VALUE ENGINEERING SUMMARY
OF
KY 395 RECONSTRUCTION
FROM
I-64 TO US 60 AT PEYTONA
SHELBY COUNTY, KENTUCKY

APRIL 13-17, 1998

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EXECUTIVE SUMMARY

Introduction

This Value Engineering report summarizes the results of the Value Engineering study performed during the week of April 13-17, 1998. This study was conducted as part of a Value Engineering Workshop conducted by Ventry Engineering for the Kentucky Transportation Cabinet.

The subject of the study was the reconstruction of KY 395 from I-64 to US 60 at Peytona.

Project Description

The project studied was the reconstruction of KY 395 from I-64 to US 60 at Peytona. The project begins at the northern limits of the KY 395 - I-64 interchange and extends north to the junction with US 60, approximately 0.32 kilometers South of Peytona, Kentucky. The existing roadway has numerous deficient horizontal and vertical curves. The proposed alignment is generally to the East of the existing road and corrects substandard horizontal curves near Sta. 21+500.

The estimated construction cost for the project is $4,231,000. Right of way and utility costs are estimated at $1,690,000 and $695,000 respectively.

Methodology

The Value Engineering Team followed the basic Value Engineering procedure for conducting this type of analysis. This process included the following phases:

1. Investigation
2. Speculation
3. Evaluation
4. Development
5. Presentation
6. Report Preparation

Evaluation criteria identified as a basis for the comparison of alternatives included the following:

- Construction Cost
- Maintenance of Traffic
- Construction Time
- Maintenance Cost
- Project Schedule
- Right of Way Impacts
- Service Life
- Salvage Value

- Design Criteria
- Environmental Concerns
- Local Access

Results

The following areas of focus were analyzed by the Value Engineering team, and from these areas the following Value Engineering alternatives were developed and are recommended for implementation:

Recommendation No. 1 - Use Original Horizontal Alignment with New Vertical Alignment

The Value Engineering Team recommends that this VE Alternative be implemented. This alternative revises the grade and reduces the amount of earthwork required.

If this recommendation can be implemented, there are possible savings of $258,000.

Recommendation No. 2 - Close Road and Reroute Traffic During Construction

The Value Engineering Team recommends that this VE Alternative be implemented. This alternative closes KY 395 to through traffic during construction.

If this recommendation can be implemented, there are possible savings of $800,000.

Recommendation No. 3 - Build on New Horizontal and Vertical Alignment

The Value Engineering Team recommends that this VE alternative be implemented. This alternative recommends a cross country alignment that is further east than the as proposed. This allows more freedom with the vertical alignment which reduces earthwork. It also eliminates the need for a detour.

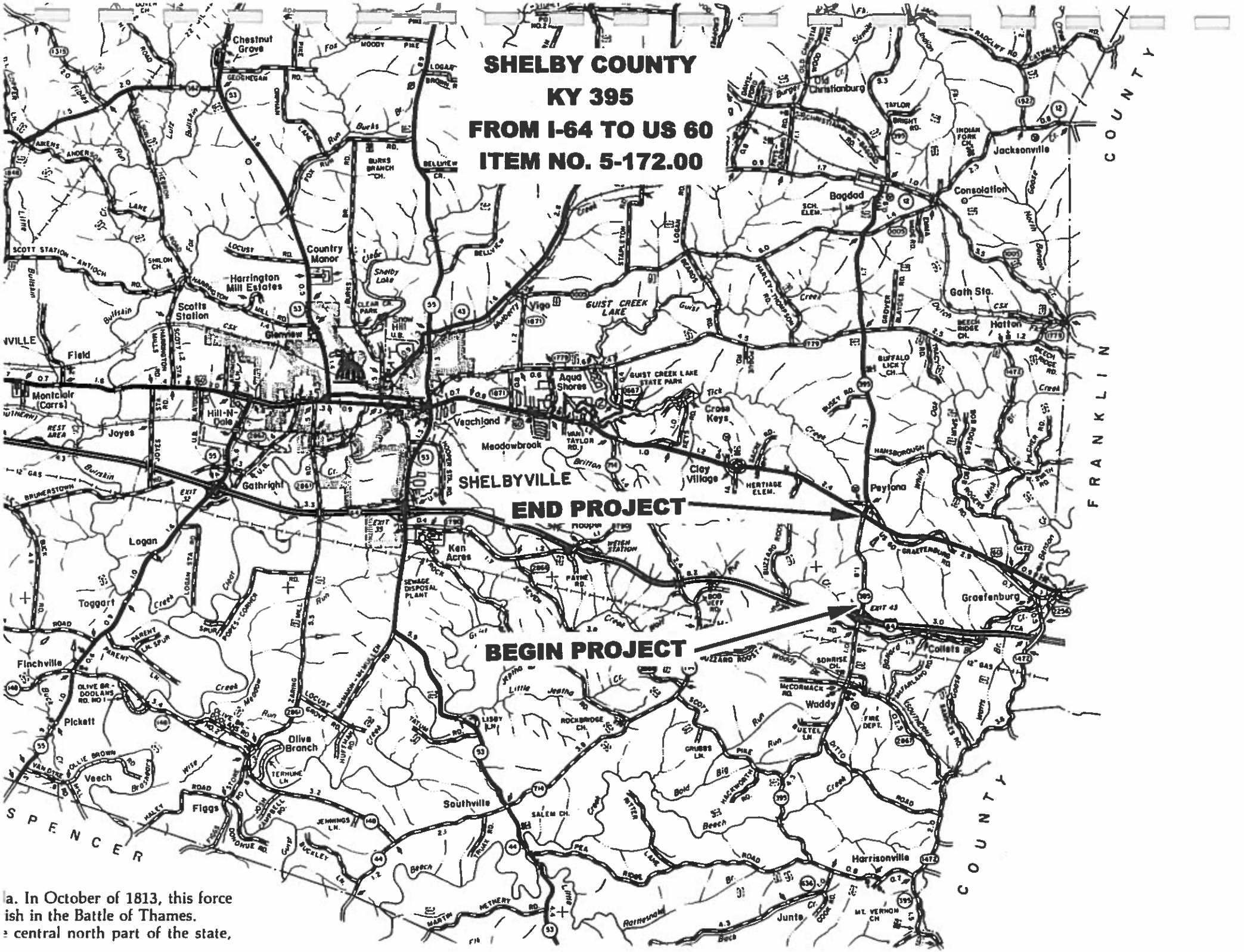
If this recommendation can be implemented, there are possible savings of $1,183,000.

Recommendation No. 4 - Revise Pavement Design

The Value Engineering Team recommends that this VE alternative be implemented. This alternative recommends using lime stabilized subgrade.

If this recommendation can be implemented, there are possible savings of $36,000.

LOCATION OF PROJECT & COST ESTIMATE



a. In October of 1813, this force
ish in the Battle of Thames.
e central north part of the state,

DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS
ESTIMATE SHEET

FOR ..... CLASS OF EST. PRELIM

DISTRICT 5
KY395, SHELBY COUNTY, I-64 NORTH TO US 60 (ALT #2)

ITEM CODE	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT
440	ENTRANCE PIPE-15 INCH	METER	1210.00	70.00E	84700.
462	CULVERT PIPE-18 INCH	METER	200.00	150.00E	30000.
464	CULVERT PIPE-24 INCH	METER	150.00	200.00E	30000.
471	CULVERT PIPE-54 INCH	METER	120.00	500.00E	60000.
472	CULVERT PIPE-60 INCH	METER	90.00	800.00E	72000.
477	CULVERT PIPE-90 INCH	METER	90.00	1500.00E	135000.
1310	REMOVING PIPE	METER	305.00	35.00E	10675.
1450	S & F BOX INLET-OUTLET-18 INCH	EACH	5.00	2000.00E	10000.
1451	S & F BOX INLET-OUTLET-24 INCH	EACH	3.00	2500.00E	7500.
2230	EMBANKMENT IN PLACE	CU M	103286.00	7.00E	723002.
2242	WATER	KL	8025.00	1.00E	8025.
2351	GUARDRAIL-STEEL W BEAM-S FACE	METER	685.80	30.00E	20574.
2370	GUARDRAIL END TREATMENT TYPE 4	EACH	6.00	700.00E	4200.
2434	R/W MARKER RURAL TYPE 1	EACH	50.00	36.00E	1800.
2545	CLEARING AND GRUBBING	LP SUM	1.00	100000.00E	100000.
2585	EDGE KEY	METER	30.00	25.00E	750.
2650	MAINTAIN AND CONTROL TRAFFIC	LP SUM	1.00	300000.00E	300000.
2651	DETOUR CONSTRUCTION	LP SUM	1.00	800000.00E	800000.
2710	SCARIFYING AND RESHAPING	SQ M	12810.00	3.00E	38430.
2726	STAKING	LP SUM	1.00	200000.00E	200000.
5960	FERTILIZER 10-20-20	M TON	15.00	350.00E	5250.
5986	SEED AND PROTECT, METHOD 2	SQ M	133580.00	0.30E	40074.
5992	AGRICULTURAL LIMESTONE	M TON	98.00	30.00E	2940.
8100	CONCRETE-CLASS A	CU M	64.00	450.00E	28800.
8150	STEEL REINFORCEMENT	KG	3075.00	1.00E	3075.
SUB-TOTAL GRADE & DRAIN					$ 2716795.
1	D G A BASE	M TON	449.00	16.00E	7184.
3	CRUSHED STONE BASE	M TON	26337.00	17.00E	447729.
100	BITUMINOUS SEAL AGGREGATE	M TON	70.00	40.00E	2800.
120	BIT CONC BASE CLASS I	M TON	11435.00	35.00E	400225.
149	BIT CONC SURFACE CLASS I-0	M TON	808.00	40.00E	32320.
154	BIT CONC SURFACE CLASS I-20/30	M TON	1361.00	45.00E	61245.
270	ANTI-STRIP ADD PER TON BIT MIX	EACH	13604.00	0.20E	2721.
291	EMULSIFIED ASPHALT RS-2	M TON	8.50	450.00E	3825.
356	BITUMINOUS MATERIAL FOR TACK	M TON	17.00	350.00E	5950.
SUB-TOTAL SURFACING					$ 963999.

DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS
ESTIMATE SHEET

FOR ..... CLASS OF EST. PRELIM

DISTRICT 5
KY395, SHELBY COUNTY, I-64 NORTH TO US 60 (ALT #2)

ITEM CODE	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT
	SUB-TOTAL GRADE, DRAIN & SURFACING			$ 3680794.	
	DEMOBILIZATION			$ 55212.	
	MOBILIZATION			$ 110424.	
	COST PER MILE GRADE AND DRAIN $.....		SUB-TOTAL	$ 3846430.	
	COST PER MILE G. & D. & SURF. $.....		+10% ENGR. & CONTG.	$ 384643.	
			GRAND TOTAL	$ 4231073.	

E PRICE FOR THIS ITEM WAS PROVIDED BY THE ENGINEER

ESTIMATED BY BIRATU DADI DATE 8/14/95

ESTIMATED BY JAMES T. WILLIAMS, JR. DATE 8/14/95

UNIT PRICES ARE FROM 9/94 TO 8/95

TEAM MEMBERS, PROJECT DESCRIPTION, AND PERSONS CONTACTED

Team Members

NAME	AFFILIATION	EXPERTISE	PHONE
Jason Bagwell	District 1 Design	Roadway Design	502-898-2431
Stacy Beason	District 3 Operations	Maintenance	502-746-7898
Chris Harris	District 10 Construction	Construction	606-666-8841
Jeff Jasper	C. O. Highway Design	Roadway Design	502-564-3280
Mike Milligan	C. O. Construction	Construction	502-564-4780
Richard Wilson	C. O. Material/Geotech	Geology	502-564-2374

Project Description

The project studied was the reconstruction of KY 395 from I-64 to US 60 at Peytona. The project begins at the northern limits of the KY 395 - I-64 interchange and extends north to the junction with US 60, approximately 0.32 kilometers South of Peytona, Kentucky. The existing roadway has numerous deficient horizontal and vertical curves. The proposed alignment is generally to the East of the existing road and corrects substandard horizontal curves near Sta. 21+500.

The estimated construction cost for the project is $4,231,000. Right of way and utility costs are estimated at $1,690,000 and $695,000 respectively.

Persons Contacted

Name	Affiliation	Phone
Andre Johannes	C. O. Highway Design	502-564-3280
Kevin Villier	District 5 Design	502-367-6411
Leo Frank	C. O. Highway Design	502-564-3280
Jim King	C. O. Bridge Design	502-564-4560
Steven Criswell	C. O. Construction	502-564-4780
Dexter Newman	C. O. Construction	502-564-4780

INVESTIGATION PHASE

Cost/Function of Major Design Elements

Item	Cost	Function
Embankment	$7/Cu M	Establishes Grade
Detour	$1,100,000	Maintains Traffic
Right of Way	$1,690,000	Establishes Ownership
Guardrail	$21,000	Absorbs Momentum
Surfacing	$964,000	Supports Vehicles

Functional Analysis Worksheet

Item	Function Verb	Function Noun	Type	Cost	Worth	Value Index
Embankment	Establishes	Grade	B	$7/Cu M	$4/Cu M	1.75
Detour	Maintains	Traffic	B	$1,100,000	$300,000	2.7
Right of Way	Establishes	Ownership	B	$1,690,000	$1,390,000	1.3
Guardrail	Absorbs	Momentum	B	$21,000	$11,000	2.00
Surfacing	Support	Vehicle	B	$964,000	$600,000	1.6

Investigation

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

- Embankment
- Detour
- Right of Way
- Surfacing

SPECULATION

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

1. Embankment
    - Retaining wall
    - Decrease height
    - Decrease side slopes
    - Decrease shoulders
    - Decrease lane widths
    - Different typical sections
    - Change grade
    - Revise horizontal alignment
    - Bridge
    - Elevated roadway
    - Close roadway
    - Do nothing
    - R/W impacts
    - Change project limits
    - Use tires for fill
    - Use waste materials - cars, freezers, bricks, fly ash, slag
    - Permit job as landfill
    - Check quantities
2. Detour
    - Close road
    - Alternative route
    - Half-width construction
    - Local Traffic
    - Change alignment
    - Build complete detour
    - Do nothing
    - Adjust work schedule (work at night/open during day)
3. Right of Way
    - Condemn and no compensation
    - Do Nothing
    - Build on agricultural property
    - Stay within existing right of way
    - Build tunnel
    - Build bridge
    - Do by easement
    - Let as design/build
    - Privatize roadway
    - Toll road
    - Change alignment to miss homes
    - Change typical - reduce lane widths or reduce/eliminate shoulders

- Change profile
- Steepen slopes
- Retaining walls and guardrail
- Change project limits
- Ask for land donations

4. Surfacing
    - Use gravel
    - Use dirt
    - Concrete
    - Subgrade stabilization (lime or cement)
    - Restrict truck traffic
    - Speed bumps
    - Asphalt millings (recycle)
    - Do nothing
    - Waste products
    - Rock roadbed
    - Geogrid
    - Geotextile
    - Chip seal
    - Overlay existing
    - Change typical section
    - DGA shoulders
    - Earth shoulders
    - No shoulders
    - Lime or cement stabilized shoulders

EVALUATION

Alternatives

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

I. Embankment
   - A. Use original horizontal alignment with new vertical alignment
   - B. Change horizontal and vertical alignment
   - C. Change typical section
   - D. Use alternative embankment materials

II. Detour
   - A. Close road
   - B. Adjust work schedule to work at night only
   - C. Build an alternate alignment and use existing road as detour

III. Right of Way
   - A. Ask for land donation
   - B. Build on agricultural property

IV. Surfacing
   - A. Use PCC Pavement
   - B. Use soil stabilization
   - C. Use rock roadbed
   - D. Use geotextiles
   - E. Restrict trucks
   - F. Use recycled materials

Evaluation

I. Embankment

"As Proposed"

Advantages
- Better parcel access
- Safe design
- Designed for truck traffic
- Wide shoulders

Disadvantages
- Higher cost
- Lack of earthwork balance
- Fill material needed
- Additional right of way cost
- Larger drainage structures
- More guardrail

- Take more houses

Conclusion

Carry forward for Matrix Evaluation

A. ***Value Engineering Alternate - Use original horizontal alignment with new vertical alignment***

Advantages

- Change earthwork balance
- Eliminate guardrail
- Flatter profile

Disadvantages

- Deteriorate access to properties
- May affect sight distance
- Increase right of way cost
- May affect drainage

Conclusion

Carry forward for Matrix Evaluation

B. ***Value Engineering Alternate - Change horizontal and vertical alignment***

Advantages

- Design to balance earthwork
- Eliminate guardrail
- Lower right of way cost - take less houses
- Flatter profile
- Improved drainage
- Improve detour situation
- Ease construction
- Reduce construction cost
- Potential fewer utility conflicts
- Increase economic development potential

Disadvantages

- Required permanent maintenance of new and old roadway sections
- Take more acreage
- Lengthen roadway section
- Potential increase in construction cost

Conclusion

Carry forward for Matrix Evaluation

C. *Value Engineering Alternate - Change typical section*

Advantages
- Decreases cost of right of way, surfacing, embankment, and drainage

Disadvantages
- Decrease lane width
- Decrease shoulder width
- Steepen slopes
- Decrease clear zone
- Increased accidents
- Hinders truck traffic
- Increases maintenance costs

Conclusion
Carry forward for Matrix Evaluation

D. *Value Engineering Alternate - Use Alternative Embankment Materials*

Advantages
- Readily available
- Positive use of waste material

Disadvantages
- Environmental concerns
- Expense
- Contractor's knowledge of methods
- Specialty contractor needed
- Permitting and paperwork
- Monitoring

Conclusion
Carry forward for Matrix Evaluation

See next page for matrix evaluation of embankment alternates.

Matrix Evaluation
Embankment Area of Focus

List the best ideas from suitability evaluation. Determine which one ranks best against desired criteria. Work down not across. 4-Excellent, 3-Good, 2-Fair, 1-Poor.	Objectives or Criteria										Total	Ranking	Use Now	Reject	Modify How?
	Construction Cost	R/W Cost	Maint. of Traffic	Ease of Const.	Driver Safety	Affect on Landowne									
Alternatives/Weight	8	8	5	3	8	7									
As Proposed	2	1	3	3	4	2					94	3		X	
	16	8	15	9	32	14									
Use Orig. Horiz. Alignment w/ New Vert. Alignment	3	2	1	2	3	3					96	2	X		Use for Embank. Area of Focus
	24	16	5	6	24	21									
Change Horiz. and Vert. Alignment	4	3	4	4	4	3					141	1	X		Use for R/W Area of Focus
	32	24	20	12	32	21									
Change Typical Section	2	2	2	3	1	3					80	4		X	
	16	16	10	9	8	21									
Use Alt. Embankment Materials	1	1	1	1	4	2					70	5		X	
	8	8	5	3	32	14									

II. Detour

"As Proposed"

Advantages
- Continued through traffic
- Better local access
- Less hindrance to emergency vehicles
- Less confusion to traveling public

Disadvantages
- Increased cost
- Decrease safety
- Public complaints
- Increased construction time
- Complicates design and construction
- Increases right of way costs

Conclusion
Carry forward for matrix evaluation

A. *Value Engineering Alternate - Close Road*

Advantages
- Speeds construction
- Cuts/eliminates costs
- No maintenance of traffic
- Improves safety
- Simplifies design
- Simplifies construction
- Decreases right of way costs

Disadvantages
- May increase traveling distance for through traffic
- Hinders emergency response
- Disrupts local traffic
- Increases traffic on additional roads
- May cause public complaints

Conclusion
Carry forward for matrix evaluation

B. ***Value Engineering Alternate - Adjust Work Schedule to Work at Night Only***

Advantages
- Limits need for detours
- May decrease construction time

Disadvantages
- Noise increases at night in residential areas
- Contractor problems
- May increase material delivery costs
- Provide temporary ties on daily basis

Conclusion
Carry forward for matrix evaluation.

C. ***Value Engineering Alternate - Build an Alternate Alignment and Use Existing Road as Detour***

Advantages
- Decrease construction time
- Eases design/construction
- Continued through traffic
- Better local access
- Less hindrance to emergency vehicles
- Less confusion to traveling public
- Increases safety

Disadvantages
- Diminished geometric criteria
- Increase costs
- Increases right of way

Conclusion
Carry forward for matrix evaluation

See next page for matrix evaluation of detour alternates.

Matrix Evaluation

Detour Area of Focus

List the best ideas from suitability evaluation. Determine which one ranks best against desired criteria. Work down not across. 4-Excellent, 3-Good, 2-Fair, 1-Poor.

	Objectives or Criteria														
	Cost	Safety	Const. Time	Thru Traffic Flow	Local Traffic	Ease of Const.					Total	Ranking	Use Now	Reject	Modify How?
Alternatives/Weight	8	8	3	3	3	6									
As Proposed	2	2	2	3	3	2					68	3		X	
	16	16	6	9	9	12									
Close Road	4	4	4	1	2	4					109	1	X		
	32	32	12	3	6	24									
Adjust Work Schedule	2	1	3	2	2	2					57	4		X	
	16	8	9	6	6	12									
Alt. Alignment w/existing Road as Detour	1	3	4	4	4	4					92	2	X		
	8	24	12	12	12	24									

III. Right of Way

"As Proposed"

Advantages
- Utilizes larger percentage of existing right of way

Disadvantages
- Takes more houses
- Negative public opinion
- Court tie ups
- Long acquisition time

Conclusion
Carry forward for matrix evaluation.

A. *Value Engineering Alternate - Ask for Land Donations*

Advantages
- Decrease right of way costs
- Happy property owners
- Economic development

Disadvantages
- Restricts location
- May compromise access control
- Upset land owners
- Depends on owner opinion
- Long acquisition time

Conclusion
Carry forward for matrix evaluation

B. *Value Engineering Alternate - Build on Agricultural Property*

Advantages
- Decrease right of way costs
- Less acquisition time
- Misses homes
- Potential economic development
- Safety increased
- Better parcel access
- Better geometric design

Disadvantages

- May split farms
- Maintain sections of existing roads
- Construction cost may be more

Conclusion

Carry forward for matrix evaluation

See next page for matrix evaluation of right of way alternates.

Matrix Evaluation
Right of Way Area of Focus

List the best ideas from suitability evaluation. Determine which one ranks best against desired criteria. Work down not across. 4-Excellent, 3-Good, 2-Fair, 1-Poor.	Objectives or Criteria										Total	Ranking	Use Now	Reject	Modify How?
	R/W Cost	Impact on Homes	Acquisition Time												
Alternatives/Weight	8	7	5												
	2	2	2												
As Proposed	16	14	10								40	3		X	
	4	2	1												
Ask for Land Donation	32	14	5								51	2		X	
	3	3	3												Design New
Build on Agri. Property	24	21	15								60	1	X		Horiz. Align.

IV. Surfacing

"As Proposed"

Advantages
- Readily available and accepted
- Easily constructed
- Quality control
- Low initial cost
- Fast construction

Disadvantages
- Maintenance costs
- Rutting

Conclusion
Carry forward for matrix evaluation

A. *Value Engineering Alternate - Use PCC Pavement*

Advantages
- Strength
- Durability/life
- No rutting
- Lower maintenance and life cycle costs

Disadvantages
- Cost
- Maintenance
- Labor intensive

Conclusion
Carry forward for matrix evaluation

B. *Value Engineering Alternate - Use Soil Stabilization*

Advantages
- Reduces DGA/Asphalt thickness
- Costs less
- Adds to pavement life
- Easier construction in wet conditions

Disadvantages
- Longer construction time

- Specialty contractor
- Construct in long sections
- Maintenance of traffic difficult

Conclusion
Carry forward for matrix evaluation

C. ***Value Engineering Alternate - Use Rock Roadbed***

Advantages
- Decrease pavement thickness

Disadvantages
- Expensive - not readily available

Conclusion
Carry forward for matrix evaluation

D. ***Value Engineering Alternate - Use Geotextiles***

Advantages
- Does not require specialty contractor
- No time restrictions
- Readily available
- Can use all excavated material

Disadvantages
- Cost

Conclusion
Carry forward for matrix evaluation

E. ***Value Engineering Alternate - Restrict Trucks***

Advantages
- Lower pavement design
- Local public support
- Higher taxes collection at weigh station
- Possible elimination of project
- Increased safety
- Decreases noise pollution

Disadvantages
- Active enforcement required

- Hard to enforce
- Signing required
- Truckers against

Conclusion
Carry forward for matrix evaluation

F. ***Value Engineering Alternate - Use Recycled Materials***

Advantages
- Uses waste material
- Environmentally friendly

Disadvantages
- Restrictive timing
- Special construction requirements
- Increased costs

Conclusion
Carry forward for matrix evaluation

See next page for matrix evaluation of surfacing alternates.

Matrix Evaluation
Surfacing Area of Focus

List the best ideas from suitability evaluation. Determine which one ranks best against desired criteria. Work down not across. 4-Excellent, 3-Good, 2-Fair, 1-Poor.	Objectives or Criteria										Total	Ranking	Use Now	Reject	Modify How?
	Initial Cost	Constructibility	Const. Time	Durability	Maint. Cost	Availability									
Alternatives/Weight	8	5	4	7	8	6									
As Proposed	3	4	4	2	2	4					114	2	X		Use Asphalt w/geotextile
	24	20	16	14	16	24									
PCC Pavement	2	2	2	4	3	3					104	3	X		Use Conc. w/geotextile
	16	10	8	28	24	18									
Soil Stabilization	2	1	1	3	4	2					90	4		X	
	16	5	4	21	32	12									
Rock Roadbed	1	3	1	3	4	1					86	5		X	
	8	15	4	21	32	6									
Geotextiles	3	3	3	3	4	3					122	1	X		
	24	15	12	21	32	18									
Recycled Materials	2	2	3	2	2	2					80	6		X	
	16	10	12	14	16	12									

DEVELOPMENT PHASE

I. Value Engineering Alternate - Use Original Horizontal Alignment with New Vertical Alignment

As Proposed

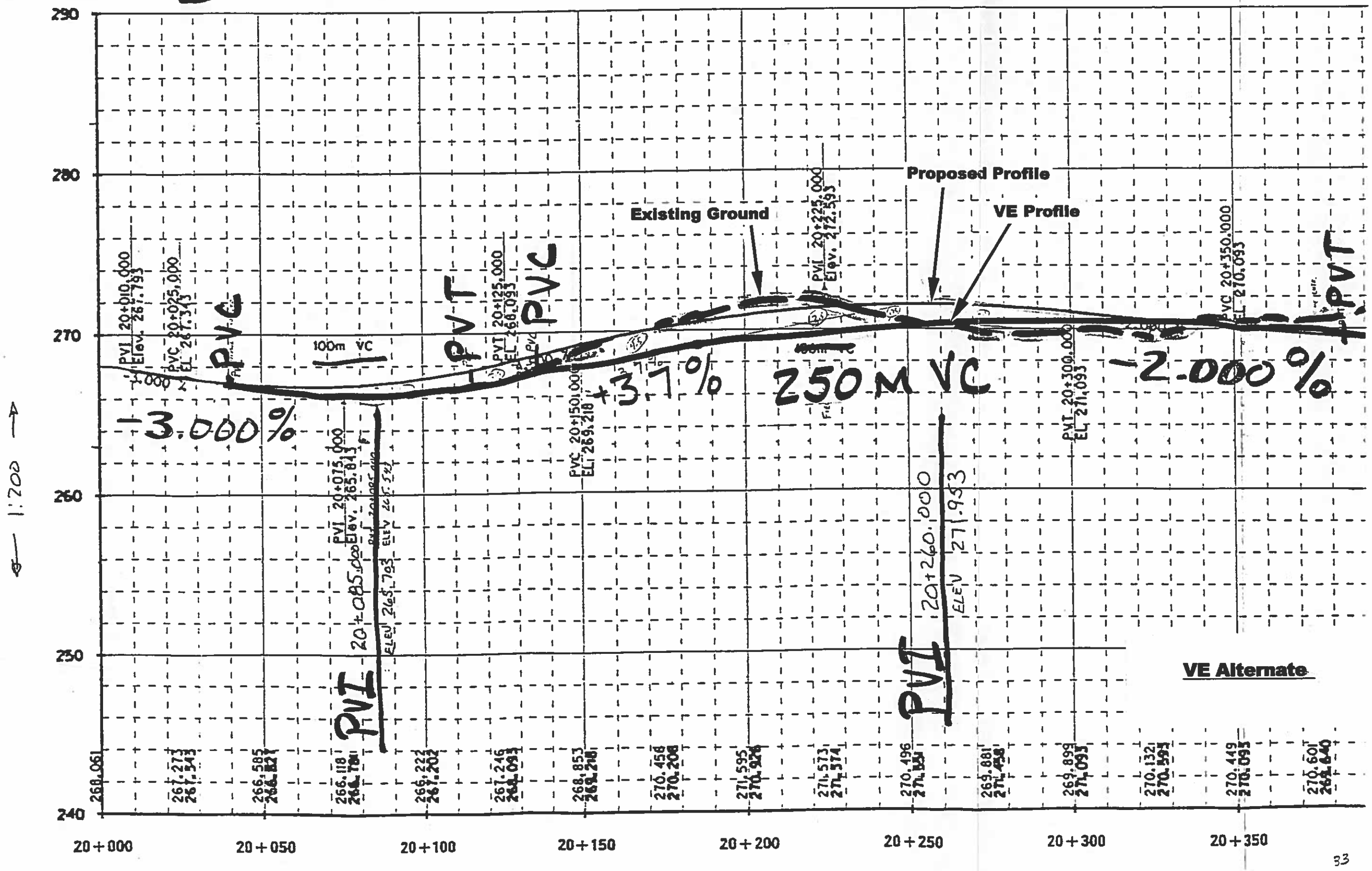
The proposed alternate included a horizontal and vertical alignment that required 103,286 m^3 of embankment in place.

VE Alternate

The Value Engineering alternate recommends a new vertical alignment on the proposed horizontal alignment. This reduces the embankment in place by 36,800 m^3.

The study discovered a substandard vertical curve at the south end of the project that will require a design exemption. This curve is below the minimum length required but could not be lengthened due to elevation restrictions, project limits, and the given grade from the interstate overpass bridge. The VE alternate shifted the PVI for this curve 10 m to the North to help lower the vertical alignment through the first cut section. In addition to moving the PVI, the exit grade was reduced from +4.5% to +3.7%. The second PVI was shifted 35 m North and its exit grade was held at -2.0% to allow a merger with the originally proposed profile through an elevation constraint area. The third PVI remained in its original location but the exit grade was reduced from +1.0% to 0.50%. The fourth PVI was shifted 70 m North and had an elevation drop of 2.4 m. The exit grade from PVI four was maintained at -3.5% as proposed to rejoin the VE profile with the originally proposed profile through another elevation constraint. The fifth PVI was relocated 38 m North, and the exit grade was changed from +1.1% to +2.2%. The sixth PVI was maintained in its original location, and the VE alternate rejoined the proposed 70 m North of PVI six.

PROPOSED PROFILE
EXISTING GROUND



Proposed Profile

VE Profile

100m VC

PVT

PVC

PVI

200m VC

PVI 20+550.000
Elev. 269.093

0 %

+0.500 %

PVI 20+450.000
Elev. 268.093

PVI 20+450
Elev 268.493

Existing Ground

VE Alternate

270.601 269.840
271.923 269.281
273.790 269.095
272.784 268.843
272.409 268.764
270.761 268.781
268.025 268.990
267.252 269.093
267.810 269.343
266.524 269.593
264.918 269.843
264.887 270.093
266.821 270.343
268.370 270.593
269.893 270.843
271.429 271.093
272.967 271.343
274.048 271.593
274.539 271.843

20+400 20+450 20+500 20+550 20+600 20+650 20+700 20+750 20+800

Existing Ground

Proposed Profile

PVI 21+000.000
Elev. 273.593

PVC

PVT

ZOOM VC

PVI 21+100.000
EL 270.093

-3.500%

PVC 21+250.000
EL 261.843

PVC 20+900.000
EL 272.393

VE Profile

PVI

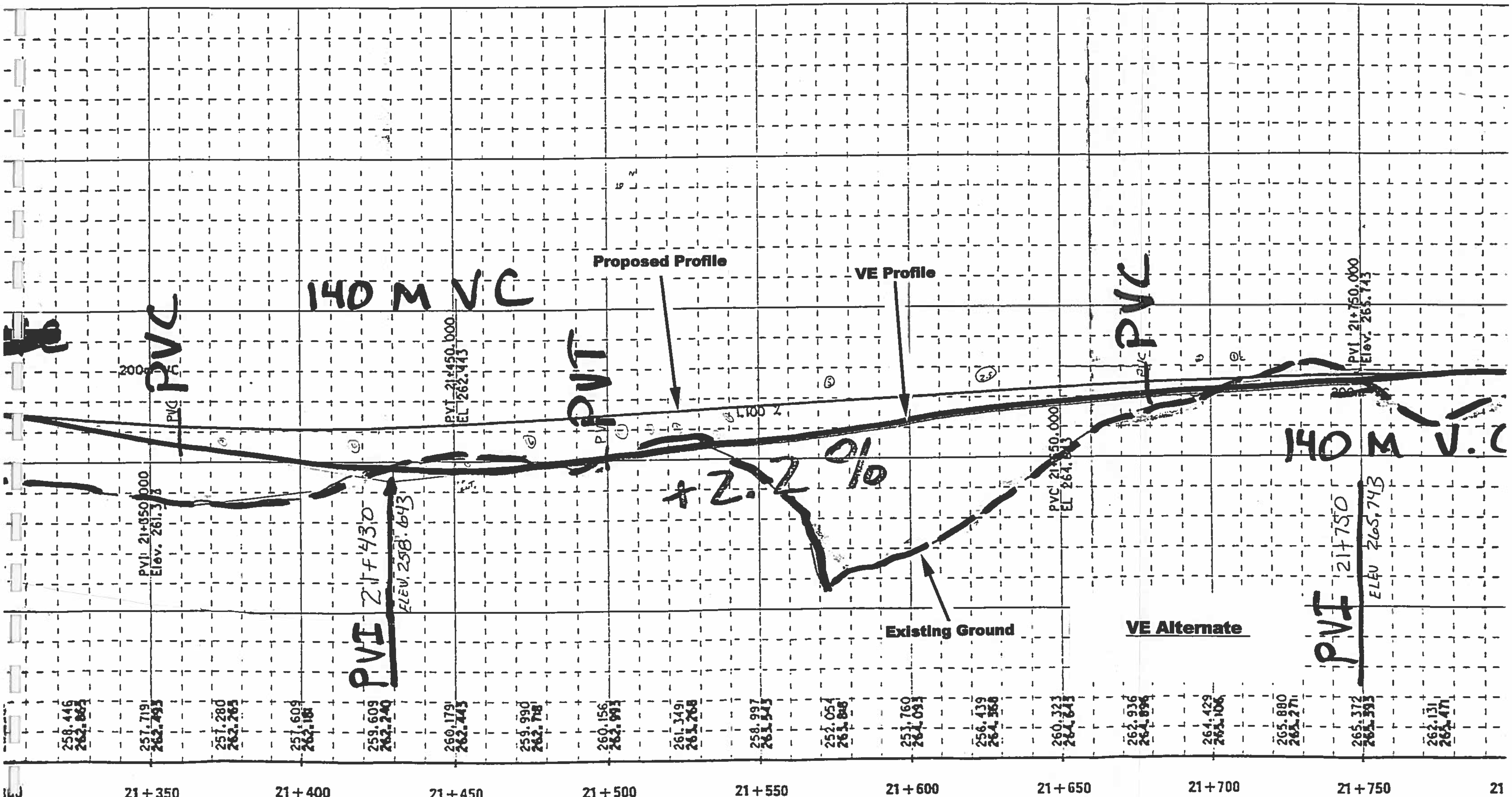
21+070
ELEV. 271.208

VE Alternate

274.247 272.093
275.335 272.343
275.746 272.593
275.651 272.775
274.769 272.812
273.743 272.710
272.230 272.468
270.576 272.025
272.240 271.562
271.391 270.890
269.178 270.093
269.481 269.218
270.222 268.343
268.725 267.468
265.940 266.595
262.434 265.718
260.595 264.845
258.960 264.040
259.148 263.301

20+850 20+900 20+950 21+000 21+050 21+100 21+150 21+200 21+250 21+300

55


140 M VC
PVC
200m VC
PVI 21+350.000
Elev. 261.3?3
PVI 21+430
ELEV. 258.643
PVI 21+450.000
EL 262.443
PVT
Proposed Profile
VE Profile
L100 2
+2.2 %
Existing Ground
PVC 21+650.000
EL 264.643
PVC
VE Alternate
PVI 21+750.000
Elev. 265.743
PVI 21+750
ELEV 265.743
140 M V.C
258.446
262.865
257.719
262.493
257.280
262.265
257.609
262.181
259.609
262.240
260.179
262.443
259.990
262.718
260.156
262.993
261.349
263.268
258.997
263.543
252.054
263.818
253.760
264.093
256.439
264.368
260.323
264.643
262.936
264.896
264.429
265.106
265.880
265.271
265.372
265.393
262.131
265.471
21+350
21+400
21+450
21+500
21+550
21+600
21+650
21+700
21+750
21

PVI

Proposed Profile

-0.300 %

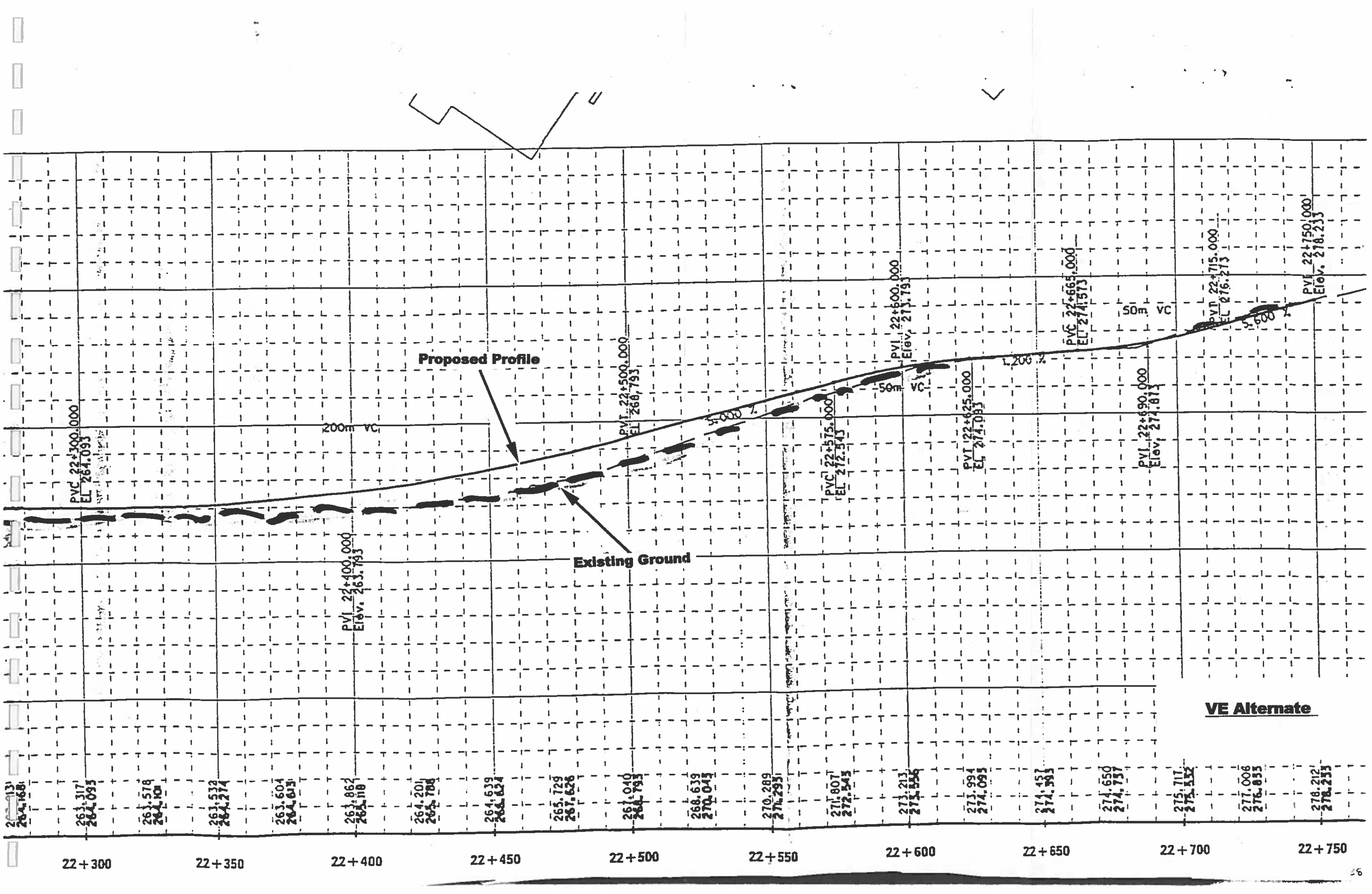
V.C.

PVT 21+850.000
EL 265.443

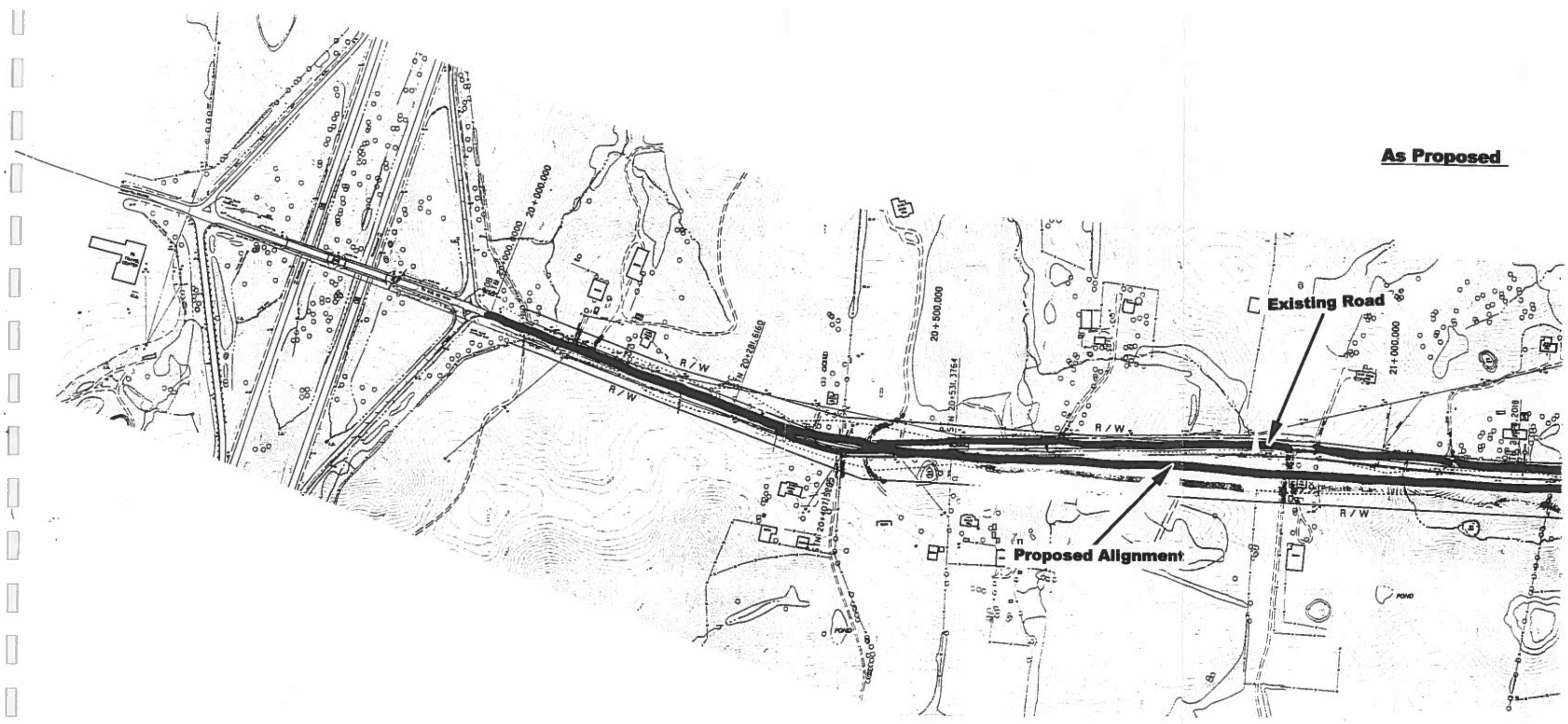
Existing Ground

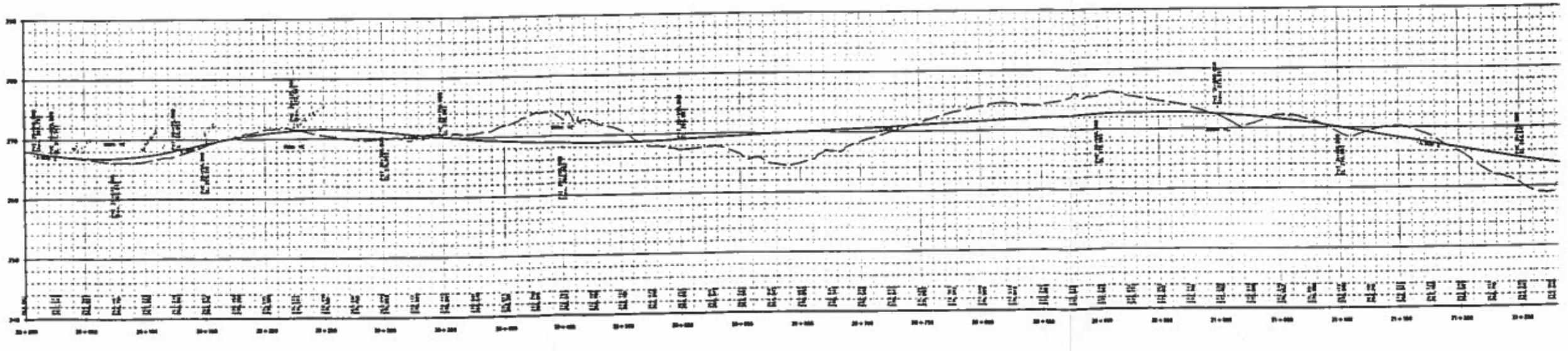
VE Alternate

21+800 21+850 21+900 21+950 22+000 22+050 22+100 22+150 22+200 22+250


Proposed Profile
Existing Ground
VE Alternate
PVC 22+300.000
EL 264.093
PVI 22+400.000
Elev. 263.793
PVI 22+500.000
EL 268.793
PVI 22+600.000
Elev. 273.793
PVC 22+665.000
EL 274.573
PVI 22+715.000
EL 276.213
PVI 22+750.000
Elev. 278.233
200m VC
50m VC
50m VC
22+300
22+350
22+400
22+450
22+500
22+550
22+600
22+650
22+700
22+750

As Proposed


Existing Road
Proposed Alignment
R/W
20+000.000
20+500.000
21+000.000
POND



JT ROAD
Alignment
ROAD to remain
ment
in

SHELBY COUNTY
FSP 106-0395 008-011 014 D
OSTP 05160 010
KY.395 (FROM I-64 To US-60)

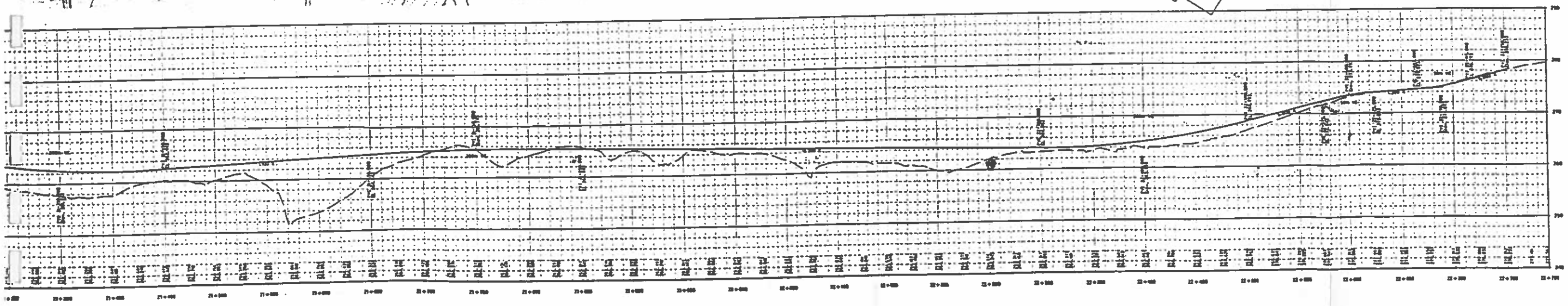
ALTERNATE NO.2
East side of Existing KY.395

Scale 1:2,000

As Proposed

Existing Road

Proposed Alignment



VE Alternate

Cost Comparison

Description	Units	Unit Cost	Proposed Quantity	Proposed Cost	VE Quantity	VE Cost
Emb in Place	Cu M	$ 7.00	103286	$723,002	66486	$ 465,402

Total = $723,002 Total = $ 465,402

Proposed Savings = $ 257,600

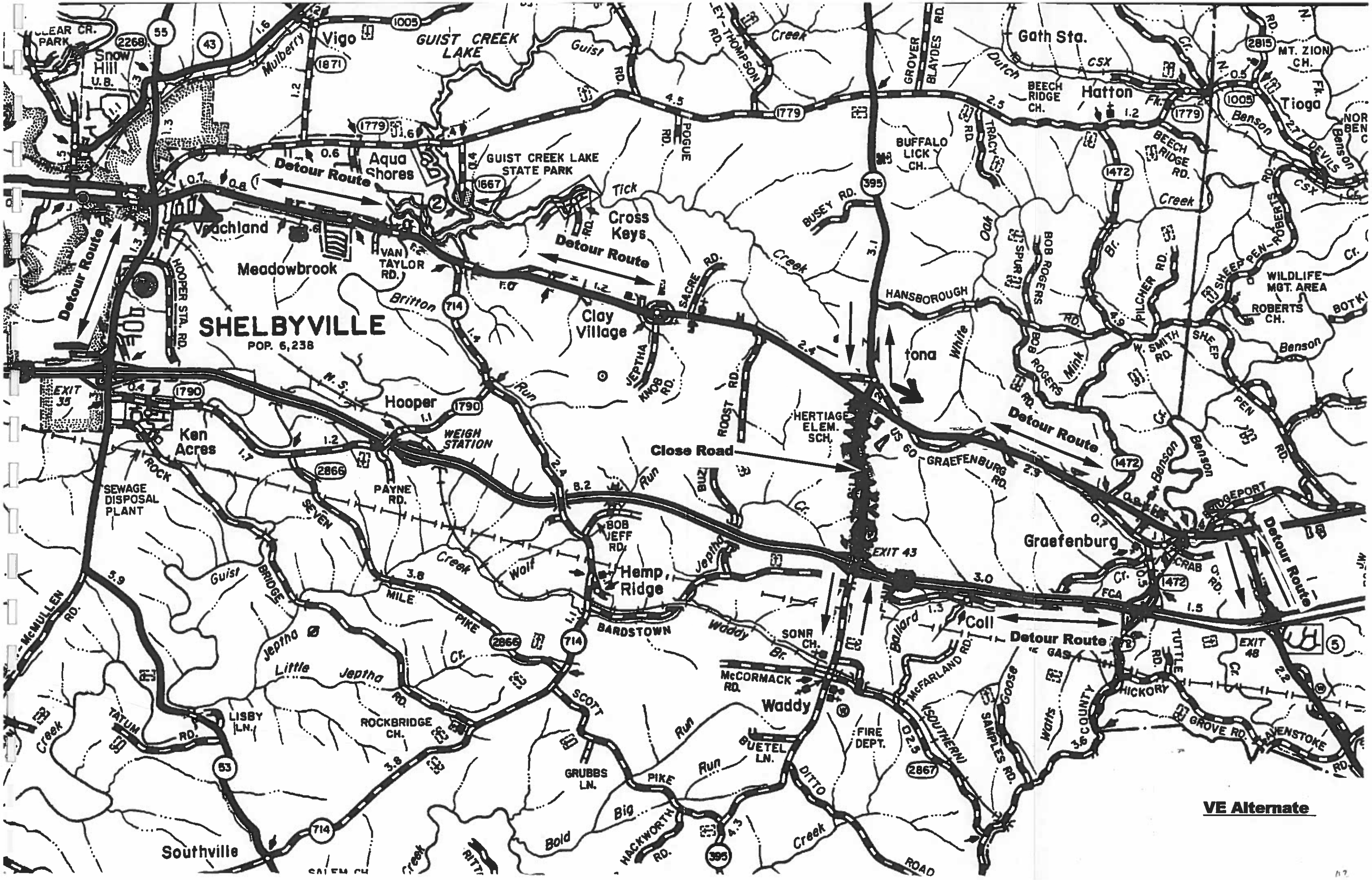
II. Value Engineering Alternate - Close Road and Reroute Traffic During Construction

As Proposed

The proposed on site detour suggests constructing a new alignment on the east side of the existing roadway. The detour road would be constructed at the beginning of the project completely to the other end of the project. This would maintain and control traffic during construction.

VE Alternate

The VE alternate is to shut the existing road down during construction and restrict travel to local traffic only. KY 53, KY 151, and part of I-64 will be used to detour traffic around the existing road. Only 120 vehicles traveling in the northbound and southbound directions on KY 395 would be affected negatively by adverse travel. The adverse travel distance is eight miles. There is not adverse travel for traffic flowing in the eastbound and westbound directions.


SHELBYVILLE
POP. 6,238
Vigo
GUIST CREEK LAKE
Snow Hill U.B.
Aqua Shores
GUIST CREEK LAKE STATE PARK
Detour Route
Cross Keys
Clay Village
Meadowbrook
Hooper
Ken Acres
SEWAGE DISPOSAL PLANT
Close Road
HERTIAGE ELEM. SCH.
Gath Sta.
Hatton
BEECH RIDGE CH.
BUFFALO LICK CH.
Tioga
MT. ZION CH.
BEECH RIDGE RD.
HANSBOROUGH
WILDLIFE MGT. AREA
ROBERTS CH.
Graefenburg
Hemp Ridge
BARDSTOWN
Waddy
SONR CH.
McCORMACK RD.
Coll
Southville
ROCKBRIDGE CH.
LISBY LN.
GRUBBS LN.
BUETEL LN.
FIRE DEPT.
HICKORY GROVE RD.
RAVENSTOKE RD.
EXIT 43
EXIT 48
EXIT 35
VE Alternate

Cost Comparison

Description	Units	Unit Cost	Proposed Quantity	Proposed Cost	VE Quantity	VE Cost
Detour Construction	Lp Sum	$ 1.00	800000	$800,000	0	$ -
			Total =	$800,000	Total =	$ -

Proposed Savings = $ 800,000

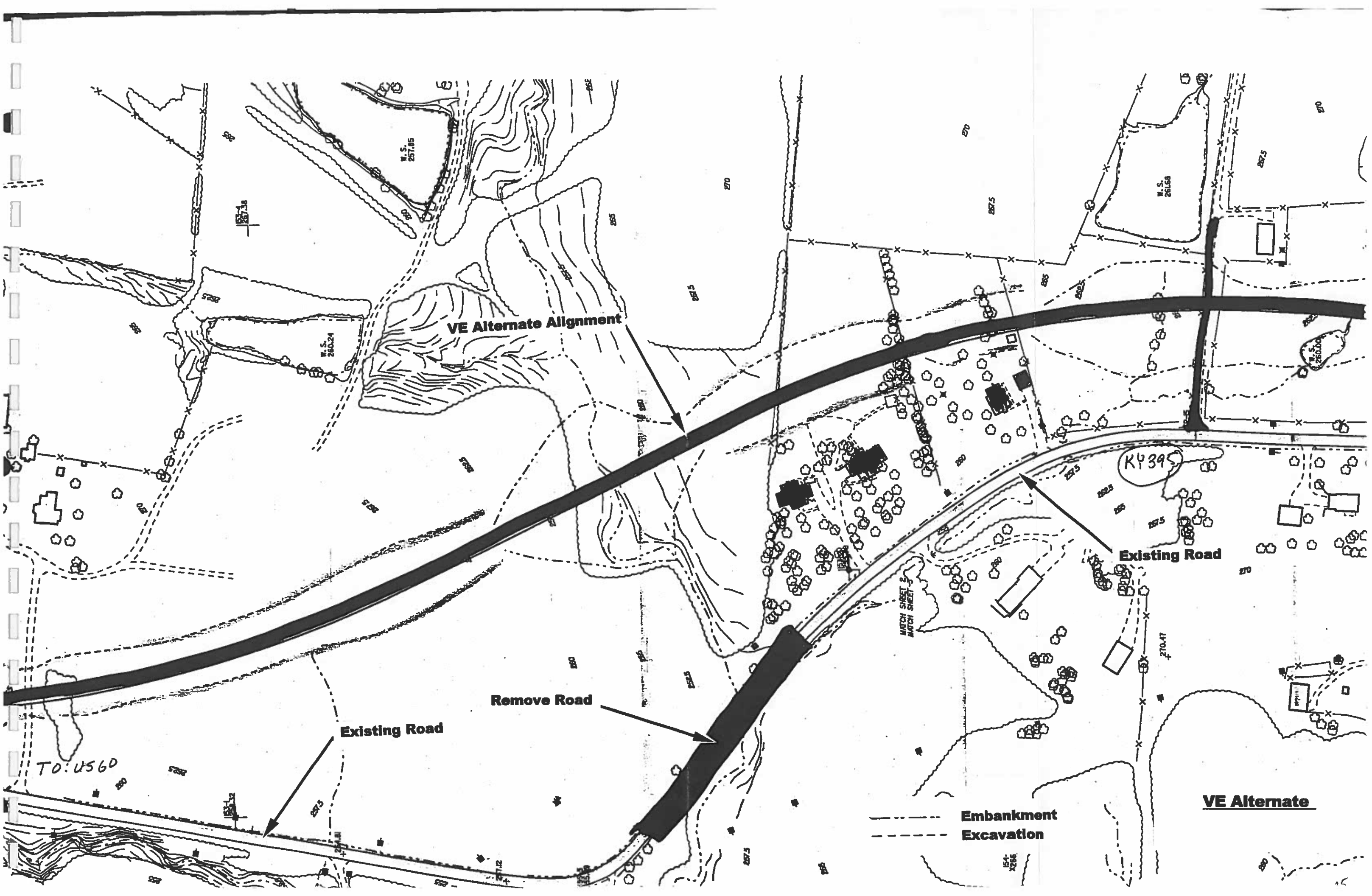
III. Value Engineering Alternate - Build on New Horizontal and Vertical Alignment

As Proposed

The as proposed design consists of a new alignment to the East side of existing KY 395. The proposed roadway will follow existing KY 395 closely with correction for reverse horizontal curves near Sta. 21+500. The acquisition of three homes near Sta. 21+500 will be necessary with the proposed alignment.

VE Alternate

The Value Engineering alternate moves the horizontal alignment further east away from the existing road in order to avoid taking the three homes. The VE alternate requires more acreage of right of way to be taken because it diverges from the existing KY 395 and its current right of way. This alternate also eliminates the need for detour construction. Earthwork quantities are reduced because a cross country alignment reduces the access demands and gives the designer the ability to position the grade to better balance the earthwork. The VE alternate changes from and embankment in place project to roadway excavation. Portions of existing KY 395 would be left in place to provide access to residents. Surfacing, drainage, and erosion control estimates should be similar between the VE alternate and as proposed.


VE Alternate Alignment
Existing Road
Remove Road
Existing Road
TO: US60
KY 39
MATCH SHEET 2
MATCH SHEET 1
Embankment
Excavation
VE Alternate

VE Alternate Alignment

Existing Road

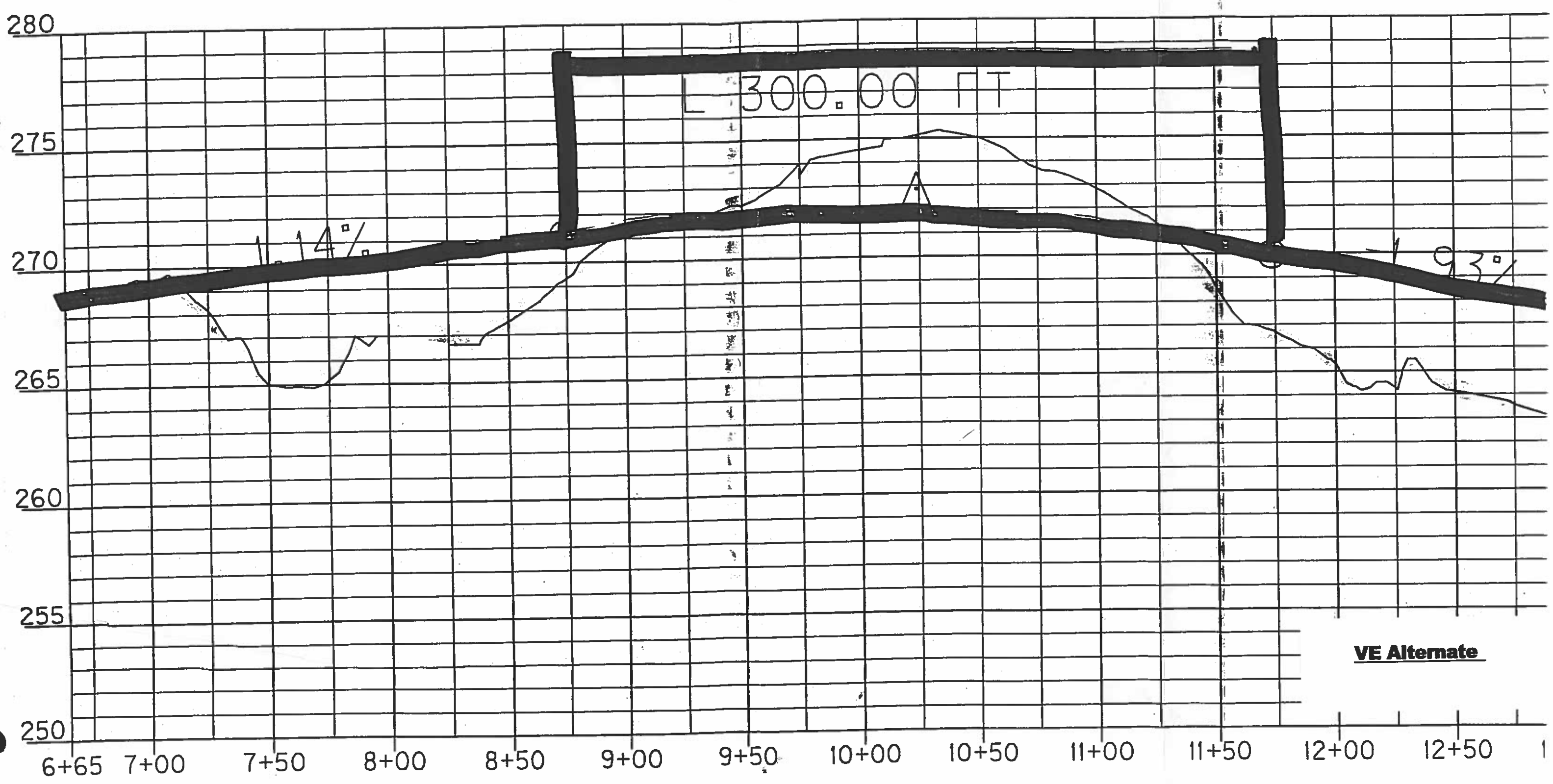
Remove Road

TO I-64

Embankment

Excavation

VE Alternate


L 300.00 FT
1.14%
1.93%
280
275
270
265
260
255
250
6+65
7+00
7+50
8+00
8+50
9+00
9+50
10+00
10+50
11+00
11+50
12+00
12+50
VE Alternate

-3%

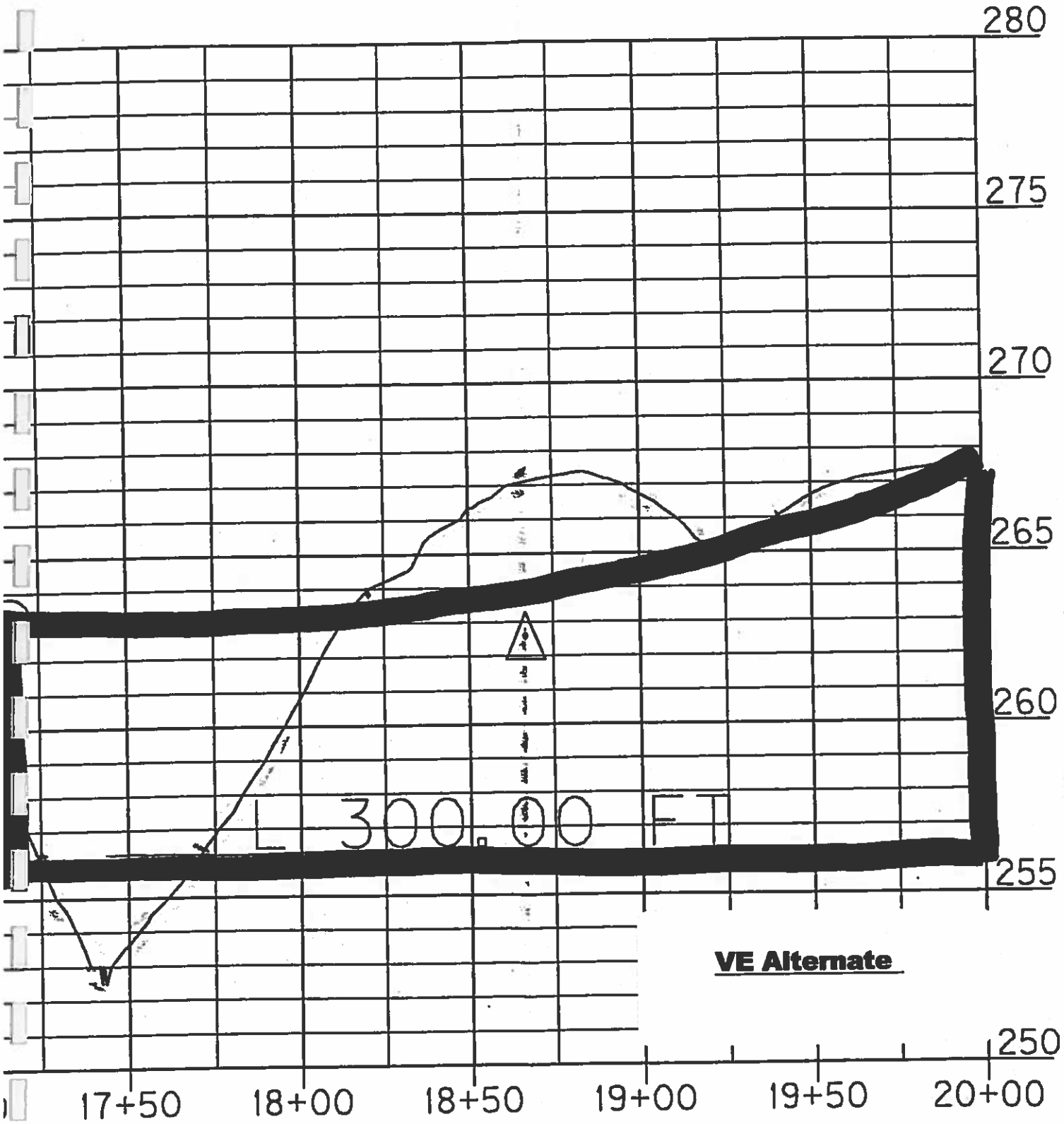
L 300.00 FT

-0.45%

L 300.00

VE Alternate

12+50 13+00 13+50 14+00 14+50 15+00 15+50 16+00 16+50 17+00 17+50 18+00 18+50 19+


280
275
270
265
260
255
250
L 300.00 FT
17+50
18+00
18+50
19+00
19+50
20+00
VE Alternate

Cost Comparison

Description	Units	Unit Cost	Proposed Quantity	Proposed Cost	VE Quantity	VE Cost
Right of Way (acreage)	Lp Sum	$ 1.00	997000	$997,000	1114000	$ 1,114,000
Right of Way (homes)	Home	$150,000.00	3	$450,000	0	$ -
Detour	Lp Sum	$800,000.00	1	$800,000	0	$ -
Emb in Place	Cu M	$ 7.00	103286	$723,002	0	$ -
Roadway Exc	Cu M	$ 4.00	0	$0	167500	$ 670,000
Total =				$2,970,002	Total =	$ 1,784,000

Proposed Savings =	$ 1,186,002

IV. Value Engineering Alternate - Revise Pavement Design

As Proposed

Use Bituminous concrete pavement on DGA and Crushed Stone Base.

VE Alternate 1

Place geotextile on the subgrade and cover with 300 mm of No. 3 stone. This eliminates 100 mm of bituminous base.

VE Alternate 2

Use 200 mm of lime stabilization with bituminous concrete pavement. This eliminates 50 mm of bituminous base.

VE Alternate 3

Use 250 mm PCC pavement with 150 mm shoulder pavement on 150 mm crushed stone base.

Cost Comparison

VE Alternate 1

Description	Units	Unit Cost	Proposed Quantity	Proposed Cost	VE Quantity	VE Cost
Crushed Stone Base	M Ton	$ 14.94	8064	$120,476	8064	$ 120,476
Bit. Base Cl. I	M Ton	$ 35.00	15456	$540,960	7728	$ 270,480
Bit Surface Cl. I	M Ton	$ 45.00	2419	$108,855	2419	$ 108,855
Geotextile Fabric TY III	Sq M	$ 1.50	0	$0	33600	$ 50,400
Crushed Agg. #3	M Ton	$ 13.00	0	$0	16128	$ 209,664
Total =				$770,291	Total =	$ 759,875

Proposed Savings = $ 10,416

Cost Comparison

VE Alternate 2

Description	Units	Unit Cost	Proposed Quantity	Proposed Cost	VE Quantity	VE Cost
Crushed Stone Base	M Ton	$ 14.94	8064	$120,476	8064	$ 120,476
Bit. Base Cl. I	M Ton	$ 35.00	15456	$540,960	10819	$ 378,665
Bit Surface Cl. I	M Ton	$ 45.00	2419	$108,855	2419	$ 108,855
Lime Stab. Subgrade	Sq M	$ 3.75	0	$0	33600	$ 126,000
			Total =	$770,291	Total =	$ 733,996

Proposed Savings = $ 36,295

Cost Comparison

VE Alternate 3

Description	Units	Unit Cost	Proposed Quantity	Proposed Cost	VE Quantity	VE Cost
Crushed Stone Base	M Ton	$ 14.94	8064	$120,476	8064	$ 120,476
Bit. Base Cl. I	M Ton	$ 35.00	15456	$540,960	0	$ -
Bit Surface Cl. I	M Ton	$ 45.00	2419	$108,855	0	$ -
PCC Pvmt. 250 mm	Sq M	$ 37.20	0	$0	20160	$ 749,952
PCC Shldr. 150 mm	Sq M	$ 20.38	0	$0	13440	$ 273,907
Total =				$770,291	Total =	$ 1,144,335

Proposed Savings = $ (374,044)

SUMMARY OF RECOMMENDATIONS

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

Recommendation No. 1 - Use Original Horizontal Alignment with New Vertical Alignment

The Value Engineering Team recommends that this VE Alternative be implemented. This alternative revises the grade and reduces the amount of earthwork required.

If this recommendation can be implemented, there are possible savings of $258,000.

Recommendation No. 2 - Close Road and Reroute Traffic During Construction

The Value Engineering Team recommends that this VE Alternative be implemented. This alternative closes KY 395 to through traffic during construction.

If this recommendation can be implemented, there are possible savings of $800,000.

Recommendation No. 3 - Build on New Horizontal and Vertical Alignment

The Value Engineering Team recommends that this VE alternative be implemented. This alternative recommends a cross country alignment that is further east than the as proposed. This allows more freedom with the vertical alignment which reduces earthwork. It also eliminates the need for a detour.

If this recommendation can be implemented, there are possible savings of $1,183,000.

Recommendation No. 4 - Revise Pavement Design

The Value Engineering Team recommends that this VE alternative be implemented. This alternative recommends using lime stabilized subgrade.

If this recommendation can be implemented, there are possible savings of $36,000.