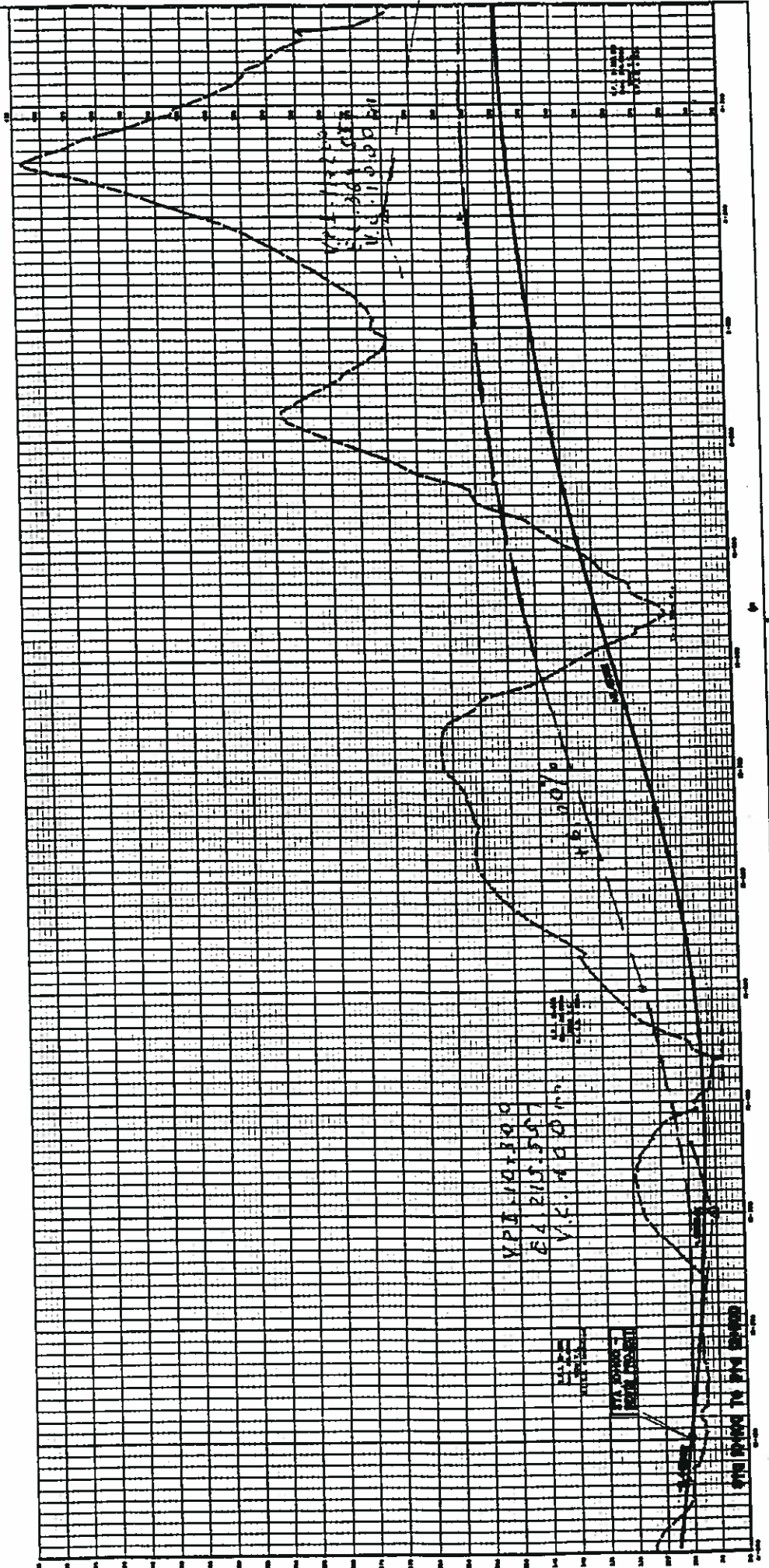
AREA 1
1 of 4

**PRELIMINARY PROFILE
ALTERNATE 9**

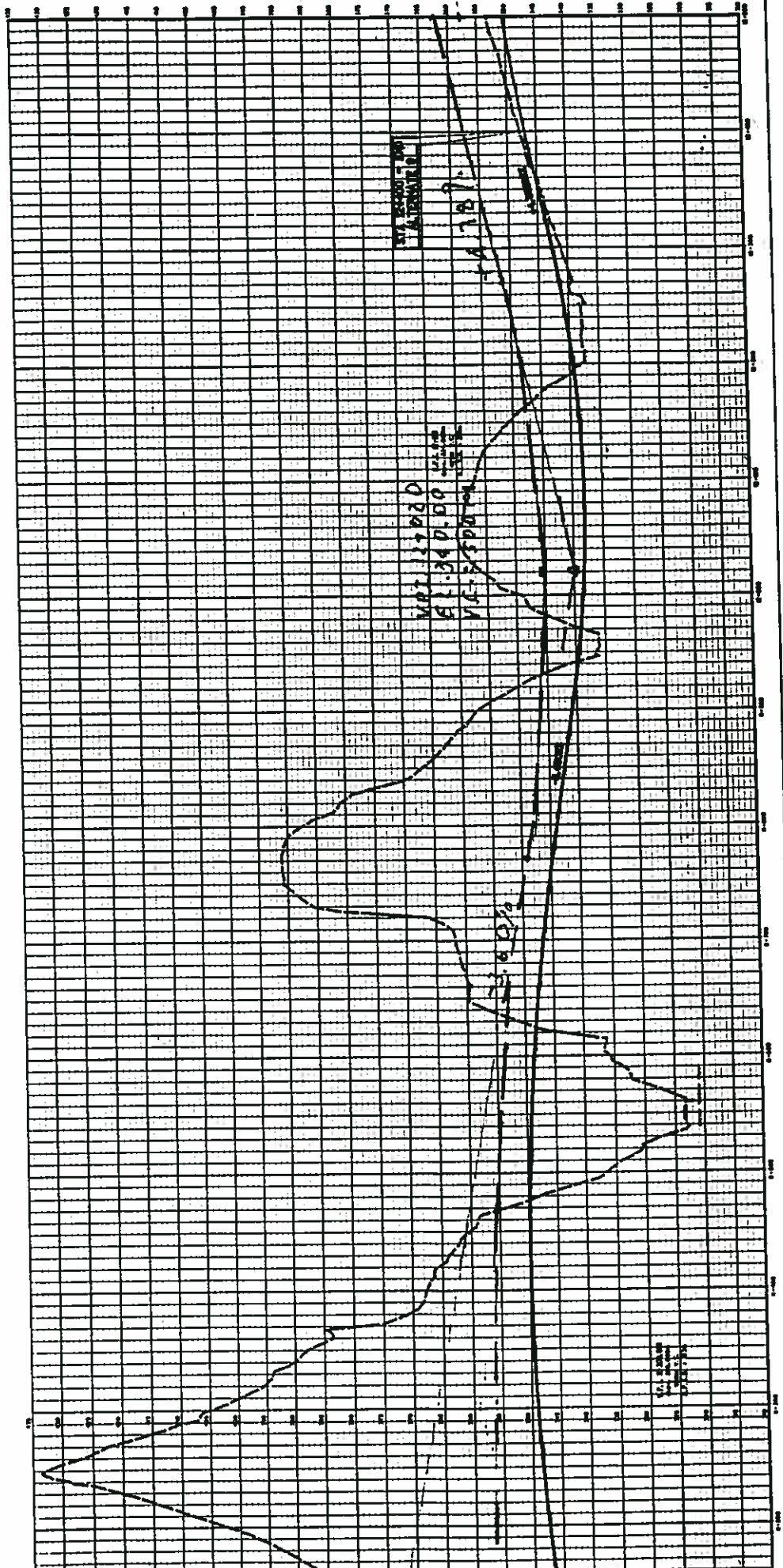
PERRY - BREATHITT COUNTIES
KY 25 GAZARD - CAMPTON ROAD
11/24/60 10-286.00

SCALE: 1" = 1000' HORIZ
1" = 200' VERT

LEGEND
— ORIGINAL DESIGN
- - - V.E. RECOMMENDED

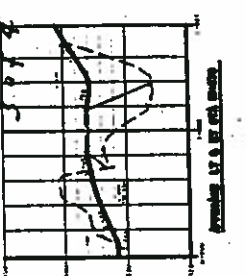
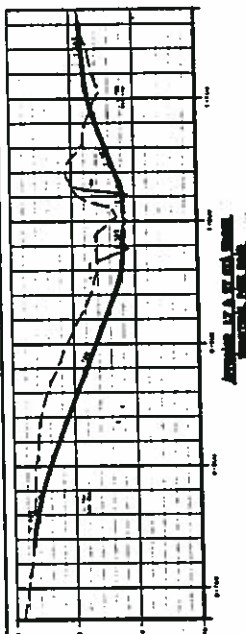
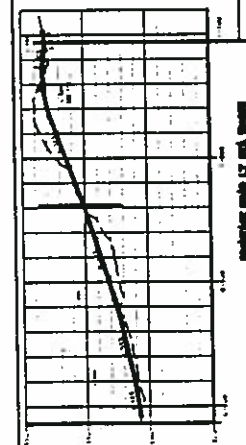
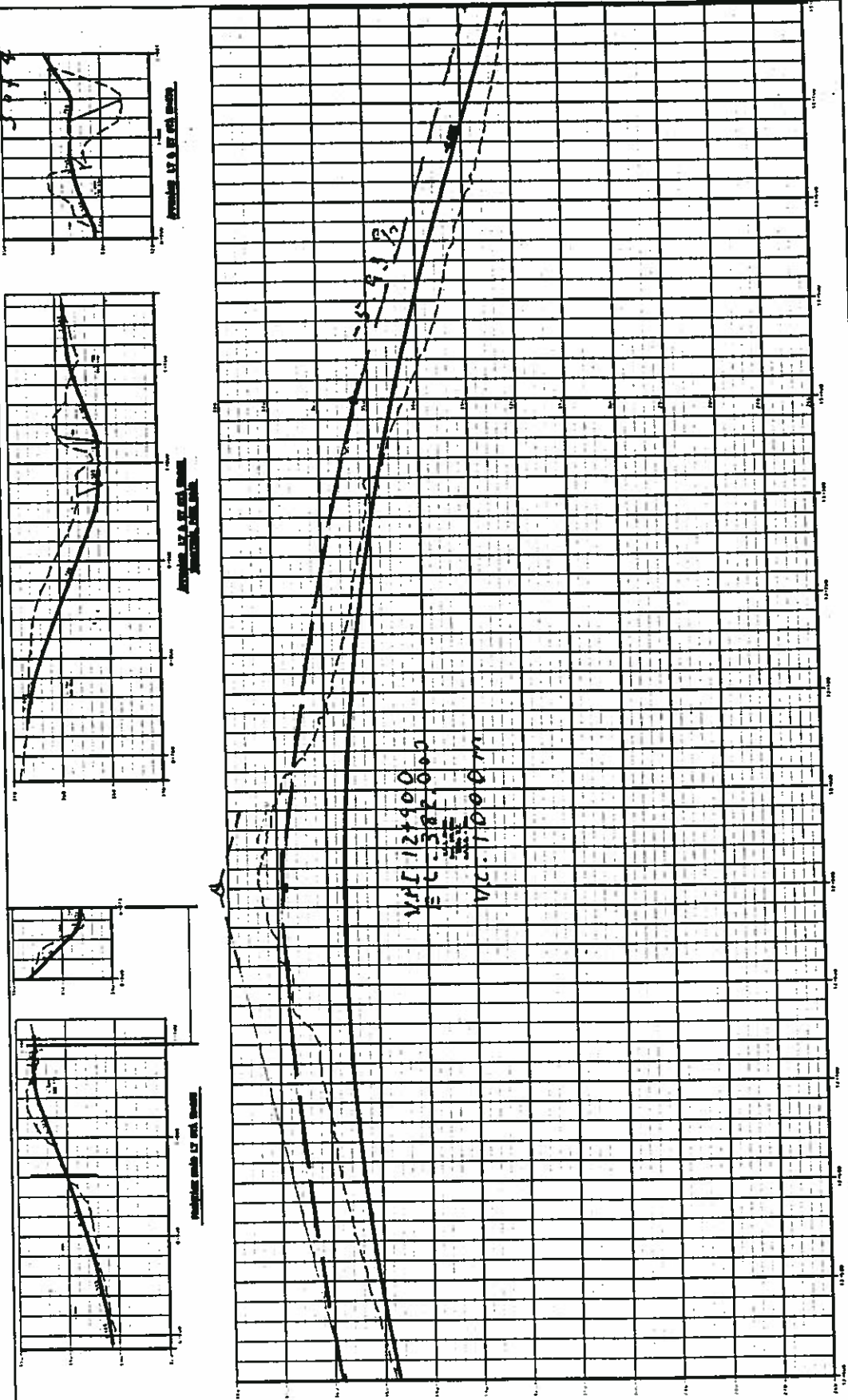


LEGEND
 ORIGINAL DESIGN
 V.E. RECOMMENDED



LEGEND
 ORIGINAL DESIGN
 V.E. RECOMMENDED

AREA 1



PRELIMINARY PROFILE
 ALTERNATE 2

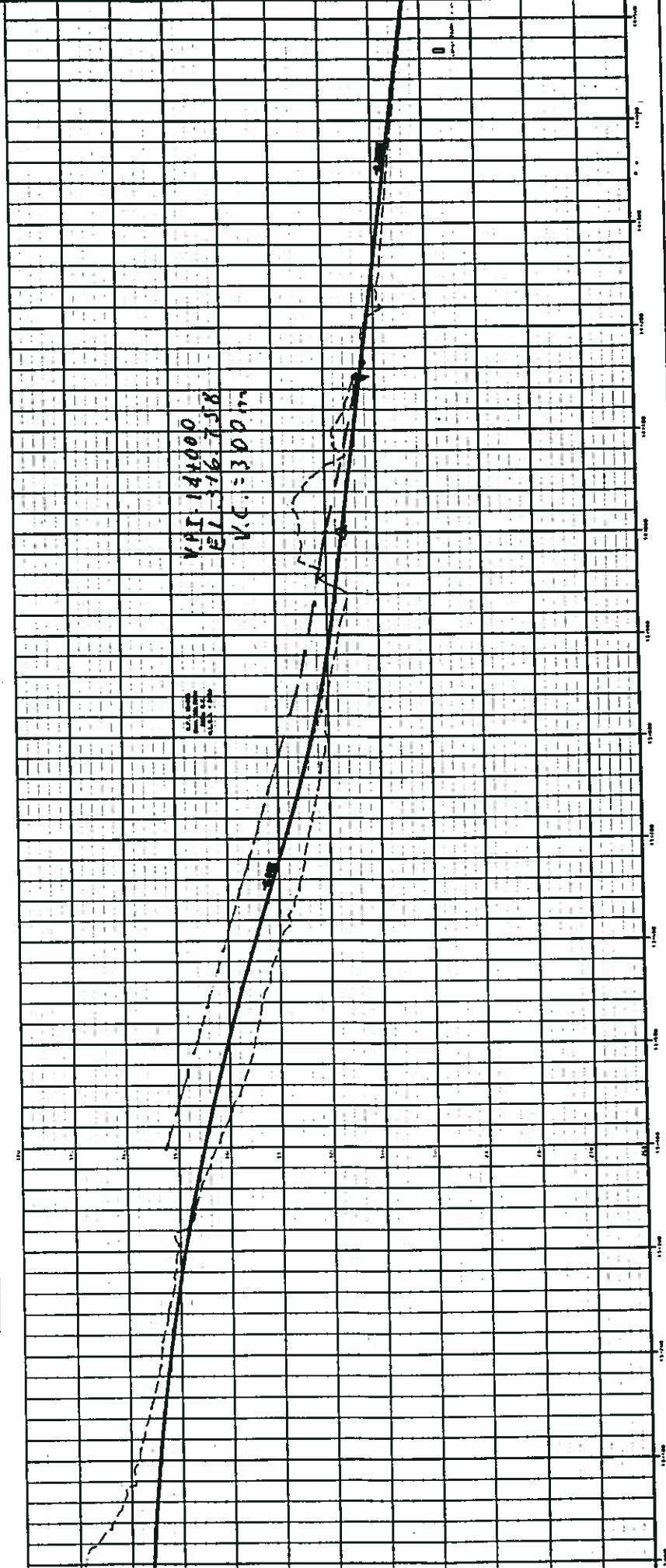
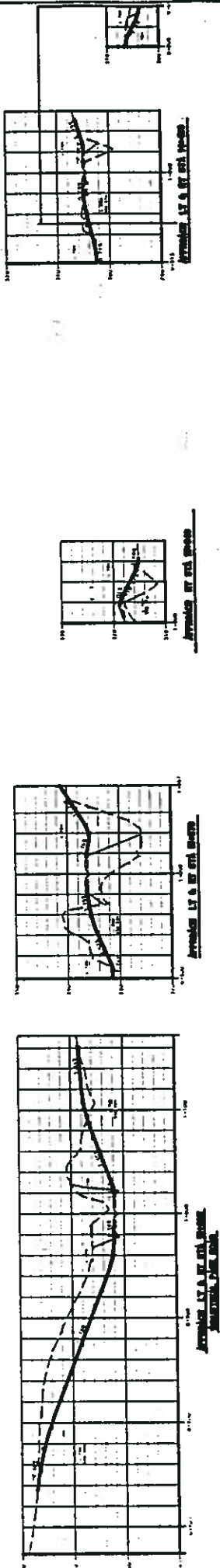
PERRY - SWEATHITT COUNTIES
 KY 16 GAZARD - CAMPTON ROAD
 SHEET NO. 10 OF 20

SCALE: 1" = 20' VERT
 1" = 100' HORIZ

Sta 12+00 To Sta 15+00

LEGEND
 ORIGINAL SIGN
 V.E. RECOMMENDED

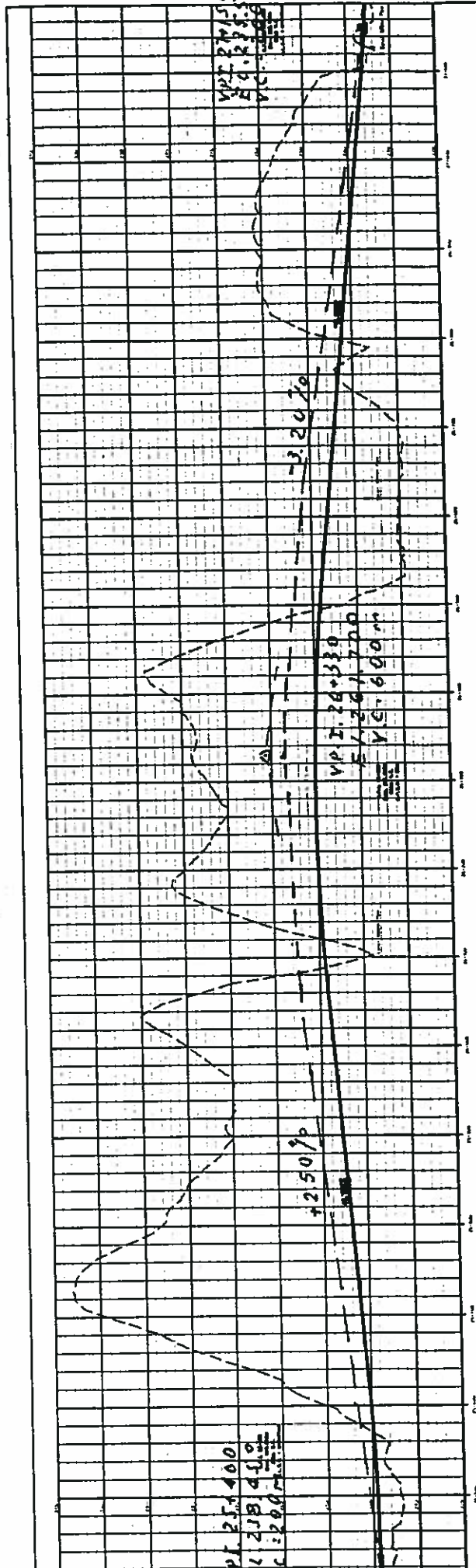
AREAL
 4 of 4



AREA 2.
1 of 1

LEGEND

— ORIGINAL DESIGN
- - - V.E. RECOMMENDED



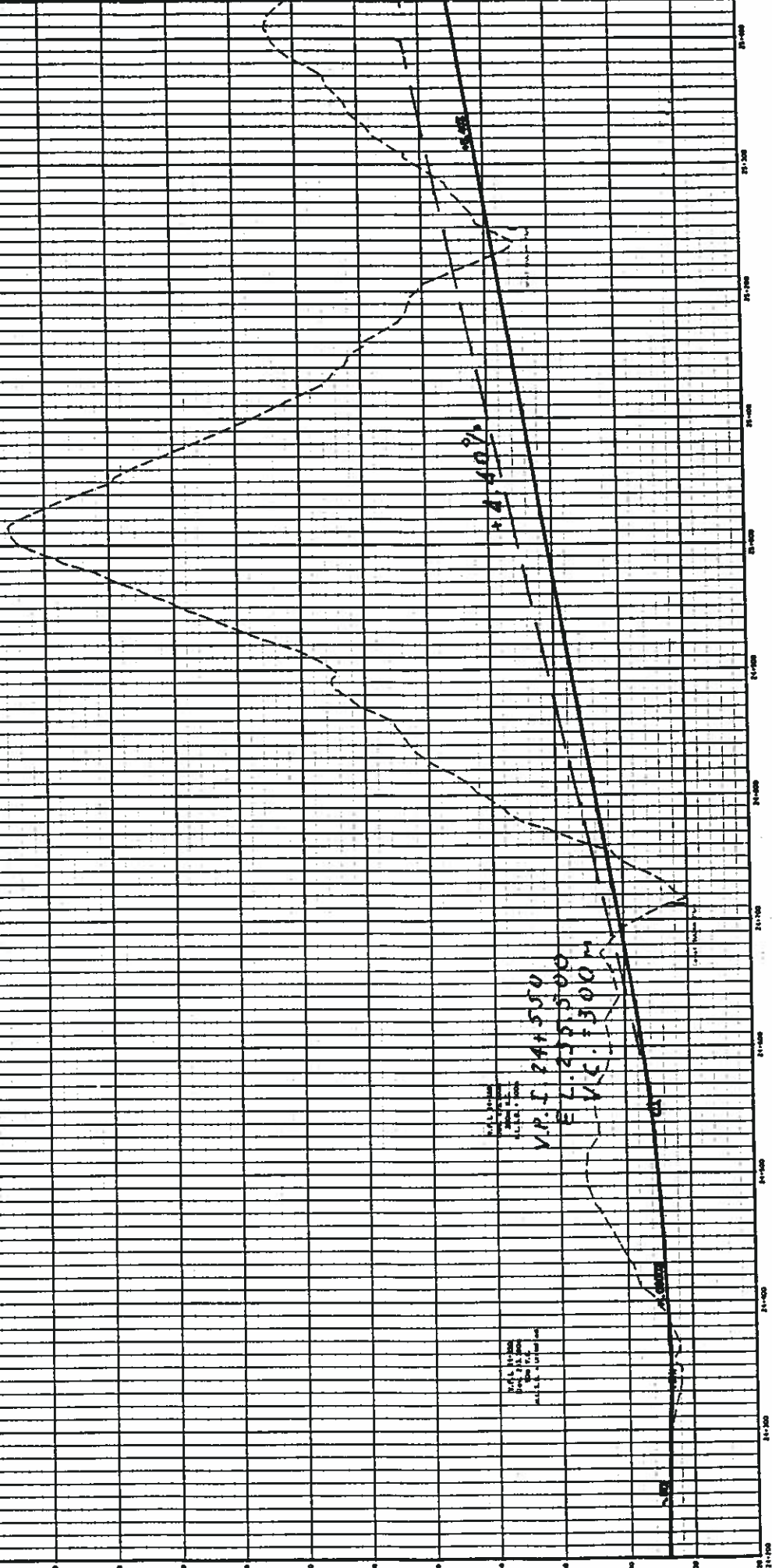
AREA 3

10.8.3

LEGEND

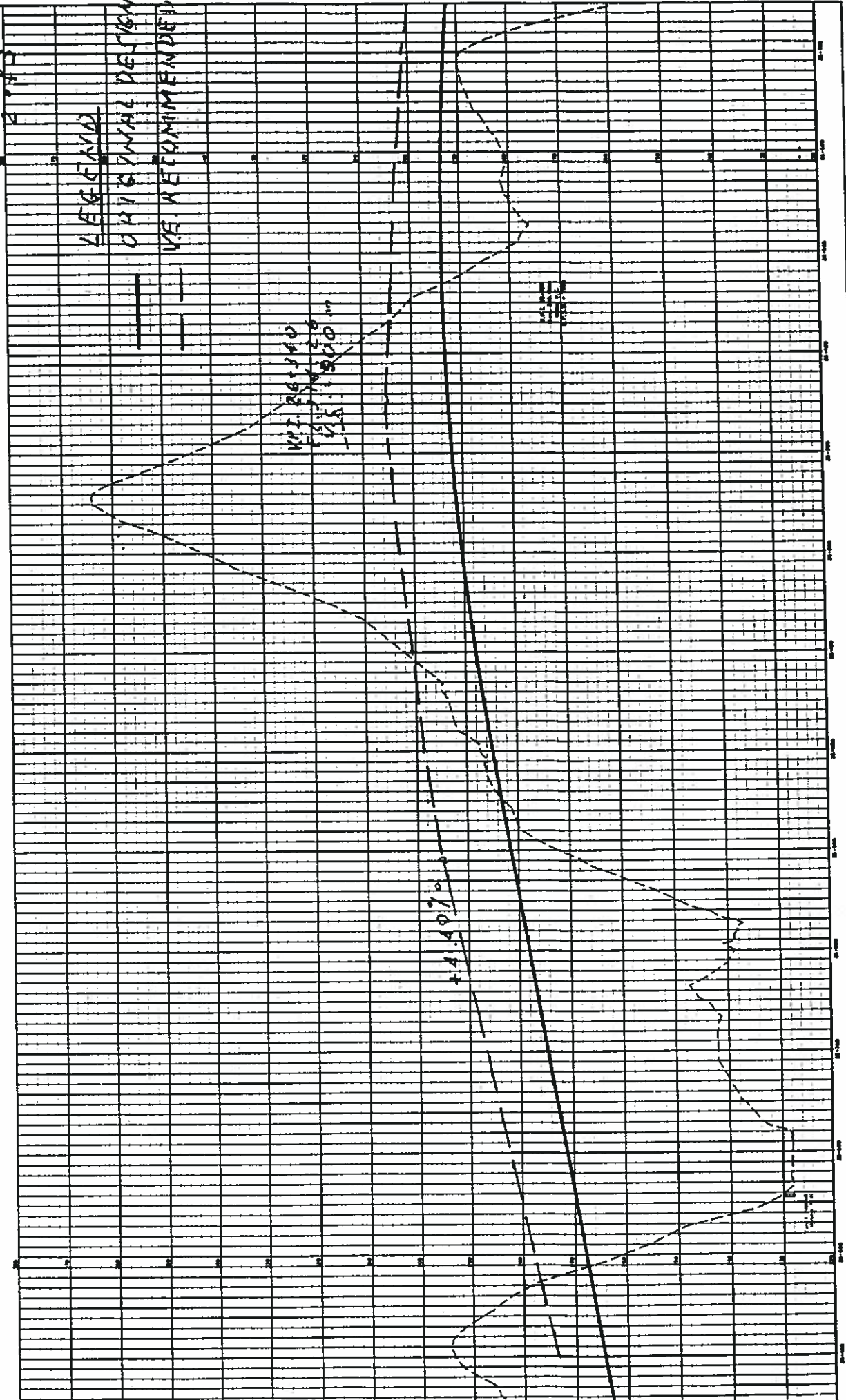
ORIGINAL DESIGN

N.E. RECOMMENDED



V.P. 1 241.550
 E 255.500
 V.C. 300 M

AREA 3



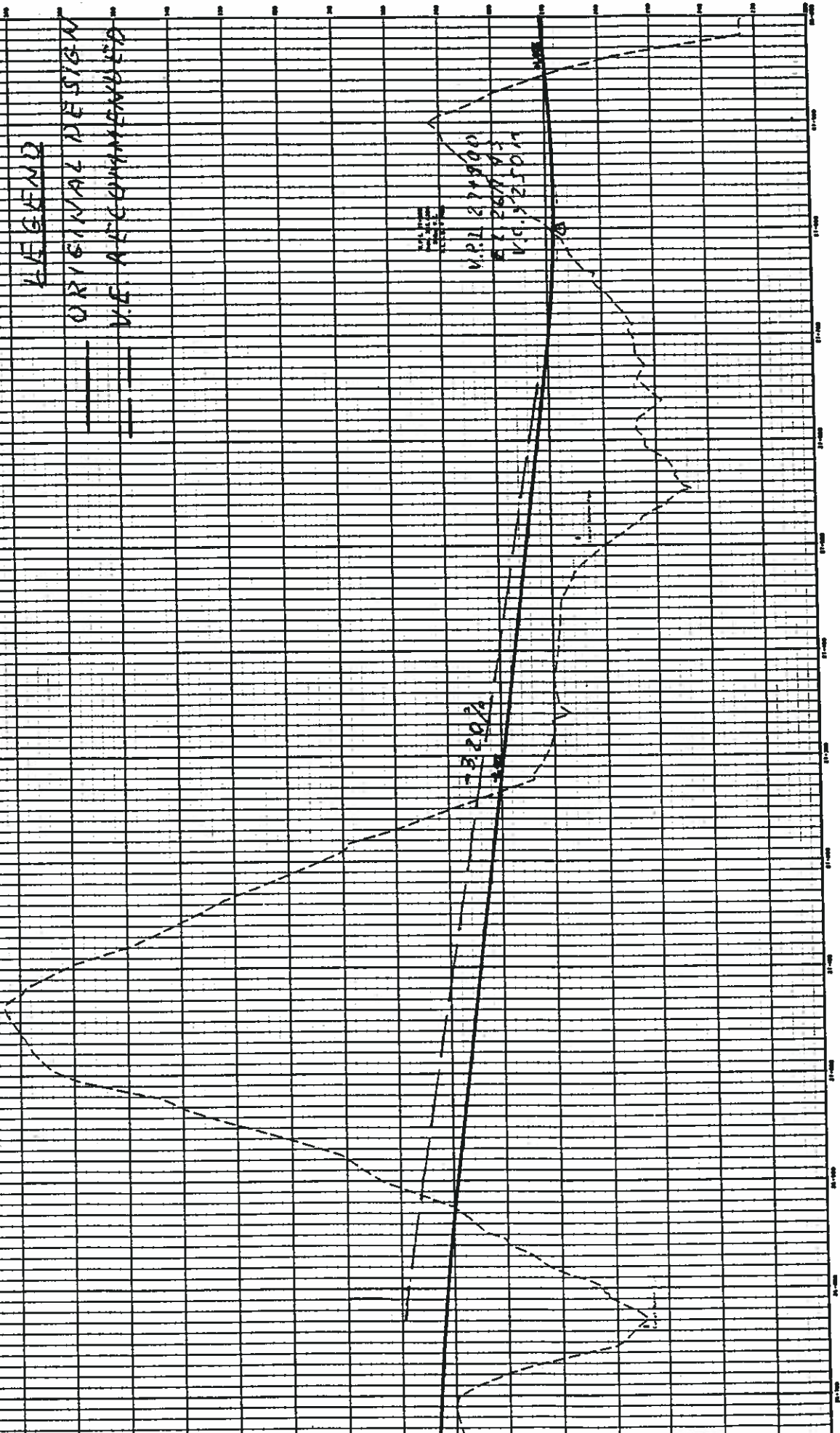
AREA.3

3 of 3

LEGEND

ORIGINAL DESIGN

RECOMMENDATION



RE

VALUE ENGINEERING RECOMMENDATION #2

VALUE ENGINEERING RECOMMENDATION #2

FORM 26 NOVEMBER 1998

PROJECT: Bifurcation

LOCATION: KY15 Hazard to Campton

STUDY DATE: November 16, 1998 through November 20, 1998

TEAM MEMBER RESPONSIBLE FOR WRITE UP: George J. Schober

FUNCTION OF COMPONENT BEING CHANGED: Vertical and Horizontal Alignment.

ORIGINAL DESIGN:

Standard Typical Section with 2 - 24 foot lanes in each direction with 12 foot paved outside shoulders and 4 foot paved median shoulders. The overall median width is 40 feet from edge to edge of pavement.

RECOMMENDED CHANGE:

DESCRIPTIVE TITLE OF RECOMMENDATION:

Bifurcate Roadway in areas of Major Cut.

Areas proposed for change include:

Area 1 - approximate Station 10+650 through approximate Station 12+400,

Area 2 - prior to equation - approximate Station 20+400 through approximate Station 21+700

Area 3 - prior to equation - approximate Station 25+550 through approximate Station 27+150

Area 4 - after the equation - approximate Station 24+9000* through approximate Station 27+200*

*north of station equation

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs	Total LC Costs
ORIGINAL DESIGN	\$103,640,000		\$103,640,000
RECOMMENDED DESIGN	\$101,508,000		\$101,508,000
ESTIMATED SAVINGS OR (COST)	\$2,132,000		\$2,132,000

VALUE ENGINEERING RECOMMENDATION #2

FORM 26 NOVEMBER 1998

Advantages:

- Reduces excavation
- Reduces waste
- Reduces clear/grub
- Reduces landscaping
- Increased aesthetics
- Reduces R.O.W.

Disadvantages:

- Increases design time/cost
- Positive median separation is required

JUSTIFICATION:

The proposed modification to the profile and alignment, which allows each half of the roadway to act somewhat independently of the other, will help to minimize the excavation on the project. With the excavation cost of the project being 67% of the total cost of the project, any means of reducing excavation will offer the potential for significant cost saving with no impact to the operation or safety of the proposed roadway.

The proposed modification, which should be considered for the areas of significant cut, can be accomplished while meeting the design standards of the Kentucky Transportation Cabinet. There are however several other potential modifications which must be considered when designing the bifurcated roadway:

Excessive grade within the clear zone. In many instances the grade in the median will be in excess of 4:1. In this circumstance, guardrail or barrier wall will be required to protect vehicles from the excessive grades. The addition of a median barrier to protect vehicles on the upper roadway from the steep slope can be accomplished in a variety of ways:

Guardrail along the edge of shoulder on the upper roadway

Standard Barrier Wall along the edge of shoulder on the upper roadway

High Barrier Wall (50" height) along the edge of shoulder on the upper roadway

Guardrail or barrier wall located outside of the clear zone of the upper roadway at the top of the slope.

These alternatives provide differing levels of safety and differing levels of cost. The cost for the high barrier wall has been deducted from the cost saving shown in the table above since it would be the most costly.

VALUE ENGINEERING RECOMMENDATION #2

FORM 26 NOVEMBER 1998

DISCUSSION CONTINUED

The addition of grade separated interchanges. In the first section shown, the proposed grade increase may require an interchange or half interchange at the westerly end of the proposed profile raise in Area 1 at the proposed intersection with old KY 15. This interchange, which allows additional vertical modification will offset much of the savings provided by the reduction in earthwork. However the addition of the interchange adds value to the project through the elimination of the conflicting traffic movement (reduction in accidents) and reduced delay for vehicle traversing this intersection/interchange. There are also additional cost for interchange ramp signalization and lighting which have been included in the total cost of the interchange.

Reduction in potential at grade accesses. Access to the facility is a significant consideration when designing a roadway. Bifurcation should only be considered in areas where no at a grade access points are anticipated. In the areas called out previously, under the **Descriptive Title of Recommendation**, it is unlikely that additional access points will be necessary due to the deep cut slopes adjacent to the roadway.

Additional potential benefits of bifurcation are a reduction in right-of-way acquisition, landscaping and restoration costs and clearing and grubbing. Another benefit is the increase of fill areas along the project which will minimize the amount of waste material for the project. These cost reductions have not been considered in our cost analysis to insure the cost savings presented are conservative.

The profile shown in the attached exhibits is very conservative and considerable additional saving can be achieved if both sides of the roadway are approached as independent roadways by designing each of the horizontal and vertical alignments separately. Also note that some of the savings realized from the bifurcation are also realized under Recommendation #1. In fact, some areas shown as bifurcated would be better suited for raising both sides of the roadway as shown in Recommendation #1. In fact the entire length of Area #3 is better suited for raising the grade of the entire cross section. Recommendations #1 and #2 should be reviewed together to determine which method will yield the best results.

VALUE ENGINEERING RECOMMENDATION#2

FORM 23 NOVEMBER 1998

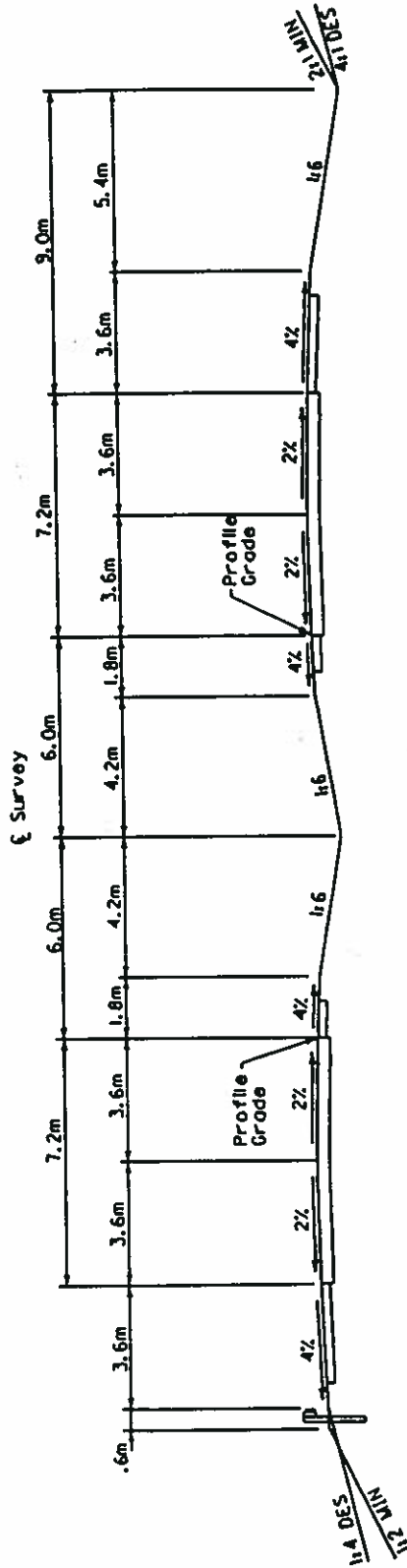
COST ESTIMATE - FIRST COST

Cost Item	Units	Unit Cost		Original Design		Recommended Design	
		\$/Unit	Source Code	Num. of Units	Total \$	Num. of Units	Total \$
Excavation	cu - m	\$ 4.00		20,735,410	\$82,941,640	19,644,960	\$78,579,840
Barrier Wall (50"h)	meters	\$ 140.00				5,213	\$729,750
New Structure	each	\$1,500,000.00				1	\$1,500,000
Totals					\$82,941,640		\$80,809,590

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

VALUE ENGINEERING RECOMMENDATION

SKETCH OF ORIGINAL DESIGN



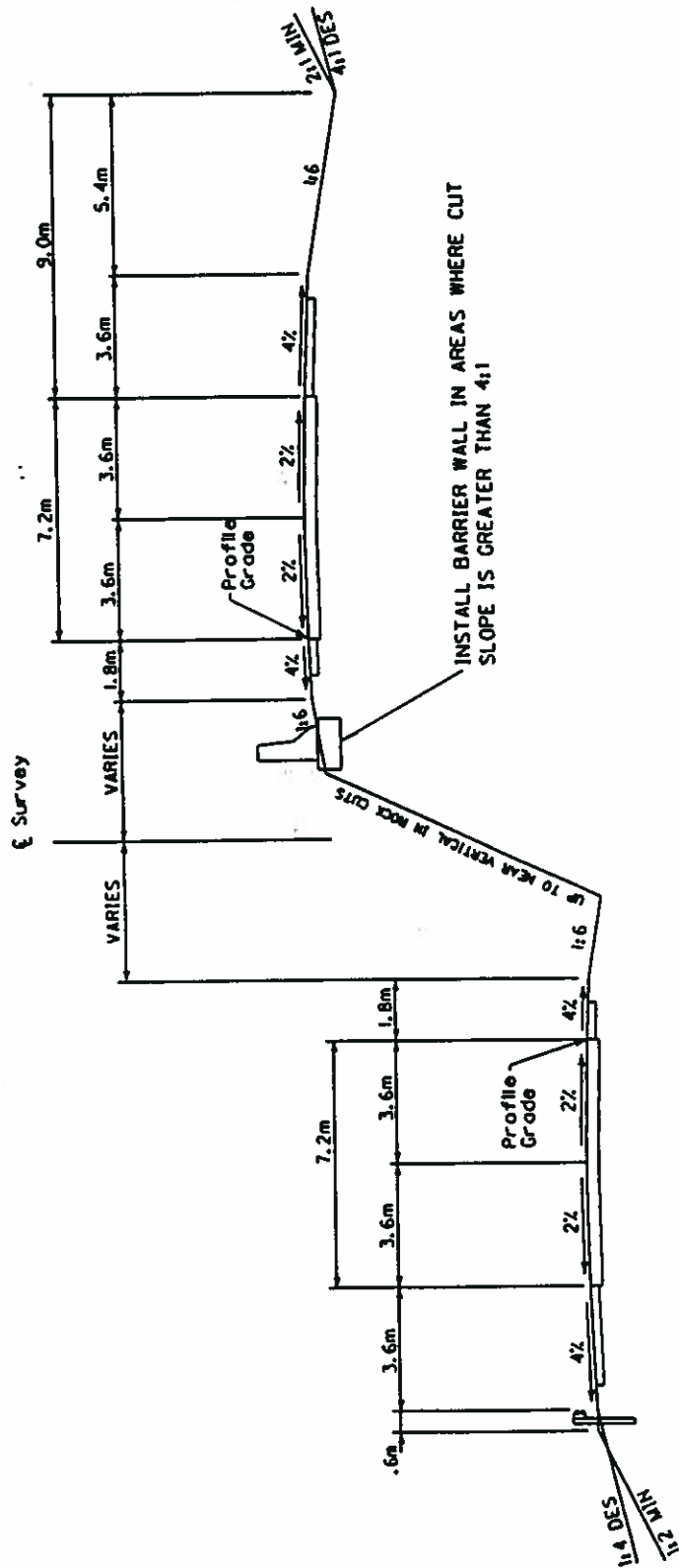
NORMAL SECTION

STA 10+835 To 12+400
(6.0m Median with Depressed Median)

602

VALUE ENGINEERING RECOMMENDATION

SKETCH OF RECOMMENDED DESIGN



REVISED TYPICAL SECTION

STA 10+835 TO 12+400
(BIFURCATED SECTION)

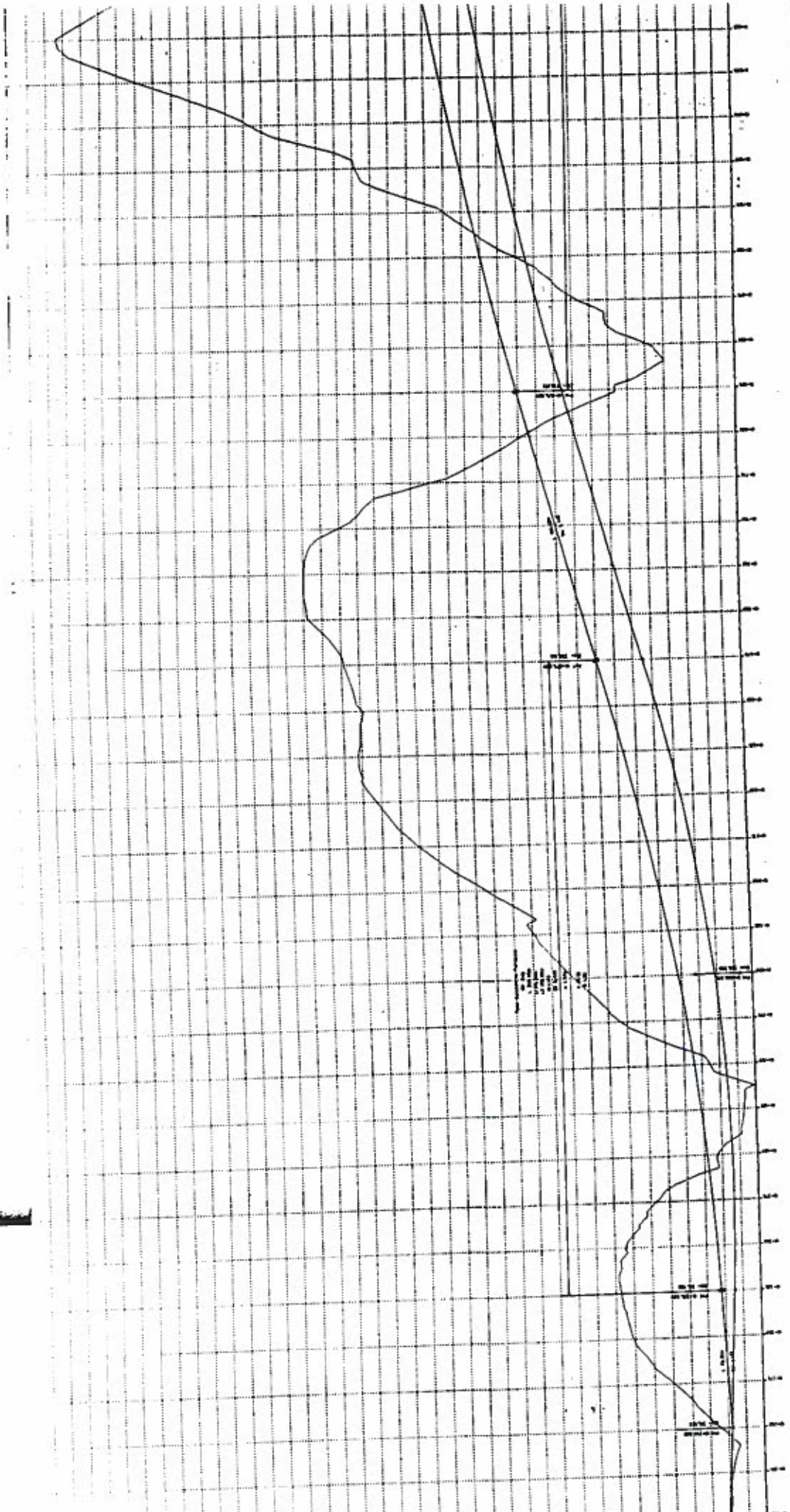
VALUE ENGINEERING RECOMMENDATION # 2

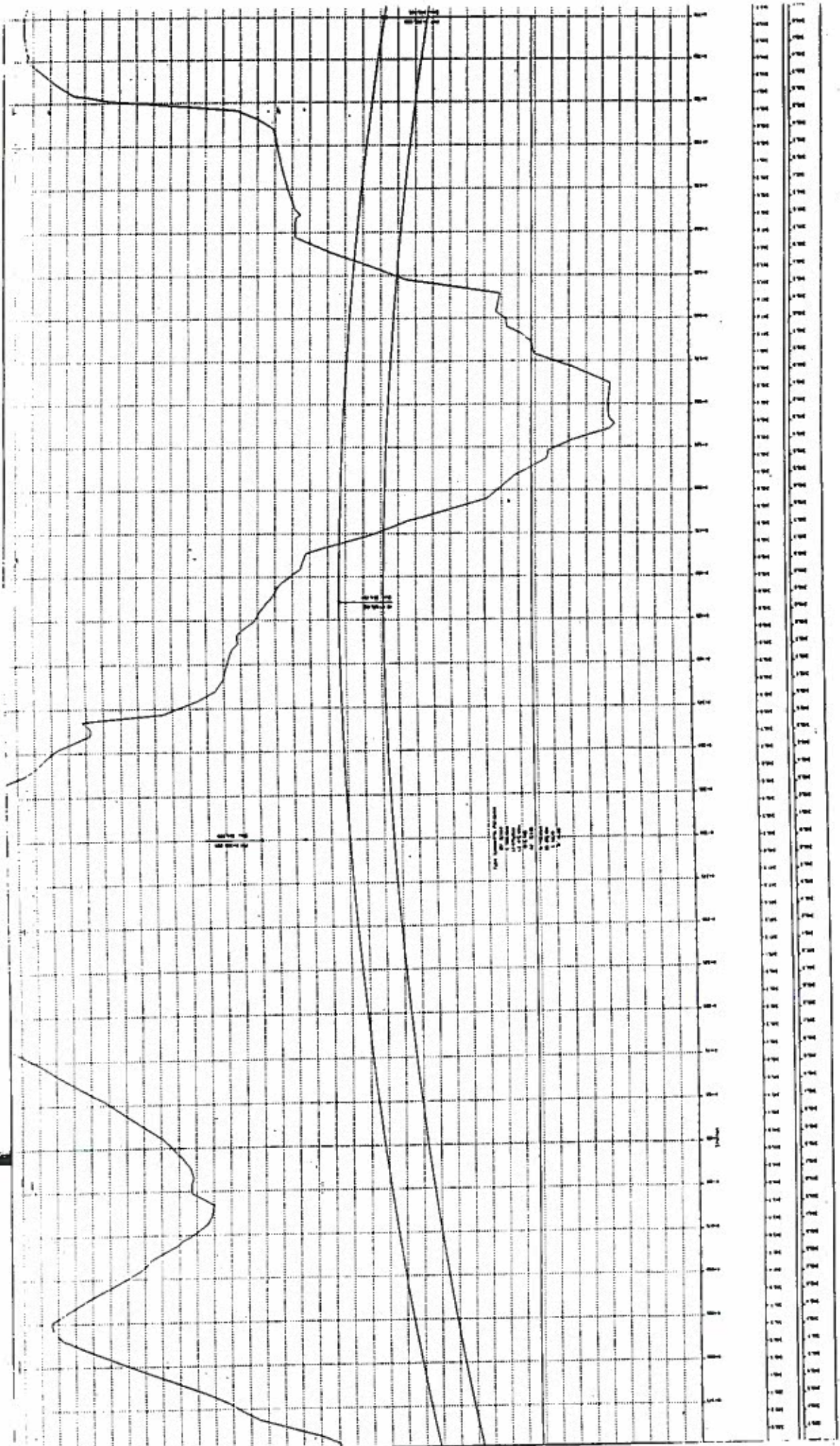
CALCULATIONS

AREA 1

Excavation Savings - Recommendation #2, Area 4

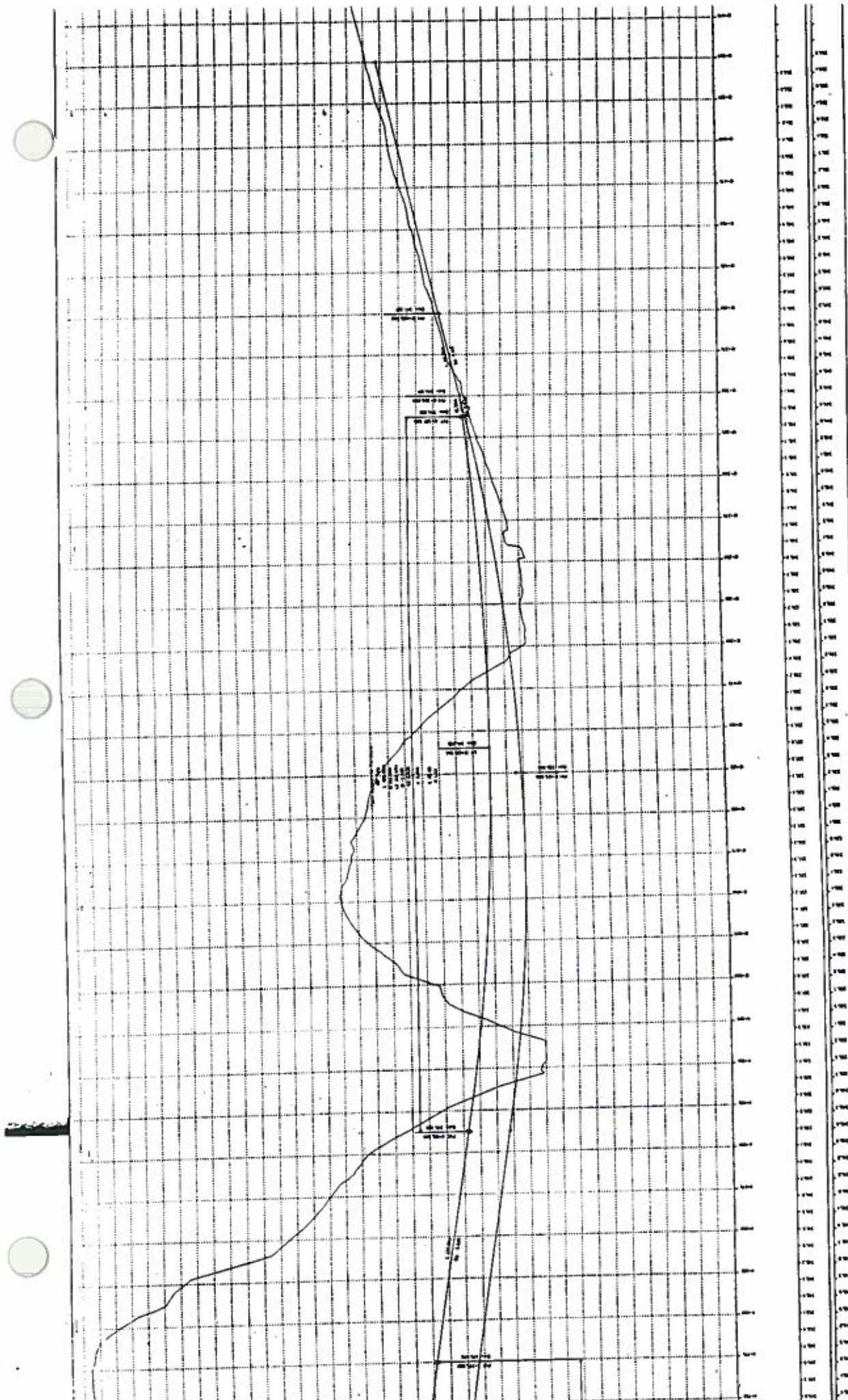
		<u>Average End Area Reduction</u>		
<u>Station to</u>	<u>Station</u>	<u>Width of half of Pavement (m)</u>	<u>Average Height Increase (m)</u>	<u>Volume Reduction (Cu. M)</u>
10650	12400	22.5	10	393750





R2A1-3

7



R2A8-4

17

VALUE ENGINEERING RECOMMENDATION # 2

CALCULATIONS

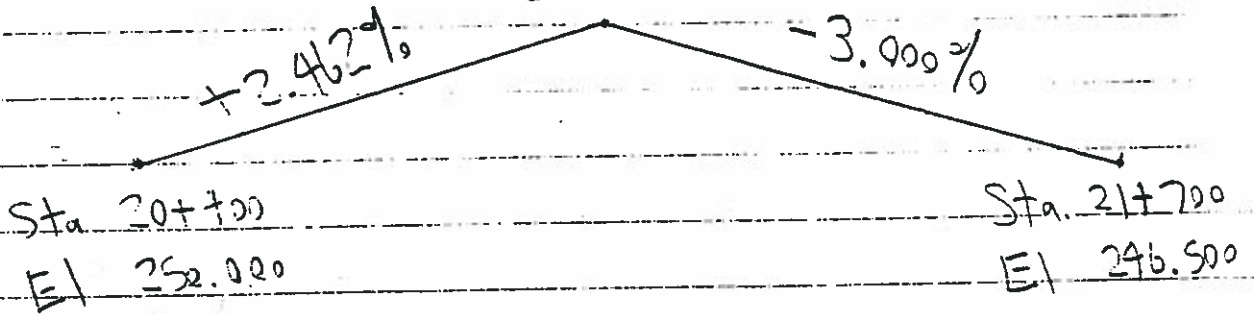
AREA 2

Profile for Bifurcated North Bound Lane

Sta 20+400 - 21+700

VPI Sta 21+050
EI 266.000

DPB 11/18/78



Sta.	EI
20+400	252.000
20+600	254.924
20+800	259.848
21+000	264.772
21+200	261.500
21+400	255.500
21+600	249.500

Note: Vertical Curve not calculated

Sta 20+400 = Approach NBL

Sta 21+080 = Approach SBL

Sta 21+833 = Entrance NBL

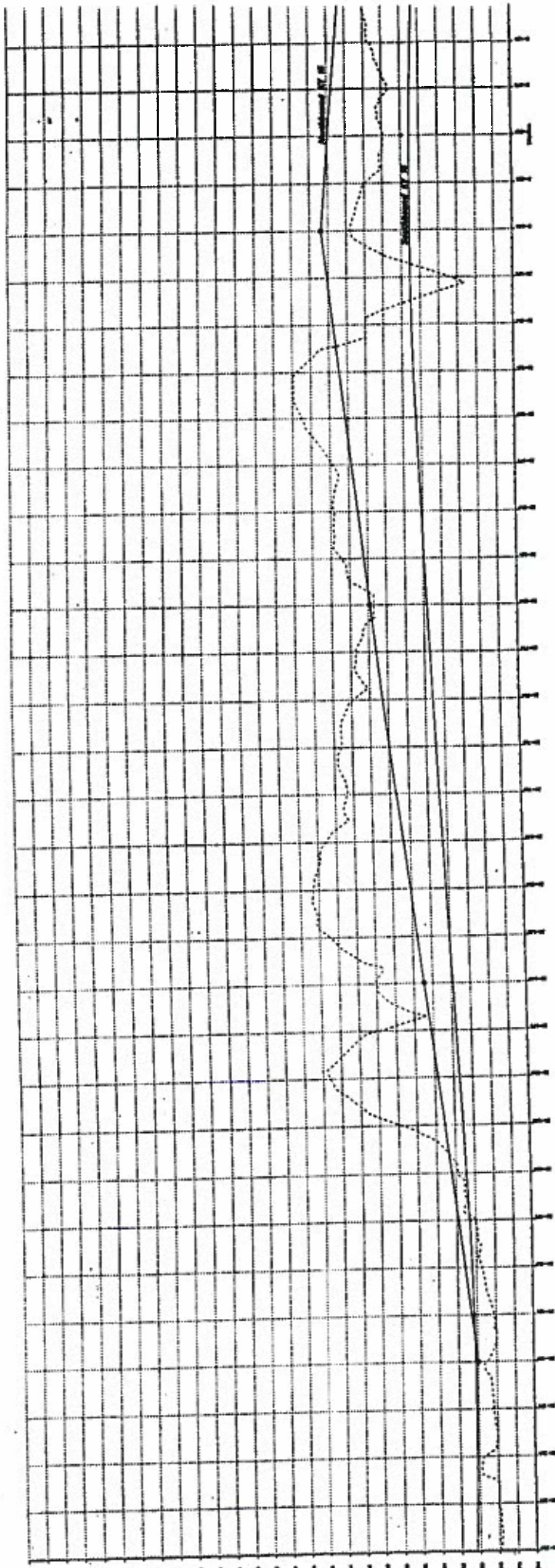
Calculation of Excavation Reduction

Sta. 20+400 - 21+700

DPB 11/18/98

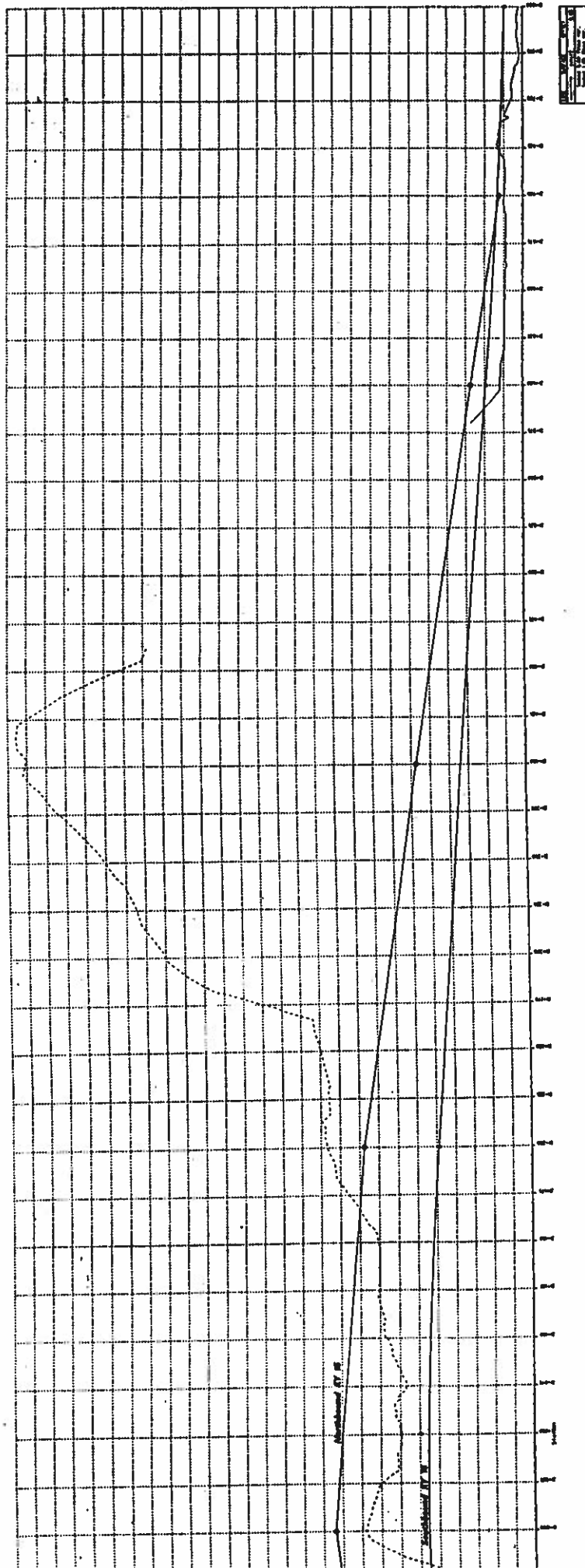
Sta.	Area (m ²)	Vol (m ³)
20+400	0	56.25
20+600	$2.5 \times 22.5 = 56.25$	19,125
20+800	$6.0 \times 22.5 = 135.00$	30,350
21+000	$7.5 \times 22.5 = 168.75$	33,750
21+200	$7.5 \times 22.5 = 168.75$	28,125
21+400	$5.0 \times 22.5 = 112.50$	16,875
21+600	$2.5 \times 22.5 = 56.25$	2,813
21+700	0	
	71	$\Sigma = 136,663$

Profile Mode



R2A2-3

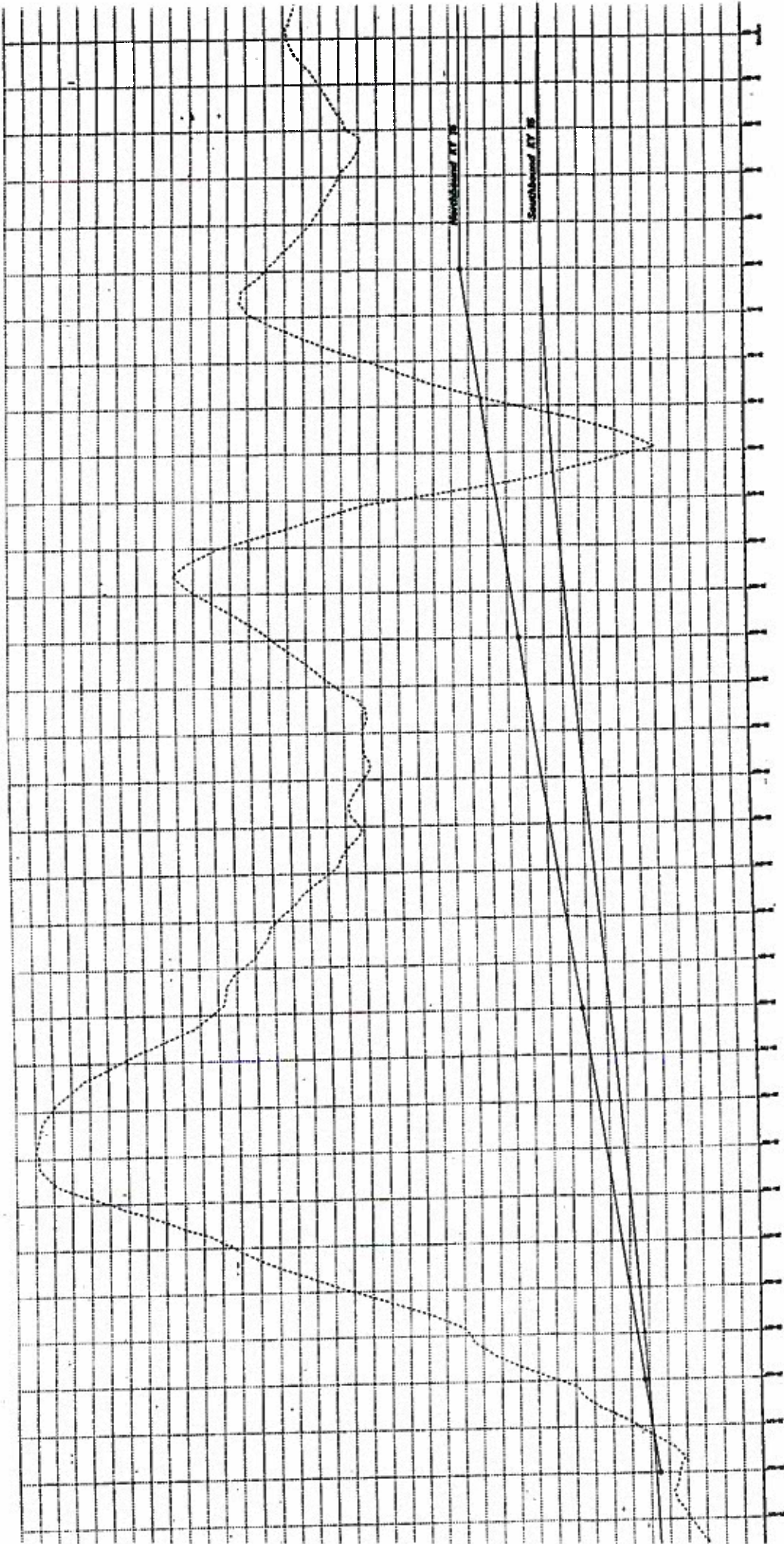
Profile Shows



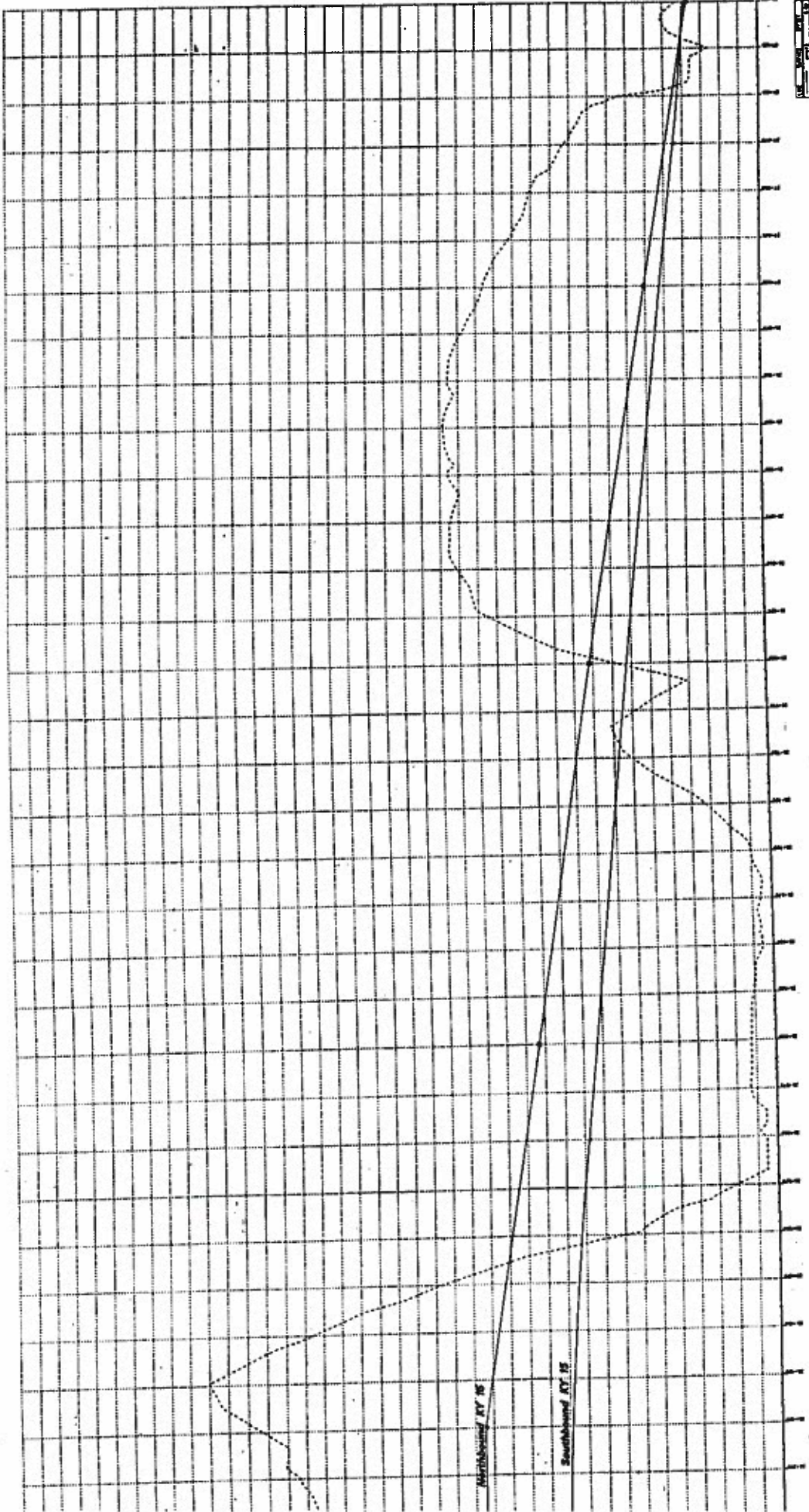
Profile IV B
Profile IV W

R2A2-4

Profile Number



R2A3-3



0.5
1.0
1.5
2.0

0.5
1.0
1.5
2.0

Northbound KY 75

Southbound KY 75

75

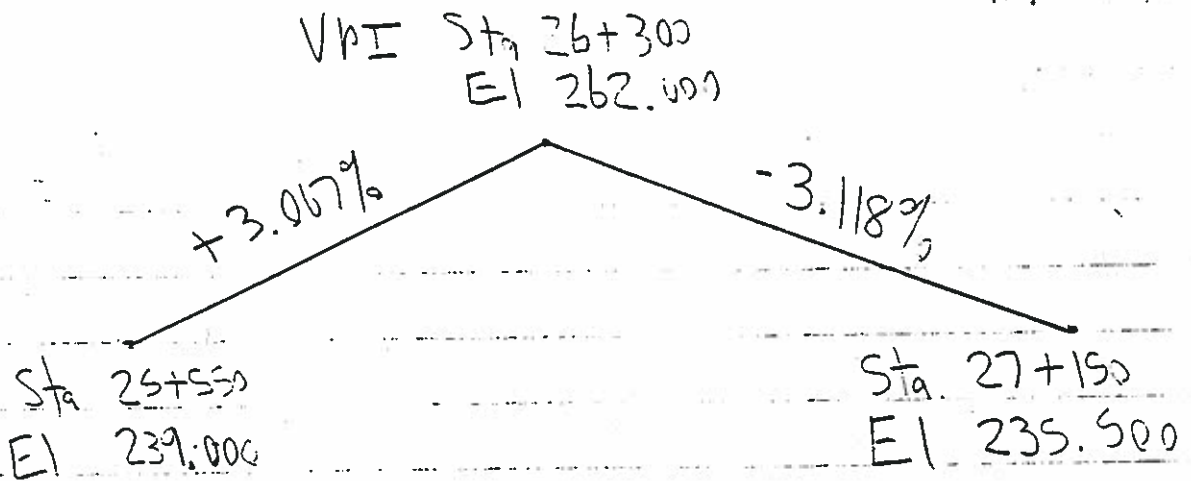
VALUE ENGINEERING RECOMMENDATION # 2

CALCULATIONS

AREA 3

Profile for Bifurcated Northbound Lane
 Station 25+550 - 27+150

DPB 11/18/98



Sta	El	Note:
25+550	239.000	Vertical Curve not calculated.
25+600	240.534	
25+800	246.668	
26+000	252.802	
26+200	258.936	
26+400	258.882	
26+600	252.646	
26+800	246.410	
27+000	240.174	
27+150	235.500	

Sta 25+538 = Approach NBL to SBL

Sta 27+115 = Approach NBL to SBL

Calculation of Excavation Reduction

Sta 25+550 - 27+150

APB 1/2/18

Sta	Area (m ²)	Vol (m ³)
25+550	0	1125
25+600	2.0 x 22.5 = 45	13,500
25+800	4.0 x 22.5 = 90	25,900
26+000	7.5 x 22.5 = 169	39,400
26+200	10 x 22.5 = 225	45,000
26+400	10 x 22.5 = 225	22,500
26+600	0	11,300
26+800	5.0 x 22.5 = 113	20,300
27+000	4.0 x 22.5 = 90	6,750
27+150	0	
		$\Sigma = 185,775$

VALUE ENGINEERING RECOMMENDATION # 2

CALCULATIONS

AREA 4

Excavation Savings - Recommendation #2, Area 4

1:1						
STATION	ELEVATION CHANGE	TRANSLATION DIST	CUT AREA	FILL AREA	Cut Volume	Fill Volume
24900						
25000	2.4	3.39	47		2350	0
25100	5	7.07	101		7400	0
25200	7.6	10.75	147	42	12400	2100
25300	10.2	14.42	212		17950	2100
25400	12.8	18.10	267		23950	0
25500	15.4	21.78		711	13350	35550
25600	18	25.46		2476	0	159350
25700	20.6	29.13		1937	0	220650
25800	22.44	31.73		2463	0	220000
25900	23.44	33.15		2455	0	245900
26000	23.48	33.21	359	166	17950	131050
26100	23.08	32.64	515		43700	8300
26200	22.44	31.73	499		50700	0
26300	21.62	30.58	476		48750	0
26400	20.58	29.10	285	244	38050	12200
26500	19.38	27.41		892	14250	56800
26600	17.98	25.43		511	0	70150
26700	16.38	23.16	76	326	3800	41850
26800	14.56	20.59		1865	3800	109550
26900	12.48	17.65	273		13650	93250
27000	9.9	14.00	216		24450	0
27100	6.44	9.11	139		17750	0
27200	2.86	4.04	60		9950	0
					364200	1408800

20

Cost Saving Calculations, Recommendation #2

Station	Station	Cu. M. Decrease in Excavation	Cost Per Cu. M.	*Length of Barrier Wall Required	Cost of Barrier Wall	Net Savings
10650	12400	393750	\$4.00	1312.5	\$140.00	1,391,250
20400	21700	136700	\$4.00	975	\$140.00	410,300
25550	27150	195800	\$4.00	1200	\$140.00	615,200
24900	27200	364200	\$4.00	1725	\$140.00	1,215,300
Totals		1,090,450		5,213		3,632,050

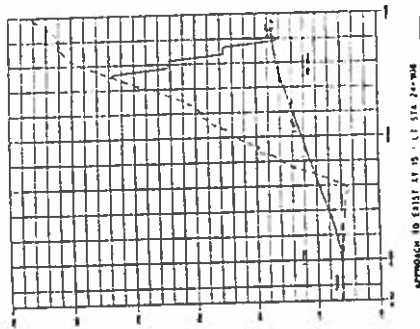
Subtract the cost of one grade separated interchange (Half Diamond) 1,500,000

Net Cost Savings 2,132,050

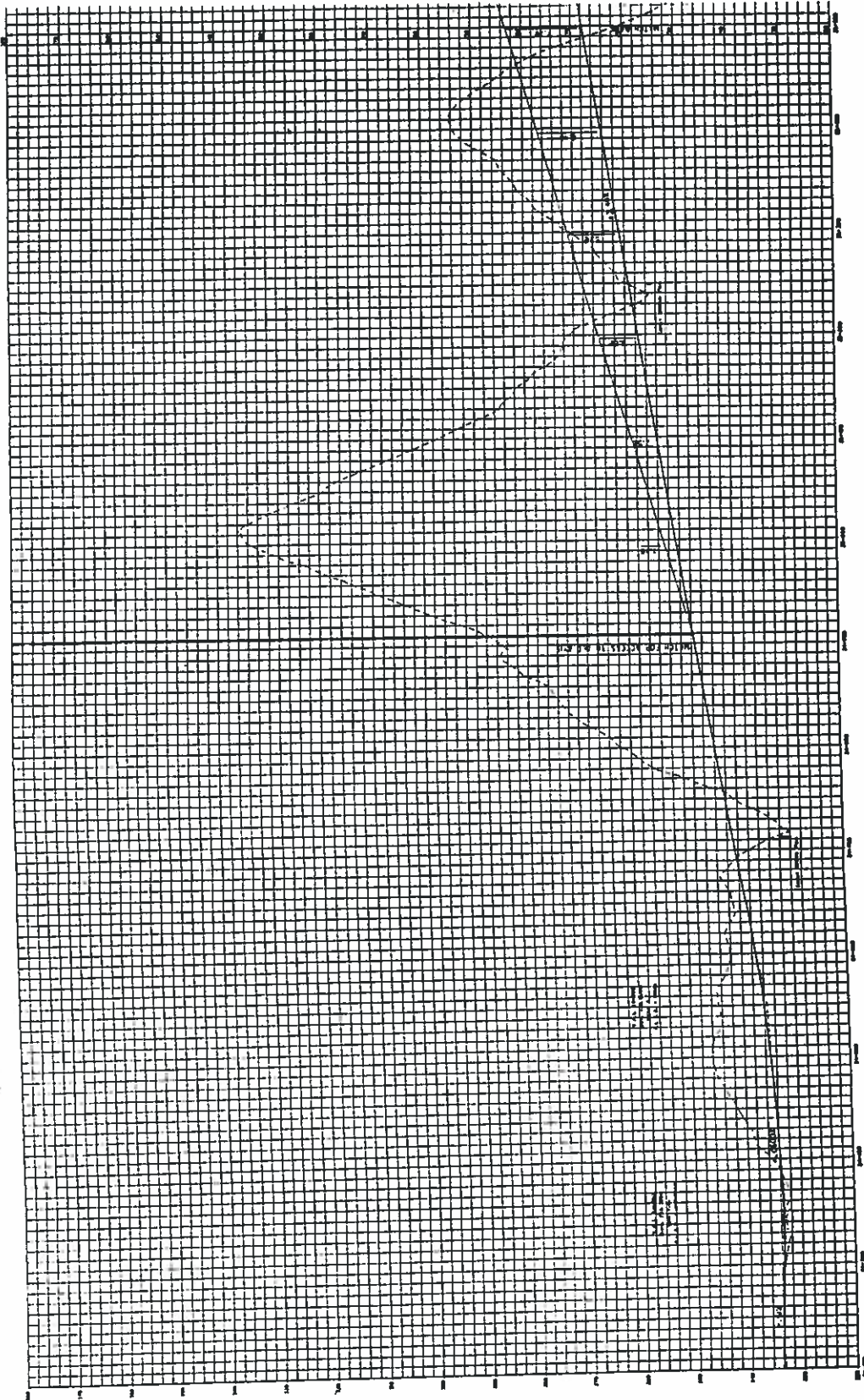
* 75% of the total length of bifurcation

PERRY - BREATHITT COUNTIES
KY 15 HAZARD - CAMPTON ROAD
11104 MO 10 25K.00

SCALE: 1" = 500' HORIZ.
1" = 100' VERT.



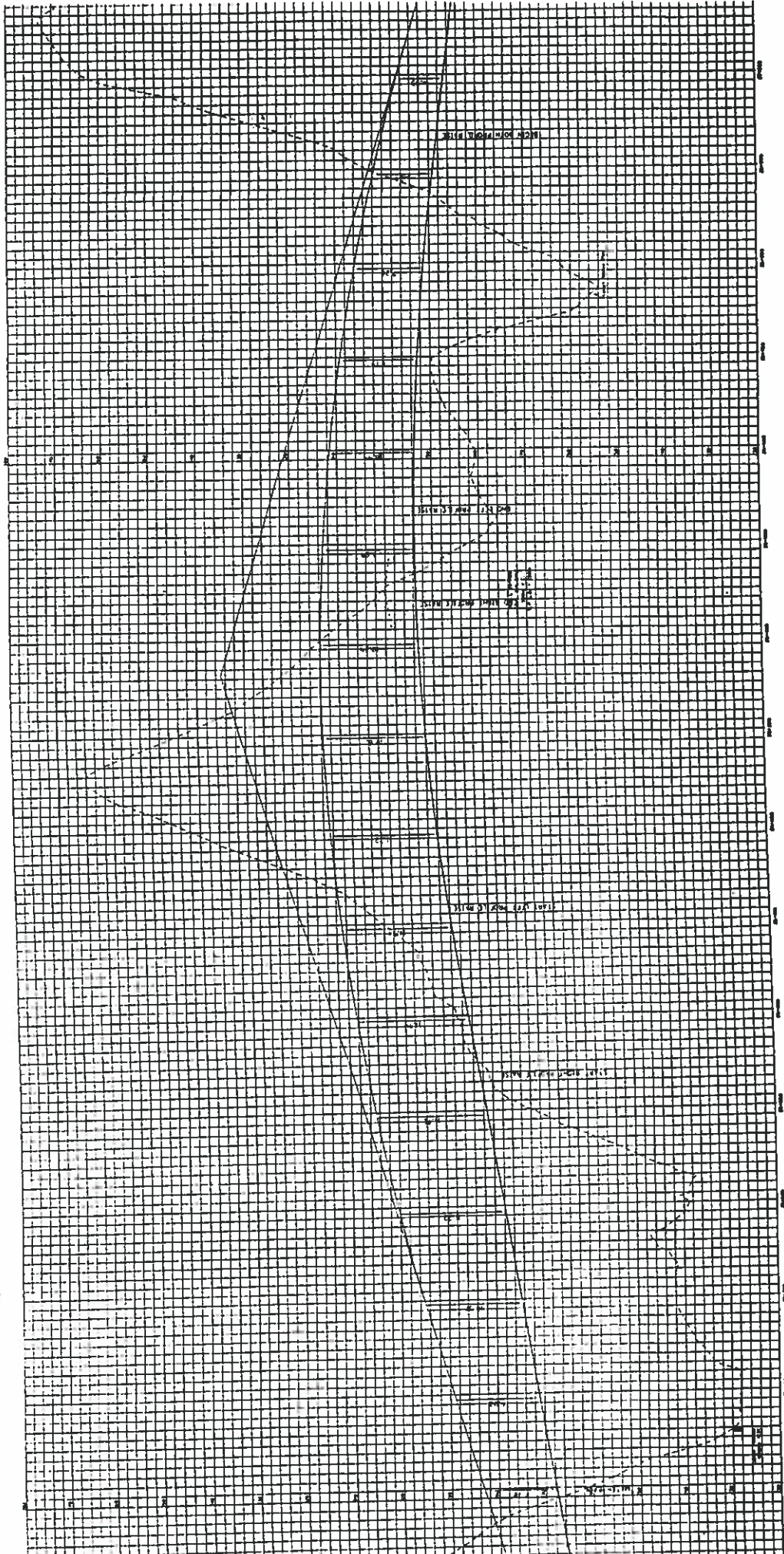
APPROACH TO EXIST. LT 15 - LT STA 24+00



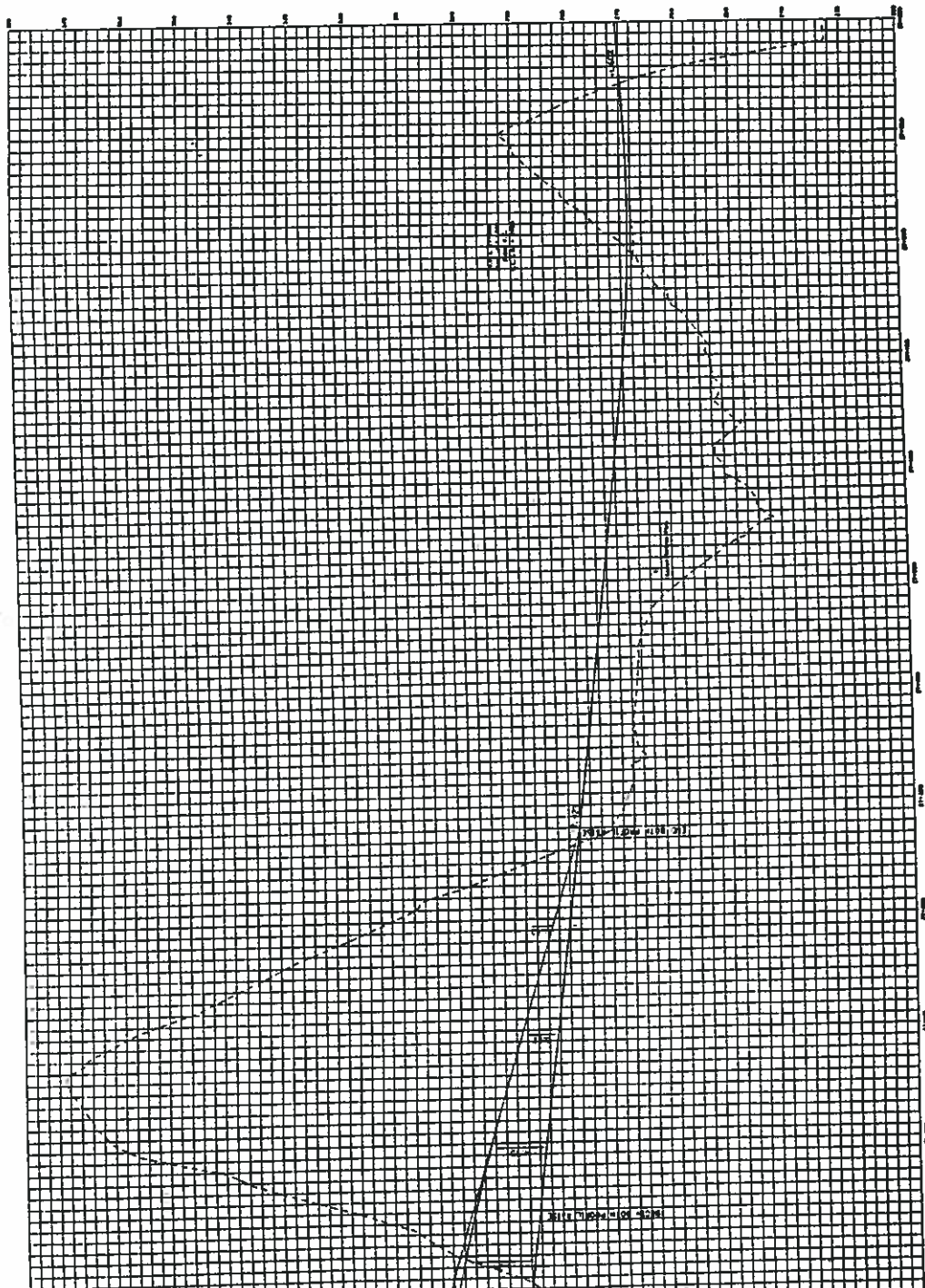
Sta 24+200 to Sta 27+900

R2A4-3

28



R2A4-4



no

VALUE ENGINEERING RECOMMENDATION #3

VALUE ENGINEERING RECOMMENDATION #3

FORM 26 NOVEMBER 1998

PROJECT: Reduce median width

LOCATION: Ky. 15, Hazard to Campton

STUDY DATE: November 16 -November 20, 1998

TEAM MEMBER RESPONSIBLE FOR WRITEUP: Naresh Shah and Dallas Montgomery

FUNCTION OF COMPONENT BEING CHANGED: Separation of roadway.

DESCRIPTIVE TITLE OF RECOMMENDATION:

Reduce median width.

ORIGINAL DESIGN:

The original roadway cross section includes a 40-foot median which, when constructing through a cut section, means all of the median area is included in the excavation cost.

RECOMMENDED CHANGE:

Reduce median width to 30 feet.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	\$103,640,000		\$103,640,000
RECOMMENDED DESIGN	\$96,061,400		\$96,061,400
ESTIMATED SAVINGS OR (COST)	\$7,578,600		\$7,578,600

VALUE ENGINEERING RECOMMENDATION #3

ADVANTAGES:

- Reduces excavation quantity.
- Reduces right-of-way width requirements.
- Reduces the area to be cleared and grubbed.
- Reduces seeding and landscaping.

DISADVANTAGES:

- Possible diminished aesthetics

JUSTIFICATION:

All required functions are provided for, yet with a reduction in excavation.

VALUE ENGINEERING RECOMMENDATION #3.

FORM: 23 NOV 1998

SKETCH OF ORIGINAL DESIGN

SEE ATTACHMENTS - TYPICAL SECTIONS

VALUE ENGINEERING RECOMMENDATION #3

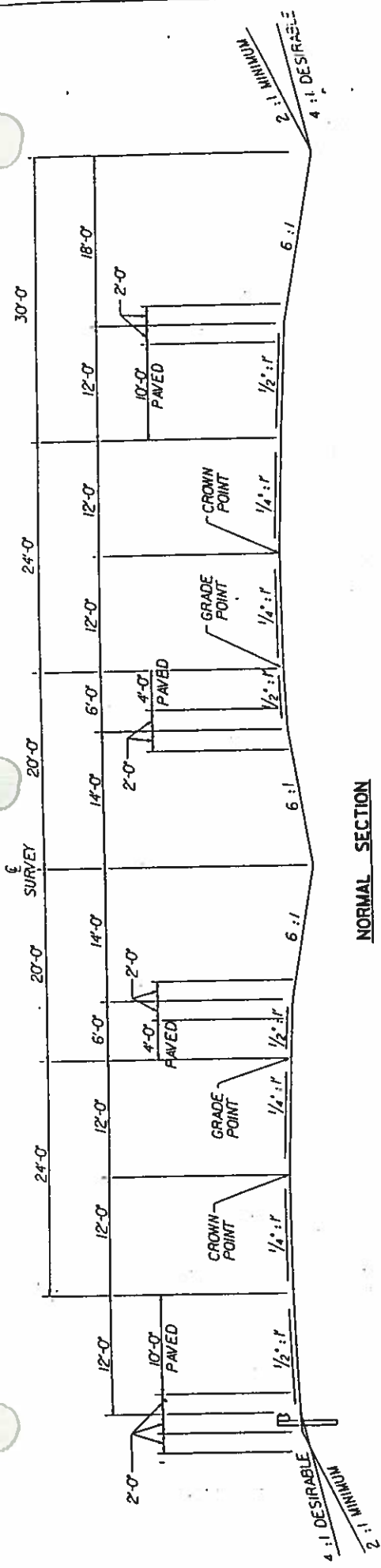
FORM 23 NOV 1998

CALCULATIONS

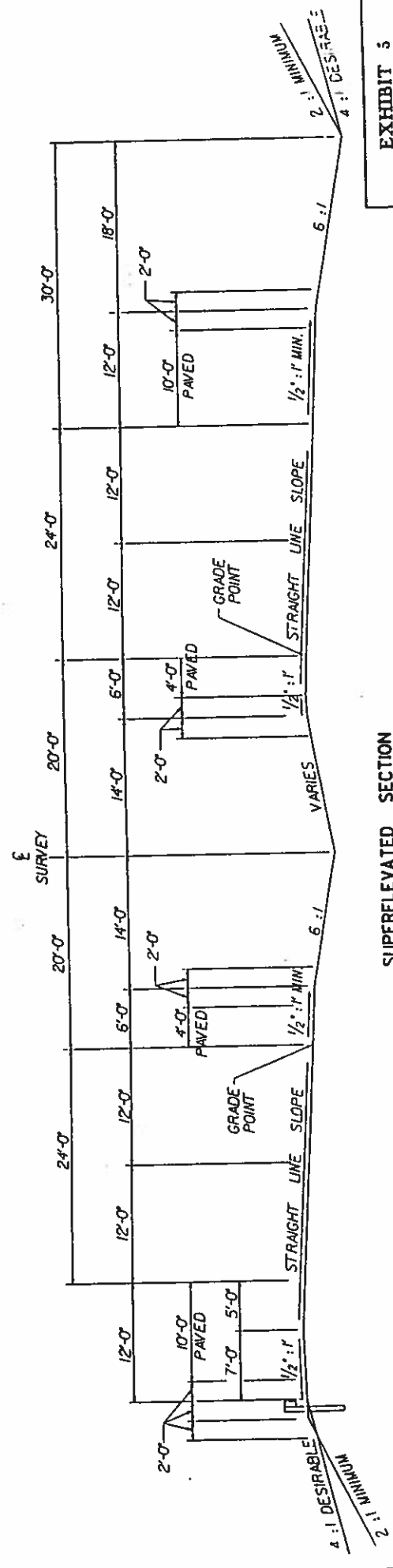
ALTERNATE 3A - 30' MEDIAN

SAVINGS - $1,894,650 \times \$4 \text{ (CU.M.)} = 7,578,600$
EXCAVATION COST

TYPICAL SECTIONS



NORMAL SECTION



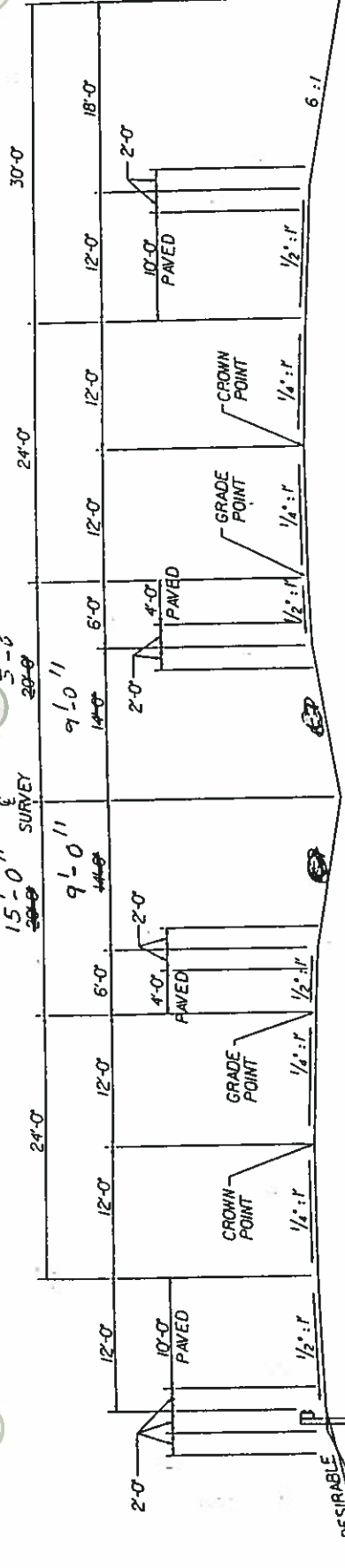
SUPERELEVATED SECTION

EXHIBIT 5
TYPICAL
SECTIONS
KY 15
HAZARD - CAMPTON ROAD
NOT TO SCALE

ORIGINAL DESIGN

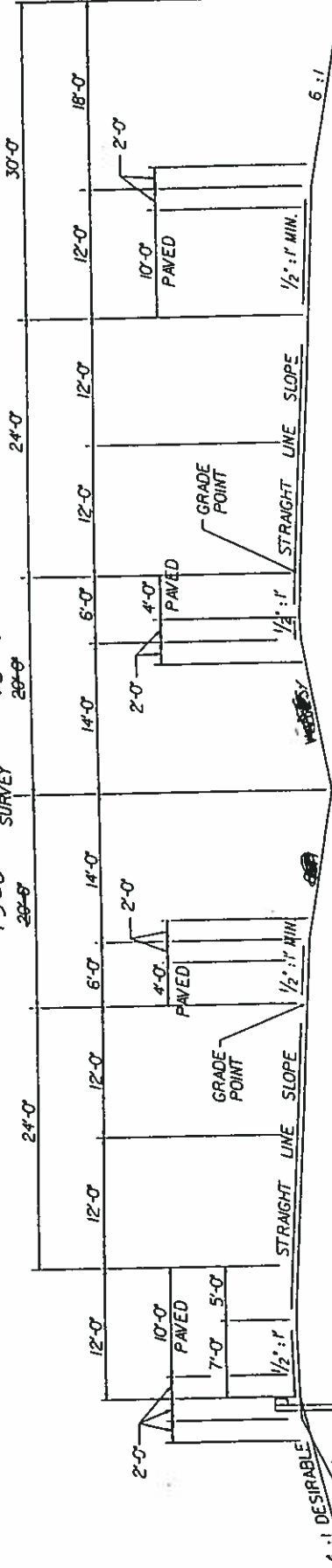
TYPICAL SECTIONS

15'-0" SURVEY
~~20'-0"~~ 5'-6" 11



NORMAL SECTION

15'-0" SURVEY
~~20'-0"~~ 15'-0" 11



SUPERELEVATED SECTION

EXHIBIT 5
 TYPICAL
 SECTIONS
 KY 15
 HAZARD - CAMPTON ROAD
 NOT TO SCALE

RECOMMENDATION 38



HAZELET + ERDAL, INC.

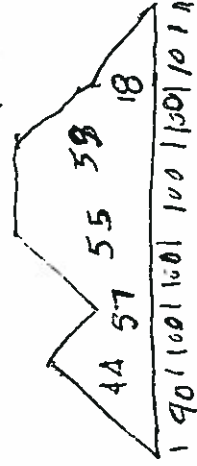
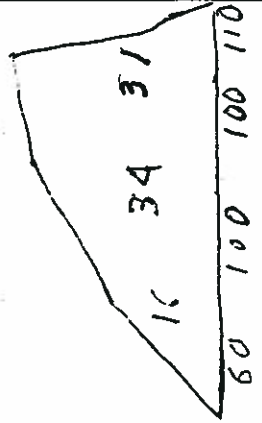
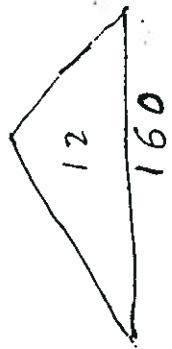
Consulting Engineers

Cont. No. _____ Sheet No. 1-
 Made By D.A.M. Date 11/12/98
 Chkd. By _____ Date _____

KY 15 FROM KY 28 TO HAZLET

SPECULATION 3 - QUANTITY

STA	L. STAKE	HEIGHT	WIDTH	Total WIDTH	Quantity	Quantity
10+250	METER	METER	20	10	9600	10
10+330	80	12		9600		
10+410	80	0				
10+490		0			4800	
10+500		16			25000	
10+600		34		84600	35000	
10+700		36			19801	
10+810		0				
10+900		0			22000	
11+000		44			35500	
11+100		27			41000	
11+200		55		197200	55000	
11+300		55			36500	
11+400		18			7000	
<u>11+400</u>		0		<u>TOTAL:</u>	<u>291400</u>	



TOTAL 93 1,894,650 cu ft



HAZELET + ERDAL, INC.

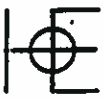
Consulting Engineers

KY 15 FROM KY 20 TO HAZLET
SPECULATION 3 - QUANTITY

Cont. No. _____ Sheet No. 2-
Made By D.P.M. Date 11/12/98
Chkd. By _____ Date _____

STA	DISTANCE METER	HEIGHT METER	WIDTH 20	WIDTH 10	QUANTITY 20	QUANTITY 10
11+630	0	0				6400
11+710	16	16	59850			12400
11+750	46	46				32500
11+850	19	19				8550
11+940	0	0				
11+970	0	0				
21+080	21	21	24150			24150
21+200	0	0				
21+400	0	0				
21+900	18	18	81000			81000
3+300	0	0				
			TOTAL			

165000 94 H6



HAZELET + ERDAL, INC.

Consulting Engineers

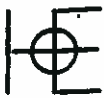
KY 15 FROM KY 28 TO Harrods

SPECULATION 3 - QUANTITY

Cont. No. _____ Sheet No. 3
 Made By D.L.M. Date 11/12/98
 Chkd. By _____ Date _____

STA	N. STAKE / METER	HEIGHT / METER	WIDTH / 20	WIDTH / 10	QUANTITY / 20	QUANTITY / 10
3+960		0		10500		10500
14+020		10		10500		
14+160		0				
14+700		0				
14+820		18		32400		32400
15+060		0				
15+215		0		16291		16291
15+360		6				
15+515		0				
17+260		0				
17+360		20		38000		38000
17+640		0				
			TOTAL			

97100 95



HAZELET + ERDAL, INC.

Consulting Engineers

Cont. No. _____ Sheet No. 4-

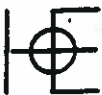
Made By D.P.M. Date 11/12/98

Chkd. By _____ Date _____

KY 15 FROM KY 20 TO HAZLET
SPECULATION 3 - QUANTITY

STA	DISTANCE / METER	HEIGHT METER	WIDTH 20	DEPTH 10	QUANTITY 20	QUANTITY 10
17+800		0			5700	10
17+860		19		58700	39000	
18+060		20			14000	
18+200		0				
18+620		0		46200	45000	
18+760		42				
18+840		0				
19+860		0		14400	14400	
19+960		12				
20+100		0				
20+500		9		35200	35000	
20+940		7				
TOTAL						

154500 96



HAZELET + ERDAL, INC.

Consulting Engineers

KY 15 FROM KY 28 TO HAZLET

SPECULATION 3 - QUANTITY

Cont. No. _____ Sheet No. 5

Made By D.L. M.D. Date 11/18/98

Chkd. By _____ Date _____

STA	DISTANCE METER	HEIGHT METER	WIDTH 20	WIDTH 10	QUANTITY 20	QUANTITY 10
21+100		0		115000		115000
21+400		96				
21+600		0				
22+040		0		28000		28000
22+240		20				
22+320		0				
22+900		0		7000		7000
22+500		7				
22+600		0				
22+790		0				
22+840		18		8100		8100
22+880		0				
				TOTAL		

158100 97



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KY 15 FROM KY 28 TO HAZLET

SPECULATION 3 - QUANTITY

Cont. No. _____ Sheet No. 6
Made By D.L.M. Date 11/12/98
Chkd. By _____ Date _____

STA	DISTANCE / METER	HEIGHT METER	WIDTH 20	WIDTH 10	DEPTH 20	DEPTH 10	QUANTITY
23+120		6		18000		18000	10
23+220		10					
23+320		0					
23+720		0		4300		4200	
23+760		12					
23+790		0		20000		20000	
23+800		10					
24+000		10					
25+500		6					50400
25+710		63		197400			107000
25+990		44					34000
26+040		24					6000
26+090		0					
				TOTAL			

20100

28



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KY 15 FROM KY 28 TO HADON

SPECULATION 3 - QUANTITY

Cont. No. _____ Sheet No. 7
Made By P.L.M. Date 11/18/98
Chkd. By _____ Date _____

STA.	STAKE METER	HEIGHT METER	WIDTH 20	WIDTH 10	QUANTITY 20	QUANTITY 10
26+120		0			9600	
26+180		32		91100	28600	
26+290		20			37700	
26+420		38			15000	
26+500		0				
26+600		16		54000	54000	
27+100		20				
28+780		0				11700
28+900		9		11700		
29+040		0				
				TOTAL		
						156800

99



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Cont. No. _____ Sheet No. 8

Made By D.L.M. Date 11/12/98

Chkd. By _____ Date _____

KY 15 FROM KY 28 TO HAZLET
SPECULATION 3 - QUANTITY

STA	DISTANCE METER	HEIGHT METER	WIDTH 20	LENGTH 10	QUANTITY 20	QUANTITY 10
24+400		0	16500	16500	16500	16500
24+500		11				
24+700		0				
24+760		0				
25+010		89	197400	197400	197400	197400
25+230		0				
25+250		0	37200	37200	37200	37200
25+400		31				
25+490		0				
25+950		0	189800	189800	189800	189800
26+260		73				
26+470		0				
			TOTAL	440900	440900	440900

100



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Cont. No. _____ Sheet No. 9
 Made By D.L.M. Date 11/12/98
 Chkd. By _____ Date _____

KY 15 FROM KY 28 TO HAZLET
SPECULATION 3 - QUANTITY

STA	DISTANCE METER	HEIGHT METER	WIDTH 20	WIDTH 10	DEPTH 20	DEPTH 10	QUANTITY	
261872		0		174000		174000	10	
260192		87						
27422		0						
274002		0		17250		17250	17250	
274900		23						
274950		0						
TOTAL								
							1,894,650	15,110
							7,578,600	101

VALUE ENGINEERING RECOMMENDATION #3A

VALUE ENGINEERING RECOMMENDATION # 3A

PROJECT: Reduce median width/with barrier

LOCATION: Ky. 15, Hazard to Campton

STUDY DATE: November 16 -November 20, 1998

TEAM MEMBER RESPONSIBLE FOR WRITEUP: Naresh Shah and Dallas Montgomery

FUNCTION OF COMPONENT BEING CHANGED: Separation of roadway.

DESCRIPTIVE TITLE OF RECOMMENDATION: Reduce median width/with barrier.

ORIGINAL DESIGN:

The original roadway cross section includes a 40-foot median which, when constructing through a cut section, means all of the median area is included in the excavation cost.

RECOMMENDED CHANGE:

Reduce median width to 20 feet and use guardrail or concrete barrier wall for separation between roadways.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	\$103,640,000		\$103,640,000
RECOMMENDED DESIGN	\$89,697,800		\$89,697,800
ESTIMATED SAVINGS OR (COST)	\$13,942,200		\$13,942,200

VALUE ENGINEERING RECOMMENDATION # 3A

ADVANTAGES:

- Reduces excavation quantity.
- Reduces right-of-way width requirements.
- Reduces the area to be cleared and grubbed.
- Reduces seeding and landscaping.

DISADVANTAGES:

- Possible diminished aesthetics

JUSTIFICATION:

All necessary functions are provided with a reduction in excavation and right-of-way requirements.

VALUE ENGINEERING RECOMMENDATION # 3A

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	cu-m	\$4.00	2200	25,910,000	\$103,640,000	22,120,700	\$88,482,800
Guard Rail or Barrier Wall	m	\$50.00	-	-	-	24,300	\$1,215,000
							\$89,697,800

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

VALUE ENGINEERING RECOMMENDATION # 3A

FORM 23 NOV 1998

SKETCH OF RECOMMENDED DESIGN

SEE ATTACHMENTS - TYPICAL SECTIONS

VALUE ENGINEERING RECOMMENDATION # 3A

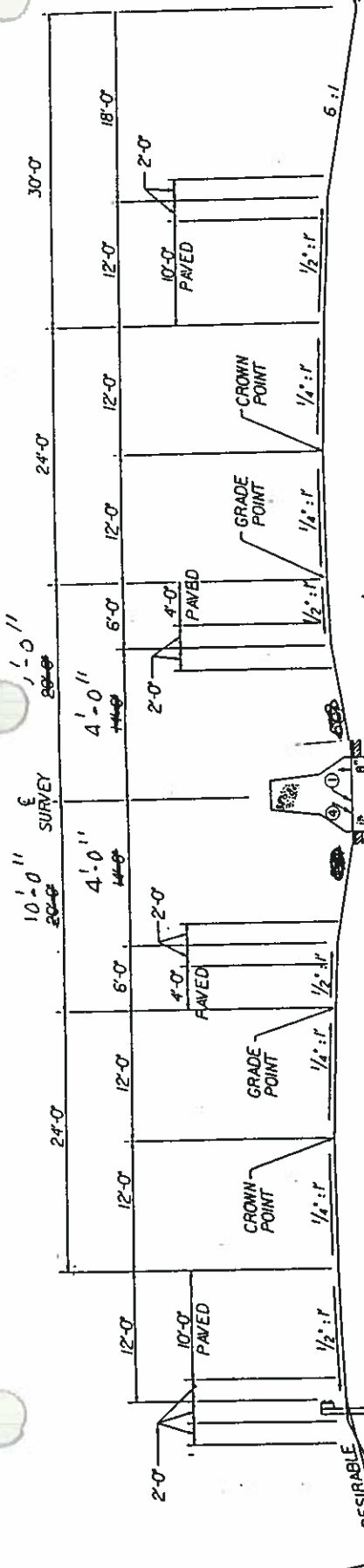
CALCULATIONS

FORM. 23 NOV 1998

<p>A ALTERNATE 3B - 20' MEDIAN W/ BARRIER WALL</p>
<p>SAVINGS OF EXCAVATION COST</p>
<p>$3,789,300 \times \\$4 \text{ (CU.M.)} = 15,157,200$</p>
<p>ADDITIONAL COST FOR BARRIER</p>
<p>$24.3 \times 1000 \times \\$50 \text{ (METER)} = 1,215,000$</p>
<p>NET SAVINGS - 13,942,200</p>

TYPICAL SECTIONS

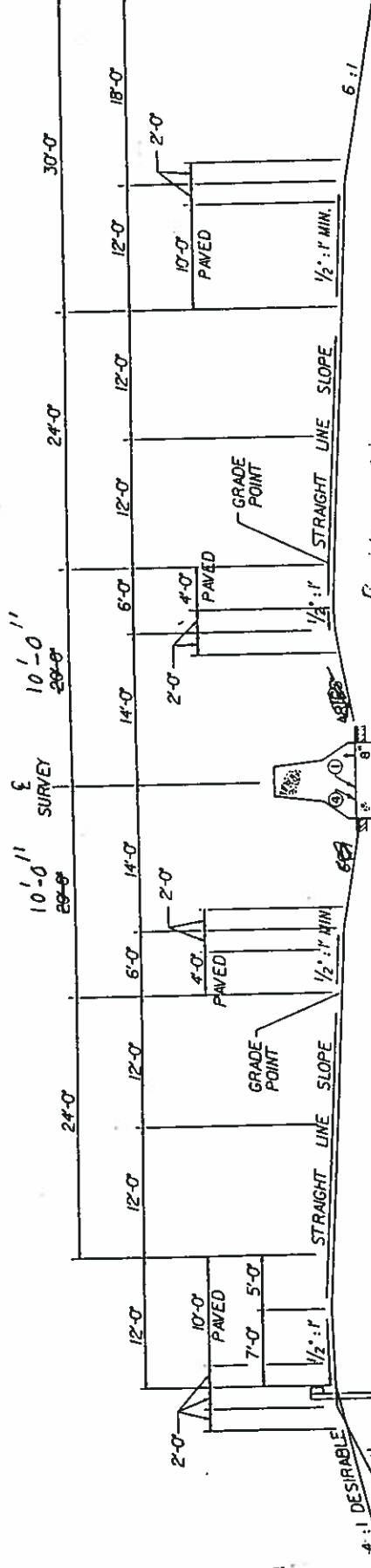
10'-0" SURVEY
1'-0" / 20'-0"



Barrier or
Double faced
Guardrail

NORMAL SECTION

10'-0" SURVEY
1'-0" / 20'-0"



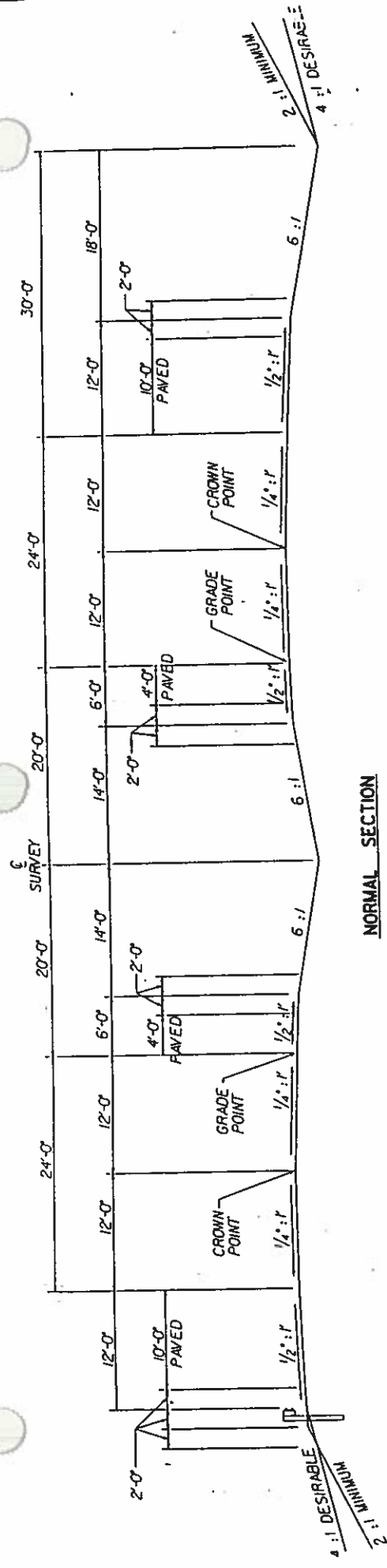
Barrier or
Double faced
Guardrail

SUPERELEVATED SECTION

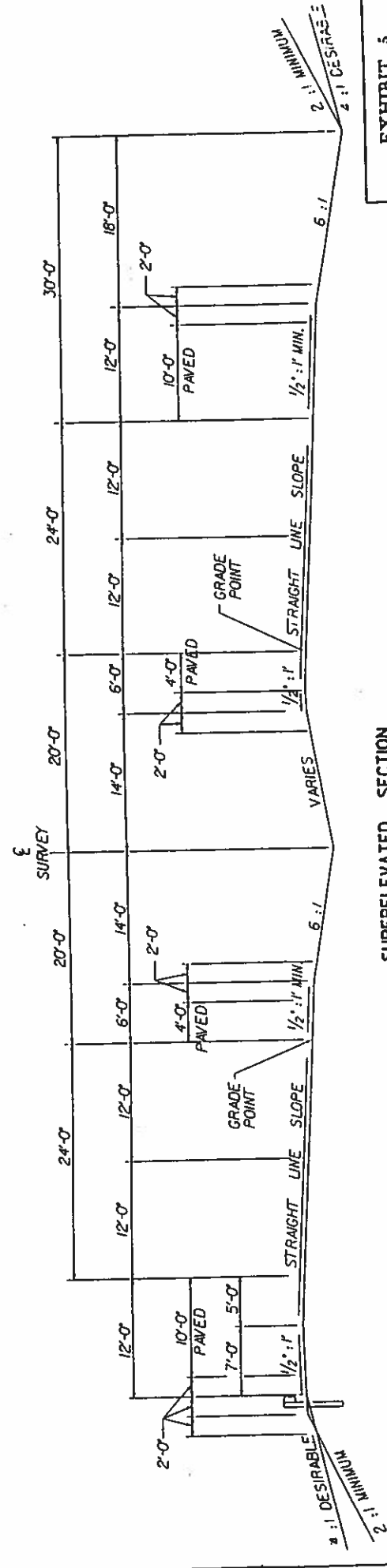
EXHIBIT 5
TYPICAL
SECTIONS
KY 15
HAZARD - CAMPTON ROAD
NOT TO SCALE

RECOMMENDATION 3BA

TYPICAL SECTIONS



NORMAL SECTION



SUPERELEVATED SECTION

EXHIBIT 5
TYPICAL
SECTIONS
KY 15
HAZARD - CAMPTON ROAD
NOT TO SCALE

ORIGINAL DESIGN



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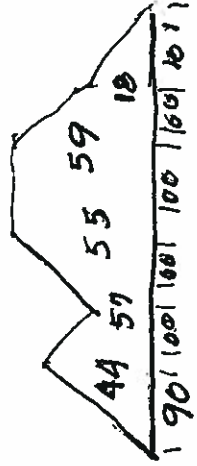
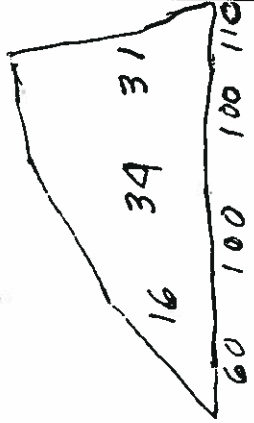
Cont. No. _____ Sheet No. 1

Made By D.L.M. Date 11/12/98

Chkd. By _____ Date _____

KY 15 FROM KY 20 TO HAZLET
SPECULATION 3 - QUANTITY

STA	DISTANCE METER	HEIGHT METER	WIDTH 20	Quantity 10	Quantity 20	Quantity 10	Quantity 10
10+250	80	0		9600		9600	9600
10+330	80	12					
10+410	80	0					
10+490		0					4800
10+500		16					25000
10+600		34					35000
10+700		36					19801
10+810		0					
10+900		0					22000
11+000		41					35500
11+100		27					41000
11+200		55					55000
11+300		55					36500
11+490		18					7000
TOTAL							291400



TOTAL 1,894,650 cc



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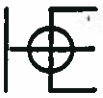
Cont. No. _____ Sheet No. 2-
 Made By D.L.M. Date 11/12/98
 Chkd. By _____ Date _____

KY 15 FROM KY 28 TO HAZLET
SPECULATION 3 - QUANTITY

STA	STAKE METER	HEIGHT METER	WIDTH 20	WIDTH 10	DEPTH 20	DEPTH 10	Quantity	
11+630		0					6100	
11+710		16		59650			12400	
11+750		46					32500	
11+850		19					8550	
11+940		0						
11+970		0		24150			24150	
21+080		21						
21+200		0						
21+400		0						
21+900		18		81000			81000	
31+300		0						
TOTAL								

165000

111



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Cont. No. _____ Sheet No. 3

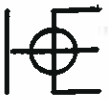
Made By D.P.M. Date 11/12/98

Chkd. By _____ Date _____

KY 15 FROM KY 28 TO HAZLET
SPECULATION 3 - QUANTITY

STA	DISTANCE METER	HEIGHT METER	WIDTH 20	WIDTH 10	WIDTH 20	QUANTITY
13+960		0		10500		10500
14+020		10				
14+160		0				
14+700		0				
14+820		18		32400		32400
15+060		0				
15+200		0				
15+360		9		16200		16200
15+560		0				
17+260		0				
17+360		20		38000		38000
17+640		0				
TOTAL						97100

97100
112



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Consulting Engineers

KY 15 FROM KY 20 TO HADON
SPECULATION 3 - QUANTITY

Cont. No. _____ Sheet No. 4-

Made By D.L.M. Date 11/12/98

Chkd. By _____ Date _____

STA	DISTANCE METER	HEIGHT METER	WIDTH 20	WIDTH 10	DEPTH 20	DEPTH 10	QUANTITY	
17+804		0					5700	
17+860		19		58700			39000	
18+060		20					14000	
18+200		0						
18+620		0		46200			45000	
18+700		42						
18+840		0						
19+860		0		14400			14400	
19+960		12						
20+100		0						
20+500		9		35200			35000	
20+940		7						
TOTAL								

154500

113



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Consulting Engineers

Cont. No. _____ Sheet No. 5
 Made By D.L.M. Date 11/12/98
 Chkd. By _____ Date _____

KY 15 FROM KY 28 TO HAZLET

SPECULATION 3 - QUANTITY

STA	STAKE METER	HEIGHT METER	WIDTH 20	WIDTH 10	QUANTITY 20	QUANTITY 10
17+100		0		115000		115000
17+400		96				
21+600		0				
22+040		0				
22+240		20		28000		28000
22+320		0				
22+400		0				
22+500		7		7000		7000
22+600		0				
22+790		0				
22+940		18		8100		8100
22+980		0				
				TOTAL		

158100

114



HAZELET + ERDAL, INC.

Consulting Engineers

KY 15 FROM KY 28 TO Harrods

Cont. No. _____ Sheet No. 6

Made By D.A.M. Date 11/12/98

Chkd. By _____ Date _____

SPECULATION 3 - QUANTITY

STA	DISTANCE METER	HEIGHT METER	WIDTH 20	LENGTH 10	QUANTITY 20	QUANTITY 10
23+120		6		18000		18000
23+220		10				
23+320		0				
23+720		0		4300		4200
23+760		12				
23+790		0				
23+800		10		20000		20000
24+000		10				
25+580		6				50400
25+740		63		197400		107000
25+990		44				34000
26+040		24				6000
26+090		0		TOTAL		

239600



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Consulting Engineers

KY 15 FROM KY 20 TO H-001X

SPECULATION 3 - QUANTITY

Cont. No. _____ Sheet No. 7
Made By D.L.M. Date 11/12/98
Chkd. By _____ Date _____

STA.	DISTANCE METER	HEIGHT METER	WIDTH 20	WIDTH 10	DEPTH 20	DEPTH 10	QUANTITY
26+120		0					9600
26+180		32		91100			28600
26+240		20					37700
26+420		38					15000
26+500		0					
26+800		16		54000			54000
27+100		20					
28+780		0					11700
28+900		9		11700			
29+040		0					
TOTAL							
							156800

116



HAZELET + ERDAL, INC.

Consulting Engineers

KY 15 FROM KY 20 TO HADON
SPECULATION 3 - QUANTITY

Cont. No. _____ Sheet No. 8

Made By D.S.M. Date 11/12/98

Chkd. By _____ Date _____

STA	DISTANCE METER	HEIGHT METER	WIDTH 20	WIDTH 10	QUANTITY 20	QUANTITY 10
24+400		0		16500		16500
24+500		11				
24+700		0				
24+760		0				
25+010		09		197400		197400
25+230		0				
25+250		0		37200		37200
25+400		31				
25+490		0				
25+950		0		189800		189800
26+260		73				
26+470		0				
				TOTAL		

440900

117



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Consulting Engineers

Cont. No. _____ Sheet No. 9

Made By D.L.M. Date 11/12/98

Chkd. By _____ Date _____

KY 15 FROM KY 28 TO HADON
SPECULATION 3 - QUANTITY

STA	DISTANCE / METER	HEIGHT METER	WIDTH 20	WIDTH 10	QUANTITY 20	QUANTITY 10
26+870		0		174000		174000
26+922		87				
27+210		0				
27+800		0		17250		17250
27+900		23				
27+950		0				
				191250		

TOTAL

1,894,650 5,791,300

\$A/C.M. 7,578,600 118 \$1,000,000 15,1

SECTION 4 - DESIGN SUGGESTIONS and COMMENTS.

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 some comments that will aid the designer.

DESIGN COMMENT #4

Eliminate at-grade crossings at intersections of existing KY15 and proposed new alignment.

This design comment on the proposed alignment includes alternatives to replace the at-grade intersection crossings. This recommendation does not constitute a proposed savings in the overall costs in the construction phase of this project, but it enhances the value of the project through improvement in safety with the elimination of conflicting turning movements and increase the road-user benefits. According to A Policy on Geometric Design of Highways and Streets (1994) this intersection consists of characteristics that would warrant an improvement from at-grade intersection to separated-grade intersection. These warrants include:

1. Elimination of spot congestion.
 - traffic volumes warrant a signalized intersection which creates a stopped (delay) situation
2. Elimination of hazard
 - being located in a sag vertical curve with steep grades
3. Site topography
4. Road-user benefits
 - KY15 is a coal-haul and log truck route and a stop situation creates delay.

The Value Engineering Team recommends further study and consideration of the following two proposed alternatives:

Proposal 1 - Place a separated-grade diamond intersection at Station 10 + 500 that will accommodate turning movements of between both Southeast and Northwest bound traffic of proposed new alignment of KY15 along with existing KY15 and KY1067.

Proposal 2 - Place a separated-grade half diamond intersection at Station 10 + 500 and at Station 12 + 100. The interchange at Station 10 + 500 will accommodate turning movements between Northwest bound traffic from Hazard to existing KY15 and Southeast bound traffic to Hazard from existing KY15. The interchange at Station 12 + 100 will accommodate turning movements between Northwest bound traffic to Haddix from existing KY15 and Southeast bound traffic from Haddix to existing KY15.

DESIGN COMMENT #4

Eliminate at-grade crossings at intersections of existing KY15 and proposed new alignment.

ADVANTAGES:

1. Proposals 1 and 2 both constitute an increased value in the proposed alignment of KY15.
2. Proposals 1 and 2 both improve the safety to the traveling public by eliminating conflicting movements.
3. Proposals 1 and 2 both constitute an increase in traffic flow thus a higher L.O.S.
4. Proposals 1 and 2 both increase road-user benefits.
5. Proposal 1 better matches site topography by alleviating constraints placed on the vertical alignment. This would allow possibility of savings in construction costs by reduction in roadway excavation quantities explained in Value Engineering Recommendation #1.

DISADVANTAGES:

Proposal 1:

1. Additional costs associated with the construction of a bridge and ramps for the purpose of a separated grade diamond interchange at Station 10 + 500.
2. The restriction of access for local traffic on existing KY15 West of KY28 making West bound turning movements to the proposed new alignment of KY15.

Proposal 2:

1. Additional costs associated with the construction of bridge and ramps for the purpose of separated grade half-diamond intersections at Station 10 + 500.
2. Additional costs associated with the construction of bridge and ramps for the purpose of separated grade half-diamond intersections at Station 12 + 100.
3. Additional maintenance costs associated with the separated grade interchanges.

APPENDICES

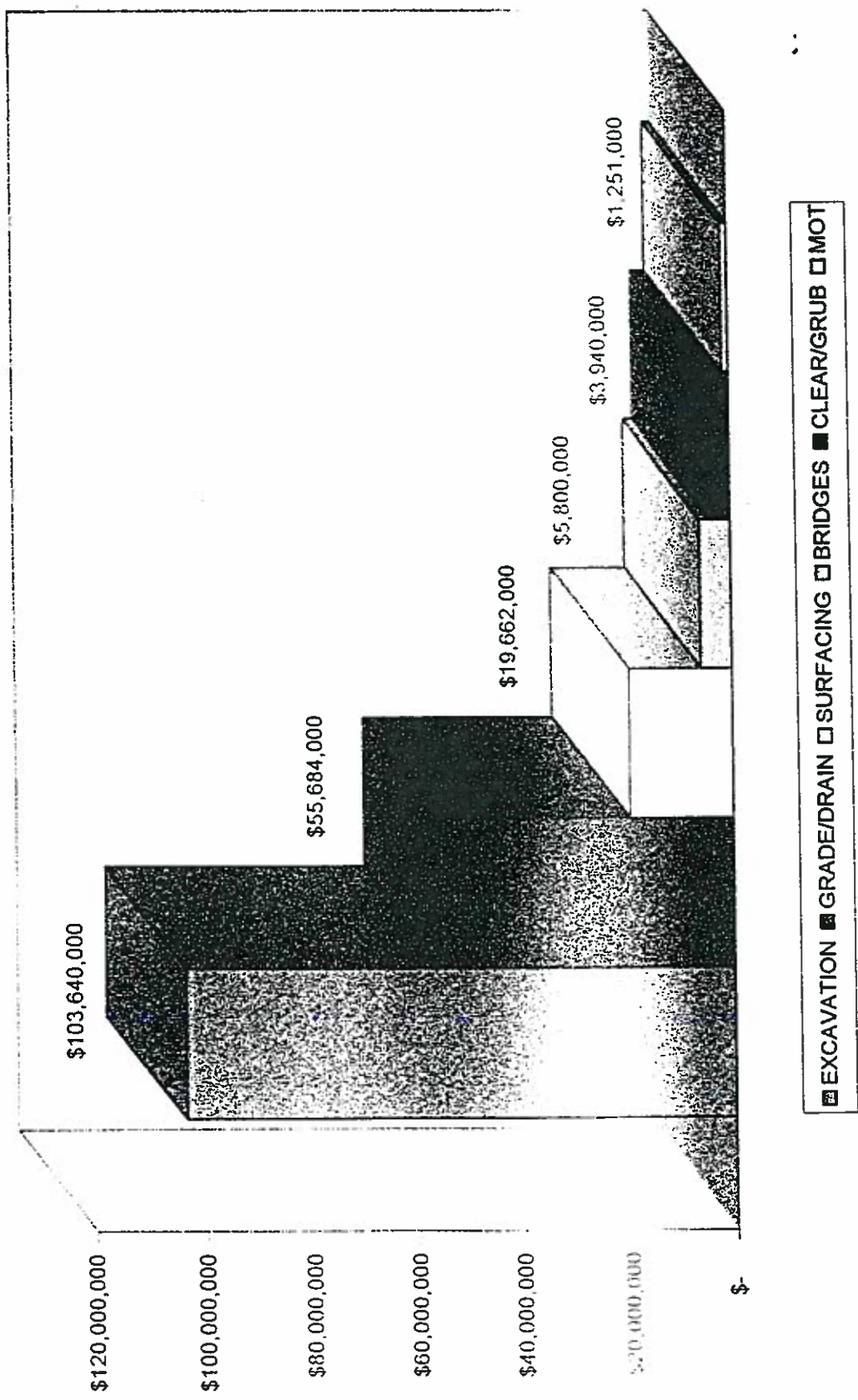
The appendices in this report contain backup information supporting the body of the report, and the mechanics of the workshop. The following appendices are included.

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	Presentation	A-25
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APPENDIX A

COST MODEL (HIGH COST AREAS)



COST ESTIMATE

PERRY/BREATHITT COUNTY
HAZARD-CAMPTON RD (KY15)
ITEM NO. 10-286.00

	ALTERNATE 1	ALTERNATE 2	ALTERNATE 3
SECTION 1	\$12,230,000.00	\$14,232,000.00	\$6,790,000.00
SECTION 2	\$14,569,000.00	\$10,063,000.00	\$10,063,000.00
SECTION 3	\$6,957,000.00	\$9,170,000.00	\$9,170,000.00
SECTION 4	\$5,216,000.00	\$5,216,000.00	\$5,216,000.00
SECTION 5	\$28,630,000.00	\$41,330,000.00	\$28,630,000.00
SECTION 6	\$16,121,000.00	\$16,121,000.00	\$16,121,000.00
SECTION 7	\$20,822,000.00	\$29,893,000.00	\$44,618,000.00
SECTION 8	\$13,246,000.00	\$13,246,000.00	\$13,246,000.00
SECTION 9	\$36,888,000.00	\$35,771,000.00	\$36,888,000.00
TOTAL	\$154,679,000.00	\$175,042,000.00	\$170,742,000.00

PERRY/BREATHITT COUNTY
HAZARD-CAMPTON RD (KY15)
ITEM NO. 10-286.00

ALTERNATE 1	COMMERCIAL	RESIDENTIAL	FARM	STORAGE	CEMETERY
SECTION 1	5	59	2	15	1
SECTION 2	0	18	0	2	2
SECTION 3	0	8	0	2	0
SECTION 4	0	1	0	0	0
SECTION 5	4	12	0	7	2
SECTION 6	3	11	2	6	2
SECTION 7	0	9	0	3	3
SECTION 8	1	17	3	11	3
SECTION 9	1	23	1	7	1
TOTAL	14	158	8	53	14

ALTERNATE 2	COMMERCIAL	RESIDENTIAL	FARM	STORAGE	CEMETERY
SECTION 1	5	48	0	24	1
SECTION 2	0	15	0	4	2
SECTION 3	1	9	0	0	0
SECTION 4	0	1	0	0	0
SECTION 5	2	3	0	1	1
SECTION 6	3	11	2	6	1
SECTION 7	0	10	0	5	1
SECTION 8	1	17	3	11	3
SECTION 9	0	4	0	3	0
TOTAL	12	118	5	54	9

ALTERNATE 3	COMMERCIAL	RESIDENTIAL	FARM	STORAGE	CEMETERY
SECTION 1	5	38	0	27	1
SECTION 2	0	9	0	1	1
SECTION 3	1	10	0	0	0
SECTION 4	0	1	0	0	0
SECTION 5	4	13	0	8	2
SECTION 6	3	11	2	6	2
SECTION 7	1	5	0	8	0
SECTION 8	1	17	3	11	3
SECTION 9	1	23	1	7	1
TOTAL	16	127	6	68	10

COUNTY: PERRY
 UPN:
 ROAD NAME: KY 15 - ALTERNATE 9 10+100-12+400 (ALT 2)
 LOCATION: SECTION 1
 INTERCHANGE - KY 28 OVER KY 15

FED. NO.:
 Class of Road:
 Type of Construction: Grade, Drain, and Surfacing
 Net Length, Kilometers: 2.300

Bid Item	Item	Quantity	Unit	Unit Price	Amount
GRADE & DRAIN					
0462	CULVERT PIPE-450 MM	234	METER	\$101.57	\$23,767.38
0464	CULVERT PIPE-600 MM	264	METER	\$120.05	\$31,693.20
0466	CULVERT PIPE-750 MM	60	METER	\$142.63	\$8,557.80
0468	CULVERT PIPE-900 MM	80	METER	\$184.83	\$14,786.40
0470	CULVERT PIPE-1200 MM	105	METER	\$250.30	\$26,281.50
0474	CULVERT PIPE-1800 MM	163	METER	\$451.81	\$73,645.03
1450	S & F BOX INLET-OUTLET-18 INCH	3	EACH	\$1,695.34	\$5,086.02
1453	S & F BOX INLET-OUTLET-36 INCH	3	EACH	\$2,937.54	\$8,812.62
1490	DROP BOX INLET TYPE 1	3	EACH	\$2,185.00	\$6,555.00
1505	DROP BOX INLET TYPE 5B	12	EACH	\$2,000.00	\$24,000.00
2200	ROADWAY EXCAVATION	3900000	CU M	\$4.00	\$15,600,000.00
2200	ROADWAY EXCAVATION	200000	CU M	\$6.00	\$1,200,000.00
2262	RW FENCE-WOVEN WIRE TYPE 1	4800	METER	\$12.70	\$60,960.00
2351	GUARDRAIL-STEEL W BEAM-S FACI	1120	METER	\$31.13	\$34,865.60
2360	GUARDRAIL TERMINAL SECT NO 1	2	EACH	\$41.70	\$83.40
2369	GUARDRAIL END TREATMENT TY 2/	5	EACH	\$381.44	\$1,907.20
2371	GUARDRAIL END TREATMENT TYPE	3	EACH	\$489.71	\$1,469.13
2373	GUARDRAIL END TREATMENT TYPE	5	EACH	\$461.55	\$2,307.75
2391	GUARDRAIL END TREATMENT TY 4/	3	EACH	\$1,243.20	\$3,729.60
2483	CHANNEL LINING CLASS II	3000	MTON	\$19.47	\$58,410.00
2484	CHANNEL LINING CLASS III	2800	MTON	\$20.43	\$57,204.00
2545	CLEARING AND GRUBBING	1	LP SU	\$500,000.00	\$500,000.00
2584	EXCELSIOR BLANKET	23000	SQ M	\$1.15	\$26,450.00
2651	DETOUR CONSTRUCTION	1	LP SU	\$100,000.00	\$100,000.00
2701	SILT FENCE	2600	METER	\$7.64	\$19,864.00
2705	SILT CHECK	110	EACH	\$53.32	\$5,865.20
2726	STAKING	1	LP SU	\$75,000.00	\$75,000.00
5960	FERTILIZER 10-20-20	34	MTON	\$350.42	\$11,914.28
5966	FERTILIZER 20-10-10	17	MTON	\$346.33	\$5,887.61
5986	SEED AND PROTECT, METHOD 2	300000	SQ M	\$0.27	\$81,000.00
5992	AGRICULTURAL LIMESTONE	200	MTON	\$26.61	\$5,322.00
8100	CONCRETE-CLASS A	80	CU M	\$404.44	\$32,355.20
8150	STEEL REINFORCEMENT	2670	KGRAM	\$1.31	\$3,497.70
X	10+157 - 3000mmx2700mm RCBC	1	LP SU	\$55,000.00	\$55,000.00

SUB - TOTAL GRADE & DRAIN: \$18,166,277.62

SURFACING					
0001	D G A BASE	49810	M TON	\$12.76	\$635,575.60
0100	BITUMINOUS SEAL AGGREGATE	227	MTON	\$33.94	\$7,704.38
0120	BIT CONC BASE CLASS I	41987	MTON	\$30.76	\$1,291,520.12
0154	BIT CONC SURFACE CLASS I-20/30	4780	MTON	\$31.62	\$151,143.60
0291	EMULSIFIED ASPHALT RS-2	27	MTON	\$320.47	\$8,652.69
0356	BITUMINOUS MATERIAL FOR TACK	48	MTON	\$247.70	\$11,889.60
1000	PERFORATED PIPE-100 MM	5000	METER	\$11.48	\$57,400.00
1010	NON-PERFORATED PIPE-100 MM	300	METER	\$24.13	\$7,239.00
2743	PAVEMENT STRIPING - WHITE	9200	METER	\$0.90	\$8,280.00
2744	PAVEMENT STRIPING - YELLOW	5000	METER	\$0.90	\$4,500.00

SUB - TOTAL SURFACING: \$2,183,904.99

SUB - TOTAL GRADE, & DRAIN & SURFACING: \$20,350,182.61

MISCELLANEOUS					
2568	MOBILIZATION	1	LP SU	\$612,713.48	\$612,713.48
2569	DEMOBILIZATION	1	LP SU	\$306,356.74	\$306,356.74
2650	MAINTAIN AND CONTROL TRAFFIC	1	LP SU	\$73,600.00	\$73,600.00

SUB - TOTAL: \$21,342,852.83
 10% ENGR. & CONTG: \$2,134,285.28
 GRAND TOTAL: \$23,477,138.11

Cost Per Kilometer Grade & Drain: \$7,898,381.57
 Cost Per Kilometer G & D & Surf: \$10,207,451.35

Last Revision:
 Estimated By:

DATE: 10/20/98 TIME: 7:57:48 AM

COUNTY: PERRY
 UPN:
 ROAD NAME: KY 15 ALTERNATE 2 (11+800-14+200)
 LOCATION: SECTION 2

Class of Road:
 Type of Construction: Grade, Drain, and Surfacing
 Net Length, Kilometers: 2.400

Bid Item	Item	Quantity	Unit	Unit Price	Amount
GRADE & DRAIN					
0462	CULVERT PIPE-450 MM	350	METER	\$101.57	\$35,549.50
0464	CULVERT PIPE-600 MM	288	METER	\$120.05	\$34,574.40
0466	CULVERT PIPE-750 MM	245	METER	\$142.63	\$34,944.35
0468	CULVERT PIPE-900 MM	16	METER	\$184.83	\$2,957.28
0469	CULVERT PIPE-1050 MM	16	METER	\$224.45	\$3,591.20
0470	CULVERT PIPE-1200 MM	228	METER	\$250.30	\$57,068.40
0472	CULVERT PIPE-1500 MM	40	METER	\$404.59	\$16,183.60
0474	CULVERT PIPE-1800 MM	47	METER	\$451.81	\$21,235.07
1450	S & F BOX INLET-OUTLET-18 INCH	3	EACH	\$1,695.34	\$5,086.02
1451	S & F BOX INLET-OUTLET-24 INCH	2	EACH	\$2,025.79	\$4,051.58
1453	S & F BOX INLET-OUTLET-36 INCH	2	EACH	\$2,937.54	\$5,875.08
1490	DROP BOX INLET TYPE 1	6	EACH	\$2,185.00	\$13,110.00
1505	DROP BOX INLET TYPE 5B	16	EACH	\$2,000.00	\$32,000.00
2200	ROADWAY EXCAVATION	843640	CU M	\$4.00	\$3,374,560.00
2200	ROADWAY EXCAVATION	361560	CU M	\$6.00	\$2,169,360.00
2262	R/W FENCE-WOVEN WIRE TYPE 1	4920	METER	\$12.70	\$62,484.00
2351	GUARDRAIL-STEEL W BEAM-S FACE	1005	METER	\$31.13	\$31,285.65
2360	GUARDRAIL TERMINAL SECT NO 1	4	EACH	\$41.70	\$166.80
2371	GUARDRAIL END TREATMENT TYPE 7	1	EACH	\$489.71	\$489.71
2373	GUARDRAIL END TREATMENT TYPE 3	1	EACH	\$461.55	\$461.55
2483	CHANNEL LINING CLASS II	2732	MTON	\$19.47	\$53,192.04
2484	CHANNEL LINING CLASS III	250	MTON	\$20.43	\$5,107.50
2545	CLEARING AND GRUBBING	1	LP SU	\$356,640.00	\$356,640.00
2584	EXCELSIOR BLANKET	20000	SQ M	\$1.15	\$23,000.00
2651	DETOUR CONSTRUCTION	1	LP SU	\$137,000.00	\$137,000.00
2701	SILT FENCE	770	METER	\$7.64	\$5,882.80
2705	SILT CHECK	128	EACH	\$53.32	\$6,824.96
2726	STAKING	1	LP SU	\$60,000.00	\$60,000.00
5960	FERTILIZER 10-20-20	21	MTON	\$350.42	\$7,358.82
5966	FERTILIZER 20-10-10	11	MTON	\$346.33	\$3,809.63
5986	SEED AND PROTECT, METHOD 2	197900	SQ M	\$0.27	\$53,433.00
5992	AGRICULTURAL LIMESTONE	150	MTON	\$26.61	\$3,991.50
8100	CONCRETE-CLASS A	70	CU M	\$404.44	\$28,310.80
8150	STEEL REINFORCEMENT	1692	KGRAM	\$1.31	\$2,216.52
SUB - TOTAL GRADE & DRAIN:					\$6,651,801.76
SURFACING					
0001	D G A BASE	50540	M TON	\$12.76	\$644,890.40
0020	TRAFFIC BOUND BASE	184	M TON	\$19.07	\$3,508.88
0100	BITUMINOUS SEAL AGGREGATE	242	MTON	\$33.94	\$8,213.48
0120	BIT CONC BASE CLASS I	37405	MTON	\$30.76	\$1,150,577.80
0154	BIT CONC SURFACE CLASS I-20/30	4622	MTON	\$31.62	\$146,147.64
0291	EMULSIFIED ASPHALT RS-2	30	MTON	\$320.47	\$9,614.10
0356	BITUMINOUS MATERIAL FOR TACK	46	MTON	\$247.70	\$11,394.20
1000	PERFORATED PIPE-100 MM	3000	METER	\$11.48	\$34,440.00
1010	NON-PERFORATED PIPE-100 MM	150	METER	\$24.13	\$3,619.50
2743	PAVEMENT STRIPING - WHITE	9600	METER	\$0.90	\$8,640.00
2744	PAVEMENT STRIPING - YELLOW	4800	METER	\$0.90	\$4,320.00
SUB - TOTAL SURFACING:					\$2,025,366.00
SUB - TOTAL GRADE, & DRAIN & SURFACING:					\$8,677,167.76
MISCELLANEOUS					
2568	MOBILIZATION	1	LP SU	\$262,619.03	\$262,619.03
2569	DEMobilIZATION	1	LP SU	\$131,309.52	\$131,309.52
2650	MAINTAIN AND CONTROL TRAFFIC	1	LP SU	\$76,800.00	\$76,800.00
SUB - TOTAL:					\$9,147,896.31
10% ENGR. & CONTG.					\$914,789.63
GRAND TOTAL:					\$10,062,685.94

Cost Per Kilometer Grade & Drain: \$2,771,584.07
 Cost Per Kilometer G & D & Surf: \$4,192,785.81

Last Revision:
 Estimated By:

DATE: 10/20/98 TIME: 8:10:06 AM

COUNTY: PERRY
 UPN:
 ROAD NAME: KY 15 ALTERNATE 2 (14+200-15+800)
 LOCATION: SECTION 3

FED. NO.:

Class of Road:
 Type of Construction: Grade, Drain, and Surfacing
 Net Length, Kilometers: 1.600

Bid Item	Item	Quantity	Unit	Unit Price	Amount
GRADE & DRAIN					
0462	CULVERT PIPE-450 MM	223	METER	\$101.57	\$22,650.11
0464	CULVERT PIPE-600 MM	88	METER	\$120.05	\$10,564.40
0466	CULVERT PIPE-750 MM	52	METER	\$142.63	\$7,416.76
0470	CULVERT PIPE-1200 MM	56	METER	\$250.30	\$14,016.80
0472	CULVERT PIPE-1500 MM	97	METER	\$404.59	\$39,245.23
1490	DROP BOX INLET TYPE 1	3	EACH	\$2,185.00	\$6,555.00
1505	DROP BOX INLET TYPE 5B	10	EACH	\$2,000.00	\$20,000.00
2200	ROADWAY EXCAVATION	741600	CU M	\$4.00	\$2,966,400.00
2200	ROADWAY EXCAVATION	494400	CU M	\$6.00	\$2,966,400.00
2262	RW FENCE-WOVEN WIRE TYPE 1	3220	METER	\$12.70	\$40,894.00
2351	GUARDRAIL-STEEL W BEAM-S FACE	1915	METER	\$31.13	\$59,613.95
2360	GUARDRAIL TERMINAL SECT NO 1	7	EACH	\$51.30	\$359.10
2369	GUARDRAIL END TREATMENT TY 2A	1	EACH	\$381.44	\$381.44
2371	GUARDRAIL END TREATMENT TYPE 7	1	EACH	\$489.71	\$489.71
2373	GUARDRAIL END TREATMENT TYPE 3	1	EACH	\$461.55	\$461.55
2483	CHANNEL LINING CLASS II	576	MTON	\$19.47	\$11,214.72
2484	CHANNEL LINING CLASS III	565	MTON	\$20.43	\$11,542.95
2545	CLEARING AND GRUBBING	1	LP SU	\$241,200.00	\$241,200.00
2584	EXCELSIOR BLANKET	10710	SQ M	\$1.15	\$12,316.50
2651	DETOUR CONSTRUCTION	1	LP SU	\$25,000.00	\$25,000.00
2701	SILT FENCE	1300	METER	\$7.64	\$9,932.00
2705	SILT CHECK	65	EACH	\$53.32	\$3,465.80
2726	STAKING	1	LP SU	\$40,000.00	\$40,000.00
5960	FERTILIZER 10-20-20	15	MTON	\$350.42	\$5,256.30
5966	FERTILIZER 20-10-10	8	MTON	\$346.33	\$2,770.64
5986	SEED AND PROTECT, METHOD 2	141000	SQ M	\$0.27	\$38,070.00
5992	AGRICULTURAL LIMESTONE	107	MTON	\$26.61	\$2,847.27
8100	CONCRETE-CLASS A	46	CU M	\$404.44	\$18,604.24
8150	STEEL REINFORCEMENT	946	KGRAM	\$1.31	\$1,239.26
X	14+442 - 2400mmx2100mm RCBC Ext	1	LP SU	\$56,000.00	\$56,000.00
SUB - TOTAL GRADE & DRAIN:					\$6,634,907.73
SURFACING					
0001	D G A BASE	33357	M TON	\$12.76	\$425,635.32
0020	TRAFFIC BOUND BASE	41	M TON	\$19.07	\$781.87
0100	BITUMINOUS SEAL AGGREGATE	161	MTON	\$33.94	\$5,464.34
0120	BIT CONC BASE CLASS I	23705	MTON	\$30.76	\$729,165.80
0154	BIT CONC SURFACE CLASS I-20/30	2938	MTON	\$31.62	\$92,899.56
0291	EMULSIFIED ASPHALT RS-2	20	MTON	\$320.47	\$6,409.40
0356	BITUMINOUS MATERIAL FOR TACK	30	MTON	\$247.70	\$7,431.00
1000	PERFORATED PIPE-100 MM	1200	METER	\$11.48	\$13,776.00
1010	NON-PERFORATED PIPE-100 MM	60	METER	\$24.13	\$1,447.80
2743	PAVEMENT STRIPING - WHITE	6400	METER	\$0.90	\$5,760.00
2744	PAVEMENT STRIPING - YELLOW	3200	METER	\$0.90	\$2,880.00
SUB - TOTAL SURFACING:					\$1,291,651.09
SUB - TOTAL GRADE, & DRAIN & SURFACING:					\$7,926,558.82
MISCELLANEOUS					
2568	MOBILIZATION	1	LP SU	\$239,332.76	\$239,332.76
2569	DEMobilIZATION	1	LP SU	\$119,666.38	\$119,666.38
2650	MAINTAIN AND CONTROL TRAFFIC	1	LP SU	\$51,200.00	\$51,200.00
SUB - TOTAL:					\$8,336,757.96
10% ENGR. & CONTG:					\$833,675.80
GRAND TOTAL:					\$9,170,433.76
Cost Per Kilometer Grade & Drain:					\$4,146,817.33
Cost Per Kilometer G & D & Surf:					\$5,731,521.10

COUNTY: PERRY
 UPN:
 ROAD NAME: KY 15 ALTERNATE 1 (15+800-17+100)
 LOCATION: SECTION 4

FED. NO.:

Class of Road:
 Type of Construction: Grade, Drain, and Surfacing
 Net Length, Kilometers: 1.300

Bid Item	Item	Quantity	Unit	Unit Price	Amount
GRADE & DRAIN					
0462	CULVERT PIPE-450 MM	85	METER	\$101.57	\$8,633.45
0464	CULVERT PIPE-600 MM	150	METER	\$120.05	\$18,007.50
0470	CULVERT PIPE-1200 MM	110	METER	\$250.30	\$27,533.00
1490	DROP BOX INLET TYPE 1	3	EACH	\$2,185.00	\$6,555.00
1505	DROP BOX INLET TYPE 5B	8	EACH	\$2,000.00	\$16,000.00
2200	ROADWAY EXCAVATION	380100	CU M	\$4.00	\$1,520,400.00
2200	ROADWAY EXCAVATION	253400	CU M	\$6.00	\$1,520,400.00
2262	R/W FENCE-WOVEN WIRE TYPE 1	2625	METER	\$12.70	\$33,337.50
2351	GUARDRAIL-STEEL W BEAM-S FACE	1295	METER	\$31.13	\$40,313.35
2360	GUARDRAIL TERMINAL SECT NO 1	4	EACH	\$41.70	\$166.80
2483	CHANNEL LINING CLASS II	434	MTON	\$19.47	\$8,449.98
2484	CHANNEL LINING CLASS III	90	MTON	\$20.43	\$1,838.70
2545	CLEARING AND GRUBBING	1	LP SU	\$156,780.00	\$156,780.00
2584	EXCELSIOR BLANKET	7980	SQ M	\$1.15	\$9,177.00
2651	DETOUR CONSTRUCTION	1	LP SU	\$23,000.00	\$23,000.00
2701	SILT FENCE	1600	METER	\$7.64	\$12,224.00
2705	SILT CHECK	45	EACH	\$53.37	\$2,401.65
2726	STAKING	1	LP SU	\$32,500.00	\$32,500.00
5960	FERTILIZER 10-20-20	15	MTON	\$350.42	\$5,256.30
5966	FERTILIZER 20-10-10	8	MTON	\$346.33	\$2,770.64
5986	SEED AND PROTECT, METHOD 2	84900	SQ M	\$0.27	\$22,923.00
5992	AGRICULTURAL LIMESTONE	65	MTON	\$26.61	\$1,729.65
8100	CONCRETE-CLASS A	31	CU M	\$404.44	\$12,537.64
8150	STEEL REINFORCEMENT	480	KGRAM	\$1.31	\$628.80
SUB - TOTAL GRADE & DRAIN:					\$3,483,563.96
SURFACING					
0001	D G A BASE	26362	M TON	\$12.76	\$336,379.12
0100	BITUMINOUS SEAL AGGREGATE	135	MTON	\$33.94	\$4,581.90
0120	BIT CONC BASE CLASS I	18418	MTON	\$30.76	\$566,537.68
0154	BIT CONC SURFACE CLASS I-20/30	2181	MTON	\$31.62	\$68,963.22
0291	EMULSIFIED ASPHALT RS-2	16	MTON	\$320.47	\$5,127.52
0356	BITUMINOUS MATERIAL FOR TACK	23	MTON	\$247.70	\$5,697.10
1000	PERFORATED PIPE-100 MM	1400	METER	\$11.48	\$16,072.00
1010	NON-PERFORATED PIPE-100 MM	70	METER	\$24.13	\$1,689.10
2743	PAVEMENT STRIPING - WHITE	5200	METER	\$0.90	\$4,680.00
2744	PAVEMENT STRIPING - YELLOW	2600	METER	\$0.90	\$2,340.00
SUB - TOTAL SURFACING:					\$1,012,067.64
SUB - TOTAL GRADE, & DRAIN & SURFACING:					\$4,495,631.60
MISCELLANEOUS					
2568	MOBILIZATION	1	LP SU	\$136,116.95	\$136,116.95
2569	DEMobilIZATION	1	LP SU	\$68,058.47	\$68,058.47
2650	MAINTAIN AND CONTROL TRAFFIC	1	LP SU	\$41,600.00	\$41,600.00
SUB - TOTAL:					\$4,741,407.02
10% ENGR. & CONTG:					\$474,140.70
GRAND TOTAL:					\$5,215,547.72
Cost Per Kilometer Grade & Drain:					\$2,679,664.58
Cost Per Kilometer G & D & Surf:					\$4,011,959.78

Last Revision:
 Estimated By:

DATE: 10/20/98

TIME: 8:00:34 AM

COUNTY: PERRY-BREATHITT
 UPN:
 ROAD NAME: KY 15 ALTERNATE 1 (17+100-21+866.3)
 LOCATION: SECTION 5

FED. NO.:

Class of Road:
 Type of Construction: Grade, Drain, and Surfacing
 Net Length, Kilometers: 4.756

Bid Item	Item	Quantity	Unit	Unit Price	Amount
GRADE & DRAIN					
0462	CULVERT PIPE-450 MM	340	METER	\$101.57	\$34,533.80
0464	CULVERT PIPE-600 MM	720	METER	\$120.05	\$86,436.00
0468	CULVERT PIPE-900 MM	166	METER	\$184.83	\$30,681.78
0470	CULVERT PIPE-1200 MM	126	METER	\$250.30	\$31,537.80
1450	S & F BOX INLET-OUTLET-18 INCH	4	EACH	\$1,695.34	\$6,781.36
1451	S & F BOX INLET-OUTLET-24 INCH	4	EACH	\$2,025.79	\$8,103.16
1453	S & F BOX INLET-OUTLET-36 INCH	7	EACH	\$2,937.54	\$20,562.78
1490	DROP BOX INLET TYPE 1	19	EACH	\$2,185.00	\$41,515.00
1505	DROP BOX INLET TYPE 5B	24	EACH	\$2,000.00	\$48,000.00
2200	ROADWAY EXCAVATION	2697170	CU M	\$4.00	\$10,788,680.00
2200	ROADWAY EXCAVATION	1155930	CU M	\$6.00	\$6,935,580.00
2262	R/W FENCE-WOVEN WIRE TYPE 1	9440	METER	\$12.70	\$119,888.00
2351	GUARDRAIL-STEEL W BEAM-S FACE	4160	METER	\$31.13	\$129,500.80
2352	GUARDRAIL-STEEL W BEAM-D FACE	90	METER	\$51.30	\$4,617.00
2360	GUARDRAIL TERMINAL SECT NO 1	5	EACH	\$41.70	\$208.50
2363	GUARDRAIL CON TO BR END TYPE A	6	EACH	\$552.30	\$3,313.80
2365	CRASH CUSHION TYPE IX-A	2	EACH	\$5,441.96	\$10,883.92
2369	GUARDRAIL END TREATMENT TY 2A	7	EACH	\$381.44	\$2,670.08
2371	GUARDRAIL END TREATMENT TYPE 7	3	EACH	\$489.71	\$1,469.13
2373	GUARDRAIL END TREATMENT TYPE 3	5	EACH	\$461.55	\$2,307.75
2391	GUARDRAIL END TREATMENT TY 4A	1	EACH	\$1,243.20	\$1,243.20
2483	CHANNEL LINING CLASS II	3675	MTON	\$19.47	\$71,552.25
2484	CHANNEL LINING CLASS III	2095	MTON	\$20.43	\$42,800.85
2545	CLEARING AND GRUBBING	1	LP SU	\$713,880.00	\$713,880.00
2584	EXCELSIOR BLANKET	37600	SQ M	\$1.15	\$43,240.00
2651	DETOUR CONSTRUCTION	1	LP SU	\$20,000.00	\$20,000.00
2701	SILT FENCE	2900	METER	\$7.64	\$22,156.00
2705	SILT CHECK	160	EACH	\$53.32	\$8,531.20
2726	STAKING	1	LP SU	\$118,900.00	\$118,900.00
2731	REMOVING EXISTING STRUCTURE	1	LP SU	\$25,000.00	\$25,000.00
5960	FERTILIZER 10-20-20	45	MTON	\$350.42	\$15,768.90
5966	FERTILIZER 20-10-10	23	MTON	\$346.33	\$7,965.59
5986	SEED AND PROTECT, METHOD 2	414800	SQ M	\$0.27	\$111,996.00
5990	SODDING	0	SQ M	\$4.16	\$0.00
5992	AGRICULTURAL LIMESTONE	316	MTON	\$26.61	\$8,408.76
8100	CONCRETE-CLASS A	85	CU M	\$404.44	\$34,377.40
8150	STEEL REINFORCEMENT	790	KGRAM	\$1.31	\$1,034.90
X	17+675 - Obi 4200mmx2400mm RCBC Ext	1	LP SU	\$240,000.00	\$240,000.00
X	18+830 - Twin Span PCIB Bridge	1	LP SU	\$810,000.00	\$810,000.00
X	19+600 - Trip 3600mmx1800mm RCBC Ext	1	LP SU	\$195,000.00	\$195,000.00
X	20+300 - 3600mmx2400mm RCBC	1	LP SU	\$49,000.00	\$49,000.00
X	- 3600mmx2400mm RCBC	1	LP SU	\$49,000.00	\$49,000.00
SUB - TOTAL GRADE & DRAIN:					\$20,897,125.71
SURFACING					
0001	D G A BASE	102017	M TON	\$12.76	\$1,301,738.92
0020	TRAFFIC BOUND BASE	85	M TON	\$19.07	\$1,620.95
0100	BITUMINOUS SEAL AGGREGATE	355	MTON	\$33.94	\$12,048.70
0120	BIT CONC BASE CLASS I	70423	MTON	\$30.76	\$2,166,211.48
0154	BIT CONC SURFACE CLASS I-20/30	8530	MTON	\$31.62	\$269,718.60
0291	EMULSIFIED ASPHALT RS-2	43	MTON	\$320.47	\$13,780.21
0356	BITUMINOUS MATERIAL FOR TACK	88	MTON	\$247.70	\$21,797.60
1000	PERFORATED PIPE-100 MM	3500	METER	\$11.48	\$40,180.00
1010	NON-PERFORATED PIPE-100 MM	175	METER	\$24.13	\$4,222.75
2743	PAVEMENT STRIPING - WHITE	19024	METER	\$0.90	\$17,121.60
2744	PAVEMENT STRIPING - YELLOW	9512	METER	\$0.90	\$8,560.80
SUB - TOTAL SURFACING:					\$3,856,999.61
SUB - TOTAL GRADE, & DRAIN & SURFACING:					\$24,754,125.32
MISCELLANEOUS					
2568	MOBILIZATION	1	LP SU	\$747,189.52	\$747,189.52
2569	DEMobilIZATION	1	LP SU	\$373,594.76	\$373,594.76
2650	MAINTAIN AND CONTROL TRAFFIC	1	LP SU	\$152,192.00	\$152,192.00
SUB - TOTAL:					\$26,027,101.60
10% ENGR. & CONTG:					\$2,602,710.16
GRAND TOTAL:					\$28,629,811.76
Cost Per Kilometer Grade & Drain:					\$4,393,844.77
Cost Per Kilometer G & D & Surf:					\$6,019,724.93

Last Revision:
 Estimated By:

DATE: 10/20/98

TIME:

8:03:47 AM

COUNTY: BREATHITT
 UPN: FED. NO.:
 ROAD NAME: KY 15 ALTERNATE 1 (21+856-25+000)
 LOCATION: SECTION 6

Class of Road:
 Type of Construction: Grade, Drain, and Surfacing
 Net Length, Kilometers: 3.144

Bid Item	Item	Quantity	Unit	Unit Price	Amount
GRADE & DRAIN					
0462	CULVERT PIPE-450 MM	260	METER	\$101.57	\$26,408.20
0464	CULVERT PIPE-600 MM	614	METER	\$120.05	\$73,710.70
0468	CULVERT PIPE-900 MM	87	METER	\$184.83	\$16,080.21
0471	CULVERT PIPE-1350 MM	91	METER	\$288.57	\$26,259.87
1450	S & F BOX INLET-OUTLET-18 INCH	5	EACH	\$1,695.34	\$8,476.70
1451	S & F BOX INLET-OUTLET-24 INCH	7	EACH	\$2,025.79	\$14,180.53
1452	S & F BOX INLET-OUTLET-30 INCH	1	EACH	\$2,462.76	\$2,462.76
1453	S & F BOX INLET-OUTLET-36 INCH	4	EACH	\$2,937.54	\$11,750.16
1490	DROP BOX INLET TYPE 1	8	EACH	\$2,185.00	\$17,480.00
1505	DROP BOX INLET TYPE 5B	22	EACH	\$2,000.00	\$44,000.00
2200	ROADWAY EXCAVATION	1218000	CU M	\$4.00	\$4,872,000.00
2200	ROADWAY EXCAVATION	522000	CU M	\$6.00	\$3,132,000.00
2262	R/W FENCE-WOVEN WIRE TYPE 1	6430	METER	\$12.70	\$81,661.00
2351	GUARDRAIL-STEEL W BEAM-S FACE	2575	METER	\$31.13	\$80,159.75
2352	GUARDRAIL-STEEL W BEAM-D FACE	180	METER	\$51.30	\$9,234.00
2360	GUARDRAIL TERMINAL SECT NO 1	2	EACH	\$41.70	\$83.40
2363	GUARDRAIL CON TO BR END TYPE A	12	EACH	\$552.34	\$6,628.08
2365	CRASH CUSHION TYPE IX-A	4	EACH	\$5,441.96	\$21,767.84
2369	GUARDRAIL END TREATMENT TY 2A	9	EACH	\$381.44	\$3,432.96
2371	GUARDRAIL END TREATMENT TYPE 7	2	EACH	\$489.71	\$979.42
2373	GUARDRAIL END TREATMENT TYPE 3	2	EACH	\$461.55	\$923.10
2391	GUARDRAIL END TREATMENT TY 4A	5	EACH	\$1,243.20	\$6,216.00
2483	CHANNEL LINING CLASS II	3090	MTON	\$19.47	\$60,162.30
2484	CHANNEL LINING CLASS III	1835	MTON	\$20.43	\$37,489.05
2545	CLEARING AND GRUBBING	1	LP SU	\$435,000.00	\$435,000.00
2584	EXCELSIOR BLANKET	23800	SQ M	\$1.15	\$27,370.00
2651	DETOUR CONSTRUCTION	1	LP SU	\$57,000.00	\$57,000.00
2701	SILT FENCE	1950	METER	\$7.64	\$14,898.00
2705	SILT CHECK	110	EACH	\$53.32	\$5,865.20
2726	STAKING	1	LP SU	\$78,600.00	\$78,600.00
2731	REMOVING EXISTING STRUCTURE	2	LP SU	\$25,000.00	\$50,000.00
5960	FERTILIZER 10-20-20	26	MTON	\$350.42	\$9,110.92
5966	FERTILIZER 20-10-10	13	MTON	\$346.33	\$4,502.29
5986	SEED AND PROTECT, METHOD 2	240100	SQ M	\$0.27	\$64,827.00
5992	AGRICULTURAL LIMESTONE	182	MTON	\$26.61	\$4,843.02
8100	CONCRETE-CLASS A	52	CU M	\$404.44	\$21,030.88
8150	STEEL REINFORCEMENT	300	KGRAM	\$1.15	\$345.00
X	22+330 - 2400mmx1800mm RCBC	1	LP SU	\$90,000.00	\$90,000.00
X	22+950 TWIN SPAN PCIB BRIDGE	1	LP SU	\$1,050,000.00	\$1,050,000.00
X	24+140 TWIN SPAN PCIB BRIDGE	1	LP SU	\$785,000.00	\$785,000.00
X	24+525 - 3000mmx2400mm RCBC	1	LP SU	\$125,000.00	\$125,000.00
X	- 3000mmx2400mm RCBC	1	LP SU	\$45,000.00	\$45,000.00
SUB - TOTAL GRADE & DRAIN:					\$11,421,938.34
SURFACING					
0001	D G A BASE	63399	M TON	\$12.76	\$808,971.24
0020	TRAFFIC SOUND BASE	85	M TON	\$19.07	\$1,620.95
0100	BITUMINOUS SEAL AGGREGATE	315	MTON	\$33.94	\$10,691.10
0120	BIT CONC BASE CLASS 1	46503	MTON	\$30.76	\$1,430,432.28
0154	BIT CONC SURFACE CLASS 1-20/30	5621	MTON	\$31.62	\$177,736.02
0291	EMULSIFIED ASPHALT RS-2	38	MTON	\$320.47	\$12,177.86
0356	BITUMINOUS MATERIAL FOR TACK	57	MTON	\$247.70	\$14,118.90
1000	PERFORATED PIPE-100 MM	2300	METER	\$11.48	\$26,404.00
1010	NON-PERFORATED PIPE-100 MM	115	METER	\$24.13	\$2,774.95
2743	PAVEMENT STRIPING - WHITE	12576	METER	\$0.90	\$11,318.40
2744	PAVEMENT STRIPING - YELLOW	6288	METER	\$0.90	\$5,659.20
SUB - TOTAL SURFACING:					\$2,501,904.90
SUB - TOTAL GRADE, & DRAIN & SURFACING:					\$13,923,843.24
MISCELLANEOUS					
2568	MOBILIZATION	1	LP SU	\$420,733.54	\$420,733.54
2569	DEMobilIZATION	1	LP SU	\$210,366.77	\$210,366.77
2650	MAINTAIN AND CONTROL TRAFFIC	1	LP SU	\$100,608.00	\$100,608.00
SUB - TOTAL:					\$14,655,551.55
10% ENGR & CCNTG					\$1,465,555.16
GRAND TOTAL					\$16,121,106.71
Cost Per Kilometer Grade & Drain:					\$3,632,932.04
Cost Per Kilometer G & D & Surf					\$5,127,578.47

Last Revision
 Estimated By

DATE: 10/20/98

TIME:

8:04:58 AM

COUNTY: BREATHITT
 UPN:
 ROAD NAME: KY 15 ALTERNATE 1 (25+000-27+312)
 LOCATION: SECTION 7

FED. NO.:

Class of Road:
 Type of Construction: Grade, Drain, and Surfacing
 Net Length, Kilometers: 2.312

Bid Item	Item	Quantity	Unit	Unit Price	Amount
GRADE & DRAIN					
0462	CULVERT PIPE-450 MM	277	METER	\$101.57	\$28,134.89
0464	CULVERT PIPE-600 MM	395	METER	\$120.05	\$47,419.75
0466	CULVERT PIPE-750 MM	30	METER	\$142.63	\$4,278.90
0468	CULVERT PIPE-900 MM	184	METER	\$184.83	\$34,008.72
0470	CULVERT PIPE-1200 MM	58	METER	\$250.30	\$14,517.40
1450	S & F BOX INLET-OUTLET-18 INCH	1	EACH	\$1,695.34	\$1,695.34
1451	S & F BOX INLET-OUTLET-24 INCH	1	EACH	\$2,025.79	\$2,025.79
1452	S & F BOX INLET-OUTLET-30 INCH	1	EACH	\$2,462.76	\$2,462.76
1453	S & F BOX INLET-OUTLET-36 INCH	6	EACH	\$2,937.54	\$17,625.24
1490	DROP BOX INLET TYPE 1	4	EACH	\$2,185.00	\$8,740.00
1505	DROP BOX INLET TYPE 5B	15	EACH	\$2,000.00	\$30,000.00
2200	ROADWAY EXCAVATION	3786000	CU M	\$4.00	\$15,144,000.00
2262	R/W FENCE-WOVEN WIRE TYPE 1	4800	METER	\$12.70	\$60,960.00
2351	GUARDRAIL-STEEL W BEAM-S FACE	880	METER	\$31.13	\$27,394.40
2360	GUARDRAIL TERMINAL SECT NO 1	1	EACH	\$41.70	\$41.70
2369	GUARDRAIL END TREATMENT TY 2A	3	EACH	\$381.44	\$1,144.32
2371	GUARDRAIL END TREATMENT TYPE 7	1	EACH	\$489.71	\$489.71
2373	GUARDRAIL END TREATMENT TYPE 3	1	EACH	\$461.55	\$461.55
2391	GUARDRAIL END TREATMENT TY 4A	1	EACH	\$1,243.20	\$1,243.20
2483	CHANNEL LINING CLASS II	2680	MTON	\$19.47	\$52,179.60
2484	CHANNEL LINING CLASS III	565	MTON	\$20.43	\$11,542.95
2545	CLEARING AND GRUBBING	1	LP SU	\$400,920.00	\$400,920.00
2584	EXCELSIOR BLANKET	19500	SQ M	\$1.15	\$22,425.00
2701	SILT FENCE	2200	METER	\$7.64	\$16,808.00
2705	SILT CHECK	120	EACH	\$53.32	\$6,398.40
2726	STAKING	1	LP SU	\$57,800.00	\$57,800.00
5960	FERTILIZER 10-20-20	28	MTON	\$350.42	\$9,811.76
5966	FERTILIZER 20-10-10	14	MTON	\$3,456.33	\$48,388.62
5986	SEED AND PROTECT, METHOD 2	258200	SQ M	\$0.27	\$69,714.00
5992	AGRICULTURAL LIMESTONE	196	MTON	\$26.61	\$5,215.56
8100	CONCRETE-CLASS A	38	CU M	\$404.44	\$15,368.72
8150	STEEL REINFORCEMENT	405	KGRAM	\$1.31	\$530.55
X	25+030 - 3000mmx1800mm RCBC	1	LP SU	\$52,000.00	\$52,000.00
SUB - TOTAL GRADE & DRAIN:					\$16,195,746.83
SURFACING					
0001	D G A BASE	50522	M TON	\$12.76	\$644,660.72
0020	TRAFFIC BOUND BASE	102	M TON	\$19.07	\$1,945.14
0100	BITUMINOUS SEAL AGGREGATE	241	MTON	\$33.94	\$8,179.54
0120	BIT CONC BASE CLASS I	33300	MTON	\$30.76	\$1,024,308.00
0154	BIT CONC SURFACE CLASS I-20/30	4044	MTON	\$31.62	\$127,871.28
0291	EMULSIFIED ASPHALT RS-2	29	MTON	\$320.47	\$9,293.63
0356	BITUMINOUS MATERIAL FOR TACK	42	MTON	\$247.70	\$10,403.40
1000	PERFORATED PIPE-100 MM	400	METER	\$11.48	\$4,592.00
1010	NON-PERFORATED PIPE-100 MM	20	METER	\$24.13	\$482.60
2743	PAVEMENT STRIPING - WHITE	9248	METER	\$0.90	\$8,323.20
2744	PAVEMENT STRIPING - YELLOW	4624	METER	\$0.90	\$4,161.60
SUB - TOTAL SURFACING:					\$1,844,221.11
SUB - TOTAL GRADE, & DRAIN & SURFACING:					\$18,039,967.94
MISCELLANEOUS					
2568	MOBILIZATION	1	LP SU	\$543,418.56	\$543,418.56
2569	DEMOBILIZATION	1	LP SU	\$271,709.28	\$271,709.28
2650	MAINTAIN AND CONTROL TRAFFIC	1	LP SU	\$73,984.00	\$73,984.00
SUB - TOTAL:					\$18,929,079.78
10% ENGR. & CONTG:					\$1,892,907.98
GRAND TOTAL:					\$20,821,987.76

Cost Per Kilometer Grade & Drain: \$7,005,080.81
 Cost Per Kilometer G & D & Surf: \$9,006,050.07

Last Revision:
 Estimated By:

DATE: 10/20/98

TIME: 8:06:15 AM

COUNTY: BREATHITT
 UPN:
 ROAD NAME: KY 15 ALTERNATE 2 (24+250-27+900)
 LOCATION: SECTION 9

FED. NO.:

Class of Road:
 Type of Construction: Grade, Drain, and Surfacing
 Net Length, Kilometers: 3.500

Bid Item	Item	Quantity	Unit	Unit Price	Amount
GRADE & DRAIN					
0462	CULVERT PIPE-450 MM	954	METER	\$101.57	\$96,897.78
0464	CULVERT PIPE-600 MM	701	METER	\$120.05	\$84,155.05
0466	CULVERT PIPE-750 MM	70	METER	\$142.63	\$9,984.10
0468	CULVERT PIPE-900 MM	370	METER	\$184.83	\$68,387.10
0470	CULVERT PIPE-1200 MM	72	METER	\$250.30	\$18,021.60
1450	S & F BOX INLET-OUTLET-18 INCH	3	EACH	\$1,695.34	\$5,086.02
1451	S & F BOX INLET-OUTLET-24 INCH	4	EACH	\$2,025.79	\$8,103.16
1453	S & F BOX INLET-OUTLET-36 INCH	1	EACH	\$2,937.54	\$2,937.54
1490	DROP BOX INLET TYPE 1	1	EACH	\$2,185.00	\$2,185.00
1505	DROP BOX INLET TYPE 5B	7	EACH	\$2,000.00	\$14,000.00
1608	CONC MED BAR BOX INLET TY 12B1	25	EACH	\$9,800.00	\$245,000.00
1967	CONC MEDIAN BARRIER TYPE 230C	2600	METER	\$159.22	\$413,972.00
2200	ROADWAY EXCAVATION	6478000	CU M	\$4.00	\$25,912,000.00
2262	R/W FENCE-WOVEN WIRE TYPE 1	7620	METER	\$12.70	\$96,774.00
2351	GUARDRAIL-STEEL W BEAM-S FACE	3245	METER	\$31.13	\$101,016.85
2365	CRASH CUSHION TYPE IX-A	1	EACH	\$5,441.96	\$5,441.96
2369	GUARDRAIL END TREATMENT TY 2A	6	EACH	\$381.44	\$2,288.64
2373	GUARDRAIL END TREATMENT TYPE 3	6	EACH	\$461.55	\$2,769.30
2483	CHANNEL LINING CLASS II	3670	MTON	\$19.47	\$71,454.90
2484	CHANNEL LINING CLASS III	610	MTON	\$20.43	\$12,462.30
2545	CLEARING AND GRUBBING	1	LP SU	\$737,760.00	\$737,760.00
2584	EXCELSIOR BLANKET	18300	SQ M	\$1.15	\$21,045.00
2651	DETOUR CONSTRUCTION	1	LP SU	\$52,000.00	\$52,000.00
2701	SILT FENCE	1500	METER	\$7.64	\$11,460.00
2705	SILT CHECK	150	EACH	\$53.32	\$7,998.00
2726	STAKING	1	LP SU	\$87,500.00	\$87,500.00
5960	FERTILIZER 10-20-20	53	MTON	\$350.42	\$18,572.26
5966	FERTILIZER 20-10-10	27	MTON	\$346.33	\$9,350.91
5986	SEED AND PROTECT, METHOD 2	494800	SQ M	\$0.27	\$133,596.00
5992	AGRICULTURAL LIMESTONE	376	MTON	\$26.61	\$10,005.36
8100	CONCRETE-CLASS A	63	CU M	\$404.44	\$25,479.72
8150	STEEL REINFORCEMENT	800	KGRAM	\$1.31	\$1,048.00
X	31+495 - 2400mmx1800mm RCBC	1	LP SU	\$750,000.00	\$750,000.00
SUB - TOTAL GRADE & DRAIN:					\$29,038,752.55
SURFACING					
0001	D G A BASE	62093	M TON	\$12.76	\$792,306.68
0100	BITUMINOUS SEAL AGGREGATE	229	MTON	\$33.94	\$7,772.26
0120	BIT CONC BASE CLASS I	50221	MTON	\$30.76	\$1,544,797.96
0154	BIT CONC SURFACE CLASS I-20/30	6066	MTON	\$31.62	\$191,806.92
0291	EMULSIFIED ASPHALT RS-2	27	MTON	\$320.47	\$8,652.69
0356	BITUMINOUS MATERIAL FOR TACK	62	MTON	\$247.70	\$15,357.40
1000	PERFORATED PIPE-100 MM	3600	METER	\$11.48	\$41,328.00
1010	NON-PERFORATED PIPE-100 MM	180	METER	\$24.13	\$4,343.40
2743	PAVEMENT STRIPING - WHITE	14000	METER	\$0.90	\$12,600.00
2744	PAVEMENT STRIPING - YELLOW	7000	METER	\$0.90	\$6,300.00
SUB - TOTAL SURFACING:					\$2,625,265.31
SUB - TOTAL GRADE, & DRAIN & SURFACING:					\$31,664,017.86
MISCELLANEOUS					
2568	MOBILIZATION	1	LP SU	\$953,280.54	\$953,280.54
2569	DEMOBILIZATION	1	LP SU	\$476,640.27	\$476,640.27
2650	MAINTAIN AND CONTROL TRAFFIC	1	LP SU	\$112,000.00	\$112,000.00
SUB - TOTAL:					\$33,205,938.67
10% ENGR. & CONTG:					\$3,320,593.87
GRAND TOTAL:					\$36,526,532.54
Cost Per Kilometer Grade & Drain:					\$8,296,786.44
Cost Per Kilometer G & D & Surf:					\$10,436,152.15

Last Revision:
 Estimated By:

DATE: 10/20/98 TIME: 8:11:56 AM

**APPENDIX B
CREATIVE IDEA LIST**

1.	Raise grade in major cut areas/full diamond interchange.
1a.	Raise grade in major cut areas/half diamond interchange.
2.	Bifurcation.
3.	Reduce median width.
3a.	Reduce median width/with barriers.
4.	Eliminate at-grade crossings.
5.	Reduce degree of curvature.

Evaluation of each of the above ideas is included on the following pages.

EVALUATION

ALTERNATIVE #1

1. Raise grades in major cut areas.

Advantages:

- Reduce excavation.
- Better Vertical alignment between 12 km and 13 km.
- Reduce clearing/Grubbing.
- Reduce landscaping.
- Reduces R.O.W.

Disadvantages:

- Steeper Grades.
- Drainage impact/fill areas.

Conclusion:

Continue development.

ALTERNATIVE #2

2. Bifurcate sections.

Advantages:

- Reduces excavation.
- Reduces waste.
- Reduces clear/grub.
- Reduces landscaping.
- Increased aesthetics.
- Reduces R.O.W.

Disadvantages:

- Increases design time/cost.
- Positive median separation.

Conclusion:

Continue development.



ALTERNATIVE #3

3. Reduce median width in cut areas.

Advantages:

- Reduces excavation.
- Reduces R.O.W.
- Reduces clear/grub.
- Reduces landscaping.

Disadvantages:

- Decreased aesthetics.



Conclusion:

Continue development.

ALTERNATIVE #4

4. Eliminate at-grade crossings.

Advantages:

- Eliminates conflicting movements.
- Increases traffic flow.
- Adds project value.
- Increases user satisfaction.

Disadvantages:

- Increases maintenance costs.
- Increases number of signalized intersections.
- Increases overall cost.

Conclusion:

Develop as a design comment.

Alternative #5

5. Reduce degree of curvature. (Selected curves)

Advantages:

- Reduces degree of curvature.
- More comfortable to drive.

Disadvantages:

- Additional excavation.
- May decrease tangent length.

Conclusion:

Drop idea from further consideration.

APPENDIX C

FUNCTION ANALYSIS COST/WORTH RATIO

ITEM	FUNCTION		TYPE	COST	WORTH	C/W
	VERB	NOUN		X 1000	X 1000	
Excavation	Remove	Material	S	\$103,640	\$75,000	1.38
MOT	Maintain	Traffic	B	\$1,251	\$1,000	1.25
Clear/Grub	Clear	Site	S	\$3,940	\$3,500	1.13
Surfacing	Support	Traffic	B	\$19,662	\$16,000	1.23
Bridges	Span	Obstacle	S	\$5,800	\$5,800	1.00
Grade/Drain	Drain	Site	S	\$55,684	\$50,000	1.12

APPENDIX D
STUDY REFERENCE MATERIAL/CONSULTANTS

REFERENCE DOCUMENTS

Date	Material
01/94	Project Scoping Report, KY 15, prepared by WMB, Inc.
1994	AASHTO Policy on Geom. Design
01/96	AASHTO Roadside Design Guidelines
06/95	KYTC Design Manual

CONSULTANTS

Name	Subject	Organization	Telephone
Bill Guillick	Roadside Barriers	KYTC Central Office	502-564-3280
Gary Poole	Culvert Extension	KYTC Central Office	502-564-3280
Tony Bowling	Interchanges	KYTC District 10	606-666-8841
Tom Baker	Fill Quantities	WMB, Inc.	606-299-5226
Robert Semones	Barrier Walls	KYTC Design	502-564-3280
Dan Byers	Alignment	WMB, Inc.	606-299-5226
Art Duncan	Bridges	WMB, Inc.	606-299-5226

APPENDIX E

PROJECT BRIEFING/PRESENTATION

VE Study Briefing
KY 15 (Hazard to Campton)
Monday, 16 November, 1998

The briefing for the Value Engineering Team was held at the KYTC District 10 headquarters building in Jackson, Kentucky, on 16 November, 1998, beginning at 9:30 a.m.

The meeting was opened by Mr. Robert Semones, KYTC Value Engineer, who introduced attendees and the value engineering team. Mr. Semones explained the goals and objectives of value engineering study and the role the design team and KYTC personnel would play in the VE process for the week-long study. He then introduced Mr. Joe Waits, Dames and Moore, Team leader for the Value Engineering study team. Mr. Waits explained the VE process and the five-step value engineering job which the team would follow during the study. He emphasized that the goal of the VE team was to identify alternatives to perform functions without reduction in quality or customer satisfaction, with a reduction in project cost. Mr. Waits further emphasized that the VE team has no intent to criticize or "second-guess", but to work as an "extension" to the design process to add project value where feasible.

Mr. Danniell Byers, WMB, Inc., then briefed the group on the design concept and details of the project. The general concept was to follow the existing alignment and avoid conflict with streams along the route. Other restrictions noted were several cemeteries along the route, and a trash disposal area. It was also noted that relocation of property owners in certain areas was not an option. There is an estimated 1 million cm of waste excavation per mile in the project.

The group was then taken on a tour of the site to inspect existing conditions.

The meeting ended at 1 p.m.

The following were in attendance:

RELOCATION FROM KY 28 IN PERRY CO. NORTH TO KY 476 IN BREATHITT CO.

V. E. STUDY BRIEFING

NOVEMBER 16, 1998

Art Duncan	WMB Inc. Balke Engineers	606-299-5226
Benjamin Goodman	BRW - H & E	312-481-0267
Bob Lewis	KYTC Co. Construction	502-564-4780
Brad Eldridge	D-10 Design	606-666-8841
Brad Hamblin	KYTC Co. Construction	502-564-4780
Brent Weddington	D-10 Design	606-666-8841
Brent Weddington	KYTC D - 10 Design	606-666-8841
C.W. Seymour Jr.	BRW - H & E	502-583-2723
Chris Pol	D-5 Design	502-367-6411
Dallas F. Montgomery	BRW Hazelet & Erdal	502-583-2723
Daniel Byers	WMB Inc.	606-299-5226
Darrin Beckett	KYTC Co. Design	502-564-2374
Daryl Greer	KTC- Hwy. Design	502-583-2723
Diana Radcliffe	KYDOT- Cooperations	502-564-4556
Eddie Terry	KYTC Co. Construction	606-666-8841
George Schober	BRW Inc.	847-364-8800
Joe Waits	Dames & Moore	334-666-5897
Joette Fields	KYTC Hwy. Design	502-564-3280
Naresh Shah	KYDOT	502-564-4560
R.T. Wilson	KYTC Div. of Material Geotech	502-564-2374
Robert Semones	KYTC Hwy. Design	502-564-3280
Rokshad Faizikhan	D10 Design Env. Co.	606-666-8841
Tom Baker	WMB Inc.	606-299-5226
William Madden	D-10 Preconstruction Eng.	606-666-8841
Brian Billings	KYTC D-10 Construction	606-663-5801

PRESENTATION

The presentation conference was held on Friday, 20 November, 1998, in the KYTC Headquarters, Frankfort, Kentucky. The meeting was opened by Mr. Robert Semones who made opening comments and introduced attendees and the value engineering team. The VE team then presented each of the value engineering proposals developed during the study and answered questions posed by the attendees.

PROPOSAL

Proposal #1, Raise Grade/Full Diamond Interchange
Propoasl #1a, Raise Grade/Half Diamond Interchange

Propoasl #2, Bifurcation

Proposal #3, Reduce Median Width

Proposal #3a, Reduce Median/With Barriers

PRESENTER

Bryan Billings
C. W. Seymour
Ben Goodman
George Schober
Chris Poe
Darrin Beckett
Dallas Montgomery
Naresh Shah
Dallas Montgomery
Naresh Shah

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KYTC - Const.
KYTC - Mater./Geotech
KYTC - Hwy. Design
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KYTC - Hwys./Geotech
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