VALUE ENGINEERING SUMMARY
OF
US 119/ZEBULON TO BENT MT.
WPI NO. 12-308.1 & 308.2
PIKE COUNTY, KENTUCKY

JANUARY 6-14, 1997

Prepared by:
Ventry Engineering

In Association With:

Kentucky Transportation Cabinet,
Department of Highways

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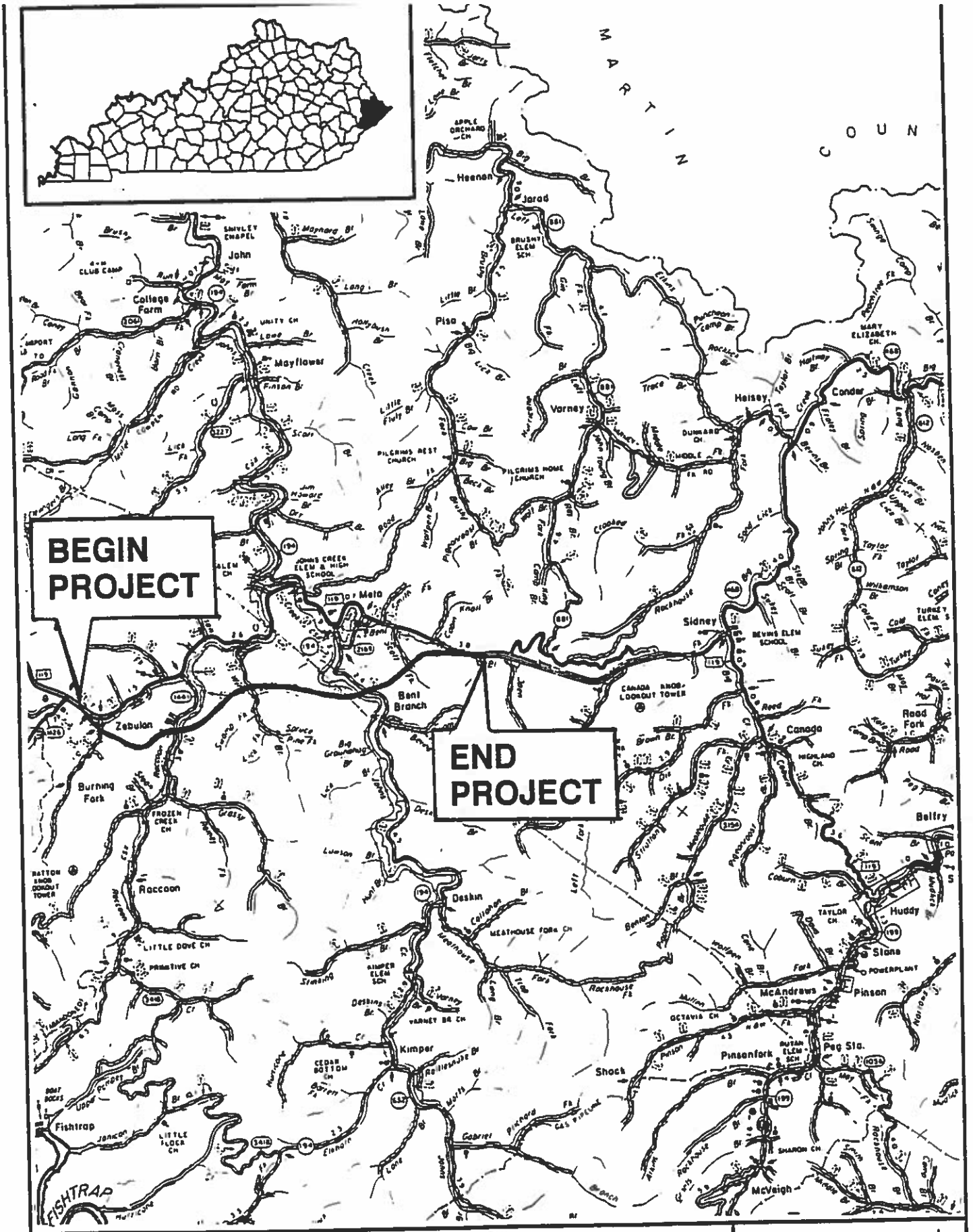
I. LOCATION OF PROJECT



Palmer ENGINEERING

EXHIBIT 1
PROJECT LOCATION MAP
Pike County, Kentucky
U.S. 119 Zebulon to Bent Mountain

EXHIBIT 3
PROPOSED ALIGNMENT
AIR QUALITY ANALYSIS

US 119 Improvement, Zebulon to Bent Mountain
Pike County, Kentucky
Item No. 12-308.00

Balke Engineers for FHWA and the
Kentucky Transportation Cabinet

December, 1996

Base: USGS 7.5' Topographic Map (Meta, KY.)

Scale: Approx. 1cm=240m (1"=2000')

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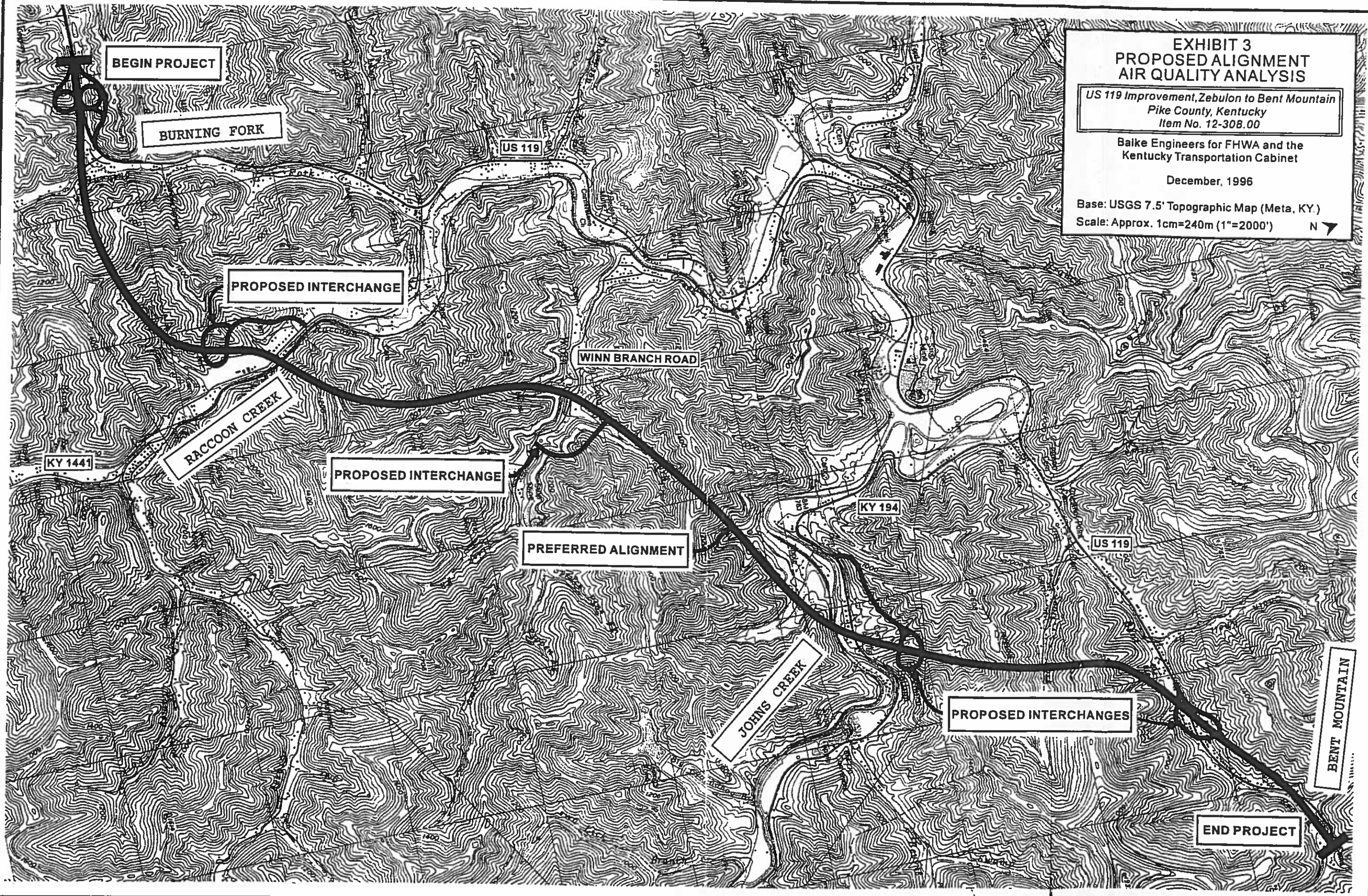


II. TEAM MEMBERS AND PROJECT DESCRIPTION

TEAM MEMBERS

NAME	AFFILIATION	EXPERTISE	PHONE
Jack Trickey, P.E. C.V.S.	Ventry Engineering	Team Leader	904/627-3900
Don Keenan, P.E.	Ventry Engineering	Structural Team Member	904/627-3900
Ron Whichel, P.E.	Ventry Engineering	Cost Estimating Team Member	904/627-3900
Dallas Gray	Ventry Engineering	Right of Way Team Member	904/627-3900
Ken Sperry, P.E.	KY Transportation Cabinet	Highway Design	502/564-3280
Steve Halloran, P.E.	KY Transportation Cabinet	Construction	502/564-4780
Daryl Greer, P.E.	KY Transportation Cabinet	Value Engineering	502/564-3280
Jeff Jasper, E.I.T.	KY Transportation Cabinet	Highway Design	502/564-3280

PROJECT DESCRIPTION

The project provides for the relocation of 14.3 kilometers (8.9 miles) of U.S. 119 in Pike County, Kentucky. The proposed new alignment is approximately 12 kilometers (7.5 miles) in length. The project relocates existing U.S. 119 from Burning Fork Road to near Bent Mountain.

Four new mainline bridges cross Burning Fork Road, Racoon Creek, Johns Creek and existing U.S. 119. Winn Branch and Scott Fork are crossed with culverts with mainline access provided only to the southeast portion of Winn Branch. Overpasses are called for on the approaches at Raccoon Creek and Johns Creek to eliminate left turning vehicles across the median.

The project is functionally classified as a rural arterial in mountainous terrain.

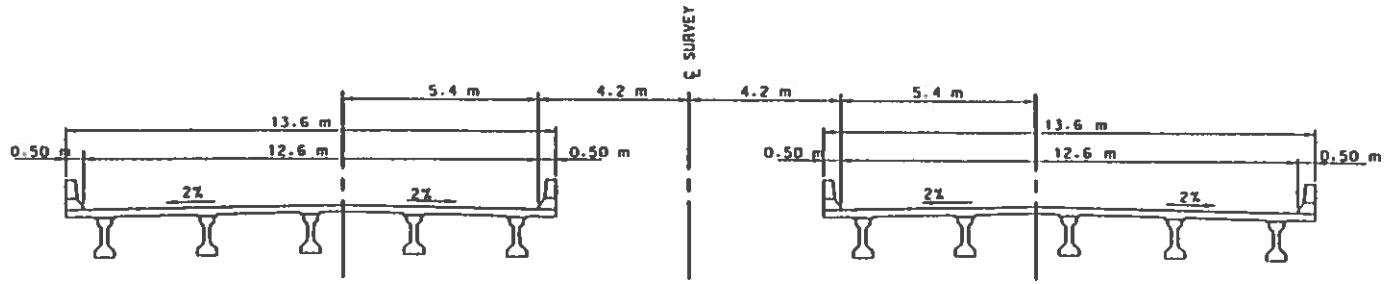
The proposed typical section provides a 12 meter depressed median with two 7.2 meter roadways and 3.6 meter outside shoulders, with 3.0 meters paved.

The proposed project will displace approximately 116 families, 5 businesses and 213 graves.

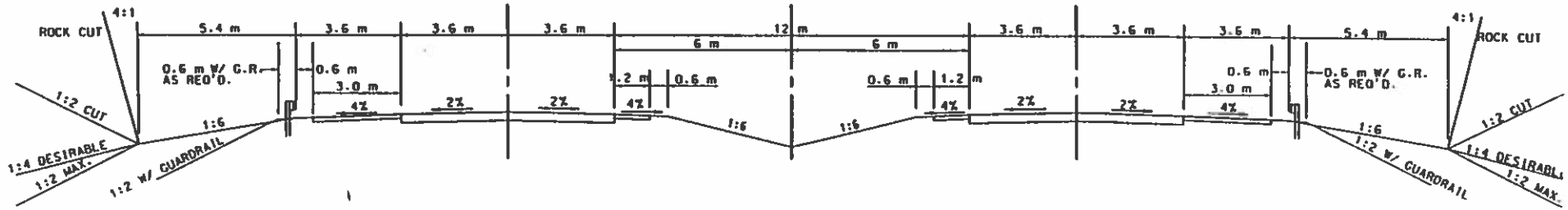
This existing and proposed facility serves local traffic, major coal operations and is a major intrastate route.

COST ESTIMATE

Roadway Excavation			$ 64,623,000
Drainage			3,129,000
Pavement and Base			8,241,000
Bridges			47,459,000
Compression Station			6,500,000
Miscellaneous (Silt checks, Guardrail, End treatments, Staking, R/W Fence, Traffic, Water)			1,164,000
Mobilization	3.0%		3,933,480
Demobilization	1.5%		1,966,740
		Subtotal	$137,016,220
Eng. & Conting.	20%		27,403,244
(Approaches)			
Burning Fork			9,202,000
Racoon Branch			8,491,000
Winn Branch			3,113,000
Johns Creek			7,853,000
Bent Mountain			5,147,000
		Subtotal	$ 33,806,000
		Total Construction	$198,225,464
Right of Way			$ 32,379,000
Utility Relocation			5,570,000
		Total Project Estimate	$236,174,464



TYPICAL DECK SECTION



TYPICAL SECTION WITH 12 m DEPRESSED MEDIAN

TYPICAL SECTIONS

NOT TO SCALE

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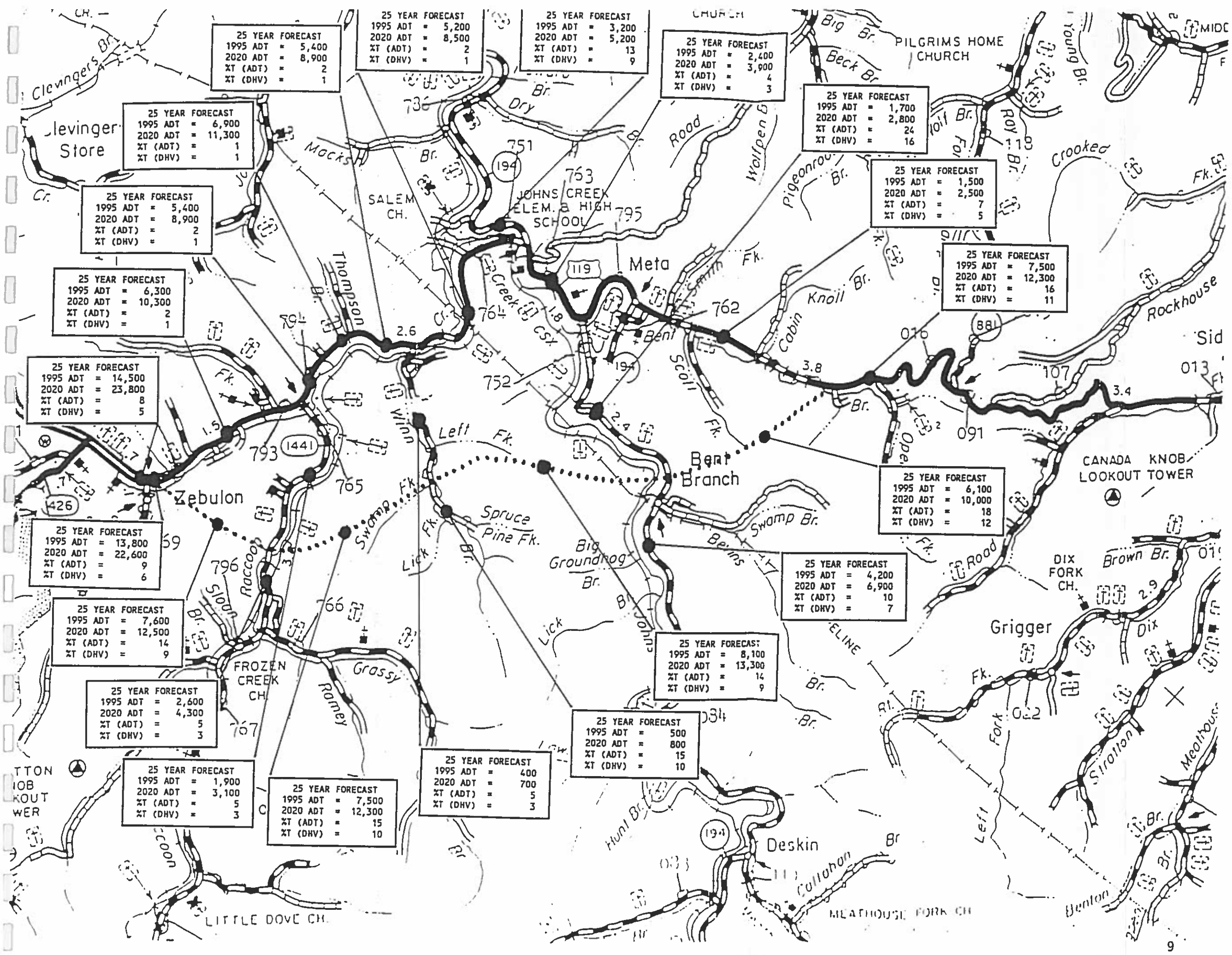
PROJECT PLANNING REPORT

US 119 ZEBULON TO BENT MOUNTAIN

Figure 3
Typical Sections
US 119 Corridor
US 119
Pike Co., 1996



PROPOSED US 119 BUILT

Pike County
US 119
Zebulon to Bent Mountain

III. INVESTIGATION PHASE

US 119/ZEBULON TO BENT MOUNTAIN
V.E. STUDY BRIEFING
January 7, 1997

NAME	AFFILIATION	PHONE
Jack Trickey	Ventry Engineering	904/627-3900
Don Keenan	Ventry Engineering	904/627-3900
Steve Halloran	KTC Construction	502/564-4780
Steve Hoefler	KTC Highway Design	502/564-3280
Randy Stephens	Palmer Engineering	606/744-1218
David Lindeman	Palmer Engineering	606/744-1218
Charles Reichenbach	KY D.O.H. Dist. #12	606/433-7791
Denton Biliter	Chief Dist. Eng., KY D.O.H. Dist. #12	606/433-7791
James D. Wright	Dist. Const. Eng., KY D.O.H. Dist. #12	606/433-7791
Keith R. Damron	Dist. #12 Design Engineer	606/433-7791
Robin R. Justice	Dist. #12 Design EIT	606/433-7791
Dallas Gray	Ventry Engineering	904/627-3900
Ron Whichel	Ventry Engineering	904/627-3900
Jeff Jasper	KTC Highway Design	502/564-3280
Ken Sperry	KTC Highway Design	502/564-3280
Daryl Greer	KTC Value Engineer	502/564-3280
Janet R. Coffey	KTC Dist. #12 Operations	502/564-4556
Dexter Newman	KTC Dist. #12 Const.	606/433-7791

PERSONS CONTACTED

NAME	AFFILIATION	PHONE
Randy Stephens	Palmer Engineering Co.	606/744-1218
Robert Miller	Tensar, Atlanta, Ga.	800/292-4459
Jerry Justice	Dist. #12, R/W	606/433-7765
Joe Emberson	Tensar, Atlanta, Ga.	800/292-4459

INVESTIGATION

The following have been identified by the Value Engineering Team as areas of focus and investigation for the Value Engineering process:

Areas identified as high cost items during the investigation phase:

ITEM	COST	FUNCTION
EXCAVATION	$64,600,000	ESTABLISH PROFILE
DRAINAGE	$3,100,000	CONVEY WATER
PAV'T & BASE	$8,200,000	SUPPORT VEHICLES
RIGHT OF WAY	$25,000,000	PROVIDE LAND
STRUCTURES	$47,500,000	SEPARATE TRAFFIC
APPROACHES	$33,800,000	PROVIDE ACCESS

FUNCTIONAL ANALYSIS WORKSHEET, INFORMATION PHASE
PROJECT: US 119/ZEBULON TO BENT MOUNTAIN
DATE: JANUARY 6-14, 1997

ITEM	FUNCT. VERB	FUNCT. NOUN	TYPE	COST	WORTH	VALUE INDEX
EXCAVATION	establish establish accom. facilitate facilitate	profile align. typical access develop.	B B B B S	$64,600,000	$60,000,000	1.1
DRAINAGE	convey minimize	water erosion	B B	$3,100,000	$3,100,000	1.0
PAV'T AND BASE	support support protect remove increase reduce	vehicles loads base water traction rutting	B B B B B B	$8,200,000	$8,200,000	1.0
RIGHT OF WAY	provide accom.	land design	B B	$25,000,000	$23,000,000	1.1
STRUCTURES	span separate convey	creek traffic water	B B B	$47,500,000	$44,000,000	1.1
BURNING FORK APPROACH	provide eliminate	access left turns	B S	$9,200,000	$8,200,000	1.1
RACCOON CREEK APPROACH	provide eliminate separate	access left turns traffic	B S S	$8,500,000	$8,000,000	1.1
WINN BRANCH APPROACH	provide	access	S	$3,100,000	$3,100,000	1.0
JOHNS CREEK APPROACH	provide eliminate separate	access left turns traffic	B S S	$7,900,000	$7,000.000	1.3
BENT MOUNTAIN APPROACH	provide eliminate	access left turns	B S	$5,100,000	$5,100,000	1.0

IV. SPECULATION PHASE

SPECULATION

Ideas generated, utilizing the brainstorming method, for performing the functions of previously identified areas of focus.

EXCAVATION

- **Revise the median width from a 12 m depressed median to a 4.2 m paved median with barrier wall throughout except at the Winn Branch Approach**
- **Revise the alignment between station 505 + 800 and station 507 + 300 to turn easterly along the hollow then back to the proposed alignment**
- **Increase the grade between station 508 + 600 and station 509 + 750**
- ~~**Bifurcate the roadways in fill areas**~~

PAVEMENT AND BASE

- ~~**Use concrete pavement instead of asphalt pavement for the US 119 mainline roadways**~~
- ~~**Construct the outside lane to be 4.3m (14') wide and strip the edge line at 3.6m (12') to provide an additional 0.6m (2') of full depth roadway for edge of pavement support**~~
- ~~**Construct a full depth shoulder to reduce future maintenance cost caused by heavy trucks**~~

STRUCTURES

- **Revise the bridge typical section to only provide a 3.0m outside shoulder instead of the 3.6m shoulder proposed**

US 119 AT BURNING FORK APPROACH

- **Eliminate Ramp D from station 40 + 000 to station 40 + 535 and utilize Ramp E with a 15m radius turnlane to provide the WB to NB movement**
- **Revise the north side of the intersection to reflect a half diamond type interchange with the long radius currently proposed for the SB to WB movement for the heavy trucks and retaining the relocated US 119 configuration currently proposed for the south side of the intersection**

RACCOON CREEK APPROACH

- Reduce the number of graves to be removed by using a combination of slope reinforcement and retaining walls on Ramp A and left of mainline station 502 + 900

WINN BRANCH APPROACH

- Construct a wagon box to maintain access to Winn Branch Drive and eliminate the proposed approach on the east side of the new mainline US 119

JOHNS CREEK APPROACH

- Use the mainline structures to provide for the separation of traffic between KY 194 and relocated US 119 and eliminate the proposed overpass on the new approach

V. EVALUATION PHASE

V.(a) ALTERNATIVES

ALTERNATIVES

The following alternatives were formulated during the "eliminate and combine" portion of the Evaluation Phase.

A. EXCAVATION

Value Engineering Alternative No. 1-Reduce the median width from a 12 m depressed median to a 4.2 m paved median with barrier wall throughout except at the Winn Branch Approach

Value Engineering Alternative No. 2-Revise the alignment between station 505 + 800 and station 507 + 300 to turn easterly along the hollow then back to the proposed alignment

Value Engineering Alternative No. 3-Flatten the side slopes in long fill sections (stations 504 + 800 to 506 + 200 and 508 + 500 to 509 + 100

B. STRUCTURES

Value Engineering Alternative No. 1-Reduce the shoulder width of the bridge typical section to 3.0m instead of the proposed 3.6m

C. US 119 AT BURNING FORK APPROACH

Value Engineering Alternative No. 1-Revise the north side of the intersection eliminating Ramp D to reflect a half diamond type interchange with the same long radius currently proposed for the SB to WB movement for the heavy trucks and also retaining the relocated US 119 configuration currently proposed for the south side of the intersection

D. RACCOON CREEK APPROACH

Value Engineering Alternative No. 1-Reduce the number of graves to be removed by using a combination of slope reinforcement and retaining walls on Ramp A and left of mainline station 502 + 900

E. WINN BRANCH APPROACH

Value Engineering Alternative No. 1-Construct a wagon box to maintain access to Winn Branch Drive and eliminate the proposed approach on the east of the new mainline US 119

F. JOHNS CREEK APPROACH

Value Engineering Alternative No. 1-Use the mainline structures to provide for the separation of traffic between KY 194 and relocated US 119 and eliminate the proposed overpass on the new approach

V.(b) ADVANTAGES AND DISADVANTAGES

EVALUATION

The following Advantages and Disadvantages were developed for the Value Engineering Alternatives previously generated during the speculation phase. It also includes the Advantages and Disadvantages for the As Proposed.

A. EXCAVATION

As Proposed Typical Section (12m depressed median)

Advantages

- provides area for snow removal
- simplifies drainage
- reduces runoff on fill sections due to the crowned roadway section
- provides area wide enough to provide a refuge for smaller turning vehicles
- allows for provision of deceleration and acceleration lanes along the median
- a larger volume of excavated material would be utilized in fill sections
- eliminates all obstacles (barrier wall, etc.) from the median
- does not require milling of curb lips and barrier wall in future resurfacing operations

Disadvantages

- increases the amount of excavation required in cut areas
- increases the R/W requirements
- increases the cost of maintenance

Conclusion

Carry Forward for Further Development

Value Engineering Alternative No. 1 - Revise the median width from a 12m depressed median to a 4.2 m paved median with barrier wall throughout except at the Winn Branch Approach.

Advantages

- reduces the amount of excavation required
- reduces the R/W requirements
- reduces the amount of maintenance required to maintain the median
- still provides enough area for a left turn storage lane
- reduces the potential for head-on collisions due to the addition of the median barrier wall
- would reduce the bridge deck width by 1' 3 1/2"

Disadvantages

- does not provide enough width for refuge of smaller turning vehicles across the median
- barrier wall is considered a obstacle to vehicles
- eliminates some of the area that could be used for storage of snow
- complicates the drainage of the project due to the addition of median drainage boxes and loss of storage area
- requires the draining of pavement runoff across 2 lanes of traffic

Conclusion

Carry Forward for Further Evaluation

Value Engineering Alternative No. 2 - Revise the alignment between station 505+800 and station 507+300 to turn easterly along the hollow then back to the proposed alignment

Advantages

- will reduce the amount of excavation required
- may reduce the amount of R/W required
- may avoid the gas well at station 506+940
- allows a flatter profile grade along the mainline

Disadvantages

- will slightly increase the length of the roadway
- adds additional curves (2) to the alignment
- increases the potential impacts to the designated mine area
- eliminates a potential waste site

Conclusion

Carry Forward for Further Evaluation

Value Engineering Alternative No. 3 - Flatten the side slopes in long fill sections (stations 504+800 to 506+200 and 508 + 500 to 509 +100)

Advantages

- reduces the amount of excavated waste
- reduces the area needed for waste disposal
- more conducive to future development
- reduces the amount of guardrail required
- reduces the potential for fill slides

Disadvantages

- may increase the demand for additional access to the mainline roadway
- will increase the amount of drainage structures required
- will increase the amount of backslope that will have to maintained (mowing, etc.)

Conclusion
Carry Forward for Further Evaluation

B. STRUCTURES

Value Engineering Alternative No. 1 - Reduce the shoulder width of the bridge typical section to 3.0m instead of the proposed 3.6m

Advantages
- **reduces the width of the bridges by 0.6m (2') each**
- **discourages the use of the outside shoulder as a traffic lane**
- **conforms to Kentucky Bridge Standards**

Disadvantages
NONE

Conclusion
Carry Forward for Further Evaluation

C. US 119 AT BURNING FORK APPROACH

As Proposed Approach

Advantages
- **provides high operating speeds on Ramps C and D**

Disadvantages
- **requires a larger amount of excavation to construct**
- **requires a larger amount of pavement to construct**
- **requires additional R/W to construct**
- **requires an increased amount of drainage to construct**
- **design is more complex normally required for this type intersection**

Conclusion
Carry Forward for Further Evaluation

Value Engineering Alternative No. 1 - Revise the north side of the intersection eliminating Ramp D to reflect a half diamond type interchange with the same long radius currently proposed for the SB to WB movement for the heavy trucks and also retaining the relocated US 119 configuration currently proposed for the south side of the intersection

Advantages

- reduces the amount of excavation required to construct
- reduces the amount of pavement required to construct
- reduces the amount of R/W required to construct
- reduces the amount of drainage required to construct
- design is similar to that normally used for a tight diamond intersection

Disadvantages

- will require a longer acceleration lane
- will reduce the operating speed of the interchange when compared to the As Proposed design

Conclusion

Carry Forward for Further Evaluation

D. RACCOON CREEK APPROACH

Value Engineering Alternative No. 1 - Reduce the number of graves to be removed by using a combination of slope reinforcement and retaining walls on Ramp A and left of mainline station 502 + 900

Advantages

- reduces the cost of grave relocation
- may help with public relations by reducing the social impacts of this project
- reduces the potential for project delay due to difficulties with grave relocation

Disadvantages

- increase the amount of waste material that will have to be disposed of elsewhere
- adds an additional cost for slope reinforcement and retaining wall

Conclusion

Carry Forward for Further Evaluation

E. WINN BRANCH APPROACH

Value Engineering Alternative No. 1 - Construct a wagon box to maintain access to Winn Branch Drive and eliminate the proposed approach on the east of the new mainline US 119

Advantages

- eliminates the only proposed at-grade crossing involving left turns in this project
- may decrease the amount of waste material
- retains the same access currently available to all the residents of Winn Branch Road

Disadvantages

- does not provide direct access to mainline US 119
- may increase the cost of construction, including drainage

Conclusion

Carry Forward for further Evaluation

F. JOHNS CREEK APPROACH

Value Engineering Alternative No. 1 - Use the mainline structures to provide for the separation of traffic between KY 194 and relocated US 119 and eliminate the proposed overpass on the new approach

Advantages

- eliminates the proposed overpass structure on the Johns Creek Approach
- may reduce the R/W requirements

Disadvantages

- may increase the length of the mainline structures

Conclusion

Drop From Further Consideration

VI. DEVELOPMENT PHASE

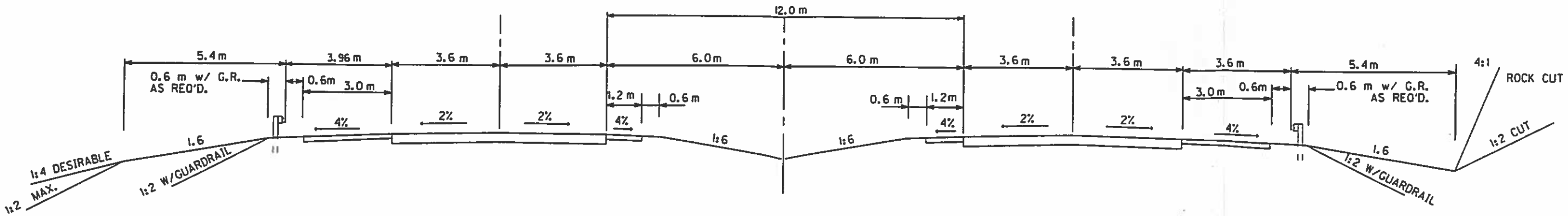
VI.(a) EXCAVATION

VI.(a)(1) AS PROPOSED

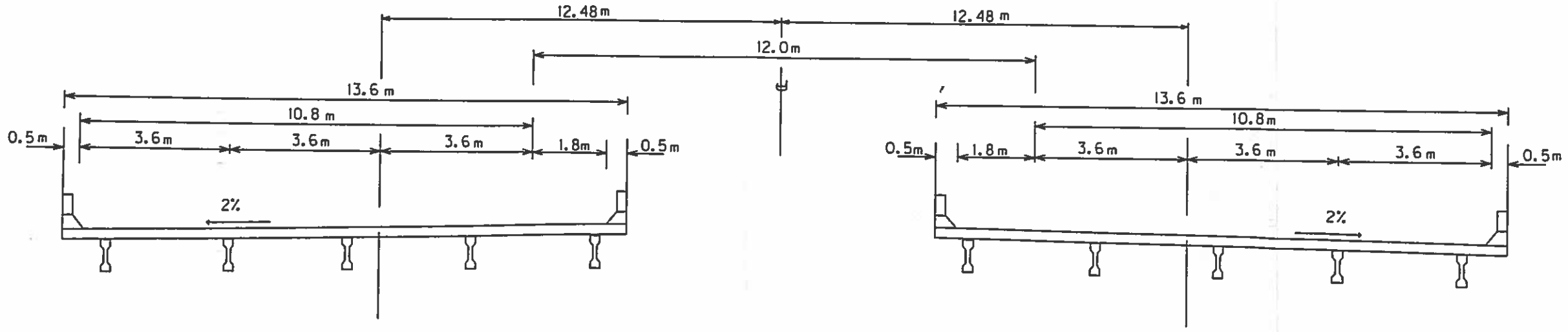
MEDIAN WIDTH

"AS PROPOSED" 12.0 m

The as proposed typical section incorporates four lanes at 3.6m, two median shoulders of 1.2m paved and .6m unpaved, two exterior shoulders at 3.0m paved and .6m unpaved. The median is a 12m depressed median. This section provides for drainage of both roadways and provides for snow storage, left turns and storage lanes.



AS PROPOSED

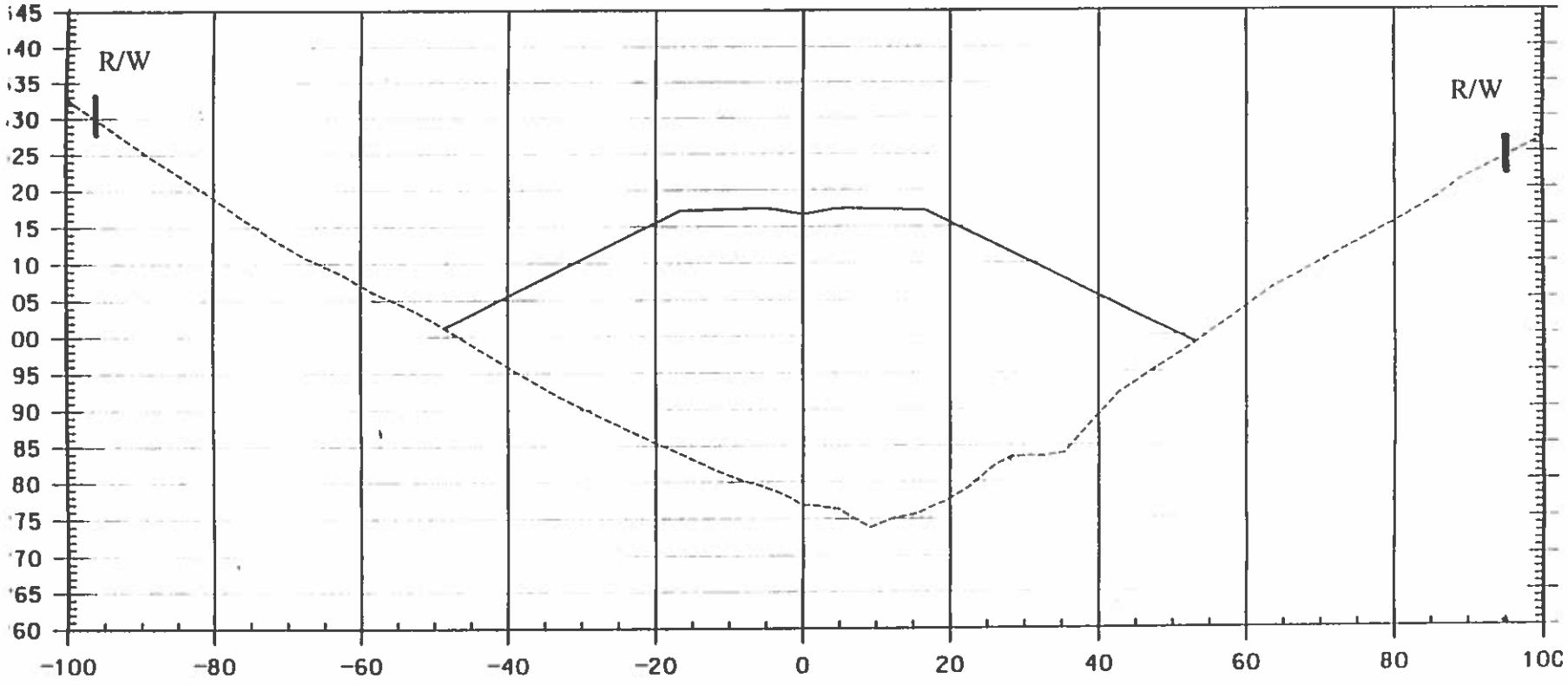


AS PROPOSED

FILL SLOPES

"AS PROPOSED"

The proposed alignment provides for a typical section with a maximum slope of 1:2 in fill sections. Guardrail are utilized in areas steeper than 1:4 slopes.



AS PROPOSED

ALIGNMENT

"AS PROPOSED"

The alignment between station 505 + 913 and station 507 + 225 crosses near the top of the mountain. This requires high volume excavation and adds to the waste disposal on the project.

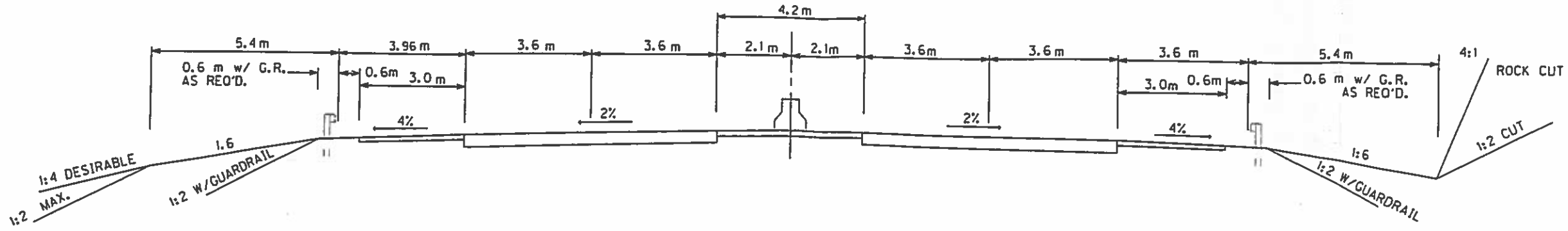
VI.(a)(2) V.E. ALTERNATIVES

MEDIAN WIDTH

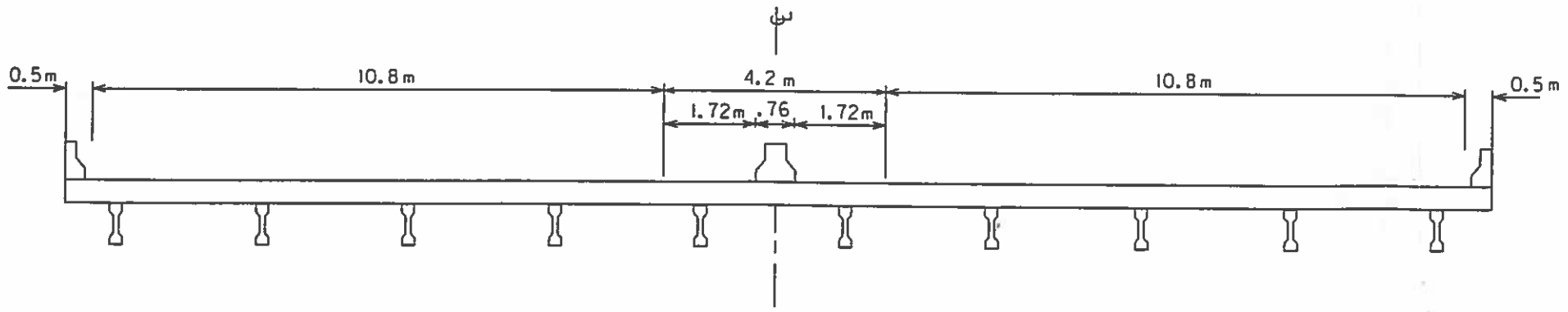
V.E. ALTERNATIVE NO. 1

The V.E. alternative typical section incorporates four lanes at 3.6m, two exterior shoulders at 3.0m paved and .6m unpaved. The median is 4.2m wide with a traffic barrier in the middle of the median. The barrier will be used throughout except where approach roads will have a left turn movement (Winn Branch only).

This typical provides for drainage, left turns and storage lanes.



VALUE ENGINEERING PROPOSAL



VALUE ENGINEERING PROPOSAL

COST COMPARISON

Revised Median Width (12m vs. 4.2m)

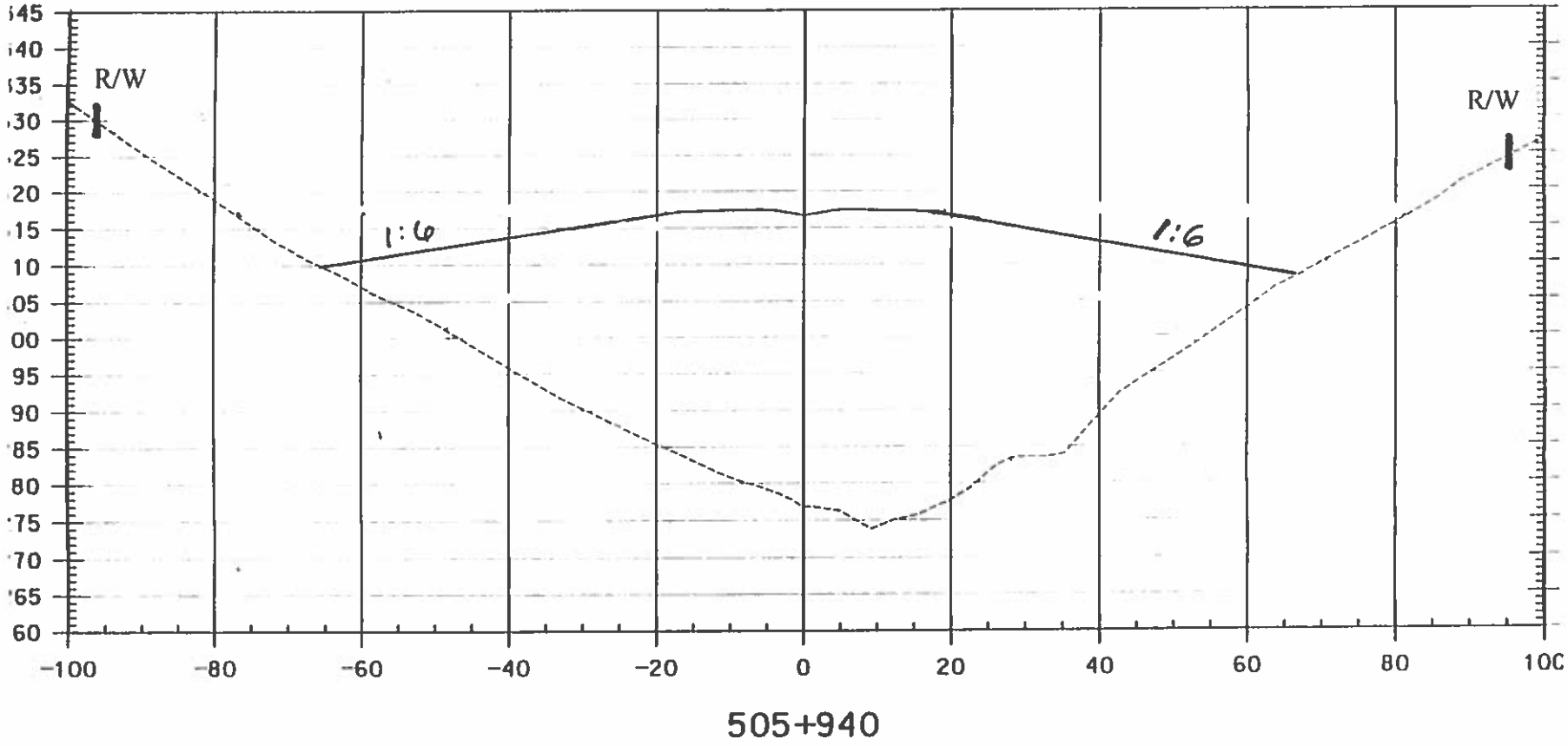
DESCRIPTION	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Pavement	$110/m^2$			11,041	$ 1,214,510
Median Barrier Type 300C	$140/m^3$			10,616	$ 1,486,240
Crash Cushions	$20,000/ea			4 ea.	$ 80,000
Conc. Median Barrier Box Inlet	$ 9,800/ea			43 ea.	$ 421,400
Excavation Section 1	$2.61/m^3$	4,934,235	$12,878,353	4,749,617	$12,396,500
Section 2	$2.61/m^3$	8,194,128	$21,386,674	7,722,398	$20,155,458
Section 3	$2.61/m^3$	6,950,220	$18,140,074	6,673,785	$17,418,579
Section 4	$2.61/m^3$	4,468,968	$11,664,006	4,210,184	$10,988,580
Subtotal		24,547,551	$64,069,107	23,355,984	$64,161,267
Bridge Conc.	$3.50/CY			148 C.Y.	$ -51,800
Bridge Rebars	$ .55/LB			35,900 LB	$ -19,745
TOTAL			$64,069,107		$64,089,722

Possible Additional Cost $ 518,985

FILL SLOPES

V.E. ALTERNATIVE NO. 2

The V.E. team recommends a typical section to provide modified slopes that will allow for the utilization of additional excavated material from station 504 + 800 to station 505 + 260, station 505 + 460 to station 506 + 200 and station 508 + 640 to station 509 + 060. This will reduce the amount of waste, the waste area required, and guardrail necessary.



VALUE ENGINEERING ALTERNATIVE

Left side guardrail eliminated by waste usage on flattening slopes

Start flattened slope	504+880	340 m
End " "	505+220	
Start " "	505+460	700 m
End " "	506+160	
Start " "	508+640	380 m
End " "	509+020	

14,600

Right side guardrail eliminated

Start flattened slope	504+800	480 m
End " "	505+280	
Start " "	505+460	920 m
End " "	506+200	
Start " "	508+640	420 m
End " "	509+060	

Total Saved 3240 m

≈ 10,800 ft

STATION	AREA	VOLUME		STATION	AREA	VOLUME		STATION	AREA	VOLUME
504780	0			505440	0			508620	0	
504800	18	180		505460	1954	19540		508640	1439	14390
504820	44	620		505480	2049	40030		508660	1387	28260
504840	148	1920		505500	2160	42090		508680	1179	25660
504860	225	3730		505520	2132	42920		508700	1184	23630
504880	325	5500		505540	2362	44940		508720	1136	23200
504900	387	7120		505560	2168	45300		508740	1386	25220
504920	429	8160		505580	2458	46260		508760	1855	32410
504940	573	10020		505600	2299	47570		508780	2393	42480
504960	572	11450		505620	1933	42320		508800	1256	36490
504980	650	12220		505640	1812	37450		508820	1167	24230
505000	745	13950		505660	2055	38670		508840	1632	27990
505020	861	16060		505680	1504	35590		508860	2385	40170
505040	981	18420		505700	1174	26780		508880	2073	44580
505060	1145	21260		505720	1224	23980		508900	1385	34580
505080	1214	23590		505740	1816	30400		508920	640	20250
505100	1419	26330		505760	1845	36610		508940	439	10790
505120	1528	29470		505780	2099	39440		508960	320	7590
505140	1734	32620		505800	1875	39740		508980	318	6380
505160	2002	37360		505820	1783	36580		509000	348	6660
505180	2506	45080		505840	1640	34230		509020	276	6240
505200	2523	50290		505860	1704	33440		509040	105	3810
505220	63	25860		505880	1900	36040		509060	0	1050
505240	435	4980		505900	1428	33280				486060
505260	560	9950		505920	1482	29100				
505280	0	5600		505940	1036	25180				
	SUM	421740	cu. m	505960	961	19970				
				505980	914	18750				
				506000	1062	19760				
				506020	1166	22280				
				506040	1233	23990				
				506060	1063	22960				
				506080	1062	21250				
				506100	1466	25280				
				506120	1156	26220				
				506140	1048	22040				
				506160	1152	22000				
				506180	1540	26920				
				506200	1485	30250				
				506220	0	14850				
						1224000	cu m			

Additional fill quantities from flattening slopes to fill in valley

cu.m

COST COMPARISON

Flatten Fill Slopes

DESCRIPTION	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Guardrail	$8.47/ft.	14,600 ft	$123,662	3800 ft	$32,186

Possible Savings $ 91,476

ALIGNMENT

V.E. ALTERNATIVE NO. 3

The V.E. team recommends that the alignment be relocated through the saddle located southerly of the proposed alignment. This greatly reduces excavation and the volume of waste.

AS PROPOSED CENTERLINE-

AS PROPOSED FILL-

AS PROPOSED CUT-

V.E. ALT. CENTERLINE-

V.E. ALT. FILL-

V.E. ALT. CUT-

COST COMPARISON

V.E. Alternative No. 3
Alignment Revision

DESCRIPTION	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Roadway Pavement	$6.81 Lin.M	1312 M	$ 893,472	1376 M	$ 937,056
Excavation	$2.61 Cu.M	6,152,513	$16,058,000	4,015,143	$10,479,523
Drainage	$224 Lin.M	1312 M	$ 293,888	1376 M	$ 308,224
TOTAL			$17,245,360		$11,724,803

Possible Savings $ 5,520,554

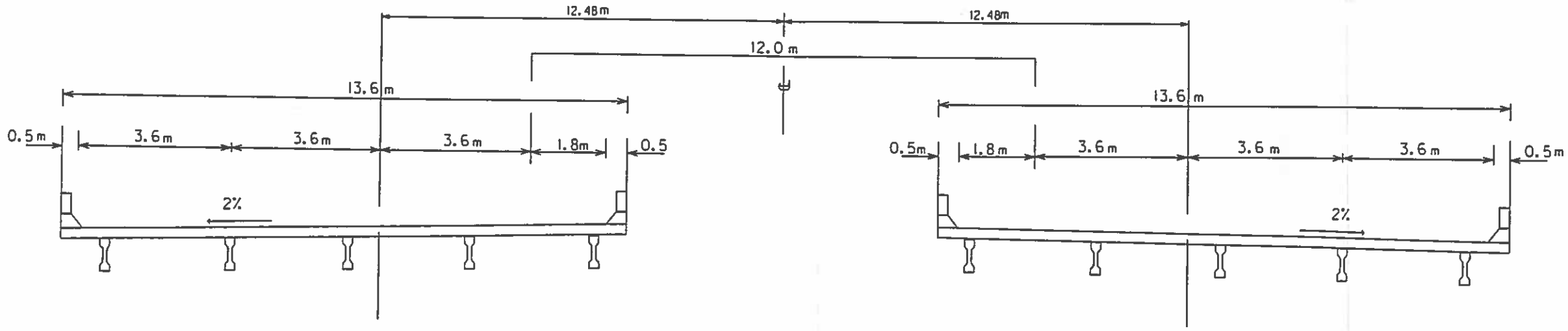
VI.(b) STRUCTURES

VI.(b)(1) AS PROPOSED

BRIDGE TYPICAL
(EXTERIOR SHOULDER 3.6 VS. 3.0)

"AS PROPOSED"

The As Proposed Typical for the bridges incorporates 3.6m exterior shoulders, two 3.6m lanes, a 1.8m interior shoulder and two barriers at .5m each. This typical is for each bridge. The 3.6m exterior shoulder could encourage people to use this as a travel lane. (See AASHTO Geometric Design Chap. IV, Pg. 338).


12.48m
12.48m
12.0 m
13.6 m
13.6 m
0.5 m
3.6 m
3.6 m
3.6 m
1.8m
0.5
0.5m
1.8 m
3.6 m
3.6 m
3.6 m
0.5 m
2%
2%

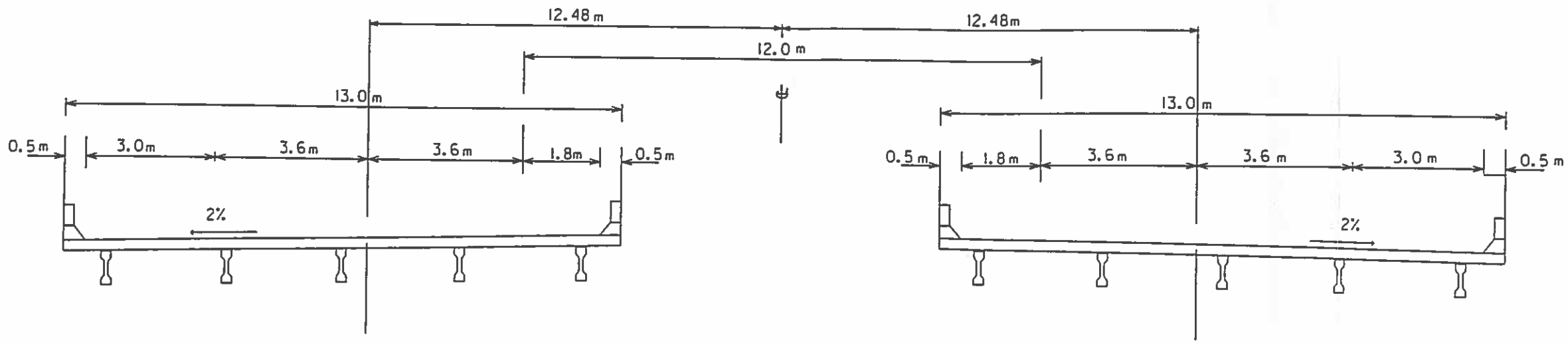
AS PROPOSED

VI.(b)(2) V.E. ALTERNATIVES

BRIDGE TYPICAL
(EXTERIOR SHOULDER 3.6 VS. 3.0)

V.E. ALTERNATIVE NO. 1

The V.E. Alternative incorporates 3.0m exterior shoulders, two 3.6m lanes, a 1.8m interior shoulder and two barriers at .5m each. This typical reduces each bridge by .6m each. A 3.0m shoulder is adequate for emergency use and is consistent with the typical section for the adjacent Bent Mountain project and with the Basic Geometric Design Standards (Exhibit 66-03-06).



VALUE ENGINEERING PROPOSAL

13. Space is provided for bus stops.
14. Improved lateral placement of vehicles and space for occasional encroachment of vehicles is provided.

For further information on other uses of shoulders, refer to *NCHRP 254* (3).

Urban highways generally have curbs along the outer lanes. A stalled vehicle during peak hours disturbs traffic flow in all lanes in that direction when the outer lane serves through traffic. Where on-street parking is permitted, the parking lane provides some of the same services listed above for shoulders. Parking lanes are discussed further in the section "On-street Parking."

Width of Shoulders

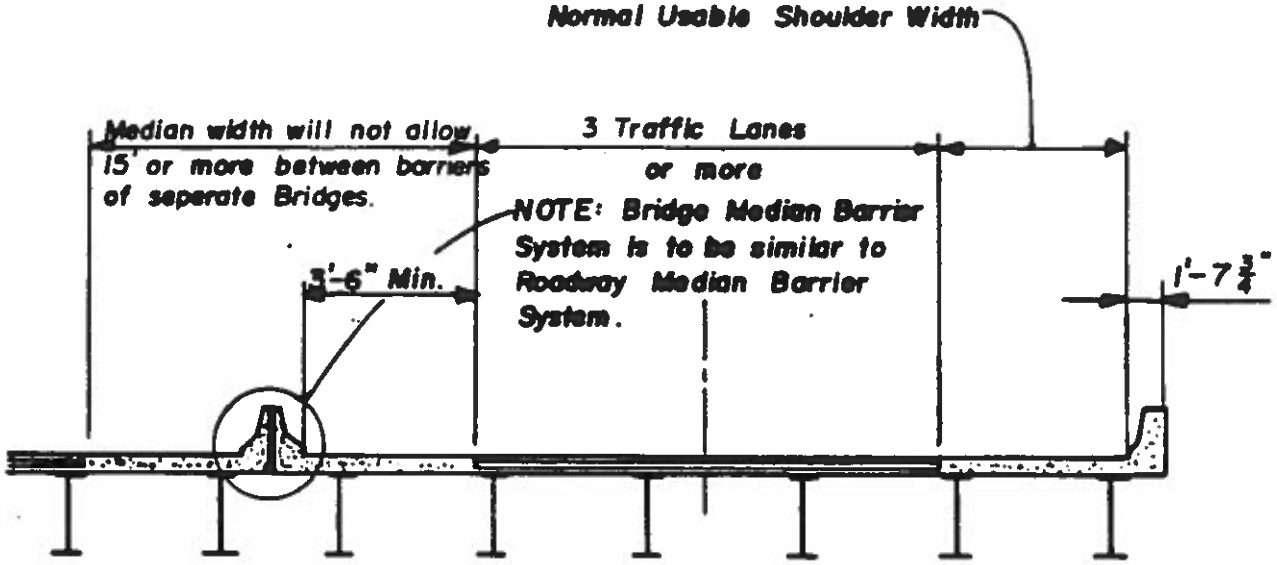
Desirably, a vehicle stopped on the shoulder should clear the pavement edge by at least 0.3 m, preferably by 0.6 m. This preference has led to the adoption of 3.0 m as the normal shoulder width that should be provided along high-type facilities. In difficult terrain and on low-volume highways, shoulders of this width may not be feasible. A minimum shoulder width of 0.6 m should be considered for the lowest-type highway, and a 1.8 to 2.4 m width would be preferable. Heavily traveled and high-speed highways and those carrying large numbers of trucks should have usable shoulders at least 3.0 m and preferably 3.6 m wide; however, widths greater than 3.0 m may encourage unauthorized use as a travel lane. Where bicyclists are to be accommodated, a minimum shoulder width of 1.2 m should be utilized. Shoulder widths for specific classes of highways are enumerated as parts of the total cross sections discussed in following chapters.

Where roadside barriers, walls, or other vertical elements are used, it is desirable to have a graded shoulder wide enough that these vertical elements can be offset a minimum of 0.6 m from the outer edge of the usable shoulder. It may be necessary to provide a graded shoulder wider than used elsewhere to provide lateral support for guardrail posts and/or clear space for lateral dynamic deflection required by the particular barrier in use. On low-volume roads, roadside barriers may be placed at the outer edge of the shoulder; however, a minimum of 1.2 m should be provided from the traveled way to the barrier.

Although it is desirable that a shoulder be wide enough for a vehicle to be driven completely off the traveled way, narrower shoulders are better than none at all. When a vehicle making an emergency stop can drive onto the shoulder to occupy only 0.3 to 1.2 m of a traveled way of adequate width, the remaining traveled way width can be used by passing vehicles. Partial shoulders are

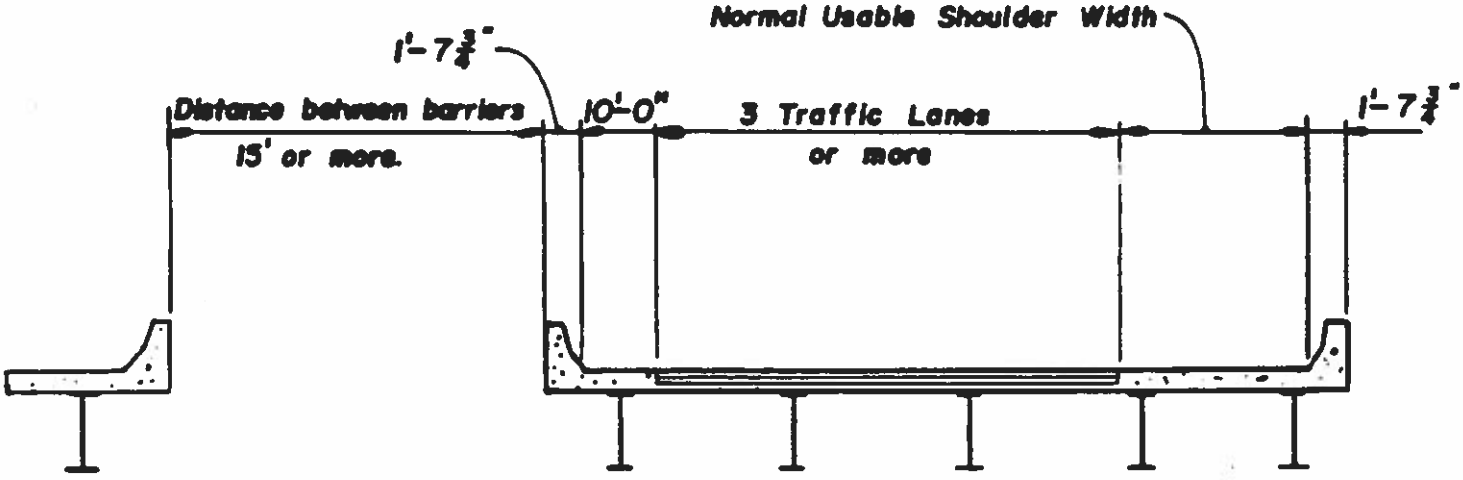
Commonwealth of Kentucky
Transportation Cabinet
Design Manual

BASIC GEOMETRIC DESIGN STANDARDS - FREEWAYS
OVERPASS DESIGN



MULTI-LANE BRIDGES

OTHER THAN URBAN-MANDATORY
URBAN-DESIRABLE



DUAL MULTI-LANE BRIDGES

OTHER THAN URBAN-MANDATORY
URBAN-DESIRABLE

NOTE:
On freeways exception is to be made for major long-span structures which warrant independent analyses for bridge-width determination.

STRUCTURES
COST COMPARISON

V.E. Alternative No. 1
Revising Bridge Typical (Exterior Shoulder 3.6 vs. 3.0)

DESCRIPTION	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Burning Fork Conc.	$3.50/CY			93.2 CY	$ 32,620
Burning Fork Steel	$ .55/LB			22,600 LB	$ 12,430
Racoon Creek Conc.	$3.50/CY			160 CY	$ 56,000
Racoon Creek Steel	$ .55/LB			38,880 LB	$ 21,380
Johns Creek Conc.	$3.50/CY			154 CY	$ 53,900
Johns Creek Steel	$ .55/LB			37,400 LB	$ 20,600
Bent Mountain Conc.	$3.50/CY			44.6 CY	$ 15,610
Bent Mountain Steel	$ .55/LB			10,800 LB	$ 5,940
TOTAL					$218,480

Possible Savings $ 218,480

VI.(c) U.S. 119 AT BURNING FORK APPROACH

VI.(c)(1) AS PROPOSED

BURNING FORK

"AS PROPOSED"

The proposed plan provides an off ramp (ramp D) from West to North for old U.S. 119. There is also a West to West ramp (ramp E) for Burning Fork Road South.

AS PROPOSED
(1 of 2)

AS PROPOSED

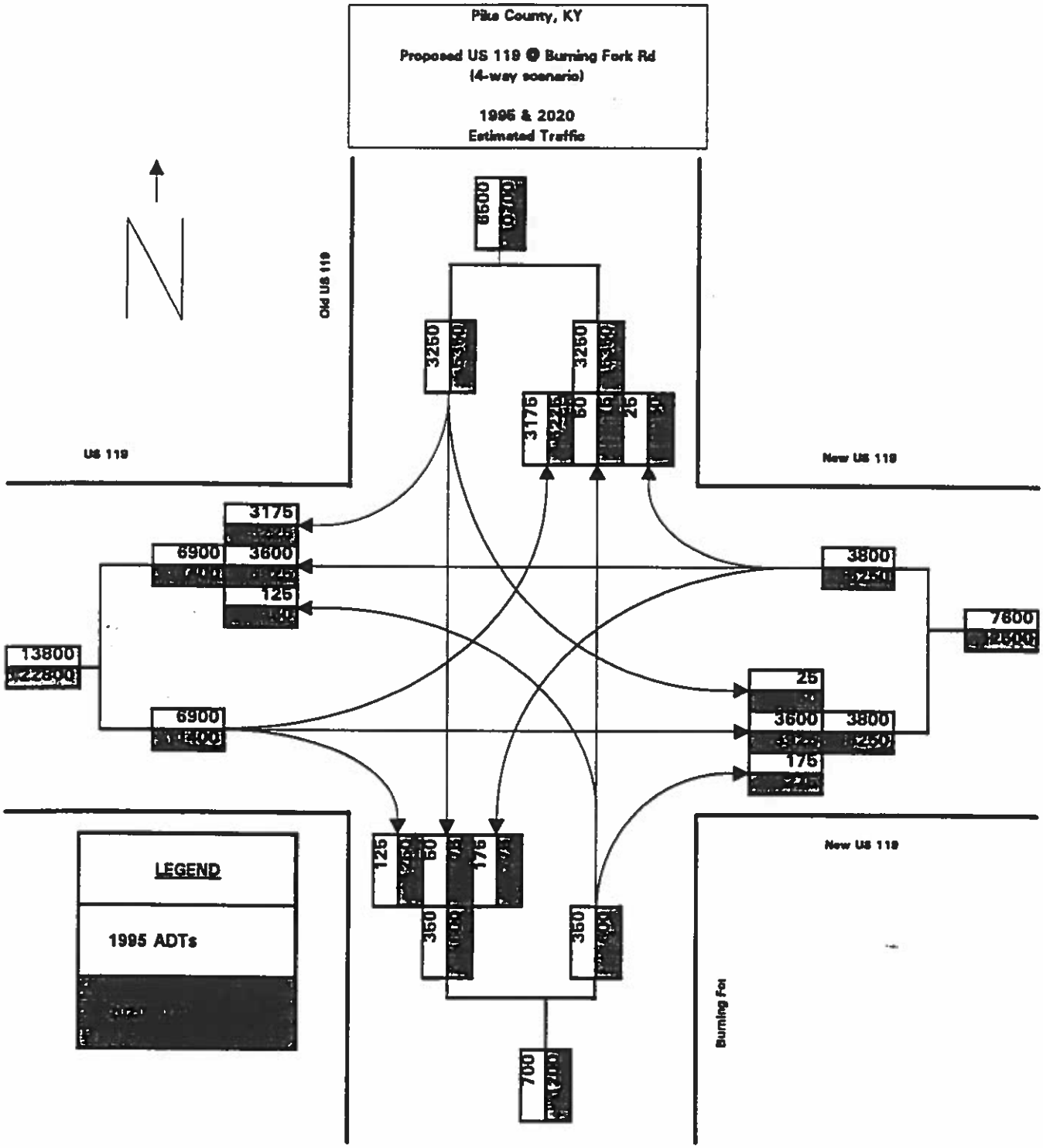
AS PROPOSED
(2 of 2)

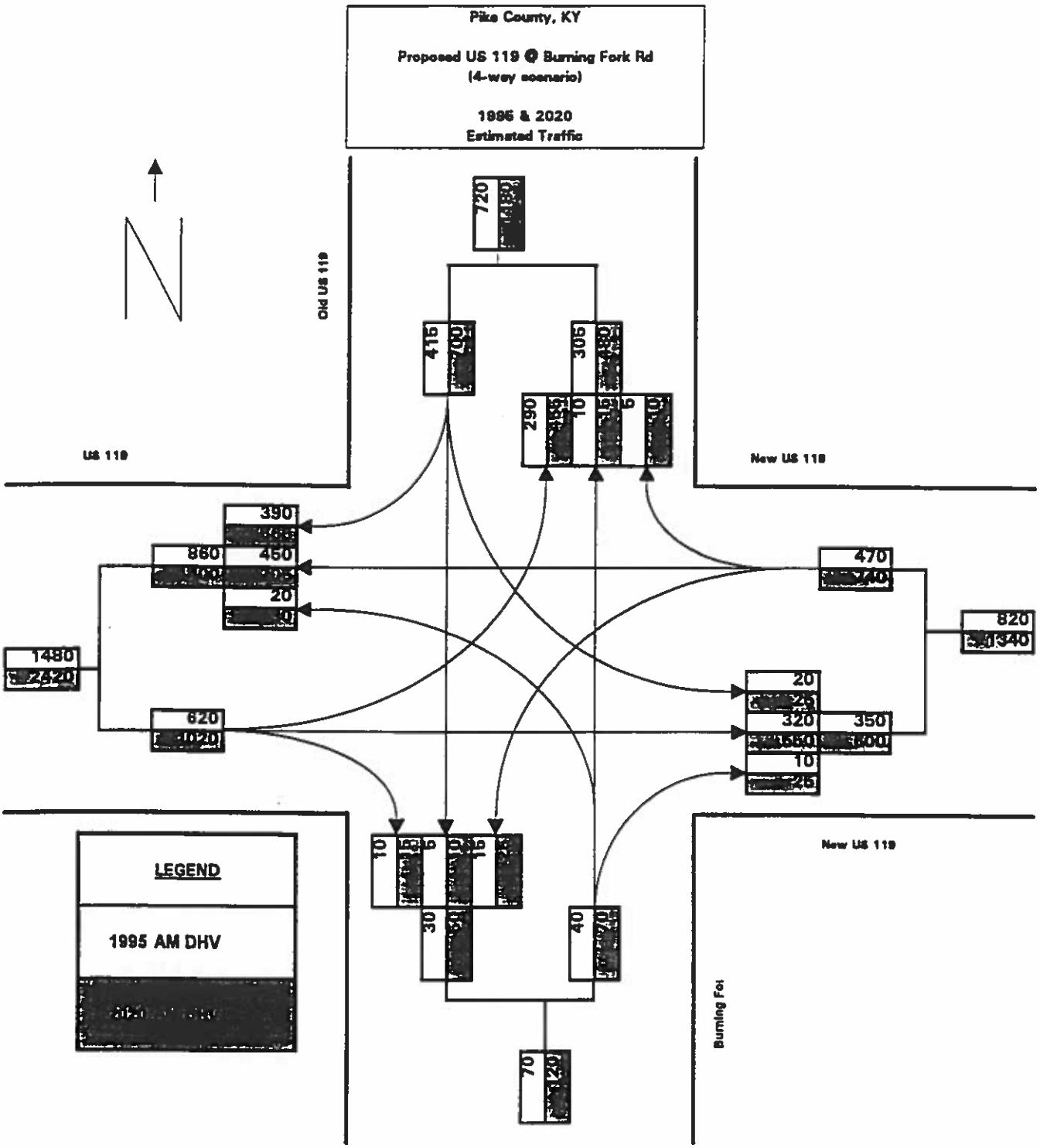
Δc = 243.305
Ts = 180.014
Ls = 56.000
θs = 02°17'30.592"LT.
LT = 37.336
ST = 18.670
X = 55.991
Y = 0.747
Es = 16.498
Se = 6.3%
T.S. = 500+803.355
S.C. = 500+859.355
C.S. = 500+102.660
S.T. = 500+158.660

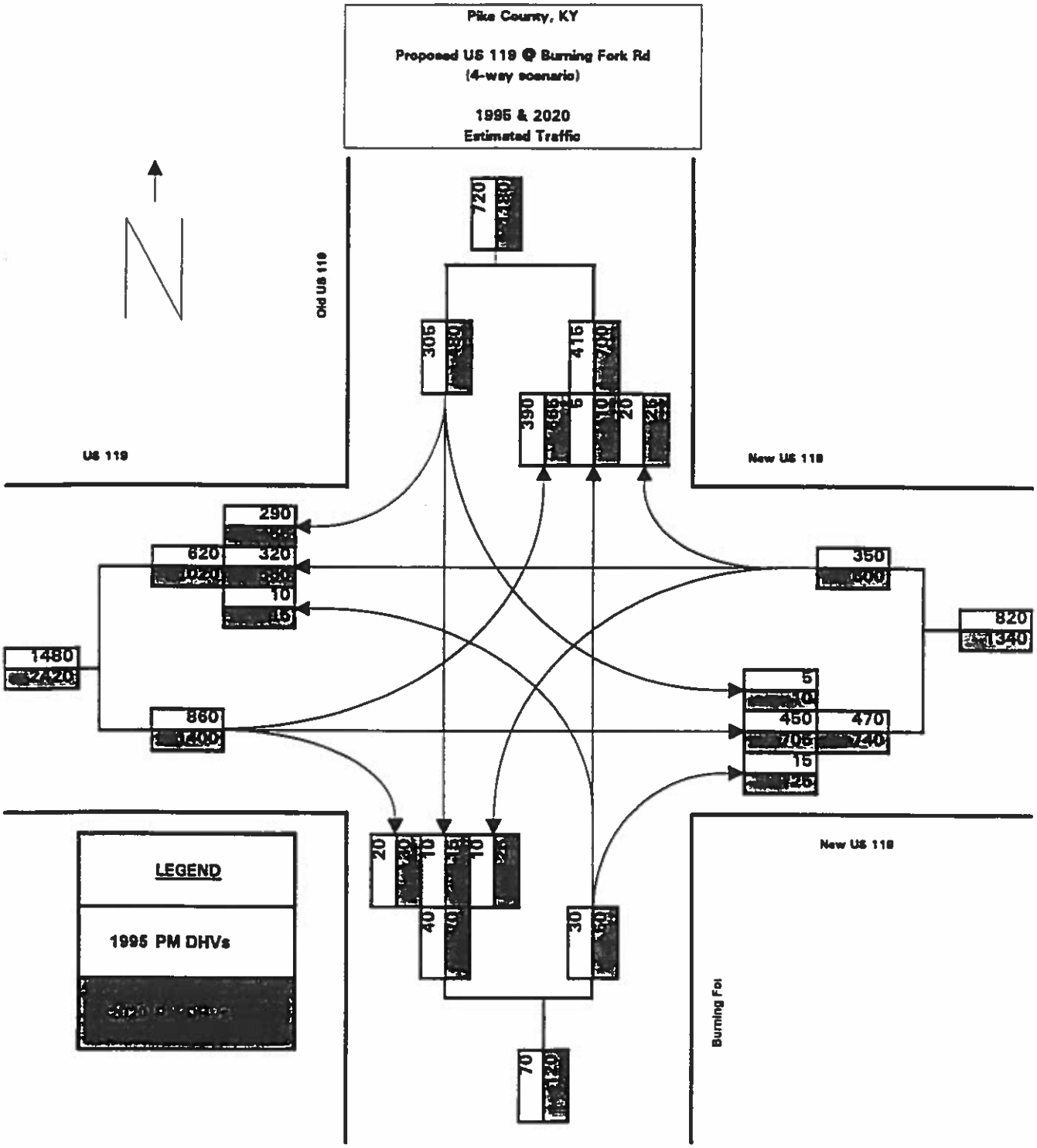
Se = 3.4%
T.S. = 501+342.430
S.C. = 501+398.430
C.S. = 501+653.037
S.T. = 501+709.037

STA. 40+288.977
MATCHLINE
P.T. STA. 40+535.891 RAMP D=
END RAMP A STA. 50+409.382
R.T. STA. 40+535.891 RAMP D=
END RAMP A STA. 50+409.382
P.C. STA. 40+764.540
P.I. STA. 40+850.387
P.I. STA. 40+934.576
C.S. STA. 501+653.037
S.T. STA. 501+709.037
P.T. STA. 41+194.656
END RAMP E
C.S. STA. 501+102.660
S.T. STA. 501+158.660
S.C. STA. 501+342.430
S.C. STA. 501+398.430

AS PROPOSED


Pike County, KY
Proposed US 119 @ Burning Fork Rd
(4-way scenario)
1995 & 2020
Estimated Traffic
Old US 119
US 119
New US 119
New US 119
Burning For
LEGEND
1995 ADTs
3250
3250
3175
60
25
3175
6900
3600
125
13800
6900
3800
7600
25
3600
3800
175
125
60
175
350
350
700


Pike County, KY
Proposed US 119 @ Burning Fork Rd
(4-way scenario)
1995 & 2020
Estimated Traffic
Old US 119
US 119
New US 119
New US 119
Burning Fo
720
415
305
290
390
860
450
20
470
820
1480
620
20
320
350
10
10
30
40
70
LEGEND
1995 AM DHV


Pike County, KY
Proposed US 119 @ Burning Fork Rd
(4-way scenario)
1995 & 2020
Estimated Traffic
Old US 119
US 119
New US 119
New US 119
720
305
415
390
290
620
320
10
15
350
820
1480
860
5
450
470
15
20
10
10
40
30
70
LEGEND
1995 PM DHVs

VI.(c)(2) V.E. ALTERNATIVES

BURNING FORK

V.E. ALTERNATIVE NO. 1

The V.E. team recommends that Ramp D be eliminated from station 40 + 000 to 40 + 535. Ramp E will be moved southerly toward the mainline and will intersect Ramp C at a more westerly location and closely (southerly) toward the mainline. Access north and south to old U.S. 119 (Burning Fork Road) is provided for west bound traffic along Ramp E. This eliminates more than 400M of ramp through a cut, reduces right of way requirements and waste.

VALUE ANALYSIS
ALTERNATIVE

PINEHILLS

VE ALT. (1 of 2)

Lc = 243.305
Ts = 180.014
Ls = 56.000
θs = 02°17'30.592"LT.
LT = 37.336
ST = 18.670
X = 55.991
Y = 0.747
Es = 16.498
Se = 6.3%
T.S. = 500+803.355
S.C. = 500+859.355
C.S. = 500+102.660
S.T. = 500+158.660

Se = 3.4%
T.S. = 501+342.430
S.C. = 501+398.430
C.S. = 501+653.037
S.T. = 501+709.037

V.E. ALT.
(2 of 2)

MATCH LINE

STA. 40+288.95

R.T. STA. 40+535.891 RAMP D=
END RAMP E STA. 50+409.382

P.C. STA. 40+764.540
P.I. STA. 40+850.387
P.T. STA. 40+934.576

C.S. STA. 501+102.660
S.T. STA. 501+158.660
S.C. STA. 501+342.430
S.C. STA. 501+398.430
C.S. STA. 501+653.037
S.T. STA. 501+709.037

END RAMP E
STA. 41+134.656

VALUE ANALYSIS
ALTERNATIVE

COST SAVINGS

V.E. Alternative No. 1
Burning Fork

DESCRIPTION	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Right of Way	$30,985/Ac.			(RED.) 19.4 Ac	(SAVINGS) $ 601,103
Pavement	$110/m^2			2,894m^2	$ 318,368
Excavation	$2.61/m^3			1,367,550	$3,569,306
TOTAL					$4,488,777

Possible Savings $4,488,777

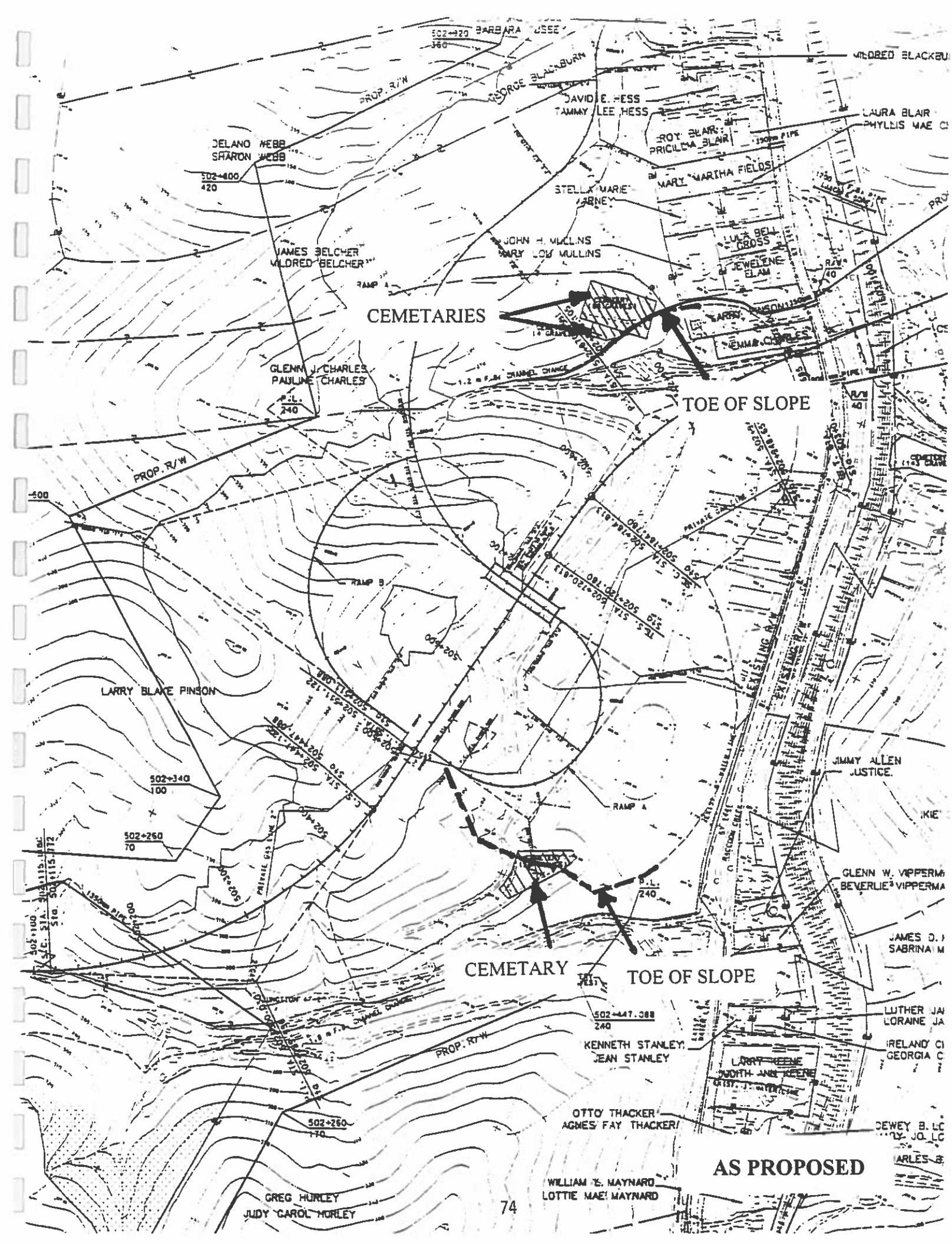
VI.(d) RACCOON CREEK APPROACH

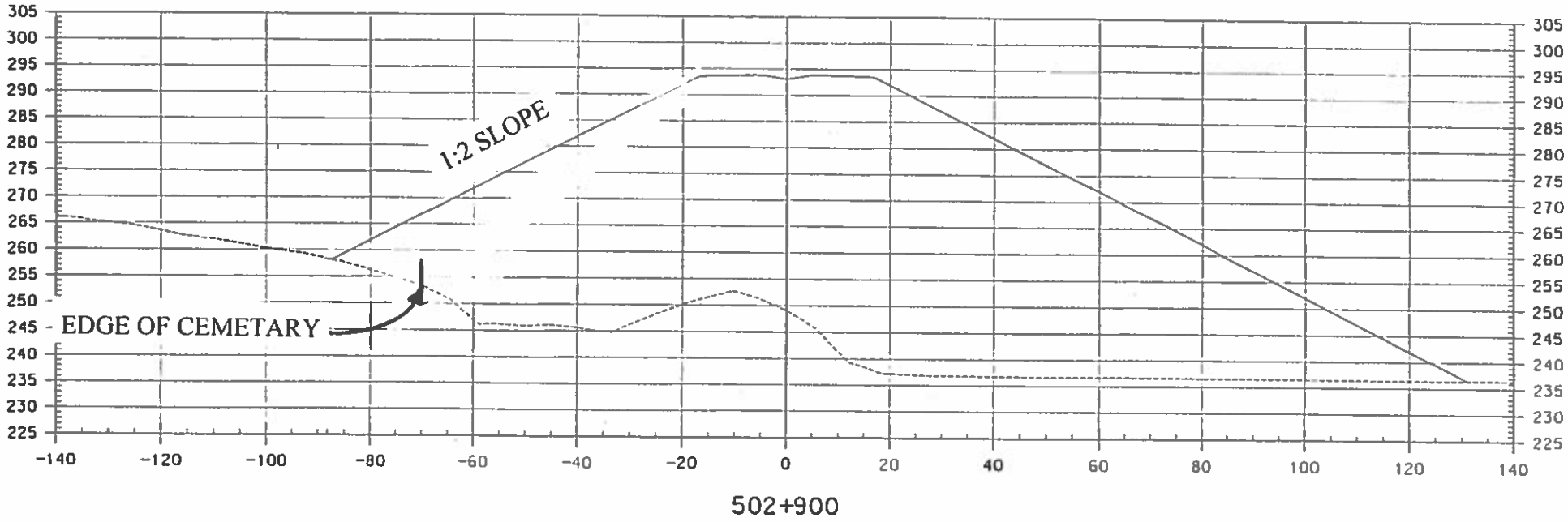
VI.(d)(1) AS PROPOSED

GRAVE REMOVAL

"AS PROPOSED"

The construction of fills for the proposed alignment and Ramp A at Raccoon Creek will force the relocation of three cemeteries. The cemetery right of station 502 + 500 contains 56 graves. The two cemeteries left of station 502 + 900 contain 4 and 68 graves respectively.


CEMETARIES
TOE OF SLOPE
CEMETARY
TOE OF SLOPE
AS PROPOSED
PROP. R/W
RAMP A
RAMP B
GLENN J. CHARLES
PAULINE CHARLES
LARRY BLAKE PINSON
JAMES BELCHER
MILDRED BELCHER
DELANO WEBB
SHARON WEBB
DAVID E. HESS
TAMMY LEE HESS
ROY BLAIR
PRICILLA BLAIR
MARY MARTHA FIELDS
STELLA MARIE ARNEY
JOHN H. MULLINS
MARY LOU MULLINS
LULA BELL GROSS
JEWELENE ELAM
EMMA CHARLES
JIMMY ALLEN JUSTICE
GLENN W. VIPPERMA
BEVERLIE VIPPERMA
KENNETH STANLEY
JEAN STANLEY
LARRY KEENE
JUDITH ANN KEENE
OTTO THACKER
AGNES FAY THACKER
WILLIAM S. MAYNARD
LOTTIE MAE MAYNARD
GREG HURLEY
JUDY CAROL HURLEY
LUTHER JA
LORAINE JA
IRELAND
GEORGIA
DEWEY B. LC
JO LC
ARLES
JAMES D.
SABRINA M
P.I. 240
P.I. 240
502+340
100
502+260
70
502+260
70
502+420
360
502+400
420
502+447.088
240
500


1:2 SLOPE
EDGE OF CEMETARY
305
300
295
290
285
280
275
270
265
260
255
250
245
240
235
230
225
-140
-120
-100
-80
-60
-40
-20
0
20
40
60
80
100
120
140
502+900

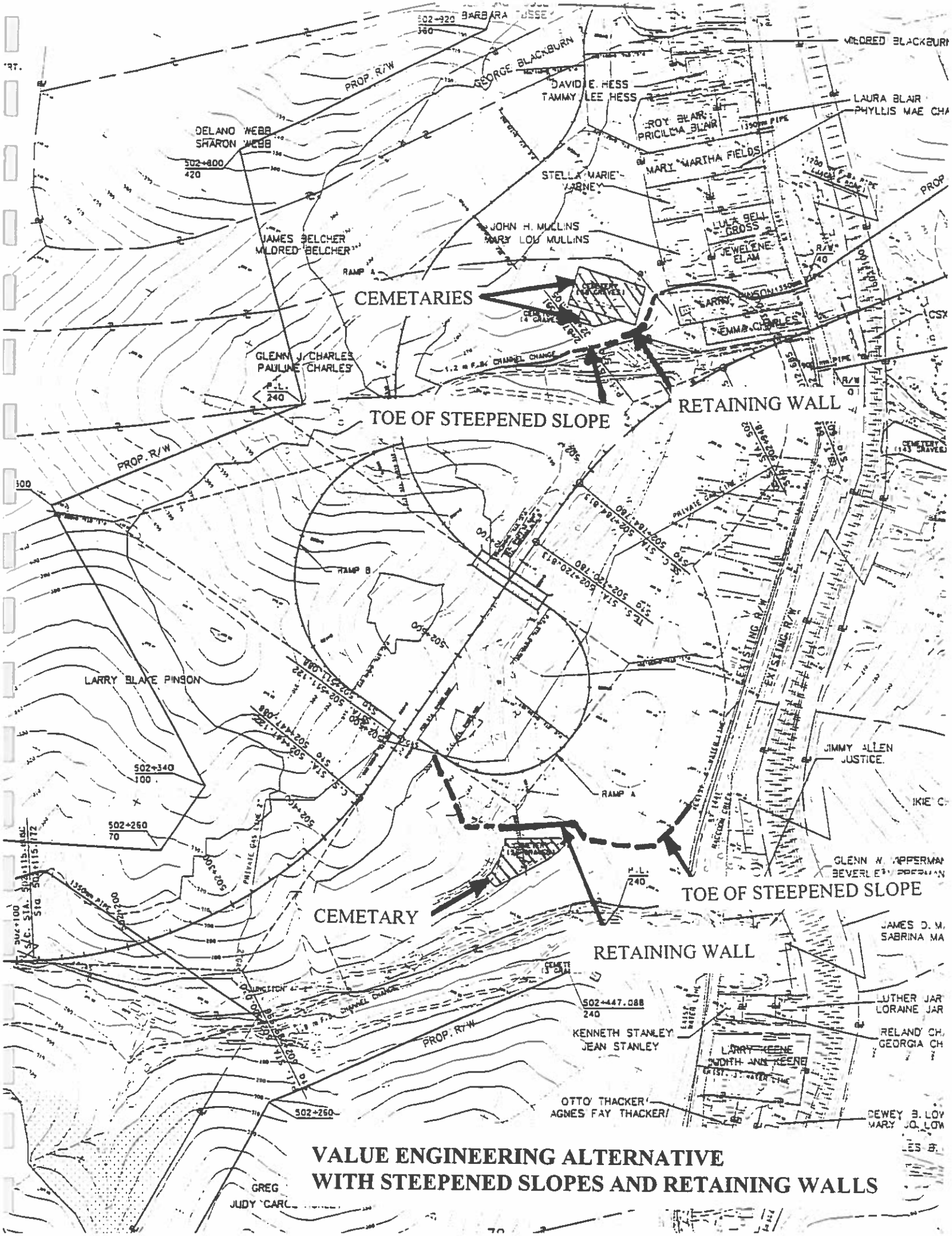
AS PROPOSED

VI.(d)(2) V.E. ALTERNATIVES

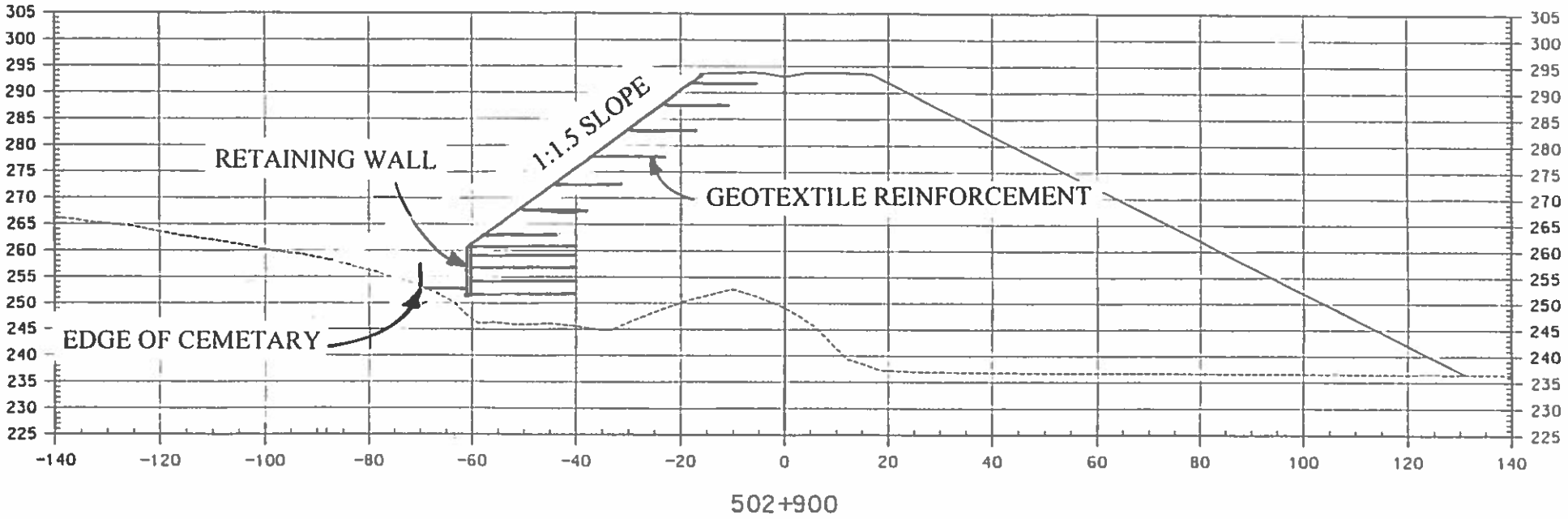
GRAVE REMOVAL

V.E. ALTERNATIVE NO. 1 - Use Retaining Walls & Steepened Slopes

This alternative uses MSE walls and 1:1.5 slopes reinforced with geotextile to reduce the footprint of the fill and avoid grave relocation.

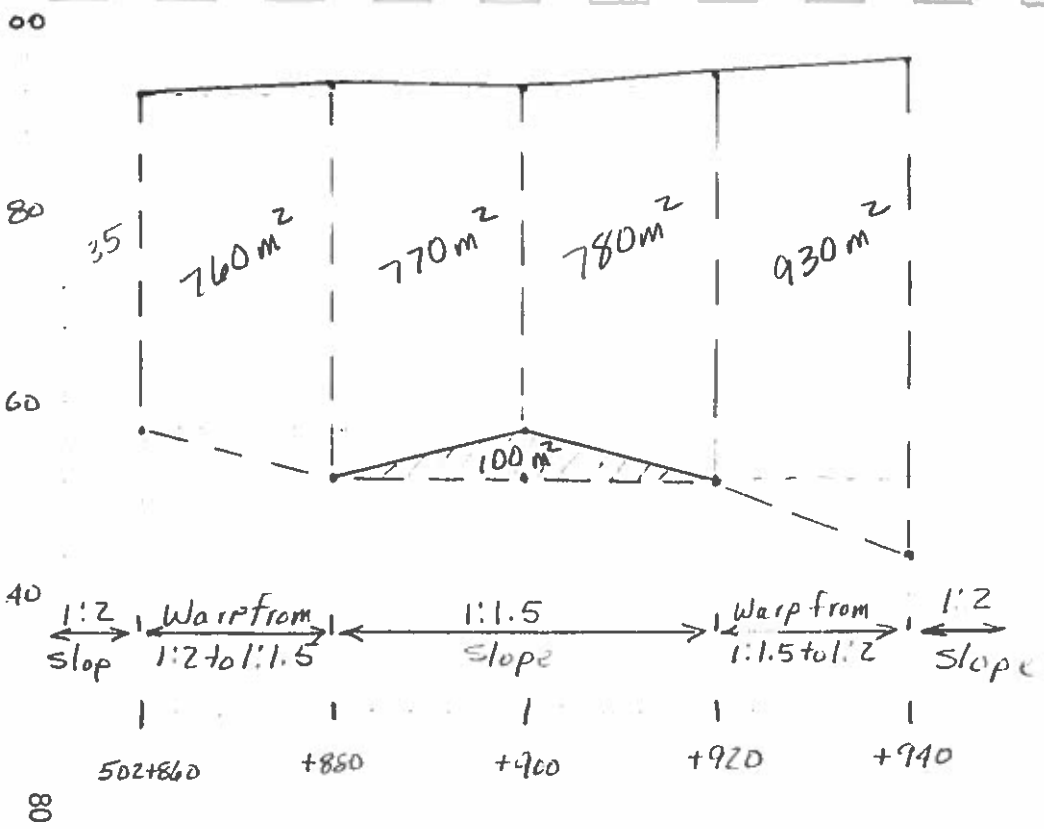


VALUE ENGINEERING ALTERNATIVE
WITH STEEPENED SLOPES AND RETAINING WALLS



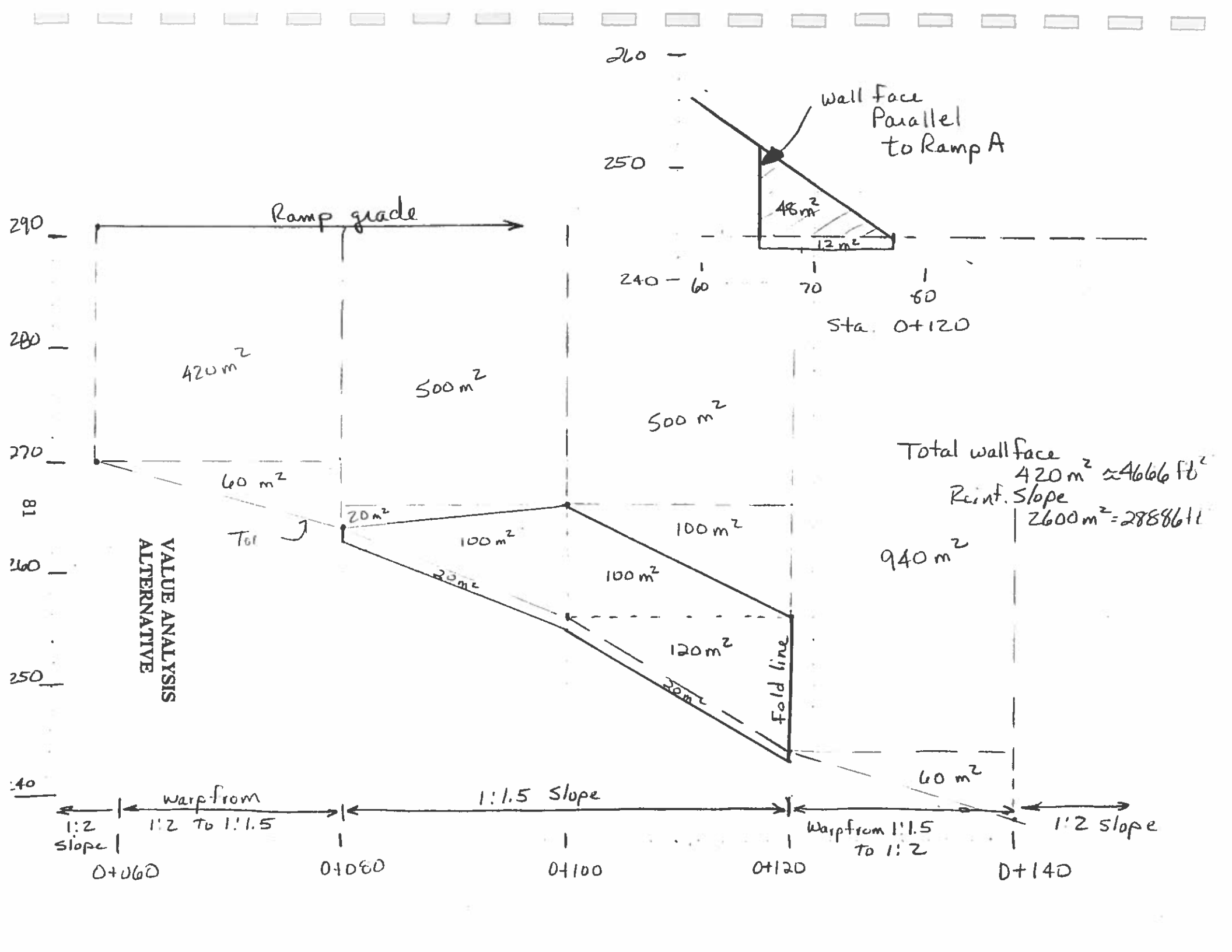
VALUE ENGINEERING ALTERNATIVE
WITH STEEPENED SLOPES AND RETAINING WALLS

Cemetaries Lt. Sta. 502+700



3240 m^2 = Reinf. Slope ≈ 35996 ft^2
100 m^2 = Wall ≈ 1111 ft^2

VALUE ANALYSIS ALTERNATIVE


260
250
240
Wall face
Parallel
to Ramp A
48m²
12m²
60
70
60
Sta. 0+120
290
280
270
260
250
240
Ramp grade
420m²
500m²
500m²
60 m²
20m²
100m²
100m²
20m²
120m²
20m²
60 m²
Total wall face
420m² ≈ 4666 ft²
Reinf. Slope
2600m² = 28886 ft²
940 m²
Fold line
VALUE ANALYSIS
ALTERNATIVE
1:2
slope
warp from
1:2 To 1:1.5
1:1.5 Slope
Warp from 1:1.5
To 1:2
1:2 slope
0+060
0+080
0+100
0+120
0+140

COST COMPARISON

Cemetery Relocation vs. Ret. Walls & Steepened Slopes ($1:1^{1/2}$)

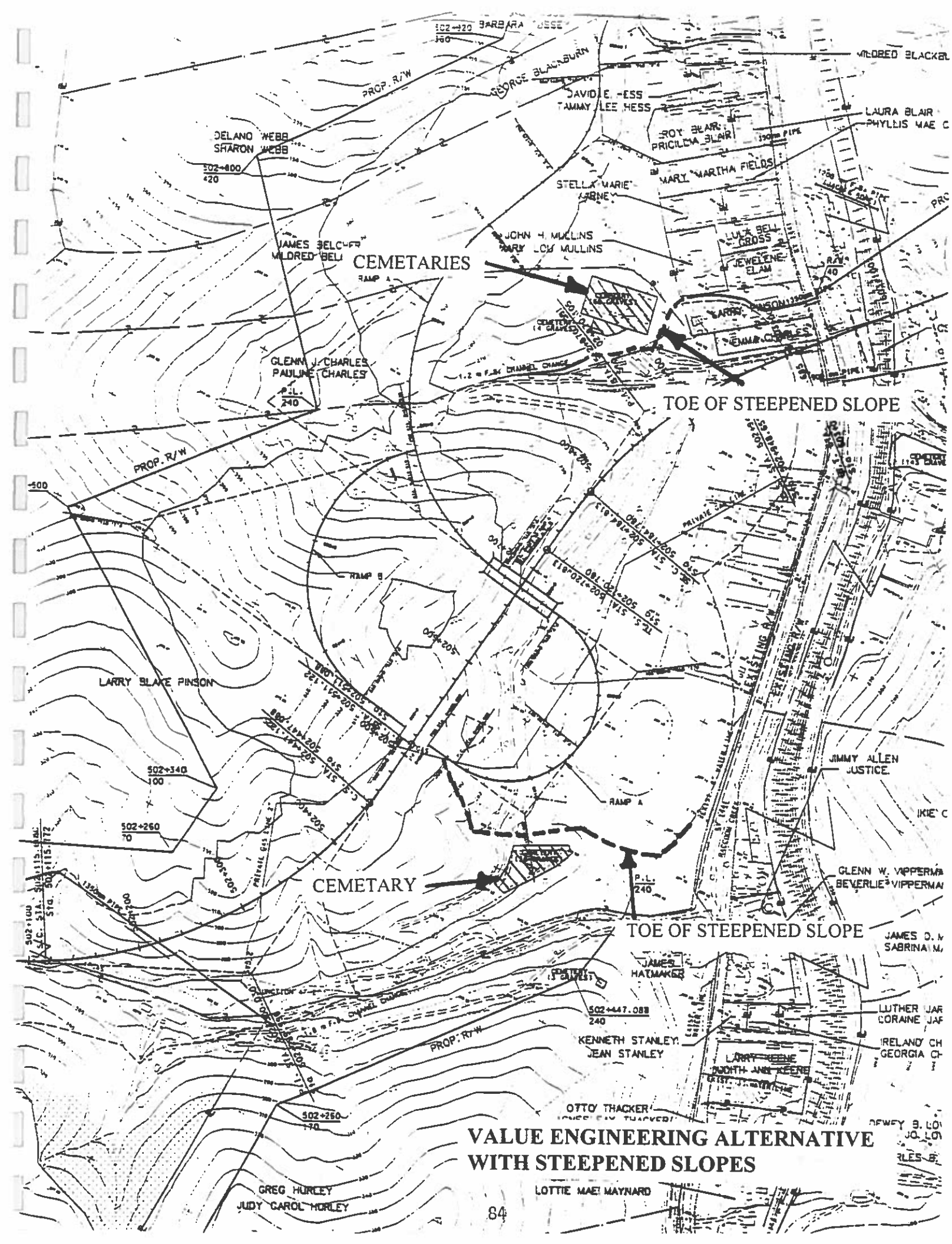
DESCRIPTION	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Grave Relocation	$3,000/Grave	128	$384,000		
Reinforced Steepened Slope	$375/$m^2$			2600m^2	$ 975,000
Reinforced Steepened Slope	$375/$m^2$			3240m^2	$1,218,000
MSE Retaining Walls	$430/$m^2$			420m^2	$ 180,600
MSE Retaining Walls	$430/$m^2$			100m^2	$ 43,000
TOTAL			$384,000		$2,413,600
Conversion Factor 10.76 SF = 1m^2					

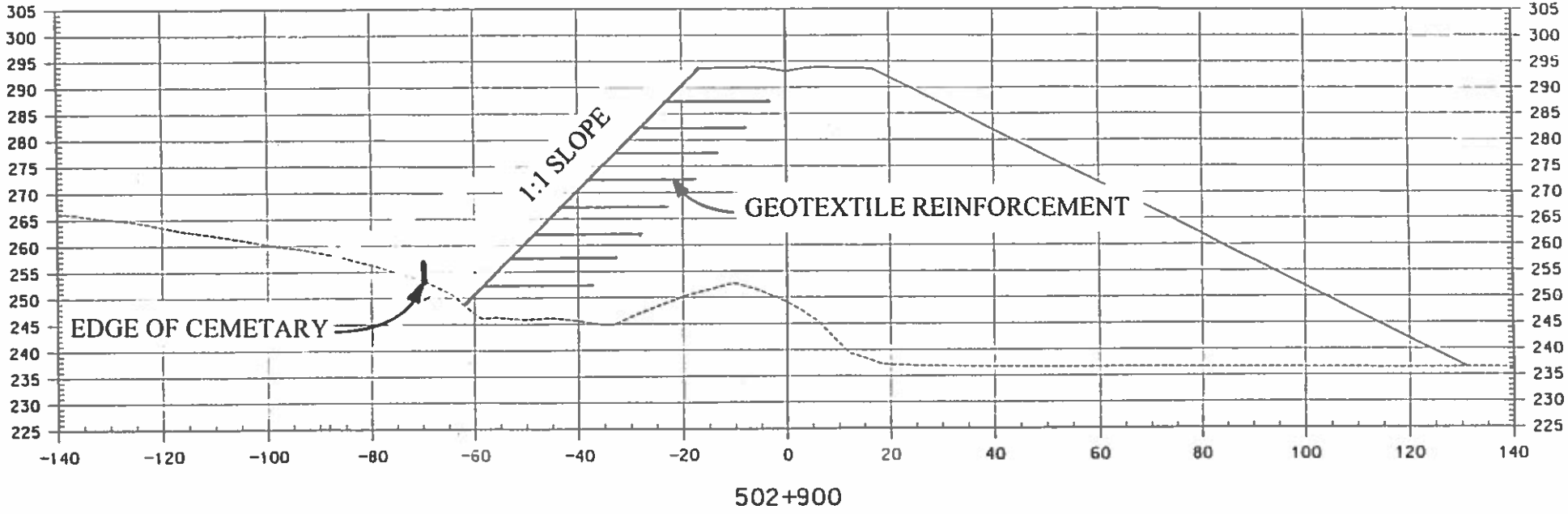
Possible Additional Cost $ 2,029,600

GRAVE REMOVAL

V.E. ALTERNATIVE NO. 2 - Steepened Slopes

This alternative uses 1:1 slopes reinforced with geotextile to reduce the footprint of the fill and avoid grave relocation.


CEMETARIES
TOE OF STEEPENED SLOPE
CEMETARY
TOE OF STEEPENED SLOPE
VALUE ENGINEERING ALTERNATIVE
WITH STEEPENED SLOPES
PROP. R/W
RAMP A
RAMP B
LARRY BLAKE PINSON
JIMMY ALLEN JUSTICE
GLENN W. VIPPERMAN
BEVERLIE VIPPERMAN
KENNETH STANLEY
JEAN STANLEY
GREG HURLEY
JUDY CAROL HURLEY
LOTTIE MAE MAYNARD
OTTO THACKER
JAMES HATMAKER
DELANO WEBB
SHARON WEBB
JAMES BELCHER
MILDRED BELL
GLENN J. CHARLES
PAULINE CHARLES
JOHN H. MULLINS
MARY LOU MULLINS
STELLA MARIE ARNEY
MARY MARTHA FIELDS
LULA BELL GROSS
JEWELENE ELAM
LARRY PINSON
EMMA CHARLES
DAVID E. HESS
TAMMY LEE HESS
ROY BLAIR
PRICILLA BLAIR
LAURA BLAIR
PHYLLIS MAE
MILDRED BLACKBU
GEORGE BLACKBURN
BARBARA JESSE
LUTHER JAR
CORAINE JAR
IRELAND CH
GEORGIA CH
JAMES D. M
SABRINA M
IKIE C
DEWEY B. LO
JO LO
RLES B
502+420
360
502+400
420
502+340
100
502+260
70
502+447.088
240
P.I.
240
EXISTING R/W
PRIVATE
1350mm PIPE



VALUE ENGINEERING ALTERNATIVE
WITH STEEPENED SLOPES

COST COMPARISON

Cemetery Relocation vs. Steepened Slopes (1:1)

DESCRIPTION	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Grave Relocation	$3,000/Grave	128	$384,000		
Reinforced Steepened Slope	$460/m^2			3020m^2	$1,389,200
Reinforced Steepened Slope	$460/m^2			3340m^2	$1,536,400
TOTAL			$384,000		$2,925,600

Possible Additional Cost $ 2,541,600

VI.(e) WINN BRANCH APPROACH

VI.(e)(1) AS PROPOSED

WINN BRANCH
(505 + 300)

"AS PROPOSED"

The mainline alignment intersects Winn Branch Road at Mainline Station 505 + 300 (±). The as proposed solution is to cut off Winn Branch road on both side of the embankment. Those residences north of the mainline maintain their existing access to the North to old U.S. 119. They would have no direct access to neighbors south of the mainline. Residents south of the mainline would have access to the mainline only by way of a new access road that would intersect the mainline at station 505 + 575. The mainline intersection would be at grade and would allow south to west turns across the median. This would be contrary to a project design criteria that stated there should be no median crossings. This intersection would be the only exception on the entire project.

WINN BRANCH AS PROPOSED

AT GRADE INTERSECTION

Route 119

Mainline

AS PROPOSED

VI.(e)(2) V.E. ALTERNATIVES

WINN BRANCH

V.E. ALTERNATIVE NO. 1

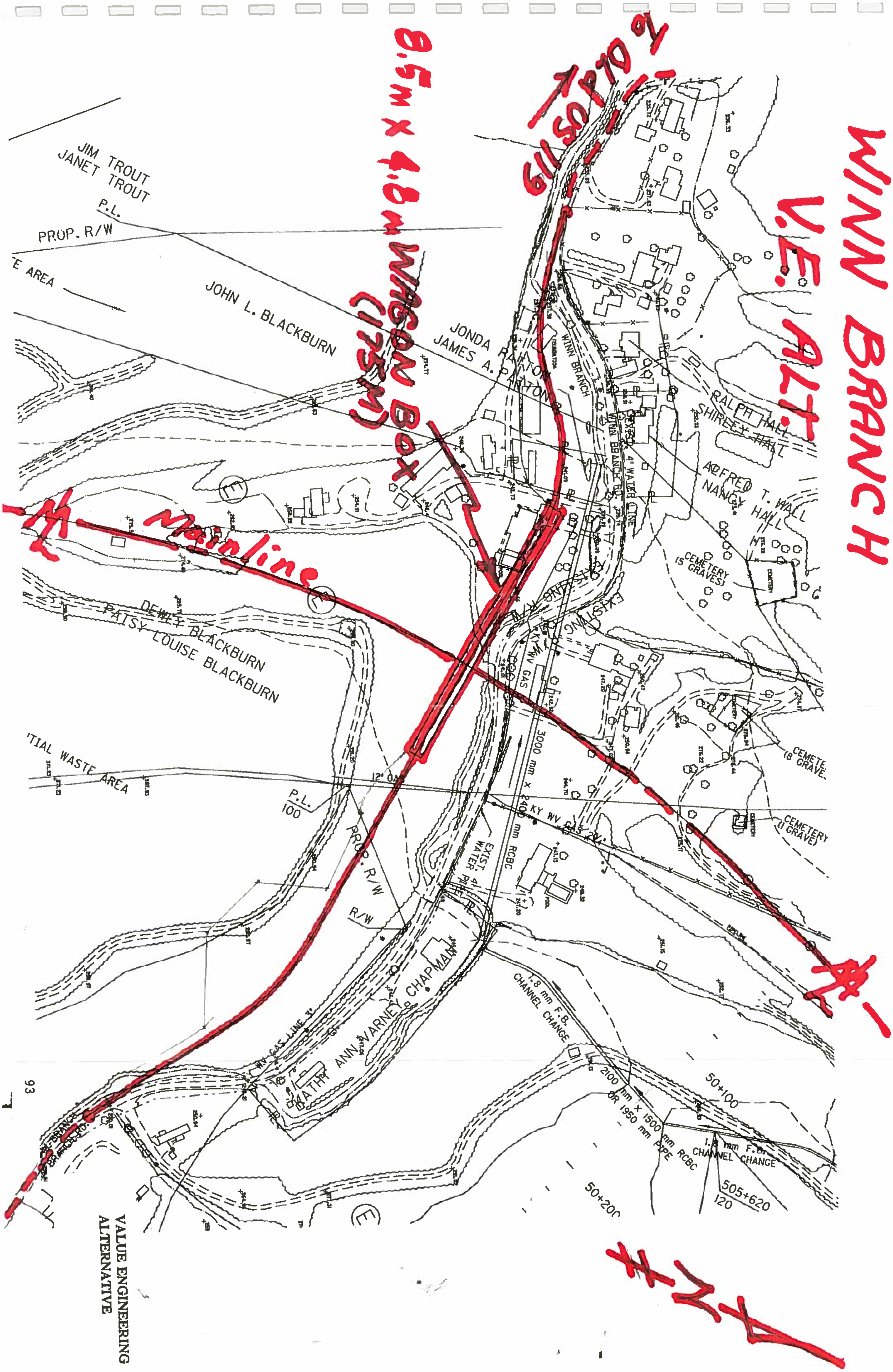
The V.E. alternative provides no access to the mainline but does maintain existing access to old U.S. 119 for all residences on Winn Branch Road. The V.E. alternative eliminates the proposed access road and the at grade intersection on the mainline and utilizes a 8.5m x 4.8m Wagon Box through the embankment at station 505 + 300. The primary advantages her would be:

1. **Maintaining neighborhood integrity.**
2. **Equal access for <u>all</u> Winn Branch Rd. residences.**
3. **Elimination of at grade intersection and resultant median crossing.**

The primary disadvantages would be:

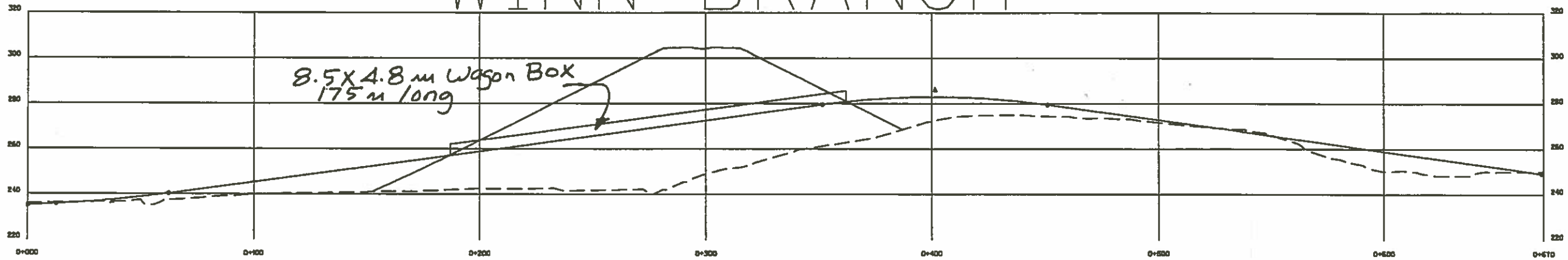
1. **Increased cost.**
   As proposed = $2.898 (2.124 + *775 R/W)
   V.E. Alternative = $4.714
2. **No direct access to new facility.**

* **R/W = 25 Acres @ $30,985/Acre**



VALUE ENGINEERING ALTERNATIVE

WINN BRANCH



VE ALT.
PROFILE

COST COMPARISON

Winn Branch

DESCRIPTION	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Access Road			$2,123,375	0	0
Wagon Box		0	0		$4,714,000
Right of Way	30,985 Ac	25	$ 774,625	0	0
TOTAL			$2,898,000		$4,714,000

Possible Additional Cost $ 1,816,000

VII. SUMMARY OF RECOMMENDATIONS

SUMMARY OF RECOMMENDATIONS

It is the recommendation of the Value Engineering Team that the following Value Engineering Alternatives be carried into the Project Development process for further development.

EXCAVATION

Recommendation No. 1

The Value Engineering Team recommends that Value Engineering Alternative No. 2 be implemented. This alternative is to flatten the fill slopes in areas with long fills to a 1:6 slope, reducing the amount of waste material.

If this recommendation can be implemented, there is a potential savings of $91,476.

Recommendation No. 2

The Value Engineering Team recommends that Value Engineering Alternative No. 3 be implemented. This alternative is to revise the alignment between stations 505+800 and 507+300.

If this recommendation can be implemented, there is a potential savings of $5,520,554.

STRUCTURES

Recommendation No. 3

The Value Engineering Team recommends that Value Engineering Alternative No. 1 be implemented. This alternative is to reduce the bridge shoulder widths to 3.0m (10 feet).

If this recommendation can be implemented, there is a potential savings of $218,480.

US 119 AT BURNING FORK

Recommendation No. 4

The Value Engineering Team recommends that Value Engineering Alternative No. 1 be implemented. This alternative is to revise the design of the US 119 at Burning Fork Road interchange.

If this recommendation can be implemented, there is a potential savings of $4,488,777.

WINN BRANCH APPROACH

Recommendation No. 5

The Value Engineering Team recommends that Value Engineering Alternative No. 1 be implemented. This alternative is to eliminate the proposed at-grade intersection and construct a wagon box along Winn Branch Road.

If this recommendation can be implemented, there is an additional cost of $1,816,000.

If all these recommendations are implemented, there is a potential total savings of approximately $8,503,287.

US 119/ZEBULON TO BENT MOUNTAIN
V.E. STUDY PRESENTATION
January 14, 1997

NAME	AFFILIATION	PHONE
Jack Trickey	Ventry Engineering	904/627-3900
Ron Whichel	Ventry Engineering	904/627-3900
Dallas Gray	Ventry Engineering	904/627-3900
Daryl Greer	KTC Co. Hwy. Design	502/564-3280
Ken Sperry	KTC Co. Design	502/564-3280
Don Keenan	Ventry Engineering	904/627-3900
David Lindeman	Palmer Engineering	606/744-1218
Randy Stephens	Palmer Engineering	606/744-1218
John Sacksteder	KTC - Design	502/564-3280
Bill Hornbeck	KTC - Bridge Design	502/564-4560
Joette Fields	KTC - Design	502-564-3280
Charles Briggs	Div. Operations	506/564-4556
Keith R. Damron	Dist. Design Engineer	606/433-7791

VIII. APPENDICES

CONSTRUCTION COST ESTIMATE
ALTERNATE B
CONSTRUCTION SECTION 1
STA. 500+000 - 503+480

LENGTH = (3480m) (3.48 km) -- (11417 FT.) (2.163 mi.)

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
EXCAVATION	5,080,749	CU. METER	$2.61	$13,260,755
SITUATION SIZE CROSS DRAINS	LS	LS	LS	$181,991
MEDIAN CROSS DRAINS	LS	LS	LS	$144,000
MEDIAN BOXS	50	EACH	$2,300.00	$115,000
PERFORATED PIPE UNDERDRAIN 4"	57,085	LIN. FT.	$5.00	$285,425
CHANNEL CHANGE		CU.YD.	$2.01	$0
CHANNEL LINING CLASS 4	6,920	TON	$3.58	$24,774
CLEARING AND GRUBBING		ACRES	$1,200.00	$0
SILT CHECKS	30	EA.	$48.47	$1,454
GUARDRAIL	5,000	LIN.FT.	$8.47	$42,350
END TREATMENTS	20	EA.	$500.00	$10,000
STAKING	2.163	MILE	$45,000.00	$97,335
RW FENCE	22,400	LIN.FT.	$3.08	$68,992
MAINTAIN AND CONTROL TRAFFIC	1	LUMP	$150,000.00	$150,000
WATER	2,000	MGAL	$2.49	$4,980
4" DGA	23,042	TON	$12.00	$276,504
6" DRAINAGE BLANKET	28,699	TON	$21.00	$602,679
10" BASE	42,738	TON	$25.37	$1,084,283
1.5" BITUMINOUS CONC. SURFACE	8,098	TON	$24.93	$201,883
FULL DEPTH DGA	14,258	TON	$11.38	$161,971
BITUMINOUS MATERIAL FOR TACK	77.2	TON	$238.75	$18,432
EMULSIFIED ASPHALT RS-2	24.3	TON	$291.18	$7,076
BITUMINOUS SEAL AGGREGATE	202	TON	$25.87	$5,246
SEED AND PROTECTION		SQ.YD.	$0.18	$0
SUB TOTAL				$16,745,109
MOBILIZATION 3%				$502,353
DEMOBILIZATION 1.5%				$251,177
SUB TOTAL				$17,498,639
ENGINEER. & CONTING. 20%				$3,499,728
MAINLINE TOTAL *				$20,998,366

* DOES NOT INCLUDE APPROACHS OR BRIDGES

OPTIONS FOR ALT. B - SECTION 1 APPR. TO US 119 AT BURNING FORK	
APPROACH RT. STA. 500+340	$7,746,766
APPROACH RT. STA. 501+000	$1,592,610
APPROACH LT. STA. 500+340	$4,605,028
APPROACH LT. STA. 501+000	$2,460,725
TURN LANES (2)	$124,968
BRIDGE	$5,521,245
CULVERT	$615,600

OPTIONS FOR ALT. B - SECTION 1 APPROACH AT RACCOON CREEK KY 1441	
APPROACH LT. STA. 502+040	$10,563,016
APPROACH RT. STA. 502+100	$548,233
APPROACH RT. STA. 502+040	$14,662,468
TURN LANES (2)	$124,968
BRIDGE	$9,865,733

5,521,245 -

9,865,733 -

BURN 1 9,201,030 -

RAC 3 7,820,912 -

PIKE COUNTY US 119

GRAND TOTAL	

CONSTRUCTION COST ESTIMATE
ALTERNATE B
CONSTRUCTION SECTION 2
STA. 503+480 - 506+320
LENGTH = (2840 m) (2.840 km) -- (9317 ft.) (1.76 mi.)

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
EXCAVATION	7,739,105	CU. METER	$2.61	$20,199,064
SITUATION SIZE CROSS DRAINS	LS	LS	LS	$84,307
MEDIAN CROSS DRAINS	LS	LS	LS	$101,049
MEDIAN BOXS	35	EACH	$2,300.00	$80,500
PERFORATED PIPE UNDERDRAIN 4"	37,268	LIN. FT.	$5.00	$186,340
CHANNEL CHANGE		CU.YD.	$2.01	$0
CHANNEL LINING CLASS 4	3,558	TON	$3.58	$12,736
CLEARING AND GRUBBING		ACRES	$1,200.00	$0
SILT CHECKS	20	EA.	$48.47	$969
GUARDRAIL	3,200	LIN.FT.	$8.47	$27,104
END TREATMENTS	14	EA.	$500.00	$7,000
STAKING	1.76	MILE	$45,000.00	$79,200
RW FENCE *	18,634	LIN.FT.	$3.06	$57,393
MAINTAIN AND CONTROL TRAFFIC	1	LUMP	$50,000.00	$50,000
WATER	2,000	MGAL	$2.49	$4,980
4" DGA	18,871	TON	$12.00	$226,452
4" DRAINAGE BLANKET	23,504	TON	$21.00	$493,584
10" BASE	34,996	TON	$25.37	$887,849
1.5" BITUMINOUS CONC. SURFACE	6,633	TON	$24.93	$165,361
FULL DEPTH DGA	11677		$11.36	$132,651
BITUMINOUS MATERIAL FOR TACK	63	TON	$236.75	$15,017
EMULSIFIED ASPHALT RS-2	40	TON	$291.18	$11,560
BITUMINOUS SEAL AGGREGATE	331	TON	$25.97	$8,596
SEED AND PROTECTION		SQ.YD.	$0.18	$0
SUB TOTAL				**$22,831,713**
MOBILIZATION 3%				$684,951
DEMOBILIZATION 1.5%				$342,476
SUB TOTAL				**$23,859,140**
ENGINEER & CONTING. 20%				$4,771,828
MAINLINE TOTAL *				**$28,630,968**

* DOES NOT INCLUDE APPROACHS OR BRIDGES

OPTIONS FOR ALTERNATE B SECTION 2 APPROACH AT WINN BRANCH		
APPROACH RT. STA. ~~505+575~~	$2,124,121	2,124,121
APPROACH LT. STA. 505+575	$2,808,110	
TURN LANES (2)	$124,966	124,966
BRIDGE	$10,947,775	10,947,775
CULVERT	$864,000	864,000
GRAND TOTAL		

CONSTRUCTION COST ESTIMATE
ALTERNATE B
CONSTRUCTION SECTION 3
STA. 506+320 - 509+200
LENGTH = (2880 m) (2.880 km) = (9449 ft.) (1.789 mi.)

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
EXCAVATION	6,968,541	CU. METER	$2.61	$18,187,892
SITUATION SIZE CROSS DRAINS	LS	LS	LS	$447,334
MEDIAN CROSS DRAINS	LS	LS	LS	$101,049
MEDIAN BOXS	35	EACH	$2,300.00	$80,500
PERFORATED PIPE UNDERDRAIN 4"	37,796	LIN. FT.	$5.00	$188,980
CHANNEL LINING CLASS 4	7,440	TON	$3.58	$26,635
CLEARING AND GRUBBING		ACRES	$1,200.00	$0
SILT CHECKS	20	EA.	$48.47	$969
GUARDRAIL	3,200	LIN.FT.	$8.47	$27,104
END TREATMENTS	14	EA.	$500.00	$7,000
STAKING	1,789	MILE	$45,000.00	$80,505
RW FENCE	18,898	LIN.FT.	$3.08	$58,206
MAINTAIN AND CONTROL TRAFFIC	1	LUMP	$50,000.00	$50,000
WATER	2,000	MGAL	$2.49	$4,980
4" DGA *	19,112	TON	$12.00	$229,344
4" DRAINAGE BLANKET	23,805	TON	$21.00	$499,905
10" BASE	35,442	TON	$25.37	$899,184
1.5" BITUMINOUS CONC. SURFACE	6,717	TON	$24.93	$167,465
FULL DEPTH DGA	11,827	TON	$11.36	$134,355
BITUMINOUS MATERIAL FOR TACK	53	TON	$238.75	$15,041
EMULSIFIED ASPHALT RS-2	40.3	TON	$291.18	$11,735
BITUMINOUS SEAL AGGREGATE	336	TON	$25.97	$8,726
SEED AND PROTECTION		SQ.YD.	$0.18	$0
SUB TOTAL				**$21,226,878**
MOBILIZATION 3%				$636,806
DEMOBILIZATION 1.5%				$318,403
SUB TOTAL				**$22,182,088**
ENGINEER. & CONTING. 20%				$4,436,416
MAINLINE TOTAL *				**$26,618,505**

* DOES NOT INCLUDE APPROACHS OR BRIDGES

OPTIONS FOR ALTERNATE B SECTION 3 APPROACH AT JOHNS CREEK			
APPROACH LT. STA. 508+620	$	3,009,770	
APPROACH RT. STA. 508+620	$	2,134,590	
TURN LANES (2)	$	124,968	
BRIDGE	$	10,769,160	10,769,160
Lanes 2			7,952,818
GRAND TOTAL			

CONSTRUCTION COST ESTIMATE
ALTERNATE B
CONSTRUCTION SECTION 4
STA. 509+200 - 512+117
LENGTH = (2917 m) (2.917 km) – (9570 ft.) (1.812 mi.)

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
EXCAVATION	4,962,339	CU. METER	$2.61	$12,951,705
SITUATION SIZE CROSS DRAINS	LS	LS	LS	$447,334
MEDIAN CROSS DRAINS	LS	LS	LS	$101,049
MEDIAN BOXS	35	EACH	$2,300.00	$80,500
BOX CULVERT 511+830	LS	LS	LS	$244,800
PERFORATED PIPE UNDERDRAIN 4"	38,280	LIN. FT.	$5.00	$191,400
CHANNEL LINING CLASS 4	1,627	TON	$3.58	$5,825
CLEARING AND GRUBBING		ACRES	$1,200.00	$0
SILT CHECKS	20	EA.	$48.47	$969
GUARDRAIL	3,200	LIN.FT.	$8.47	$27,104
END TREATMENTS	20	EA.	$500.00	$10,000
STAKING	1,812	MILE	$45,000.00	$81,540
RW FENCE	19,140	LIN.FT.	$3.06	$58,561
MAINTAIN AND CONTROL TRAFFIC	1	LUMP	$150,000.00	$150,000
WATER	2,000	MGAL	$2.49	$4,980
4" DGA	19,194	TON	$12.00	$230,328
4" DRAINAGE BLANKET	23,905	TON	$21.00	$502,005
10" BASE	35,591	TON	$25.37	$902,944
1.5" BITUMINOUS CONC. SURFACE	6,746	TON	$24.93	$168,178
FULL DEPTH DGA	11,876	TON	$11.36	$134,911
BITUMINOUS MATERIAL FOR TACK	64.8	TON	$238.75	$15,423
EMULSIFIED ASPHALT RS-2	40.8	TON	$291.16	$11,880
BITUMINOUS SEAL AGGREGATE	340	TON	$25.97	$8,830
SEED AND PROTECTION		SQ.YD.	$0.16	$0
SUB TOTAL				**$16,330,656**
MOBILIZATION 3%				$489,920
DEMOBILIZATION 1.5%				$244,960
SUB TOTAL				**$17,065,536**
ENGINEER. & CONTING. 20%				$3,413,107
GRAND TOTAL *				**$20,478,643**

* DOES NOT INCLUDE APPROACHS OR BRIDGES

OPTIONS FOR ALTERNATE B SECTION 4 APPROACH AT SCOTTS FORK	
APPROACH LT. STA. 110+299	$1,675,674
TURN LANES (2)	$124,966

OPTIONS FOR ALTERNATE B SECTION 4 APPROACH AT 119 AT BENT MOUNTAIN	
APPROACH LT. STA. 510+980	$2,771,185
APPROACH RT. STA. 510+980	$5,289,962
APPROACH LT. STA. 511+300	$408,732
OVERPASS ON A	$2,600,000
TURN LANES (2)	$124,966
GRAND TOTAL	

APPROACH COST ESTIMATES ALTERNATE B
US 119 AT BURNING FORK BRANCH

DISCRIPTION	BURN 1 * QUANTITY	UNIT PRICE	TOTAL PRICE	BURN 2 QUANTITY	UNIT PRICE	TOTAL PRICE	BURN 3 QUANTITY	UNIT PRICE	TOTAL PRICE
EXCAVATION	2,455,643	$2.61	$6,409,228	874265	$2.61	$2,281,832	2428577	$2.61	$6,334,410
DRAINAGE		$ -	$721,784		$ -	$151,356	0		$221,314
1.5" SURFACE	4,423	$31	$137,113	2024	$31	$62,744	3250	$31	$100,750
10" BASE	22,805		$729,760	14528	$32	$468,896	20711	$32	$662,752
4" DRAINAGE BLANKET	8,597	$25	$214,925	7360	$25	$184,000	9147	$25	$228,675
4" DGA	6,928	$14	$97,003	9639	$14	$134,946	10815	$14	$151,410
FULL DEPTH DGA	3,601	$14	$50,214	4014	$14	$56,196	5527	$14	$77,378
OVERPASS	1		$ 1,328,000	1		$ 1,360,000	1		$ 1,300,000
TOTAL			$9,201,830			$4,699,170			$9,172,689

APPROACH COST ESTIMATES ALTERNATE B
US 119 AT BENT MOUNTAIN

DISCRIPTION	BENT 1 QUANTITY	UNIT PRICE	TOTAL PRICE	BENT 2 QUANTITY	UNIT PRICE	TOTAL PRICE	BENT 3 QUANTITY	UNIT PRICE	TOTAL PRICE	BENT 4 * QUANTITY	UNIT PRICE	TOTAL PRICE
EXCAVATION	2348283	$2.61	$ 6,131,520	1148686	$2.61	$ 3,048,994	1345688	$2.61	$ 3,512,186	491730	$2.61	$ 1,283,415
DRAINAGE		$ -	$1,321,503		$ -	336054		$ -	$ 1,908,320		$ -	$ 1,240,335
1.5" SURFACE	3054	$31	$ 94,674	1649	$31	$52,359	2582	$31	$ 80,042	1850	$31	$ 57,350
10" BASE	29015	$32	$ 928,488	19340	$32	$321,280	15351	$32	$ 491,232	12131	$32	$ 388,192
4" DRAINAGE BLANKET	8145	$25	$ 203,625	5357	$25	$133,925	8190	$25	$ 204,750	5292	$25	$ 132,300
4" DGA	8505	$14	$ 119,070	9424	$14	$131,936	14408	$14	$ 201,660	9766	$14	$ 136,724
FULL DEPTH DGA	4124	$14	$ 57,736	3761	$14	$52,654	5750	$14	$ 80,500	4336	$14	$ 60,704
OVERPASS	1		$ 1,932,000	2		$ 3,373,000	1		$ 2,000,000	1		$ 1,858,000
TOTAL			$10,788,717			$ 7,447,392			$ 8,477,690			$ 5,148,686

APPROACH COST ESTIMATES ALTERNATE B
US 119 AT RACCOON CREEK (RAC1)

DISCRIPTION	RAC1 QUANTITY	UNIT PRICE	TOTAL PRICE	RAC2 QUANTITY	UNIT PRICE	TOTAL PRICE	RAC 3 * QUANTITY	UNIT PRICE	TOTAL PRICE
EXCAVATION	6653048	$2.61	$ 17,364,456	2,703,647	$2.61	$ 7,056,519	2,573,490	$2.61	$ 6,716,809
DRAINAGE		$ -	$ 64,300			58300			$ 36,330
1.5" SURFACE	3852	$31	$ 119,412	1,529	$31	$ 47,399	2,723	$31	$ 84,413
10" BASE	31031	$32	$ 992,992	15,369	$32	$ 488,208	19,617	$32	$ 627,744
4" DRAINAGE BLANKET	12006	$25	$ 300,150	6,771	$25	$ 169,275	8,540	$25	$ 213,500
4" DGA	10446	$14	$ 146,244	5,857	$14	$ 81,998	7,388	$14	$ 103,464
FULL DEPTH DGA	3636	$14	$ 53,970	2,252	$14	$ 31,529	2,801	$14	$ 39,704
OVERPASS	1		$ 878,000						
			$20,911,282			$ 7,906,227			$ 7,826,913

APPROACH COST ESTIMATES ALTERNATE B
US 119 AT JOHNS CREEK (JOHNS1)

DISCRIPTION	* JOHNS 1 QUANTITY	UNIT PRICE	TOTAL PRICE
EXCAVATION	2423869	$2.61	$ 6,326,184
DRAINAGE		$ -	$ 177,265
1.5" SURFACE	453	$31	$ 13,423
10" BASE	3062	$32	$ 98,624
4" DRAINAGE BLANKET	1259	$25	$ 31,450
4" DGA	1320	$14	$ 18,480
FULL DEPTH DGA	1390	$14	$ 19,460
OVERPASS	1		$ 1,268,000
			$7,952,886

* PREFERRED ALT.