VALUE ENGINEERING STUDY

OF

SR 7 - ELLIOTT COUNTY

STATE PROJECT NUMBER: 09-126.00

FRANKFORT, KENTUCKY

DECEMBER 1-5, 2008

Prepared by:

VE GROUP, L.L.C.

In Association With:

KENTUCKY TRANSPORTATION CABINET

VALUE ENGINEERING STUDY
TEAM LEADER

Thomas A. Hartley, P.E., C.V.S.
C.V.S. Registration No. 20010901

DATE

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I. EXECUTIVE SUMMARY

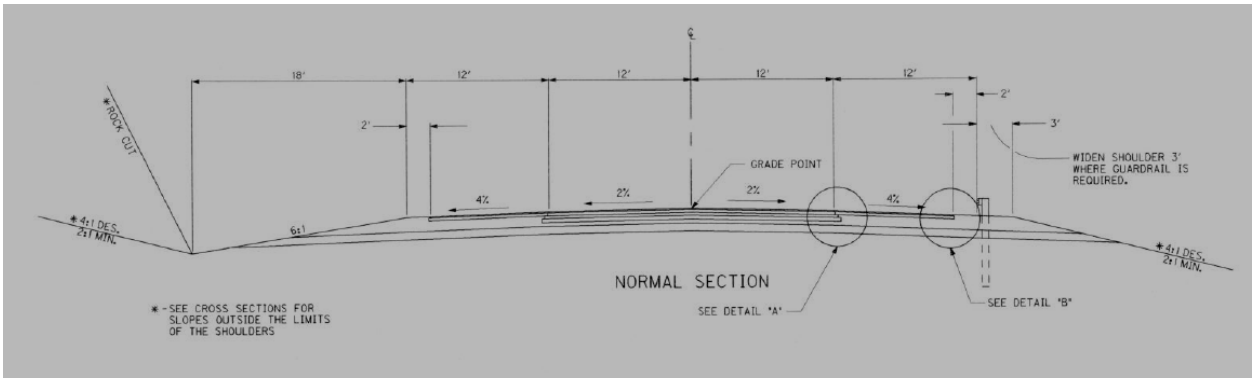
INTRODUCTION

This Value Engineering report summarizes the results of the Value Engineering study performed by VE Group for the Kentucky Transportation Cabinet (KYTC). The study was performed during the week of December 1-5, 2008.

The subject of the study was reconstruction of KY-7 on mostly new alignment from 400' north of KY-706 to the Bridge over the Sandy River.

PROJECT DESCRIPTION

The KY-7 improvement project is 5.25 miles in length with a total preliminary Right-of-Way Acquisition, including associated access road approaches, of approximately 145.9 acres. Roughly 17.2 acres of this, 11.8%, consists of existing KY-7 Right-of-Way. The additional land that must be acquired is estimated to be 128.7 acres. Preliminary engineering data indicates that the proposed Right-of-Way will range from approximately 120', where the proposed horizontal and vertical alignment is relatively close to the centerline of existing KY-7, to as much as 450', where the alignment involves sizable cuts into hillsides or across small ridges. The majority of the Right-of-Way to be acquired is located adjacent to the existing KY-7 Right-of-Way except for the "cross country" section north of KY-409.



AS PROPOSED TYPICAL SECTION

Improvements to KY-7 begin approximately 400' north of the relocated KY-706 intersection and proceeds east across Hog Camp Creek and along the immediate south side of the existing roadway for a distance of approximately 3,000'. At this point the proposed alignment assumes a north-northeast direction and crosses to the west side of KY-7. It then gently curves back to the northeast paralleling the existing roadway at an average distance of 90' as it climbs to the top of the ridge that separates the Hog Camp Creek and Fraley Branch drainage areas.

At the top of the ridge, as the alignment begins to descend into the Fraley Branch valley, it experiences a sweeping left turn followed immediately by a sweeping right turn and resumes a northeast direction. The alignment continues straight at an average distance of 130' along the west side of existing KY-7 for approximately 5,000', thus avoiding impacts to Fraley Branch.

I. EXECUTIVE SUMMARY

PROJECT DESCRIPTION

As the alignment approaches the KY-409 intersection it curves slightly to the right and then immediately back to the left where it assumes north-northeast direction, still along the west side of existing KY-7. Roughly 1,500’ north of the KY-409 intersection, Alternate I continues straight, assuming a 4,200’ "cross country" path over three hills, a course that diverges away from the existing roadway by as much as 900’. This segment crosses primarily wooded side slopes, ridge tops and narrow ravines, and a minor amount of residential property. Approximately 3,000’ south of Horton Flats Road, the alignment converges back with existing KY-7 where it continues to follow along the west side of the roadway at an average distance of 55’ up to Ridgeway Road. Front Ridgeway Road to the project termini at the Little Sandy River, 2,300’, the centerline is contained within the existing KY-7 Right-of-Way.

Reconstruction of intersecting road approaches include: KY-885, I Hog Camp Road, KY-409, Horton Flats Road, and Ridgeway Road. Two additional new connector approaches are proposed that will link a remnant section of existing KY-7 with the "cross country' section described between KY-409 and Horton Flats Road. The entrance into the Bruin Recreation Area requires minor reconstruction. Approaches will consist of 2- 10’ lane, 6’ shoulders, ditches (as needed) and 2:1 or 4:1 side slopes. At this time, the need for a center turn lane at KY-409 or KY-885 does not appear warranted. However, a center turn lane approximately 1,800’ in length will improve access at the Bruin Recreation Area (Grayson Lake State Park). It is anticipated that the majority of the existing at-grade private access points along KY-7 will be reconstructed so as to provide continued residential, business and church access. Exceptions may include instances where a residence is displaced and the property is purchased entirely, or in cases where a property becomes landlocked.

I. EXECUTIVE SUMMARY

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:

- Future Maintenance Cost
- Construction Time
- Construction Cost
- Constructability
- Maintenance Of Traffic

I. EXECUTIVE SUMMARY

RESULTS – AREAS OF FOCUS

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 NUMBER 1-

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This Value Engineering Alternative adjusts the vertical alignment**.**

If this recommendation can be implemented, there is a possible savings of ***$9,270,054.***

RECOMMENDATION NUMBER 2-

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This Value Engineering Alternative will place waste in false cuts.

If this recommendation can be implemented, there is a possible savings of ***$738,045.***

RECOMMENDATION NUMBER 3-

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This Value Engineering Alternative will let the project as a separate grade and drainage contract and a separate surface contract.

If this recommendation can be implemented, there is a possible savings of ***$1,271,906.***

RECOMMENDATION NUMBER 4-

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This Value Engineering Alternative will construct 11' lanes.

If this recommendation can be implemented, there is a possible savings of ***$824,719.***

RECOMMENDATION NUMBER 5-

The Value Engineering Team recommends that the Value Engineering alternative be implemented. This Value Engineering Alternative will construct 10' shoulders/5' paved.

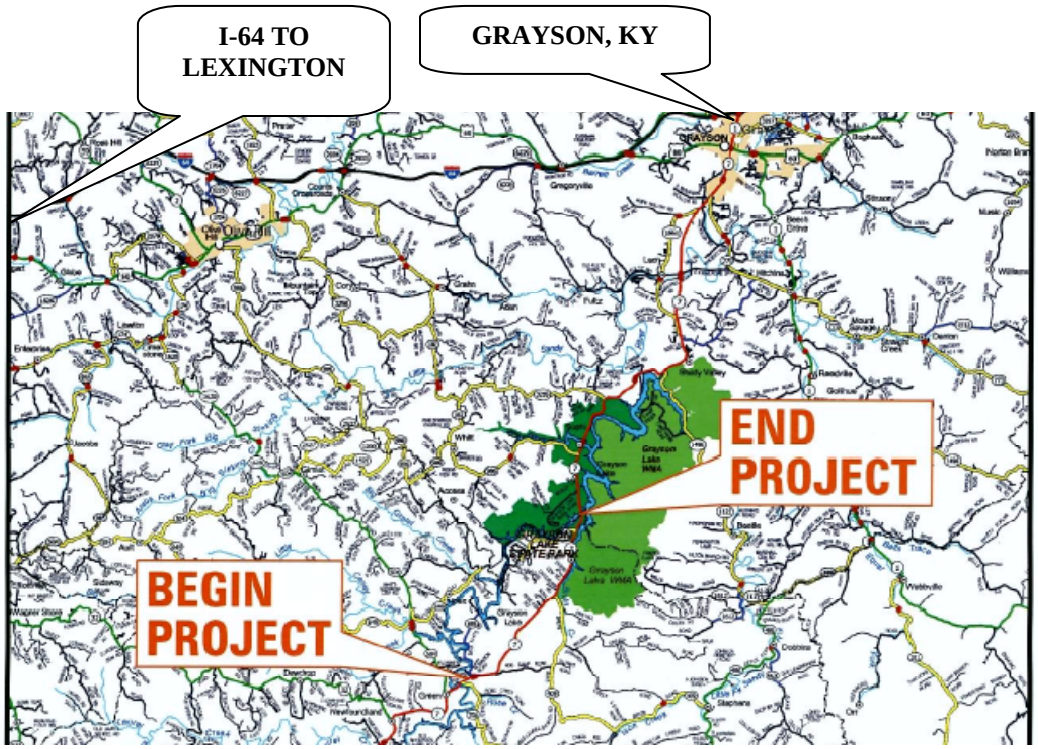
If this recommendation can be implemented, there is a possible savings of ***$1,832,191.***

RECOMMENDATION NUMBER 6-

The Value Engineering Team recommends that the Value Engineering alternative be implemented. This Value Engineering Alternative use "Practical Solutions" for existing alignment.

If this recommendation can be implemented, there is a possible savings of ***$7,695,495.***

II. LOCATION OF PROJECT



III. TEAM MEMBERS AND PROJECT DESCRIPTION

TEAMMEMBERS

NAME	AFFILIATION	EXPERTISE	PHONE/ EMAIL
Thomas A. Hartley, P.E., C.V.S.	VE GROUP	Team Leader	850/627-3900
Robert Semones, P.E., P.L.S., PG	KYTC, CO	VE Coordinator	502/564-3280 x 3368
Mindy Rockwell	KYTC, CO	VE Assistant	502/564-4555 x 3868
Danny Jasper, P.E.	KYTC, CO	Construction	502/564-4780

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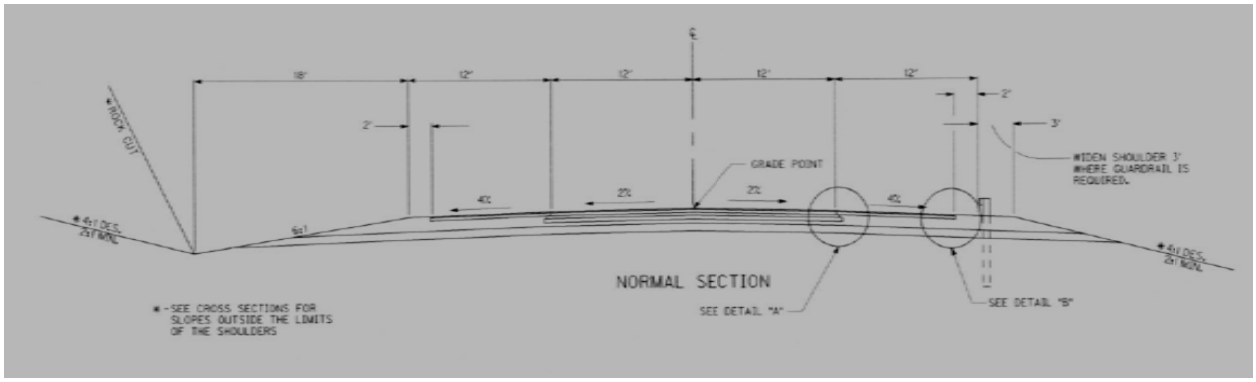

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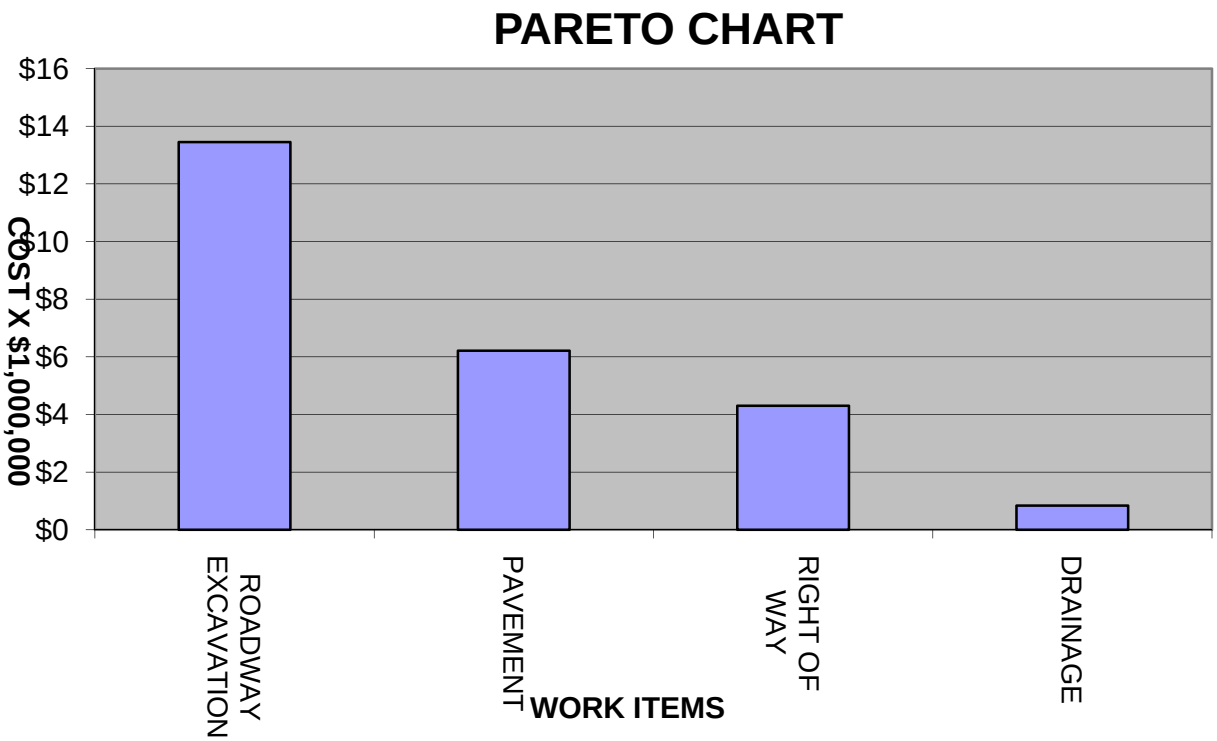
IV. INVESTIGATION PHASE

VALUE ENGINEERING STUDY BRIEFING *SR 7 - ELLIOTT COUNTY* DECEMBER 1, 2008		
NAME	**AFFILIATION**	**PHONE**
Thomas A. Hartley, P.E., C.V.S.	VE GROUP	850/627-3900
Robert Semones, P.E., P.L.S., PG	KYTC, CO	502/564-3280 x 3368
Mindy Rockwell	KYTC, CO	502/564-4555 x 3868
Danny Jasper, P.E.	KYTC, CO	502/564-4780
James Simpson	KYTC, CO Highway Design	502/564-3280
David Gormley	KYTC, CO Highway Design	502/564-3280
Lindsay Carter	KYTC, CO Highway Design	502/564-3280
Jeff Jasper	KYTC, CO Highway Design	502/564-3280
Karen Mynhier	KYTC, D9 Environmental	606/845-2551
Darrin Eldridge	KYTC, D9	606/845-2551
Kevin Martin	KYTC, CO Highway Design	502/564-3280

STUDY RESOURCES *SR 7 - ELLIOTT COUNTY* DECEMBER 1-5, 2008		
NAME	**AFFILIATION**	**PHONE**
Leo Frank	KYTC/CO Pavement Design	502/564-3280
David Gormley	KYTC, CO Highway Design	502/564-3280
Lindsay Carter	KYTC, CO Highway Design	502/564-3280
Mike Calebs	KYTC, CO	606/813-4490

IV. INVESTIGATION PHASE

PARETO CHART



IV. INVESTIGATION PHASE

FUNCTIONAL ANALYSIS WORKSHEET

SR 7 - ELLIOTT COUNTY

DECEMBER 1-5, 2008

ITEM	FUNCT. VERB	FUNCT. NOUN	* TYPE	COST	WORTH	VALUE INDEX
ROADWAY EXCAVATION	SET	PROFILES	B	$13,500,000	$6,250,000	2.00
PAVEMENT	SUPPORT	VEHICLE	B	$6,250,000	$4,200,000	1.48
RIGHT OF WAY	ACQUIRE	RIGHTS	B	$4,300,000	$4,300,000	1.00
DRAINAGE	CONVEY	WATER	S	$850,000	$850,000	1.00

***B – Basic S – Secondary**

** Note: This worksheet is a tool of the Value Engineering process and is only used for determining the areas that the Value Engineering team should focus on for possible alternatives. The column for COST indicates the approximate amount of the cost as shown in the cost estimate. The column for WORTH is an estimated cost for the lowest possible alternative that would provide the FUNCTION shown. Many times the lowest cost alternatives are not considered implementable but are used only to establish a worth for a function. A value index greater than 1.00 indicates the Value Engineering team intends to focus on this area of the project.

IV. INVESTIGATION PHASE

The following areas have a value index greater than 1.00 on the proceeding Functional Analysis Worksheet and therefore have been identified by the Value Engineering Team as areas of focus and investigation for the Value Engineering process:

A. EARTHWORK

B. PAVEMENT

V. SPECULATION PHASE

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

A. EARTHWORK

- Adjust vertical alignment
- Adjust horizontal alignment
- Change typical section
- Place waste in false cuts
- Let as a single contractor/single project
- Let as separate grade and drainage contract and a separate surface contract

B. PAVEMENT

- Construct 11' lanes
- Construct 10' shoulders/5' paved
- Eliminate truck climbing lanes
- Provide for alternative pavement bids
- Use "Practical Solutions" for as proposed alignment
- Use "Practical Solutions" for existing alignment
- Grade & Drain for 2 – 12' lanes, 2 – 12' shoulders and guardrail; pave 2 – 11' lanes, 2 – 8' shoulders and guardrail.

VI. EVALUATION PHASE

A. ALTERNATIVES

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

A. EARTHWORK

Value Engineering Alternative Number 1:	***Adjust Vertical Alignment.***
Value Engineering Alternative Number 2:	***Place waste in false cuts.***
Value Engineering Alternative Number 3:	***Let as separate grade and drainage contract and a separate surface contract.***

B. PAVEMENT

Value Engineering Alternative Number 1:	***Construct 11' lanes.***
Value Engineering Alternative Number 2:	***Construct 10' shoulders/5' paved.***
Value Engineering Alternative Number 3:	***Eliminate truck climbing lanes.***
Value Engineering Alternative Number 4:	***Provide for alternative pavement bids.***
Value Engineering Alternative Number 5:	***Use "Practical Solutions" for as proposed alignment.***
Value Engineering Alternative Number 6:	***Use "Practical Solutions" for existing alignment.***

VI. EVALUATION PHASE

B. ADVANTAGES AND DISADVANTAGES

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. EARTHWORK

"As Proposed": **Approximately 3,842,988 cubic yards of waste will be generated for this project using a maximum grade of 4%.**

Advantages

- Common practice in the eastern part of the State.
- Matches character of the corridor.

Disadvantages

- High construction cost.
- Disposal of material.
- Increased Right of Way.
- Increase impact to environment.

Conclusion

CARRY FORWARD FOR FURTHER DEVELOPMENT.

Value Engineering Alternative Number 1: Adjust Vertical Alignment.

Advantages

- Reduced waste disposal.
- Lower construction cost.
- May reduce Right of Way.
- Reduced impact to environment.

Disadvantages

- Possibly exceed profile grade criteria.

Conclusion

CARRY FORWARD FOR FURTHER DEVELOPMENT.

VI. EVALUATION PHASE

B. ADVANTAGES AND DISADVANTAGES

A. EARTHWORK *(continued)*

Value Engineering Alternative Number 2: Place waste in false cuts.

Advantages

- Onsite disposal of waste.
- Lower unit cost of disposal.
- Future borrows material onsite.
- Reduced guardrail requirements.

Disadvantages

- May increase Right of Way footprint.
- Slight increase in Right of Way Acquisition Cost.

Conclusion

CARRY FORWARD FOR FURTHER DEVELOPMENT.

Value Engineering Alternative Number 3: Let as separate grade and drainage contract and a separate surface contract.

Advantages

- More opportunity for smaller contractors.
- More competitive bids.
- Lower contract price.

Disadvantages

- Increased Maintenance of Traffic.
- Longer construction time.

Conclusion

CARRY FORWARD FOR FURTHER DEVELOPMENT.

B. PAVEMENT

"As Proposed": **The "As Proposed" pavement design (preliminary) includes:**

- 1 – 1 ¼" LAYER OF CL2 ASPH, SURF. O.38E PG64-22
- 2 – 3" LAYERS OF CL2 ASPH. BASE 0.75E, PG64-22
- 1 – 3¾" LAYER OF CL2 ASPH. BASE 0.75E, PG64-22
- 1 – 4" LAYER OF CRUSHED STONE BASE
- 8" CHEMICALLY TREATED SUBGRADE (CEMENT)

For a typical section of 2 – 12' lanes with 2 – 12' shoulders/ 10' paved.

Advantages

- Common practice.
- Generous paved parking area.

Disadvantages

- High construction cost.
- High maintenance cost.
- Increased impervious area.

Conclusion

CARRY FORWARD FOR FURTHER DEVELOPMENT.

Value Engineering Alternative Number 1: Construct 11' lanes.

Advantages

- Lower construction cost.
- Lower maintenance cost.
- Reduced impervious area.

Disadvantages

- Slightly reduced LOS.
- Minor driver discomfort.
- Does not match rest of corridor.

Conclusion

CARRY FORWARD FOR FURTHER DEVELOPMENT.

B. PAVEMENT

Value Engineering Alternative Number 2: Construct 10' shoulders/5' paved.

Advantages

- Lower construction cost.
- Reduced impervious area.

Disadvantages

- Higher maintenance cost.

Conclusion

CARRY FORWARD FOR FURTHER DEVELOPMENT.

Value Engineering Alternative Number 3: Eliminate truck climbing lanes.

Advantages

- Lower construction cost.
- Reduced impervious area.
- Reduced Right of Way.

Disadvantages

- Reduced LOS.
- Lower visibility for passing.

Conclusion

DROPPED FROM FURTHER DEVELOPMENT.

Value Engineering Alternative Number 4: Provide for alternative pavement bids.

Advantages

- Promote competitive pricing.

Disadvantages

- None apparent.

Conclusion

CARRY FORWARD AS A DESIGN COMMENT.

B. PAVEMENT

Value Engineering Alternative Number 5: Use "Practical Solutions" for as proposed alignment.

Advantages

- Lower construction cost.
- Reduced Right of Way.
- Reduced environmental impacts.

Disadvantages

- Lower Design Speed.
- Reduced LOS.
- Driver discomfort with narrower lanes.
- Too restrictive.

Conclusion

DROPPED FROM FURTHER DEVELOPMENT.

Value Engineering Alternative Number 6: Use "Practical Solutions" for existing alignment.

Advantages

- Lower construction cost.
- Reduced Right of Way impacts.
- Reduced environmental impacts.

Disadvantages

- Lower Design Speed.
- Reduced LOS.
- Driver discomfort with narrower lanes.
- Higher MOT impacts.

Conclusion

CARRY FORWARD FOR FURTHER DEVELOPMENT.

VII. DEVELOPMENT PHASE

A. EARTHWORK

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE NUMBER 1
(3) VALUE ENGINEERING ALTERNATIVE NUMBER 2
(4) VALUE ENGINEERING ALTERNATIVE NUMBER 3

B. PAVEMENT

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE NUMBER 1
(3) VALUE ENGINEERING ALTERNATIVE NUMBER 2
(4) VALUE ENGINEERING ALTERNATIVE NUMBER 3

C. DESIGN COMMENTS

(1) ALTERNATIVE PAVEMENT BIDS

VII. DEVELOPMENT PHASE

A. EARTHWORK

1. "As Proposed"

Approximately 3,842,988 cubic yards of waste will be generated for this project using a maximum grade of -4.79%.

II. DEVELOPMENT PHASE

A. EARTHWORK

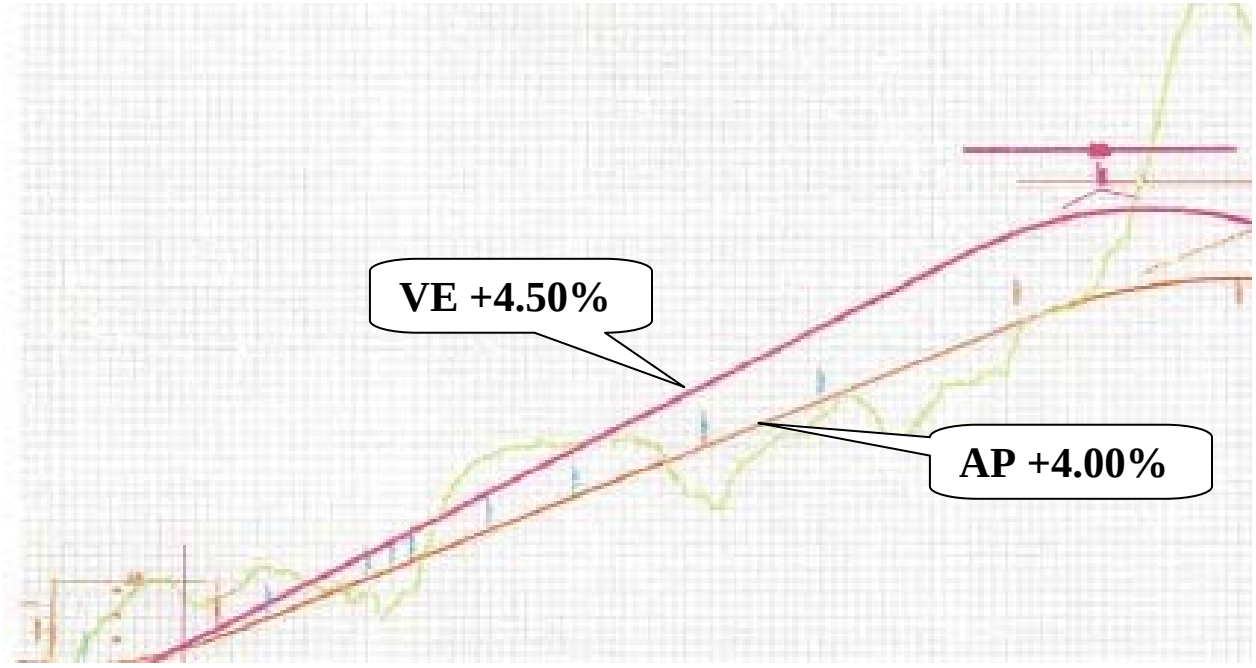
2. Value Engineering Alternative Number 1

The Value Engineering Team recommends adjusting the grades to reduce the amount of waste on the project. It appears increasing the grades to the maximum 5% for this type of facility will reduce the amount of cut required in three locations:

1. STA 4188+00 to STA 4227+30 (+4.50%)
2. STA 4325+00 to STA 4351+00 (+5.00%)
3. STA 4351+00 to STA 4378+00 (-5.00%)

The grade from VPI at STA 4227+30 to an existing VPI at STA 4288+50 will be -2.28%. This grade passes through the existing VPI at STA 4234+00. Adjusting this grade will increase the amount of fill required and use more of the cut material to help balance the earthwork.

Adjusting these grades will significantly reduce the amount of waste disposal by the contractor and will also eliminate the warrant for a climbing lane from STA 4228+00 and 4260+50 where the grade is reduced to -2.28%.

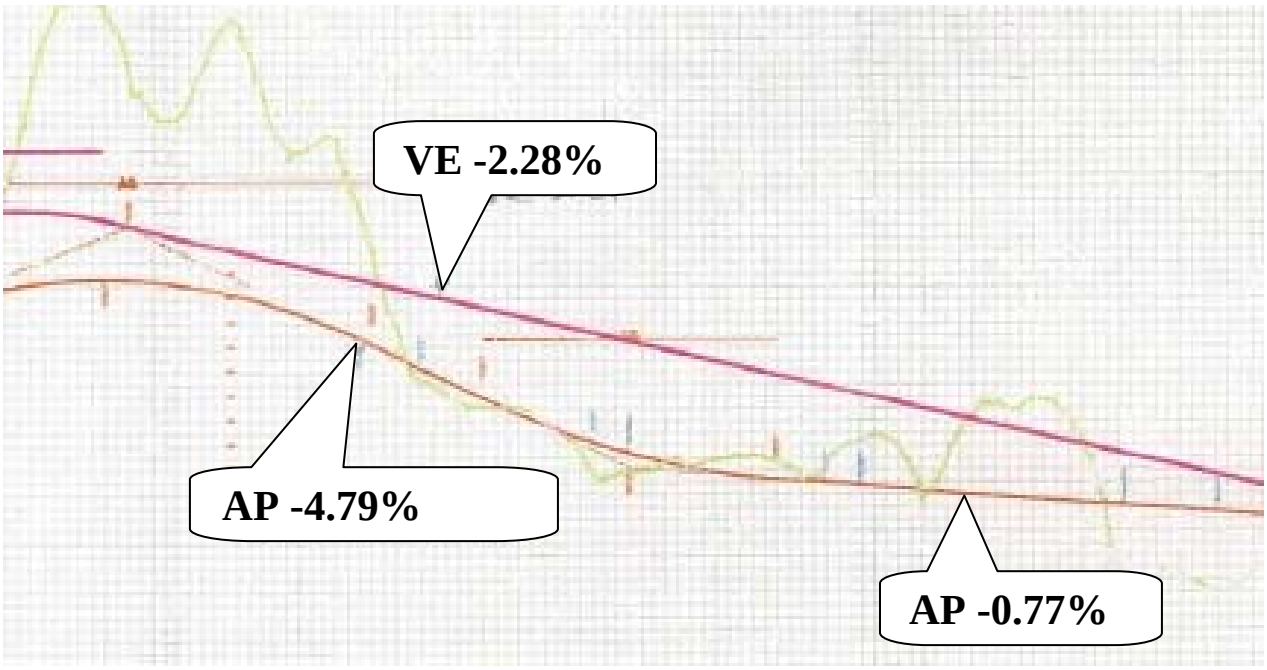


STA 4188+00 to STA 4227+30 (+4.50%)

II. DEVELOPMENT PHASE

A. EARTHWORK

2. Value Engineering Alternative Number 1

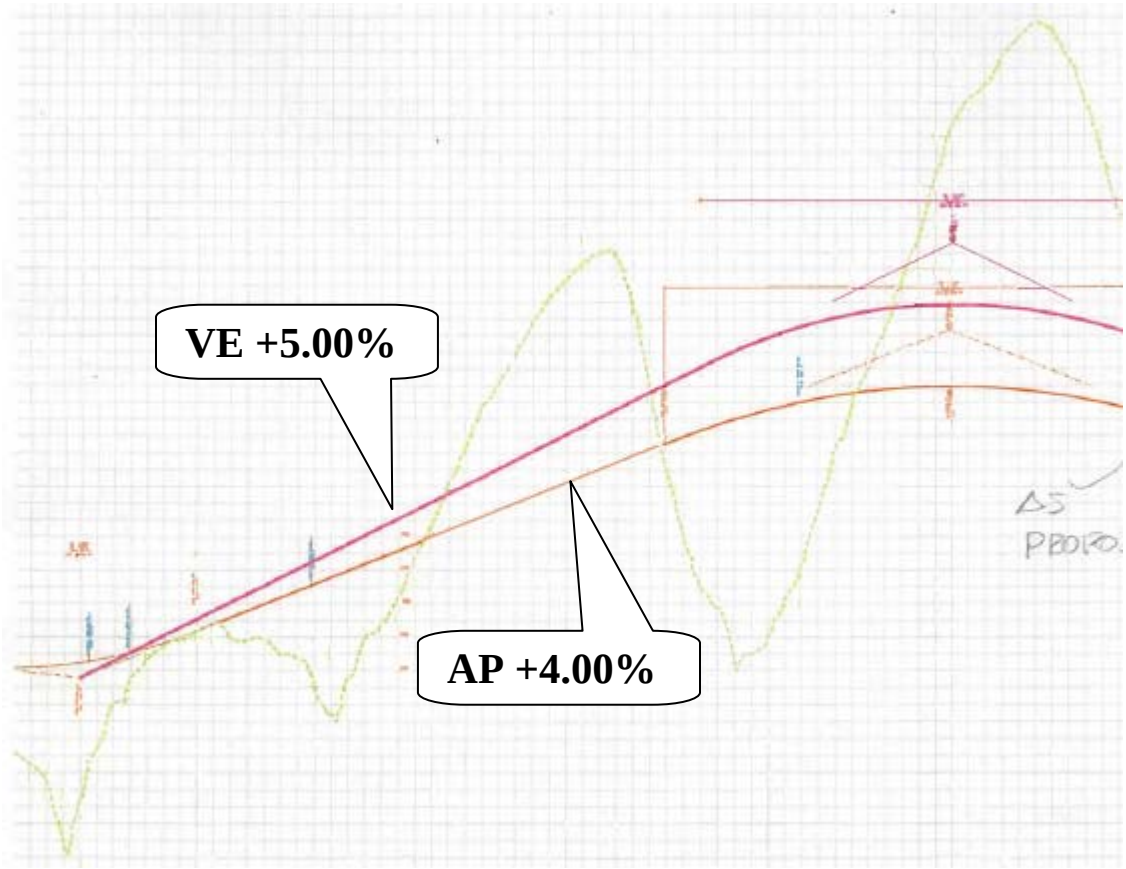


STA 4227+30 to STA 4288+50 (-2.28%)

II. DEVELOPMENT PHASE

A. EARTHWORK

2. Value Engineering Alternative Number 1

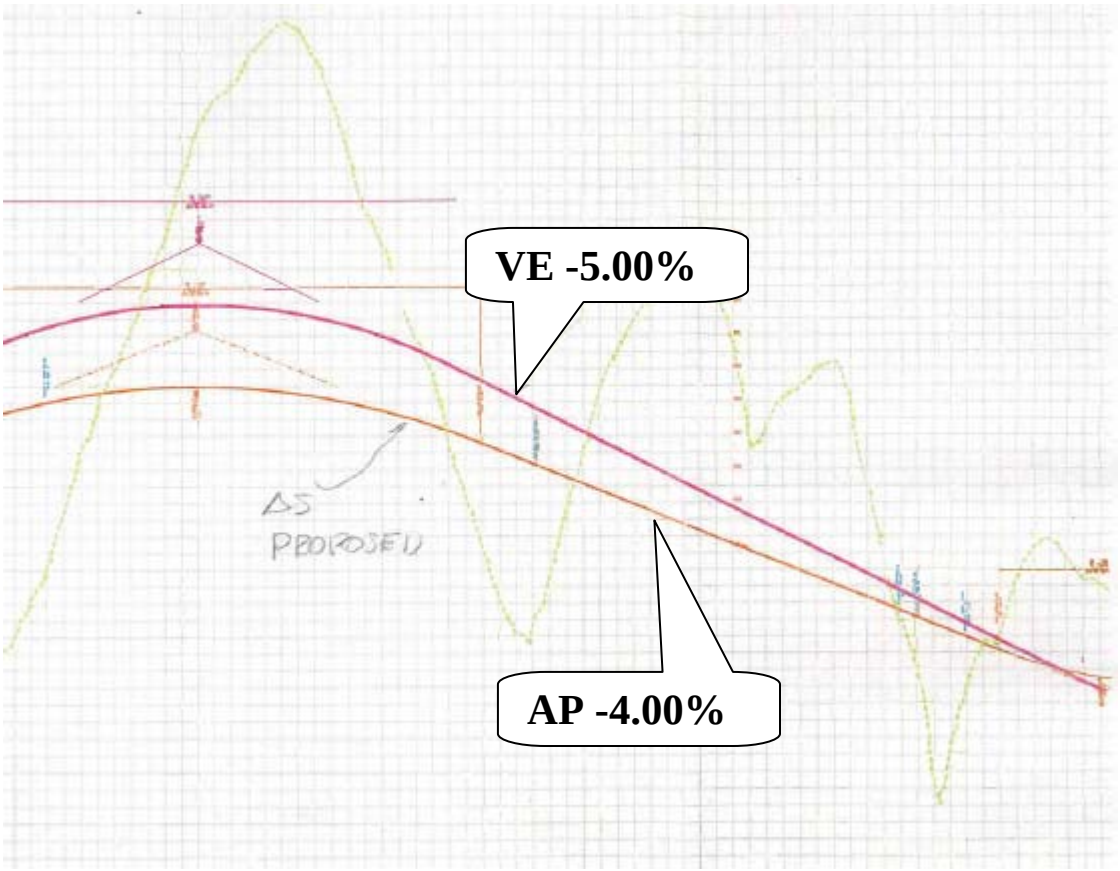


STA 4325+00 to STA 4351+00 (+5.00%)

II. DEVELOPMENT PHASE

A. EARTHWORK

2. Value Engineering Alternative Number 1



STA 4351+00 to STA 4378+00 (-5.00%)

EARTHWORK - ADJUST GRADES
VALUE ENGINEERING ALTERNATIVE NUMBER 1
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
ROADWAY EXCAVATION WASTE	CY	$3.50	2,453,199	$8,586,197	0.0	$0
ROADWAY EXCAVATION BALANCE	CY	$2.50	-	$0	363,347	$908,368
CLIMBING LANE	SY	$45.27	5,194	$235,149	-	$0
SUBTOTAL				**$8,821,345**		**$908,368**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		6.5%		$630,727		$64,948
TRAFFIC CONTROL/MOT		0.0%		$0		$0
CONTINGENCY		10.0%		$882,135		$90,837
GRAND TOTAL				**$10,334,206**		**$1,064,153**

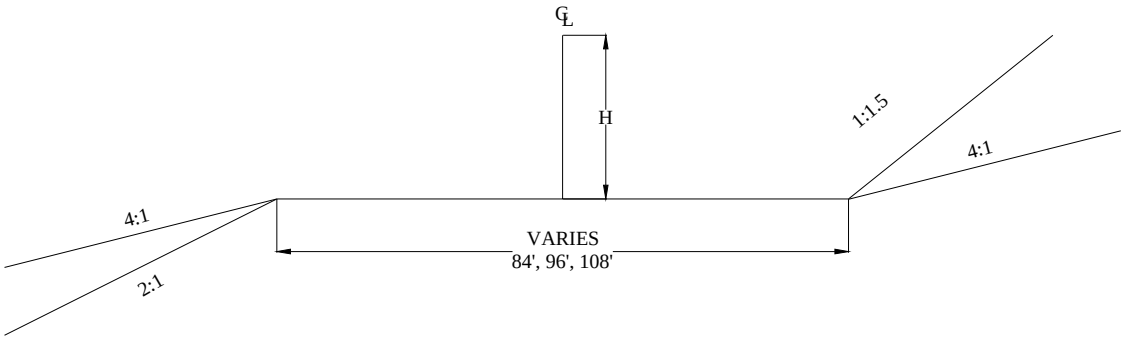
POSSIBLE SAVINGS **$ 9,270,054**

II. DEVELOPMENT PHASE

A. EARTHWORK

COST COMPARISON SHEET BACK UP CALCULATIONS

In order to estimate the cut/fill quantities in these areas, the following template was assumed and quantities were calculated every 100'.



VALUE ENGINEERING ALTERNATIVE TEMPLATE

4:1 slopes were used for cut/fill heights of up to 10', with over 10' of fill the slopes were reduced to a 2:1 slope, and for the cut over 10' deep the slopes were adjusted to a 1:1.5. It is also assume the height of the cut or fill at the center line is the average height of ground over the typical section

The unit price for the Value Engineering Roadway Excavation (Balance) was discussed with KYTC Construction Personnel and it was assumed reducing the unit price by $1.00 was reasonable because of the reduction in the cost of disposal and fuel costs.

CLIMBING LANE PAVEMENT:

	PAVEMENT	RATE	LBS	TN	PRICE	
SURF	1.25	115	143.75	0.07	$75.56	$5.43
ASPH BASE	3	115	345	0.17	$56.70	$9.78
ASPH BASE	3	115	345	0.17	$56.70	$9.78
ASPH BASE	3.75	115	431.25	0.22	$56.70	$12.23
CSB	4	115	460	0.23	$23.70	$5.45
ROADBED STAB				1	$2.60	$2.60
						$45.27

12' X 4250' = 5667 SY

II. DEVELOPMENT PHASE

A. EARTHWORK

COST COMPARISON SHEET BACK UP CALCULATIONS

AS PROPOSED EARTHWORK QUANTITIES FOR STA 4188+00 TO 4288+00:

STA	TYPICAL WIDTH	NAT GRND	AP EL	H-AP	TYPE	ABS H	SLOPE	WIDTH	AREA	VOLUME	CUT	FILL
418800	96	761.10	732.29	-28.81	-1	28.81	0.667	153.62	4426	16391.82	16,392	-
418900	96	765.30	734.12	-31.18	-1	31.18	0.667	158.36	4938	18287.65	18,288	-
419000	96	757.80	736.68	-21.12	-1	21.12	0.667	138.24	2920	10813.44	10,813	-
419100	96	755.90	739.97	-15.93	-1	15.93	0.667	127.86	2037	7543.74	7,544	-
419200	96	760.70	743.85	-16.85	-1	16.85	0.667	129.7	2185	8094.241	8,094	-
419300	96	769.70	747.79	-21.91	-1	21.91	0.667	139.82	3063	11346.13	11,346	-
419400	96	769.20	751.73	-17.47	-1	17.47	0.667	130.94	2288	8472.303	8,472	-
419500	96	763.60	755.67	-7.93	-1	7.93	4	111.86	887	3285.37	3,285	-
419600	96	761.00	759.61	-1.39	-1	1.39	4	98.78	137	508.5341	509	-
419700	96	756.90	736.54	-20.36	-1	20.36	0.667	136.72	2784	10309.7	10,310	-
419800	96	750.50	767.48	16.98	1	16.98	2	129.96	2207	8173.04	-	8,173
419900	96	759.70	771.42	11.72	1	11.72	2	119.44	1400	5184.581	-	5,185
420000	96	784.20	775.36	-8.84	-1	8.84	4	113.68	1005	3721.967	3,722	-
420100	96	805.00	779.30	-25.70	-1	25.7	0.667	147.4	3788	14030.3	14,030	-
420200	96	814.60	783.24	-31.36	-1	31.36	0.667	158.72	4977	18435.03	18,435	-
420300	96	819.00	787.18	-31.82	-1	31.82	0.667	159.64	5080	18813.87	18,814	-
420400	96	819.90	791.12	-28.78	-1	28.78	0.667	153.56	4419	16368.36	16,368	-
420500	96	821.20	759.06	-62.14	-1	62.14	0.667	220.28	13688	50697.03	50,697	-
420600	96	821.00	799.00	-22.00	-1	22	0.667	140	3080	11407.41	11,407	-
420700	96	822.20	802.94	-19.26	-1	19.26	0.667	134.52	2591	9595.76	9,596	-
420800	96	823.20	806.88	-16.32	-1	16.32	0.667	128.64	2099	7775.573	7,776	-
420900	96	821.10	810.82	-10.28	-1	10.28	0.667	116.56	1198	4437.914	4,438	-
421000	96	807.40	814.76	7.36	1	7.36	4	110.72	815	3018.145	-	3,018
421100	96	802.40	818.70	16.30	1	16.3	2	128.6	2096	7763.63	-	7,764
421200	96	799.80	822.64	22.84	1	22.84	2	141.68	3236	11985.08	-	11,985
421300	96	815.00	826.58	11.58	1	11.58	2	119.16	1380	5110.64	-	5,111
421400	96	822.80	830.51	7.71	1	7.71	4	111.42	859	3181.66	-	3,182
421500	96	824.80	834.45	9.65	1	9.65	4	115.3	1113	4120.907	-	4,121
421600	96	831.80	838.39	6.59	1	6.59	4	109.18	719	2664.801	-	2,665
421700	96	840.90	842.33	1.43	1	1.43	4	98.86	141	523.5919	-	524
421800	96	835.90	846.27	10.37	1	10.37	2	116.74	1211	4483.681	-	4,484
421900	96	823.40	850.21	26.81	1	26.81	2	149.62	4011	14856.71	-	14,857
422000	96	829.60	854.15	24.55	1	24.55	2	145.1	3562	13193.35	-	13,193
422100	96	844.90	858.09	13.19	1	13.19	2	122.38	1614	5978.49	-	5,978
422200	96	845.50	862.03	16.53	1	16.53	2	129.06	2133	7901.34	-	7,901

422300	96	851.00	865.97	14.97	1	14.97	2	125.94	1885	6982.673	-	6,983
422400	96	865.00	869.91	4.91	1	4.91	4	105.82	520	1924.356	-	1,924
422500	96	873.50	873.63	0.13	1	0.13	4	96.26	13	46.34741	-	46
422600	96	877.50	876.91	-0.59	-1	0.59	4	97.18	57	212.3563	212	-
422700	96	883.00	879.76	-3.24	-1	3.24	4	102.48	332	1229.76	1,230	-
422800	96	900.40	882.17	-18.23	-1	18.23	0.667	132.46	2415	8943.503	8,944	-
422900	96	926.70	834.15	-92.55	-1	92.55	0.667	281.1	26016	96354.83	96,355	-
423000	108	964.80	885.69	-79.11	-1	79.11	0.667	266.22	21061	78002.46	78,002	-
423100	108	995.70	886.79	-108.91	-1	108.91	0.667	325.82	35485	131426.1	131,426	-
423200	108	1000.20	887.45	-112.75	-1	112.75	0.667	333.5	37602	139267.1	139,267	-
423300	108	996.60	887.68	-108.92	-1	108.92	0.667	325.84	35490	131446.3	131,446	-
423400	108	971.90	887.47	-84.43	-1	84.43	0.667	276.86	23375	86575.15	86,575	-
423500	108	953.90	886.82	-67.08	-1	67.08	0.667	242.16	16244	60163.31	60,163	-
423600	108	964.90	885.74	-79.16	-1	79.16	0.667	266.32	21082	78081.08	78,081	-
423700	108	974.90	884.22	-90.68	-1	90.68	0.667	289.36	26239	97182.09	97,182	-
423800	108	992.30	882.27	-110.03	-1	110.03	0.667	328.06	36096	133690.5	133,691	-
423900	108	975.00	879.88	-95.12	-1	95.12	0.667	298.24	28369	105068.8	105,069	-
424000	96	947.70	887.05	-60.65	-1	60.65	0.667	217.3	13179	48812.02	48,812	-
424100	96	938.90	873.78	-65.12	-1	65.12	0.667	226.24	14733	54565.74	54,566	-
424200	96	946.10	870.08	-76.02	-1	76.02	0.667	248.04	18856	69837.04	69,837	-
424300	96	926.20	865.94	-60.26	-1	60.26	0.667	216.52	13047	48324.06	48,324	-
424400	96	894.60	861.36	-33.24	-1	33.24	0.667	162.48	5401	20003.09	20,003	-
424500	96	864.90	856.57	-8.33	-1	8.33	4	112.66	938	3475.77	3,476	-
424600	96	846.50	851.78	5.28	1	5.28	4	106.56	563	2083.84	-	2,084
424700	96	840.60	846.98	6.38	1	6.38	4	108.76	694	2569.959	-	2,570
424800	96	836.30	842.19	5.89	1	5.89	4	107.78	635	2351.201	-	2,351
424900	96	835.10	837.44	2.34	1	2.34	4	100.68	236	872.56	-	873
425000	96	834.20	832.98	-1.22	-1	1.22	4	98.44	120	444.803	445	-
425100	96	829.20	828.85	-0.35	-1	0.35	4	96.7	34	125.3519	125	-
425200	96	823.60	825.07	1.47	1	1.47	4	98.94	145	538.6733	-	539
425300	96	808.50	823.30	14.80	1	14.8	2	125.6	1859	6884.741	-	6,885
425400	96	808.40	820.02	11.62	1	11.62	2	119.24	1386	5131.736	-	5,132
425500	96	809.40	815.72	6.32	1	6.32	4	108.64	687	2542.981	-	2,543
425600	96	813.30	813.27	-0.03	-1	0.03	4	96.06	3	10.67333	11	-
425700	96	811.20	811.16	-0.04	-1	0.04	4	96.08	4	14.23407	14	-
425800	96	813.80	809.39	-4.41	-1	4.41	4	104.82	462	1712.06	1,712	-
425900	96	816.10	807.95	-8.15	-1	8.15	4	112.3	915	3389.796	3,390	-

426000	96	815.50	806.85	-8.65	-1	8.65	4	113.3	980	3629.796	3,630	-
426100	84	811.00	806.04	-4.96	-1	4.96	4	93.92	466	1725.345	1,725	-
426200	84	806.70	805.27	-1.43	-1	1.43	4	86.86	124	460.0363	460	-
426300	84	818.30	804.50	-13.80	-1	13.8	0.667	111.6	1540	5704	5,704	-
426400	84	821.00	804.12	-16.88	-1	16.88	0.667	117.76	1988	7362.181	7,362	-
426500	84	822.90	802.97	-19.93	-1	19.93	0.667	123.86	2469	9142.703	9,143	-
426600	84	811.30	802.20	-9.10	-1	9.1	4	102.2	930	3444.519	3,445	-
426700	84	803.00	801.44	-1.56	-1	1.56	4	87.12	136	503.36	503	-
426800	84	825.10	800.67	-24.43	-1	24.43	0.667	132.86	3246	12021.37	12,021	-
426900	84	836.60	799.90	-36.70	-1	36.7	0.667	157.4	5777	21394.74	21,395	-
427000	84	835.00	799.13	-35.87	-1	35.87	0.667	155.74	5586	20690.35	20,690	-
427100	84	838.80	798.37	-40.43	-1	40.43	0.667	164.86	6665	24686.26	24,686	-
427200	84	836.00	797.60	-38.40	-1	38.4	0.667	160.8	6175	22869.33	22,869	-
427300	84	820.09	796.83	-23.26	-1	23.26	0.667	130.52	3036	11244.06	11,244	-
427400	84	787.80	796.06	8.26	1	8.26	4	100.52	830	3075.167	-	3,075
427500	84	765.90	795.30	29.40	1	29.4	2	142.8	4198	15549.33	-	15,549
427600	84	766.60	794.53	27.93	1	27.93	2	139.86	3906	14467.74	-	14,468
427700	84	764.60	793.76	29.16	1	29.16	2	142.32	4150	15370.56	-	15,371
427800	84	762.00	792.99	30.99	1	30.99	2	145.98	4524	16755.26	-	16,755
427900	84	760.06	792.23	32.17	1	32.17	2	148.34	4772	17674.44	-	17,674
428000	84	768.70	791.46	22.76	1	22.76	2	129.52	2948	10918.06	-	10,918
428100	84	770.50	790.69	20.19	1	20.19	2	124.38	2511	9300.86	-	9,301
428200	84	775.80	789.92	14.12	1	14.12	2	112.24	1585	5869.736	-	5,870
428300	84	779.80	789.92	10.12	1	10.12	2	104.24	1055	3907.07	-	3,907
428400	84	777.40	788.39	10.99	1	10.99	2	105.98	1165	4313.779	-	4,314
428500	84	789.00	787.40	-1.60	-1	1.6	4	87.2	140	516.7407	517	-
428600	84	790.50	785.96	-4.54	-1	4.54	4	93.08	423	1565.123	1,565	-
428700	84	761.20	784.07	22.87	1	22.87	2	129.74	2967	10989.46	-	10,989
428800	84	775.00	781.74	6.74	1	6.74	4	97.48	657	2433.39	-	2,433
428900	84	792.20	778.95	-13.25	-1	13.25	0.667	110.5	1464	5422.685	5,423	-
										TOTALS	1,801,077	260,694
STA	TYPICAL WIDTH	NAT GRND	AP EL	H-AP	TYPE	ABS H	SLOPE	WIDTH	AREA	VOLUME	CUT	FILL

VE ALTERNATIVE EARTHWORK QUANTITIES FOR STA 4188+00 TO 4288+00:

STA	TYPICAL WIDTH	NAT GRND	EL	H	CUT = -1	ABS H	SLOPE	WIDTH	AREA	VOLUME	CUT	FILL
418800	96	761.10	732.29	-28.81	-1	28.8	0.667	153.6	4426	16391.8	16,392	-
418900	96	765.30	736.79	-28.51	-1	28.5	0.667	153.0	4363	16157.8	16,158	-
419000	96	757.80	741.29	-16.51	-1	16.5	0.667	129.0	2130	7889.3	7,889	-
419100	96	755.90	745.79	-10.11	-1	10.1	0.667	116.2	1175	4351.8	4,352	-
419200	96	760.70	750.29	-10.41	-1	10.4	0.667	116.8	1216	4504.1	4,504	-
419300	96	769.70	754.79	-14.91	-1	14.9	0.667	125.8	1876	6948.1	6,948	-
419400	96	769.20	759.29	-9.91	-1	9.9	4	115.8	1148	4251.0	4,251	-
419500	96	763.60	763.79	0.19	1	0.2	4	96.4	18	67.8	-	68
419600	96	761.00	768.29	7.29	1	7.3	4	110.6	806	2985.7	-	2,986
419700	96	756.90	772.79	15.89	1	15.9	2	127.8	2030	7520.1	-	7,520
419800	96	750.50	777.29	26.79	1	26.8	2	149.6	4007	14841.7	-	14,842
419900	96	759.70	781.79	22.09	1	22.1	2	140.2	3097	11468.8	-	11,469
420000	96	784.20	786.29	2.09	1	2.1	4	100.2	209	775.5	-	775
420100	96	805.00	790.79	-14.21	-1	14.2	0.667	124.4	1768	6548.2	6,548	-
420200	96	814.60	795.29	-19.31	-1	19.3	0.667	134.6	2600	9627.8	9,628	-
420300	96	819.00	799.79	-19.21	-1	19.2	0.667	134.4	2582	9563.7	9,564	-
420400	96	819.90	804.29	-15.61	-1	15.6	0.667	127.2	1986	7355.2	7,355	-
420500	96	821.20	808.79	-12.41	-1	12.4	0.667	120.8	1499	5553.2	5,553	-
420600	96	821.00	813.29	-7.71	-1	7.7	4	111.4	859	3181.7	3,182	-
420700	96	822.20	817.79	-4.41	-1	4.4	4	104.8	462	1712.1	1,712	-
420800	96	823.20	822.29	-0.91	-1	0.9	4	97.8	89	329.7	330	-
420900	96	821.10	826.79	5.69	1	5.7	4	107.4	611	2262.9	-	2,263
421000	96	807.40	831.29	23.89	1	23.9	2	143.8	3435	12721.9	-	12,722
421100	96	802.40	835.79	33.39	1	33.4	2	162.8	5435	20130.5	-	20,130
421200	96	799.80	840.29	40.49	1	40.5	2	177.0	7166	26540.4	-	26,540
421300	96	815.00	844.79	29.79	1	29.8	2	155.6	4635	17165.7	-	17,166
421400	96	822.80	849.29	26.49	1	26.5	2	149.0	3946	14616.6	-	14,617
421500	96	824.80	853.79	28.99	1	29.0	2	154.0	4464	16532.9	-	16,533
421600	96	831.80	858.29	26.49	1	26.5	2	149.0	3946	14616.6	-	14,617
421700	96	840.90	862.79	21.89	1	21.9	2	139.8	3060	11332.5	-	11,333
421800	96	835.90	867.29	31.39	1	31.4	2	158.8	4984	18459.6	-	18,460
421900	96	823.40	871.79	48.39	1	48.4	2	192.8	9329	34550.5	-	34,550
422000	96	829.60	876.29	46.69	1	46.7	2	189.4	8842	32748.7	-	32,749

422100	96	844.90	880.79	35.89	1	35.9	2	167.8	6022	22302.3	-	22,302
422200	96	845.50	885.29	39.79	1	39.8	2	175.6	6986	25875.3	-	25,875
422300	96	851.00	889.79	38.79	1	38.8	2	173.6	6733	24937.7	-	24,938
422400	96	865.00	893.70	28.70	1	28.7	2	153.4	4403	16306.6	-	16,307
422500	96	873.50	897.02	23.52	1	23.5	2	143.0	3365	12462.4	-	12,462
422600	96	877.50	899.76	22.26	1	22.3	2	140.5	3127	11582.2	-	11,582
422700	96	883.00	901.90	18.90	1	18.9	2	133.8	2529	9365.8	-	9,366
422800	96	900.40	903.45	3.05	1	3.1	4	102.1	312	1155.2	-	1,155
422900	96	926.70	904.42	-22.28	-1	22.3	0.667	140.6	3132	11598.6	11,599	-
423000	96	964.80	904.80	-60.00	-1	60.0	0.667	216.0	12961	48003.6	48,004	-
423100	96	995.70	904.58	-91.12	-1	91.1	0.667	278.2	25351	93892.5	93,892	-
423200	96	1000.20	903.78	-96.42	-1	96.4	0.667	288.8	27848	103141.5	103,141	-
423300	96	996.60	902.39	-94.21	-1	94.2	0.667	284.4	26794	99235.7	99,236	-
423400	84	971.90	900.11	-71.79	-1	71.8	0.667	227.6	16337	60506.4	60,506	-
423500	84	953.90	897.83	-56.07	-1	56.1	0.667	196.1	10997	40727.9	40,728	-
423600	84	964.90	895.55	-69.35	-1	69.3	0.667	222.7	15443	57196.5	57,196	-
423700	84	974.90	893.27	-81.63	-1	81.6	0.667	247.3	20182	74749.9	74,750	-
423800	84	992.30	890.99	-101.31	-1	101.3	0.667	286.6	29036	107540.2	107,540	-
423900	84	975.00	888.71	-86.29	-1	86.3	0.667	256.6	22139	81995.8	81,996	-
424000	84	947.70	886.43	-61.27	-1	61.3	0.667	206.5	12654	46865.2	46,865	-
424100	84	938.90	884.15	-54.75	-1	54.7	0.667	193.5	10593	39233.8	39,234	-
424200	84	946.10	881.87	-64.23	-1	64.2	0.667	212.5	13645	50537.7	50,538	-
424300	84	926.20	879.59	-46.61	-1	46.6	0.667	177.2	8259	30590.1	30,590	-
424400	84	894.60	877.31	-17.29	-1	17.3	0.667	118.6	2050	7591.6	7,592	-
424500	84	864.90	875.03	10.13	1	10.1	2	104.3	1057	3913.2	-	3,913
424600	84	846.50	872.75	26.25	1	26.3	2	136.5	3584	13273.2	-	13,273
424700	84	840.60	870.47	29.87	1	29.9	2	143.7	4294	15904.4	-	15,904
424800	84	836.30	868.19	31.89	1	31.9	2	147.8	4713	17457.1	-	17,457
424900	84	835.10	865.91	30.81	1	30.8	2	145.6	4487	16619.4	-	16,619
425000	84	834.20	863.63	29.43	1	29.4	2	142.9	4205	15574.2	-	15,574
425100	84	829.20	861.35	32.15	1	32.2	2	148.3	4769	17661.3	-	17,661
425200	84	823.60	859.07	35.47	1	35.5	2	154.9	5496	20357.3	-	20,357
425300	84	808.50	856.79	48.29	1	48.3	2	180.6	8721	32300.5	-	32,300
425400	84	808.40	854.51	46.11	1	46.1	2	176.2	8126	30097.8	-	30,098
425500	84	809.40	852.23	42.83	1	42.8	2	169.7	7267	26916.2	-	26,916
425600	84	813.30	849.95	36.65	1	36.7	2	157.3	5766	21354.9	-	21,355
425700	84	811.20	847.67	36.47	1	36.5	2	156.9	5724	21201.4	-	21,201

425800	84	813.80	845.39	31.59	1	31.6	2	147.2	4650	17222.6	-	17,223
425900	84	816.10	843.11	27.01	1	27.0	2	138.0	3729	13809.5	-	13,809
426000	84	815.50	840.83	25.33	1	25.3	2	134.7	3412	12635.4	-	12,635
426100	84	811.00	838.55	27.55	1	27.6	2	139.1	3833	14195.7	-	14,196
426200	84	806.70	836.27	29.57	1	29.6	2	143.1	4233	15679.0	-	15,679
426300	84	818.30	833.99	15.69	1	15.7	2	115.4	1811	6706.7	-	6,707
426400	84	821.00	831.71	10.71	1	10.7	2	105.4	1129	4183.2	-	4,183
426500	84	822.90	829.43	6.53	1	6.5	4	97.1	634	2348.8	-	2,349
426600	84	811.30	827.15	15.85	1	15.9	2	115.7	1834	6793.8	-	6,794
426700	84	803.00	824.87	21.87	1	21.9	2	127.7	2794	10349.1	-	10,349
426800	84	825.10	822.59	-2.51	-1	2.5	4	89.0	223	826.4	826	-
426900	84	836.60	820.31	-16.29	-1	16.3	0.667	116.6	1899	7031.8	7,032	-
427000	84	835.00	818.03	-16.97	-1	17.0	0.667	117.9	2001	7410.9	7,411	-
427100	84	838.80	815.75	-23.05	-1	23.0	0.667	130.1	2998	11104.5	11,105	-
427200	84	836.00	813.47	-22.53	-1	22.5	0.667	129.1	2907	10767.2	10,767	-
427300	84	820.09	811.19	-8.90	-1	8.9	4	101.8	906	3354.2	3,354	-
427400	84	787.80	808.91	21.11	1	21.1	2	126.2	2665	9870.6	-	9,871
427500	84	765.90	806.63	40.73	1	40.7	2	165.5	6740	24963.0	-	24,963
427600	84	766.60	804.35	37.75	1	37.8	2	159.5	6022	22303.4	-	22,303
427700	84	764.60	802.07	37.47	1	37.5	2	158.9	5956	22060.2	-	22,060
427800	84	762.00	799.79	37.79	1	37.8	2	159.6	6031	22338.2	-	22,338
427900	84	760.06	797.51	37.45	1	37.5	2	158.9	5952	22042.9	-	22,043
428000	84	768.70	795.23	26.53	1	26.5	2	137.1	3637	13469.8	-	13,470
428100	84	770.50	792.95	22.45	1	22.5	2	128.9	2894	10719.9	-	10,720
428200	84	775.80	790.67	14.87	1	14.9	2	113.7	1692	6265.9	-	6,266
428300	84	779.80	788.39	8.59	1	8.6	4	101.2	870	3220.5	-	3,220
428400	84	777.40	786.11	8.71	1	8.7	4	101.4	884	3273.2	-	3,273
428500	84	789.00	783.83	-5.17	-1	5.2	4	94.3	487	1805.1	1,805	-
428600	84	790.50	781.55	-8.95	-1	8.9	4	101.9	912	3376.3	3,376	-
428700	84	761.20	779.27	18.07	1	18.1	2	120.1	2171	8042.4	-	8,042
428800	84	775.00	776.99	1.99	1	2.0	4	88.0	175	649.6	-	650
428900	84	792.20	774.71	-17.49	-1	17.5	0.667	119.0	2080	7705.4	7,705	-
										VE	1,111,154	909,100
										AS PROP	1,801,077	260,694
STA	TYPICAL WIDTH	NAT GRND	EL	H	CUT = -1	ABS H	SLOPE	WIDTH	AREA	VOLUME	CUT	FILL

AS PROPOSED EARTHWORK QUANTITIES FOR STA 4325+00 TO 4378+00:

STA	TYPICAL WIDTH	NAT GRND	AP EL	H-AP	TYPE	ABS H	SLOPE	WIDTH	AREA	VOLUME	CUT	FILL
432500	96	669.70	712.15	42.45	1	42.45	2	180.9	7679	28441.5	-	28,441
432600	96	699.90	714.00	14.10	1	14.1	2	124.2	1751	6486	-	6,486
432700	96	712.90	716.57	3.67	1	3.67	4	103.34	379	1404.659	-	1,405
432800	96	719.20	719.86	0.66	1	0.66	4	97.32	64	237.8933	-	238
432900	96	723.60	723.77	0.17	1	0.17	4	96.34	16	60.65852	-	61
433000	96	719.10	727.77	8.67	1	8.67	4	113.34	983	3639.473	-	3,639
433100	96	715.20	731.77	16.57	1	16.57	2	129.14	2140	7925.37	-	7,925
433200	96	707.30	735.77	28.47	1	28.47	2	152.94	4354	16126.67	-	16,127
433300	96	706.50	739.77	33.27	1	33.27	2	162.54	5408	20028.54	-	20,029
433400	96	723.00	743.77	20.77	1	20.77	2	137.54	2857	10580.39	-	10,580
433500	96	743.10	747.77	4.67	1	4.67	4	105.34	492	1821.992	-	1,822
433600	96	765.00	751.77	-13.23	-1	13.23	0.667	122.46	1620	6000.54	6,001	-
433700	96	787.90	755.77	-32.13	-1	32.13	0.667	160.26	5149	19070.94	19,071	-
433800	96	803.30	759.77	-43.53	-1	43.53	0.667	183.06	7969	29513.34	29,513	-
433900	96	821.20	763.77	-57.43	-1	57.43	0.667	210.86	12110	44850.7	44,851	-
434000	96	831.60	767.77	-63.83	-1	63.83	0.667	223.66	14276	52874.88	52,875	-
434100	96	833.70	771.77	-61.93	-1	61.93	0.667	219.86	13616	50429.37	50,429	-
434200	96	796.30	775.77	-20.53	-1	20.53	0.667	137.06	2814	10421.64	10,422	-
434300	96	751.70	779.71	28.01	1	28.01	2	152.02	4258	15770.67	-	15,771
434400	96	728.70	783.22	54.52	1	54.52	2	205.04	11179	41402.89	-	41,403
434500	96	714.80	786.27	71.47	1	71.47	2	238.94	17077	63248.3	-	63,248
434600	108	730.30	788.85	58.55	1	58.55	2	225.1	13180	48813.35	-	48,813
434700	108	756.30	790.95	34.65	1	34.65	2	177.3	6143	22753.5	-	22,754
434800	108	788.40	792.59	4.19	1	4.19	4	116.38	488	1806.045	-	1,806
434900	108	810.90	793.75	-17.15	-1	17.15	0.667	142.3	2440	9038.685	9,039	-
435000	108	840.10	794.44	-45.66	-1	45.66	0.667	199.32	9101	33707.23	33,707	-
435100	108	872.40	794.67	-77.73	-1	77.73	0.667	263.46	20479	75847.21	75,847	-
435200	108	884.80	794.42	-90.38	-1	90.38	0.667	288.76	26098	96659.74	96,660	-
435300	108	898.30	793.70	-104.60	-1	104.6	0.667	317.2	33179	122885.6	122,886	-
435400	108	901.90	792.51	-109.39	-1	109.39	0.667	326.78	35746	132394.3	132,394	-
435500	108	881.20	790.85	-90.35	-1	90.35	0.667	288.7	26084	96607.57	96,608	-
435600	108	847.90	788.73	-59.17	-1	59.17	0.667	226.34	13393	49601.99	49,602	-
435700	96	823.10	786.12	-36.98	-1	36.98	0.667	169.96	6285	23278.23	23,278	-
435800	96	799.40	783.05	-16.35	-1	16.35	0.667	128.7	2104	7793.5	7,794	-
435900	96	762.60	779.51	16.91	1	16.91	2	129.82	2195	8130.579	-	8,131

436000	96	732.20	771.57	39.37	1	39.37	2	174.74	6880	25479.68	-	25,480
436100	96	723.10	771.57	48.47	1	48.47	2	192.94	9352	34636.3	-	34,636
436200	96	758.30	767.57	9.27	1	9.27	4	114.54	1062	3932.54	-	3,933
436300	96	793.40	763.57	-29.83	-1	29.83	0.667	155.66	4643	17197.55	17,198	-
436400	96	814.10	759.57	-54.53	-1	54.53	0.667	205.06	11182	41414.53	41,415	-
436500	96	829.40	755.57	-73.83	-1	73.83	0.667	243.66	17989	66627.47	66,627	-
436600	96	833.60	751.57	-82.03	-1	82.03	0.667	260.06	21333	79010.08	79,010	-
436700	96	808.30	747.57	-60.73	-1	60.73	0.667	217.46	13206	48912.39	48,912	-
436800	96	782.50	743.57	-38.93	-1	38.93	0.667	173.86	6768	25068.04	25,068	-
436900	96	794.40	739.57	-54.83	-1	54.83	0.667	205.66	11276	41764.21	41,764	-
437000	96	801.70	735.57	-66.13	-1	66.13	0.667	228.26	15095	55906.79	55,907	-
437100	96	765.60	731.57	-34.03	-1	34.03	0.667	164.06	5583	20677.64	20,678	-
437200	96	725.40	727.57	2.17	1	2.17	4	100.34	218	806.4363	-	806
437300	96	677.50	723.57	46.07	1	46.07	2	188.14	8668	32102.26	-	32,102
437400	96	705.60	719.57	13.97	1	13.97	2	123.94	1731	6412.747	-	6,413
437500	96	718.50	715.57	-2.93	-1	2.93	4	101.86	298	1105.37	1,105	-
437600	96	746.10	711.98	-34.12	-1	34.12	0.667	164.24	5604	20755.07	20,755	-
437700	96	743.20	710.50	-32.70	-1	32.7	0.667	161.4	5278	19547.33	19,547	-
437800	96	735.50	707.32	-28.18	-1	28.18	0.667	152.36	4294	15901.87	15,902	-
											1,314,864	402,048
STA	TYPICAL WIDTH	NAT GRND	AP EL	H-AP	TYPE	ABS H	SLOPE	WIDTH	AREA	VOLUME	CUT	FILL

VE ALTERNATIVE EARTHWORK QUANTITIES FOR STA 4325+00 TO 4378+00:

TYPICAL WIDTH	NAT GRND	EL	H	CUT = -1	ABS H	SLOPE	WIDTH	AREA	VOLUME	CUT	FILL
96	669.70	712.15	42.45	1	42.4	2	180.9	7679	28441.5	-	28,441
96	699.90	717.15	17.25	1	17.3	2	130.5	2251	8337.5	-	8,338
96	712.90	722.15	9.25	1	9.3	4	114.5	1059	3922.7	-	3,923
96	719.20	727.15	7.95	1	7.9	4	111.9	890	3294.8	-	3,295
96	723.60	732.15	8.55	1	8.5	4	113.1	967	3581.5	-	3,581
96	719.10	737.15	18.05	1	18.1	2	132.1	2384	8831.1	-	8,831
96	715.20	742.15	26.95	1	26.9	2	149.9	4040	14962.2	-	14,962
96	707.30	747.15	39.85	1	39.9	2	175.7	7002	25932.0	-	25,932
96	706.50	752.15	45.65	1	45.7	2	187.3	8550	31667.6	-	31,668
96	723.00	757.15	34.15	1	34.2	2	164.3	5611	20780.9	-	20,781
96	743.10	762.15	19.05	1	19.1	2	134.1	2555	9461.5	-	9,461
96	765.00	767.15	2.15	1	2.1	4	100.3	216	798.7	-	799
96	787.90	772.15	-15.75	-1	15.8	0.667	127.5	2008	7437.5	7,438	-
96	803.30	777.15	-26.15	-1	26.2	0.667	148.3	3878	14363.1	14,363	-
96	821.20	782.15	-39.05	-1	39.1	0.667	174.1	6799	25180.0	25,180	-
96	831.60	787.15	-44.45	-1	44.5	0.667	184.9	8219	30440.0	30,440	-
96	833.70	792.15	-41.55	-1	41.6	0.667	179.1	7442	27561.5	27,562	-
96	796.30	797.15	0.85	1	0.9	4	97.7	83	307.6	-	308
96	751.70	801.60	49.90	1	49.9	2	195.8	9769	36182.9	-	36,183
96	728.70	805.49	76.79	1	76.8	2	249.6	19165	70981.6	-	70,982
96	714.80	808.83	94.03	1	94.0	2	284.1	26710	98924.6	-	98,925
108	730.30	811.61	81.31	1	81.3	2	270.6	22006	81504.4	-	81,504
108	756.30	813.85	57.55	1	57.5	2	223.1	12838	47549.9	-	47,550
108	788.40	815.53	27.13	1	27.1	2	162.3	4401	16301.0	-	16,301
108	810.90	816.65	5.75	1	5.8	4	119.5	687	2545.6	-	2,546
108	840.10	817.22	-22.88	-1	22.9	0.667	153.8	3517	13027.3	13,027	-
108	872.40	817.24	-55.16	-1	55.2	0.667	218.3	12042	44600.0	44,600	-
108	884.80	816.71	-68.09	-1	68.1	0.667	244.2	16628	61583.6	61,584	-
108	898.30	815.62	-82.68	-1	82.7	0.667	273.4	22602	83712.6	83,713	-
108	901.90	813.98	-87.92	-1	87.9	0.667	283.8	24957	92434.4	92,434	-
108	881.20	811.78	-69.42	-1	69.4	0.667	246.8	17136	63465.7	63,466	-
108	847.90	809.03	-38.87	-1	38.9	0.667	185.7	7220	26739.2	26,739	-
96	823.10	805.73	-17.37	-1	17.4	0.667	130.7	2271	8412.4	8,412	-

96	799.40	801.87	2.47	1	2.5	4	100.9	249	923.9	-	924
96	762.60	797.46	34.86	1	34.9	2	165.7	5777	21397.6	-	21,398
96	732.20	792.50	60.30	1	60.3	2	216.6	13060	48371.7	-	48,372
96	723.10	787.50	64.40	1	64.4	2	224.8	14476	53616.6	-	53,617
96	758.30	782.50	24.20	1	24.2	2	144.4	3494	12941.2	-	12,941
96	793.40	777.50	-15.90	-1	15.9	0.667	127.8	2032	7527.1	7,527	-
96	814.10	772.50	-41.60	-1	41.6	0.667	179.2	7455	27611.8	27,612	-
96	829.40	767.50	-61.90	-1	61.9	0.667	219.8	13606	50393.5	50,393	-
96	833.60	762.50	-71.10	-1	71.1	0.667	238.2	16937	62728.6	62,729	-
96	808.30	757.50	-50.80	-1	50.8	0.667	197.6	10039	37180.1	37,180	-
96	782.50	752.50	-30.00	-1	30.0	0.667	156.0	4680	17334.8	17,335	-
96	794.40	747.50	-46.90	-1	46.9	0.667	189.8	8902	32970.9	32,971	-
96	801.70	742.50	-59.20	-1	59.2	0.667	214.4	12693	47011.4	47,011	-
96	765.60	737.50	-28.10	-1	28.1	0.667	152.2	4277	15841.5	15,841	-
96	725.40	732.50	7.10	1	7.1	4	110.2	782	2897.0	-	2,897
96	677.50	727.50	50.00	1	50.0	2	196.0	9799	36294.3	-	36,294
96	705.60	722.50	16.90	1	16.9	2	129.8	2193	8123.4	-	8,123
96	718.50	717.50	-1.00	-1	1.0	4	98.0	98	363.6	364	-
96	746.10	712.50	-33.60	-1	33.6	0.667	163.2	5484	20310.9	20,311	-
96	743.20	707.50	-35.70	-1	35.7	0.667	167.4	5977	22135.6	22,136	-
96	735.50	702.50	-33.00	-1	33.0	0.667	162.0	5346	19801.5	19,802	-
									VE	860,169	698,875
									AS PROP	1,314,864	402,048
TYPICAL WIDTH	NAT GRND	EL	H	CUT = -1	ABS H	SLOPE	WIDTH	AREA	VOLUME	CUT	FILL

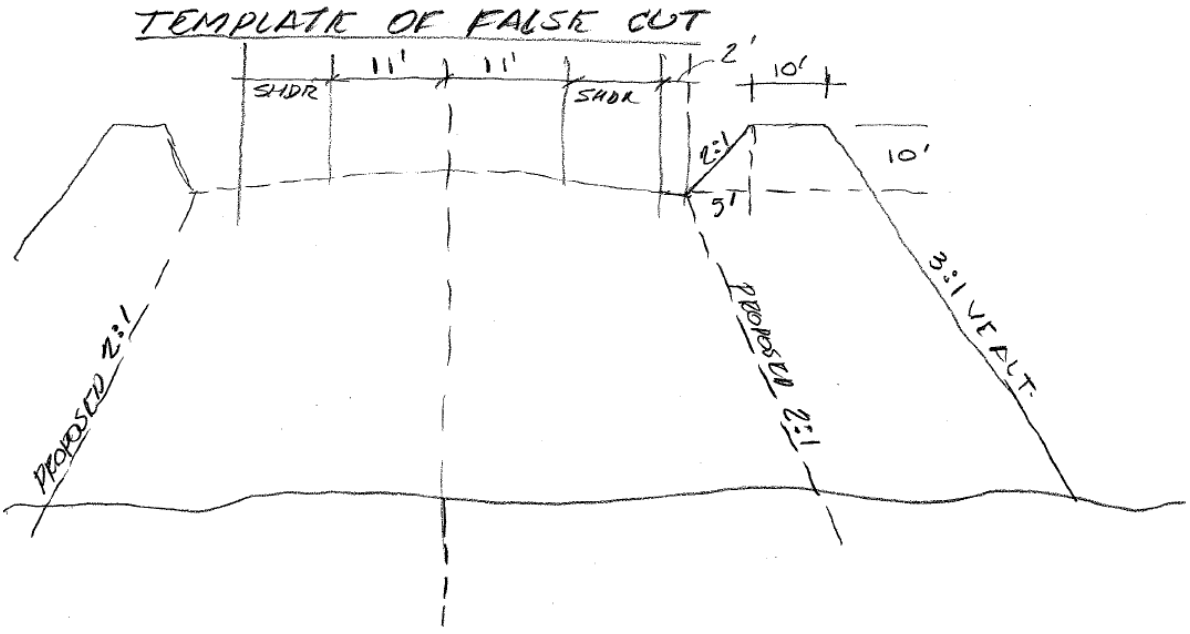
STA	TYPICAL WIDTH	NAT GRND	AP EL	H-AP	TYPE	ABS H	SLOPE	WIDTH	AREA	VOLUME	CUT	FILL
432500	96	669.70	712.15	42.45	1	42.45	2	180.9	7679	28441.5	-	28,441
432600	96	699.90	714.00	14.10	1	14.1	2	124.2	1751	6486	-	6,486
432700	96	712.90	716.57	3.67	1	3.67	4	103.34	379	1404.659	-	1,405
432800	96	719.20	719.86	0.66	1	0.66	4	97.32	64	237.8933	-	238
432900	96	723.60	723.77	0.17	1	0.17	4	96.34	16	60.65852	-	61
433000	96	719.10	727.77	8.67	1	8.67	4	113.34	983	3639.473	-	3,639
433100	96	715.20	731.77	16.57	1	16.57	2	129.14	2140	7925.37	-	7,925
433200	96	707.30	735.77	28.47	1	28.47	2	152.94	4354	16126.67	-	16,127
433300	96	706.50	739.77	33.27	1	33.27	2	162.54	5408	20028.54	-	20,029
433400	96	723.00	743.77	20.77	1	20.77	2	137.54	2857	10580.39	-	10,580
433500	96	743.10	747.77	4.67	1	4.67	4	105.34	492	1821.992	-	1,822
433600	96	765.00	751.77	-13.23	-1	13.23	0.667	122.46	1620	6000.54	6,001	-
433700	96	787.90	755.77	-32.13	-1	32.13	0.667	160.26	5149	19070.94	19,071	-
433800	96	803.30	759.77	-43.53	-1	43.53	0.667	183.06	7969	29513.34	29,513	-
433900	96	821.20	763.77	-57.43	-1	57.43	0.667	210.86	12110	44850.7	44,851	-
434000	96	831.60	767.77	-63.83	-1	63.83	0.667	223.66	14276	52874.88	52,875	-
434100	96	833.70	771.77	-61.93	-1	61.93	0.667	219.86	13616	50429.37	50,429	-
434200	96	796.30	775.77	-20.53	-1	20.53	0.667	137.06	2814	10421.64	10,422	-
434300	96	751.70	779.71	28.01	1	28.01	2	152.02	4258	15770.67	-	15,771
434400	96	728.70	783.22	54.52	1	54.52	2	205.04	11179	41402.89	-	41,403
434500	96	714.80	786.27	71.47	1	71.47	2	238.94	17077	63248.3	-	63,248
434600	108	730.30	788.85	58.55	1	58.55	2	225.1	13180	48813.35	-	48,813
434700	108	756.30	790.95	34.65	1	34.65	2	177.3	6143	22753.5	-	22,754
434800	108	788.40	792.59	4.19	1	4.19	4	116.38	488	1806.045	-	1,806
434900	108	810.90	793.75	-17.15	-1	17.15	0.667	142.3	2440	9038.685	9,039	-
435000	108	840.10	794.44	-45.66	-1	45.66	0.667	199.32	9101	33707.23	33,707	-
435100	108	872.40	794.67	-77.73	-1	77.73	0.667	263.46	20479	75847.21	75,847	-
435200	108	884.80	794.42	-90.38	-1	90.38	0.667	288.76	26098	96659.74	96,660	-
435300	108	898.30	793.70	-104.60	-1	104.6	0.667	317.2	33179	122885.6	122,886	-
435400	108	901.90	792.51	-109.39	-1	109.39	0.667	326.78	35746	132394.3	132,394	-
435500	108	881.20	790.85	-90.35	-1	90.35	0.667	288.7	26084	96607.57	96,608	-
435600	108	847.90	788.73	-59.17	-1	59.17	0.667	226.34	13393	49601.99	49,602	-
435700	96	823.10	786.12	-36.98	-1	36.98	0.667	169.96	6285	23278.23	23,278	-
435800	96	799.40	783.05	-16.35	-1	16.35	0.667	128.7	2104	7793.5	7,794	-
435900	96	762.60	779.51	16.91	1	16.91	2	129.82	2195	8130.579	-	8,131

VII. DEVELOPMENT PHASE

A. EARTHWORK

3. Value Engineering Alternative Number 2

The "As Proposed" design has 3,842,988 cubic yards of waste that will have to be trucked off the site. A "False Cut" is actually a fill section that exceeds the fill requirements for the normal typical section and the roadway appears to be in a cut section. This section would be the same as the "As Proposed" to the clear zone, then a 10' high – 10' wide berm would be constructed with 3:1 side slopes to natural ground. This design provides additional areas to place excess material.



EARTHWORK - CONSTRUCT FALSE CUTS
VALUE ENGINEERING ALTERNATIVE NUMBER 2
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
ROADWAY EXCAVATION ON SITE DISPOSAL	CY	$2.00	-	$0	420,000.0	$840,000
ROADWAY EXCAVATION WASTE	CY	$3.50	3,842,988	$13,450,458	3,422,988.0	$11,980,458
SUBTOTAL				**$13,450,458**		**$12,820,458**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		6.5%		$961,708		$916,663
TRAFFIC CONTROL/MOT		0.0%		$0		$0
CONTINGENCY		10.0%		$1,345,046		$1,282,046
RIGHT OF WAY	AC	$ 3,000.00	0.0	$0	7.0	$21,000
GRAND TOTAL				**$15,757,212**		**$15,019,167**

POSSIBLE SAVINGS: $738,045

VII. DEVELOPMENT PHASE

A. EARTHWORK

COST COMPARISON SHEET BACK UP CALCULATIONS

VENTRY ENGINEERING L.L.C.
PROVIDING VALUE ENGINEERING SERVICES

Page _____ Of _____ Date _____
Ventry Engineering Contract # _____
Agency: _____

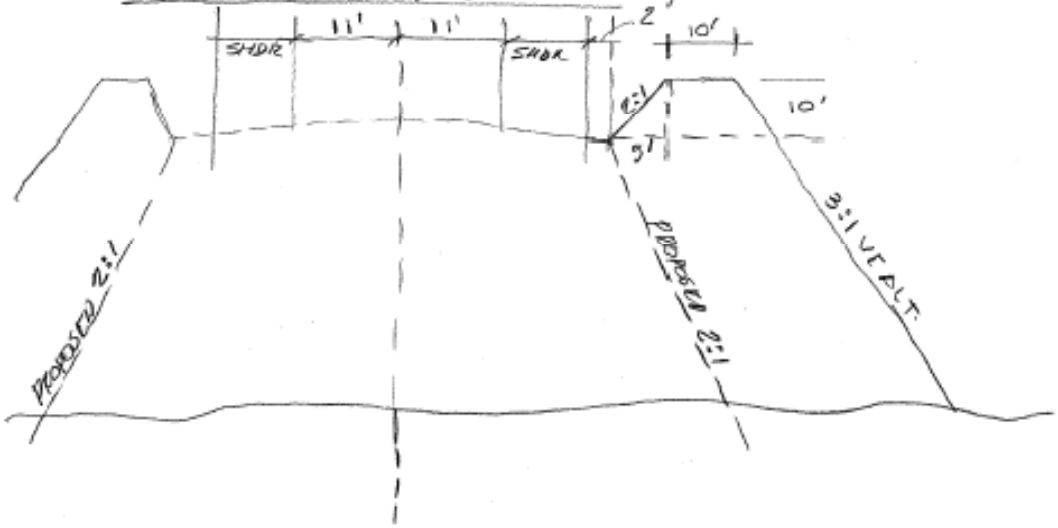
Subject: ELLIOTT COUNTY KY7	Agency Project Name:
VE ALT #2 12/02/08	
	Prepared By: ROBERT SIMMONS

VE ALT #2 - USE FALSE CUTS TO DISPOSE OF WASTE

FILL AREAS TO CONSIDER

		AVG. FILL
4209+50 - 4224+50	- 1500'	20'
4274+00 - 4285+00	- 1100'	25'
4322+50 - 4329+00	- 750'	30'
4329+00 - 4335+50	- 650'	32
4342+00 - 4348+50	- 650'	50'
4358+00 - 4362+50	- 450'	35'

TEMPLATE OF FALSE CUT



Subject: ELLIOTT COUNTY KY 7	Agency Project Name:
12/2/08	
	Prepared By: ROBERT SEMONES

		2:1	RT	LT
	4209 –	20×67+200 = 1540		
	4209+50	18×78+200 = 1604		
	4210+00	18×67+" = 1406		
	4210+50	15×74+" = 1310		
	4211+00	18×49+" = 1082		
	4211+25	18×66+" = 1388		
BEGIN LT & RT	4211+50 LT	18×58+" = 1244 40×20+"		
	4212+00 LT	20×30+" = 800 72×25+" =	1000 2000	(1500×50)/27 = 2800 YD³
	4212+50 LT	54×20+" = 1280 25×25+" =	825	2600 YD³
	4213+00	87×14+" = 1418	0	769 YD³
	4214+00	69×18+" = 1450		
	4214+50	67×18+" = 1408		
	4215+00	69×18+" = 1450		
	4215+50	67×16+" = 1310		
	4216+00	69×14+" = 1200		
	4216+50	69×18+" = 1442		
	4217+00	69×20+" = 1580		
	4217+50	69×18+" = 1450		
	4218+00	" 1450		
	4218+50	" 1450		
	4219+00	74×18+" 1532		
	4219+50	1532		
	4220+00	69×18+" 1442		
	4220+50	69×18+" 1442		
	4221+00	1442		
	4221+50	69×23+" 1743		

VENTRY ENGINEERING L.L.C.
PROVIDING VALUE ENGINEERING SERVICES

Page _____ Of _____ Date _____
Ventry Engineering Contract # _____
Agency: _____

Subject: ELLIOTT COUNTY KY 7	Agency Project Name:
VE ALT #9 12/09/08	
	Prepared By: ROBERT SEMONES

		2:1
4222+00	54×18+200 =	1174
4222+50	54×18+200 =	1174
4223+00	35×18+" =	837
4223+50	35×18+" =	837
4224+00		500

END FALSE CUT
4224+25

CALCULATE YARDAGE

2911	2761
2788	2837
2515	2754
2215	2670
1144	2670
1219	2949
1893	2700
1926	2179
2498	1869
2656	1550
2646	1238
2654	463
2556	
2329	72,000 YD^3 WASTED ON
2446	SITE FOR FALSE CUT AREA
2800	FOR 4209+50 - 4224+50
2806	2:1 SIDE SLOPES
2685	
2685	

VENTRY ENGINEERING L.L.C.
PROVIDING VALUE ENGINEERING SERVICES

Page _____ Of _____ Date _____
Ventry Engineering Contract # _____
Agency: _____

Subject: ELLIOTT COUNTY KY 7	Agency Project Name: FALSE CUT
VE ALT #2 12/01/08	
	Prepared By: ROBERT SIMONES

12 58 1460

ADDITIONAL RIGHT OF WAY COST

50 × 2000 = 2.3 ACRES × $ 2,000 / ACRE
= $5,000

4209+50 - 4224+50

STA 4274+00 - 4285+00

		RT	LT
4274+00	22 × 89+200 =	2158	0
4274+50	=	1457	1140
4274+58		1457	1140
4275+00	22 ×	2080	1460
4275+50		2363	1140
4276+00	22 × 78+200 =	1922	750
4276+50	18 × 74	1350	450
4277+00		1350	750
4277+50		1450	1127
4278+00		1609	1207
4278+50		1609	1207
4278+58		1607	1207
4279+00		1607	703
4279+50		1607	400
4280+00		1609	0
4280+50		1607	0
4281+00		1609	0
4281+50		1700	0
4282+00		1700	0
4282+50		1607	0

VENTRY ENGINEERING L.L.C.
PROVIDING VALUE ENGINEERING SERVICES

Page _____ Of _____ Date _____
Ventry Engineering Contract # _____
Agency: _____

Subject: ELLIOTT COUNTY KY 7	Agency Project Name: FALSE CUT
VE ALT #2 12/02/08	4270+00 - 4285+00
	Prepared By: ROBERT SEMONES

	RT	LT
4283+00	1609	0
4283+50	1607	0
4284+00	1750	0
4284+50	1607	0

CALCULATE YARDAGE

RT

2000
3347
433
524
4132
4000
3030
2500
2832
3000
237
237
3000
3000
3000
3000
3070
3070
3000
3000
3000

3070
3000

56,487 YD³

2:1 SIDE SLOPES

TOTAL
72,691

LT

1056
338
385
2408
1750
1111
1111
1738
2161
2235
179
156
1206
370

16,204 YD³

2:1 SIDE SLOPES

VENTRY ENGINEERING L.L.C.
PROVIDING VALUE ENGINEERING SERVICES

Page _____ Of _____ Date _____
Ventry Engineering Contract # _____
Agency: _____

Subject: ELLIOTT COUNTY KY 7	Agency Project Name: FAST CUT
VE ALT #2 12/02/08	Prepared By: ROBERT SEMONIN

4322+50 – 4335+50

	RT	LT
4323+00	1529	
4323+50	1510	0
4324+00	1924	701
4324+50	2106	1455
4325+00	2188	2034
4325+28	2091	1574
4326+00	1784	893
4326+44	1647	
4326+50	1587	
4327+00	1622	
4327+50	1663	
4328+00	1591	
4328+50	1568	
4329+00	1703	
4329+50	1774	
4330+00	2036	
4330+50	2478	
4331+00	2810	
4331+50	2988	
4331+91	3404	984
4332+00	3446	1042
4332+50	3508	1122
4333+00	3308	1583
4333+50	3041	1700
4334+00	3002	1166
4334+50	2513	0
4335+00	0	

VENTRY ENGINEERING L.L.C.
PROVIDING VALUE ENGINEERING SERVICES

Page _____ Of _____ Date _____
Ventry Engineering Contract # _____
Agency: _____

Subject: ELLIOTT COUNTY KY7	Agency Project Name: FALSE CUT
VE ALT #2 12/02/08	
	Prepared By: ROBERT SIMONES

CALCULATE YARDAGE

RT

1416
2814
3180
3731
3980
→ 2214
2004
2800
359
3006
3042
3013
2925
3029
3220
3528
4180
4990
5379
1065
1102
6513
6389
5879
3575
5104
2327
92,796 YD³

4322150 – 4335150

LT

834
2181
3,231
1871
1279
463
9,859

164
338
2100
2574
3037
2650
1100
12,000

TOTAL 114,6424 YD³

VENTRY ENGINEERING L.L.C.
PROVIDING VALUE ENGINEERING SERVICES

Page _____ Of _____ Date 12/02/08
Ventry Engineering Contract # _____
Agency: _____

Subject:	Agency Project Name:
	Prepared By: ROBERT SIMMONS

4242+50 - 4348+50

	RT	LT
4342+50	723	0
4343+00	2638	1265
4343+50	2927	1736
4344+00	3625	2378
4344+50	4323	2840
4345+00	3947	3498
4345+50	3809	3493
4346+00	3208	3343
4346+50	2721	2917
4347+00	1714	2102
4347+50	1270	1513
4348+00	0	766

CALCULATE YARDAGE

RT	LT
669	1700
3112	2800
5153	3809
6100	4831
7360	5822
7657	6427
7200	6330
6500	5800
5500	4647
4300	3347
3000	2300
1200	894
57,751 YD³ RT	48,207 YD³

TOTAL
105,958 YD³

VENTRY ENGINEERING L.L.C.
PROVIDING VALUE ENGINEERING SERVICES

Page _____ Of _____ Date _____
Ventry Engineering Contract # _____
Agency: _____

Subject:	Agency Project Name:
	Prepared By:

4358+00 — 4362+50

	RT	LT
4358+50	0	2143
4359+00	733	2030
4359+50	1479	2032
4360+00	2212	2142
4360+50	2814	2257
4361+00	3226	1908
→ 4361+10	3184	1677
4361+50	3145	883
4362+00	2368	0
	0	0

CALCULATE YARDAGE

RT	LT
679	1985
2048	3864
3411	3761
4653	3865
5593	4073
1200	3931
4088	679
5105	1900
2193	816
29,570	24,878

TOTAL 54,448 YD³

VENTRY ENGINEERING L.L.C.
PROVIDING VALUE ENGINEERING SERVICES

Page _____ Of _____ Date _____
Ventry Engineering Contract # _____
Agency: _____

Subject:	Agency Project Name:
	Prepared By:

TOTAL YARDAGE

72,000
72,691
114,642
105,958
54,448

420,000 YD^3 × $2/YD^3$ = $840,000

ADDITIONAL RIGHT OF WAY
(5100 × 60) / 43560 = 7 ACRES
ADDITIONAL
WITH 2:1

0 $3,000/AC × 7 = $21,000

NET SAVINGS = $819,000

VII. DEVELOPMENT PHASE

A. EARTHWORK

4. Value Engineering Alternative Number 3

The "As Proposed" Construction Project is assumed to be let as one contract. There appears to be the possibility of some savings by letting the project with two contracts:

- Grade & Drain work
- Pavement work

EARTHWORK - GRADE & DRAIN CONTRACT AND SURFACE CONRACT
VALUE ENGINEERING ALTERNATIVE NUMBER 3
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
GRADE & DRAIN CONTRACT	LS	$14,287,938.14	1.0	$14,287,938	1.0	$14,287,938
SURFACE CONTRACT	LS	$7,238,047.89	1.0	$7,238,048	0.85	$6,152,341
SUBTOTAL				**$21,525,986**		**$20,440,279**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		6.5%		$1,539,109		$1,461,481
TRAFFIC CONTROL/MOT		0.0%		$0		$0
CONTINGENCY		10.0%		$2,152,599		$2,044,028
GRAND TOTAL				**$25,217,693**		**$23,945,787**

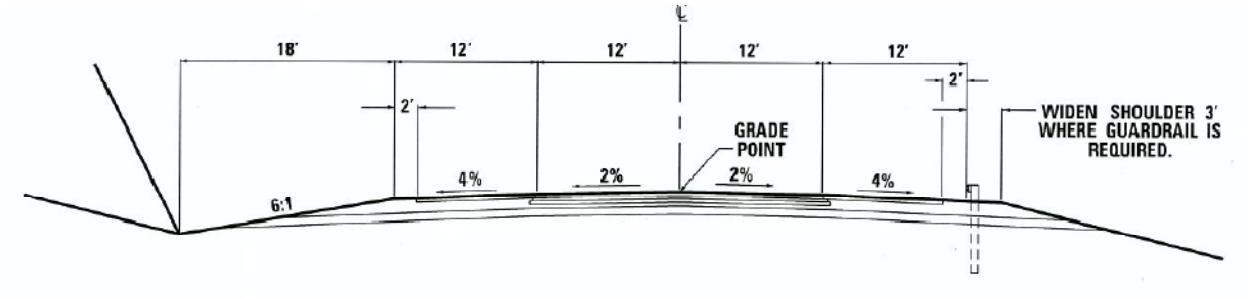
POSSIBLE SAVINGS: $1,271,906

VII. DEVELOPMENT PHASE

B. PAVEMENT

1. "As Proposed"

The proposed project is for the reconstruction of Ky. 7 from 0.4 miles north of Ky. 706 to the Carter county line. The project ties to a previously reconstructed section of KY. 7 on the south end and a bridge over Grayson Lake on the north end. The design will be for a 2 lane Rural Arterial highway with a 55 mph design speed with truck lanes warranted.



AS PROPOSED TYPICAL SECTION WITH CLIMBING LANE

- 12' Driving Lanes
- 12' Truck Climbing Lanes
- 12' Shoulders (10' Paved)
- 18' cut ditch @ 6:1

The "As Proposed" pavement design (preliminary) includes:

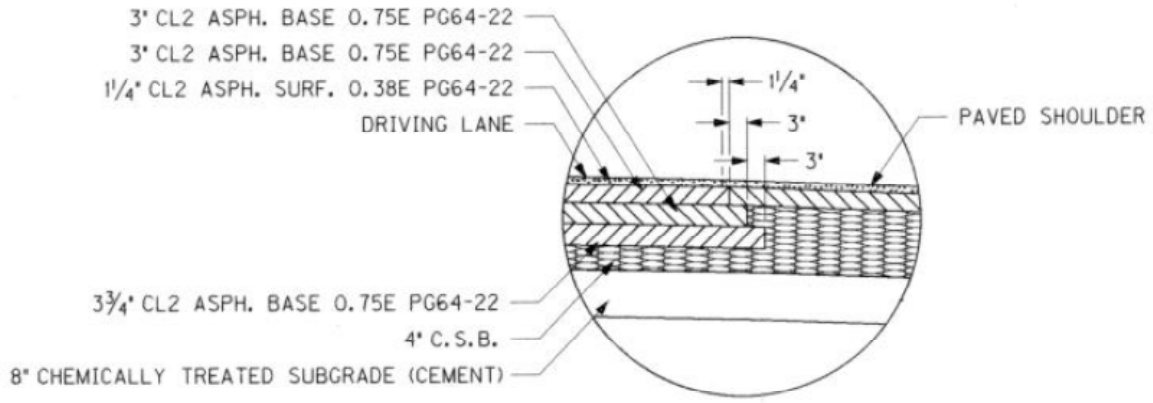
- 1 – 1 ¼" LAYER OF CL2 ASPH, SURF. O.38E PG64-22
- 2 – 3" LAYERS OF CL2 ASPH. BASE 0.75E, PG64-22
- 1 – 3¾" LAYER OF CL2 ASPH. BASE 0.75E, PG64-22
- 1 – 4" LAYER OF CRUSHED STONE BASE
- 8" CHEMICALLY TREATED SUBGRADE (CEMENT)

For a typical section of 2 – 12' lanes with 2 – 12' shoulders/ 10' paved.

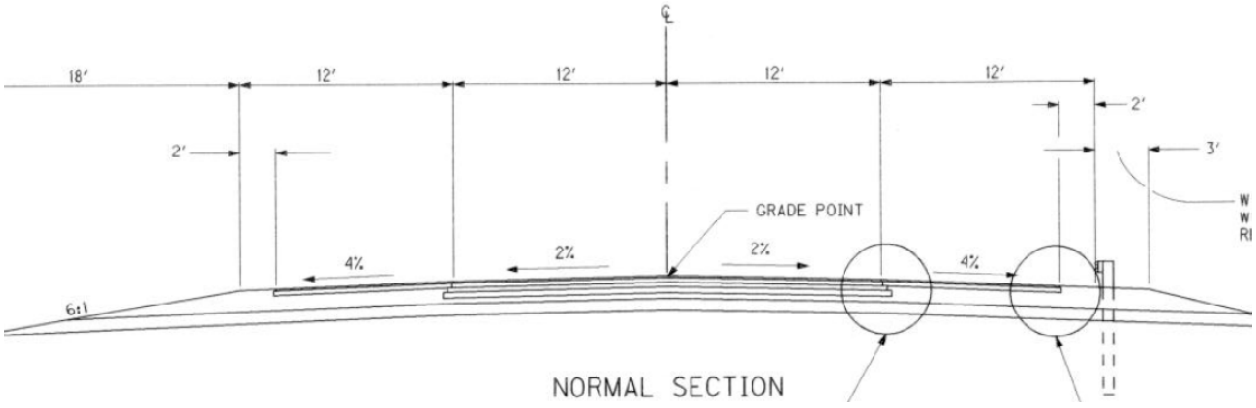
VII. DEVELOPMENT PHASE

B. PAVEMENT

1. "As Proposed"



AS PROPOSED PAVEMENT DESIGN DETAILS



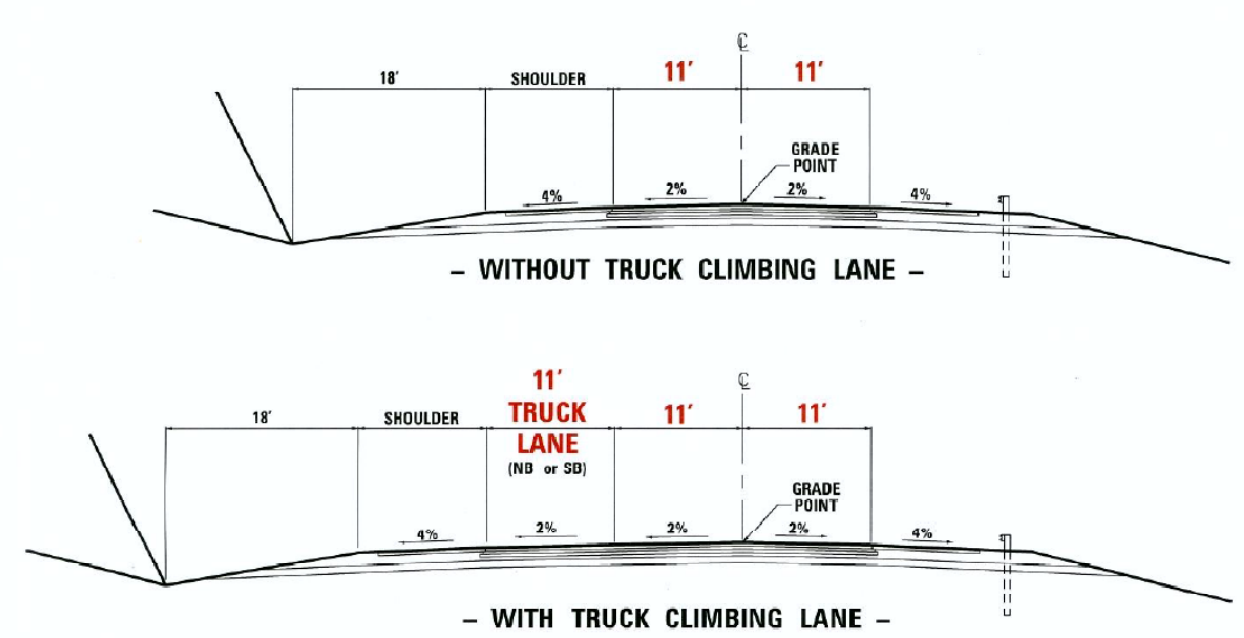
AS PROPOSED TYPICAL SECTION

VII. DEVELOPMENT PHASE

B. PAVEMENT

2. Value Engineering Alternative Number 1

Value Engineering Alternative Number 1 will reduce the width of the Driving Lanes and the Truck Climbing Lanes. These lanes would be reduced from 12’ lanes to 11’ lanes resulting in a reduction in the Pavement Quantities and reduction in the Roadway Excavation quantity.



Value Engineering Number 1 TYPICAL SECTION

- 11’ Driving Lanes
- 11’ Truck Climbing Lanes
- 12’ Shoulders (10’ Paved)
- 18’ cut ditch @ 6:1

EARTHWORK - CONSTRUCT 11' LANES
VALUE ENGINEERING ALTERNATIVE NUMBER 1
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
ROADWAY EXCAVATION	CY	$3.50	3,842,988	$13,450,458	3,726,791.0	$13,043,769
$1^{1}/_{4}$" CL2 ASPH SURF	TN	$75.56	6,062.0	$458,045	5,535.0	$418,225
CL2 ASPH BASE	TN	$56.70	50,227.0	$2,847,871	46,119.0	$2,614,947
CRUSHED STONE BASE	TN	$23.70	54,440.0	$1,290,228	54,252.8	$1,285,791
CEMENT STABILIZED ROADBED	SY	$2.60	215,000.0	$559,000	207,341.0	$539,087
SUBTOTAL				**$18,605,602**		**$17,901,818**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		6.5%		$1,330,301		$1,279,981
TRAFFIC CONTROL/MOT		0.0%		$0		$0
CONTINGENCY		10.0%		$1,860,560		$1,790,182
GRAND TOTAL				**$21,796,463**		**$20,971,980**

POSSIBLE SAVINGS: $824,483

VII. DEVELOPMENT PHASE

B. PAVEMENT

COST COMPARISON SHEET BACK UP CALCULATIONS

Elliott County
Ky. 7 Reconstruction
Item No. 9-126.51
VALUE ENGINEERING STUDY #1

- QUANTITY CALCULATIONS -

PAVEMENT
Total Project Length is 5.25 miles (27,717')
Subtract 1' of pavement for each driving lane (2' Total)
Subtract 1' of pavement of the total length of Truck Climbing Lane

2' x 27,717 = 55,434
1' x 13,500 = 13,500 (Truck Lane)
68,934 sq. ft. / 9 = 7,659 Sq. Yards Reduced

1 ¼" CL2 Asph Surface
1.25"x 110 lbs (per inch depth) x 7,659 SY = 1,053,113 lbs / 2000 = 527 Tons
527 Tons @ $75.55 per ton = $39,781
3" CL2 Asph Base
3" CL2 Asph Base
3 ¾" CL2 Asph Base
9.75"x 110 lbs (per inch depth) x 7,659 SY = 8,214,277 lbs / 2000 = 4108 Tons
4108 Tons @ $56.70 per ton = $232,924
TOTAL PAVEMENT SAVING = $272,705 **use $273,000**

EARTHWORK
Proposed Roadway Excavation quantity was 3,842,988 Cubic Yards
Total Project Length is 5.25 miles (27,717')

Proposed Typical Section width from ditch to ditch was 84'
VE #1 Typical Section width from ditch to ditch is 82' (reduced lane widths from 12' to 11')
This is a 2.5% reduction in template width

3,842,988 Cubic Yards
x2.5%
96,075 Cubic Yard Reduction @ $3.50 per CY = $336,263 (for Driving Lanes)

18,225' of the this project is in a cut
8,000' of the Truck Lane is in a cut (44% of project in a cut)

The 1' of Reduction in the Truck Lane with is $1/84^{th}$ (.0119) of the Total ditch to ditch width

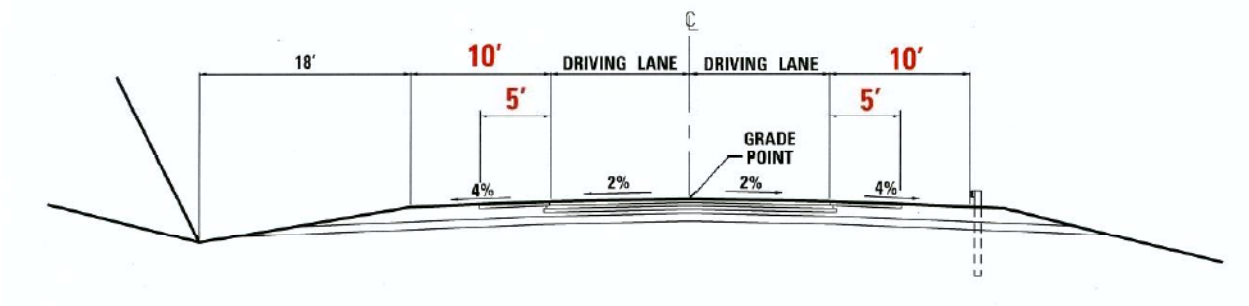
.44 x .0119 x 3,842,988 = 20,122 Cubic Yard Reduction @ $3.50 per CY = $70,427 (Truck Lanes)

VII. DEVELOPMENT PHASE

B. PAVEMENT

3. Value Engineering Alternative Number 2

Value Engineering Alternative Number 2 will reduce the Shoulder widths. The shoulders will be changed from 12’ shoulders with 10’ paved to 10’ shoulders with 5’ paved. This will cut the Pavement Quantities for the paved shoulders in half and change the total width of the typical section resulting in a reduced Roadway Excavation quantity.



VALUE ENGINEERING NUMBER 2 TYPICAL SECTION

- 12’ Driving Lanes
- 12’ Truck Climbing Lanes
- 10’ Shoulders (5’ Paved)
- 18’ cut ditch @ 6:1

EARTHWORK - CONSTRUCT 10' SHOULDER/5' PAVED
VALUE ENGINEERING ALTERNATIVE NUMBER 2
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
ROADWAY EXCAVATION	CY	$3.50	3,842,988.0	$13,450,458	3,650,838.0	$12,777,933
1 1/4" CL1 ASPH SURF	TN	$77.74	5,033.0	$391,265	2,516.5	$195,633
CL1 ASPH BASE	TN	$70.24	10,162.0	$713,779	5,081.0	$356,889
CRUSHED STONE BASE	TN	$23.70	54,440.0	$1,290,228	41,491.0	$983,337
CEMENT STABILIZED ROADBED	SY	$2.60	215,000.0	$559,000	202,680.0	$526,968
SUBTOTAL				**$16,404,730**		**$14,840,760**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		6.5%		$1,172,939		$1,061,115
TRAFFIC CONTROL/MOT		0.0%		$0		$0
CONTINGENCY		10.0%		$1,640,473		$1,484,076
GRAND TOTAL				**$19,218,142**		**$17,385,951**

POSSIBLE SAVINGS: $1,832,191

VII. DEVELOPMENT PHASE

B. PAVEMENT

COST COMPARISON SHEET BACK UP CALCULATIONS

Elliott County
Ky. 7 Reconstruction
Item No. 9-126.51
VALUE ENGINEERING STUDY #2

- QUANTITY CALCULATIONS -

PAVEMENT
Proposed Paved Shoulder width was 10’
VE #1 Paved Shoulder width is 5’ (use 50% of Proposed Estimate Shoulder Cost)

CL1 Asph Surface 0.38D PG64-22	$391,269	
CL1 Asph Base 0.75D PG64-22	$713,780	
SHOULDER TOTAL FOR PROPOSED	$1,105,049	
	X 50%	
TOTAL PAVEMENT SAVINGS	$552,525	**use $553,000**

EARTHWORK
Proposed Roadway Excavation quantity was 3,842,988 Cubic Yards
Total Project Length is 5.25 miles (27,717’)

Proposed Typical Section width from ditch to ditch was 84’
VE #1 Typical Section width from ditch to ditch is 80’ (reduced total shoulder widths from 12’ to 10’)
This is a 5% reduction in template width

3,842,988 Cubic Yards
X5%
192,150 Cubic Yard Reduction @ $3.50 per CY = $672,525

VII. DEVELOPMENT PHASE

B. PAVEMENT

4. Value Engineering Alternative Number 3

The Value Engineering Team in the interest of "Practical Solutions" looked at the possibility of applying these concepts within the limits of this project.

PRACTICAL SOLUTIONS
GEOMETRICS:
TWO LANE RURAL ARTERIALS

			Traffic Volume (ADT)							
	Design Speed (5)		Under 400		400 to 1500		1500 to 2000		2000 to 5000	
			Pavement Width	Graded Shoulder Width	Pavement Width	Graded Shoulder Width	Pavement Width	Graded Shoulder Width	Pavement Width	Graded Shoulder Width
Pavement Width and Graded Shoulder Width (Feet) (4)	30	Level	20	2 to 4	20	2 to 4	20 to 22	3 to 5	20 to 22	4 to 6
		Rolling					20			3 to 5
		Mountain								
	35	Level	20	2 to 4	20	2 to 4	20 to 22	3 to 5	20 to 22	4 to 6
		Rolling								
		Mountain					20			
	40	Level	20	3 to 5	20 to 22	3 to 5	20 to 22	4 to 6	20 to 22	4 to 6
		Rolling		2 to 4	20			3 to 5		
		Mountain				2 to 4			NA	NA
	45	Level	20	3 to 5	20 to 22	3 to 5	20 to 22	4 to 6	22 to 24	6 to 8
		Rolling			20					
		Mountain		2 to 4	NA	NA	NA	NA	NA	NA
	50	Level	20 to 22	4 to 6	20 to 22	4 to 6	22 to 24	6 to 8	NA	NA
		Rolling			NA	NA	NA	NA		
		Mountain	NA	NA						
Min. Clear Roadway Width of New and Reconstructed Bridges (3)	All Speeds	Approach Roadway Width								

	Design Speed	eMAX. 4%	eMAX. 6%	eMAX. 8%
Minimum Radius (Feet)	30 MPH	300	275	250
	35 MPH	420	380	350
	40 MPH	565	510	465
	45 MPH	730	660	600
	50 MPH	930	835	760
Normal Pavement Cross Slopes	Rate of Cross Slope = 2%			
Normal Shoulder Cross Slopes	Earth = 8 to 10%		Paved = 4 to 6%	

4. Value Engineering Alternative Number 3

PRACTICAL SOLUTIONS
GEOMETRICS:
TWO LANE RURAL ARTERIALS

	Design Speed		Traffic Volume (ADT) Under 400	400 to 1500	1500 to 2000	2000 to 5000
Maximum Grade (Percent)	30	Level	7	7	6	6
		Rolling	10	9	7	7
		Mountain	12	10	8	8
	35	Level	7	7	6	5
		Rolling	10	9	8	6
		Mountain	12	10	9	7
	40	Level	7	6	5	5
		Rolling	10	8	6	6
		Mountain	12	10	8	NA
	45	Level	7	6	5	5
		Rolling	10	8	6	NA
		Mountain	12	NA	NA	NA
	50	Level	7	6	5	NA
		Rolling	10	NA	NA	NA
		Mountain	NA	NA	NA	NA

	Design Speed	30	35	40	45	50
Minimum Stopping Sight Distance (1)	(Feet)	200	250	305	360	425
Minimum Passing Sight Distance (2)	(Feet)	1090	1280	1470	1625	1835

1) MINIMUM STOPPING SIGHT DISTANCES ARE BASED ON A HEIGHT OF EYE OF 3.5 FT AND HEIGHT OF OBJECT OF 2.0 FT. BOTH HORIZONTAL AND VERTICAL ALIGNMENTS ARE CONSIDERED.

(2) MINIMUM PASSING SIGHT DISTANCES ARE BASED ON A HEIGHT OF EYE OF 3.5 FT AND HEIGHT OF OBJECT OF 3.5 FT. BOTH HORIZONTAL AND VERTICAL ALIGNMENTS ARE CONSIDERED.

(3) NORMAL PAVEMENT CROSS SLOPES ON BRIDGES SHALL BE 2%

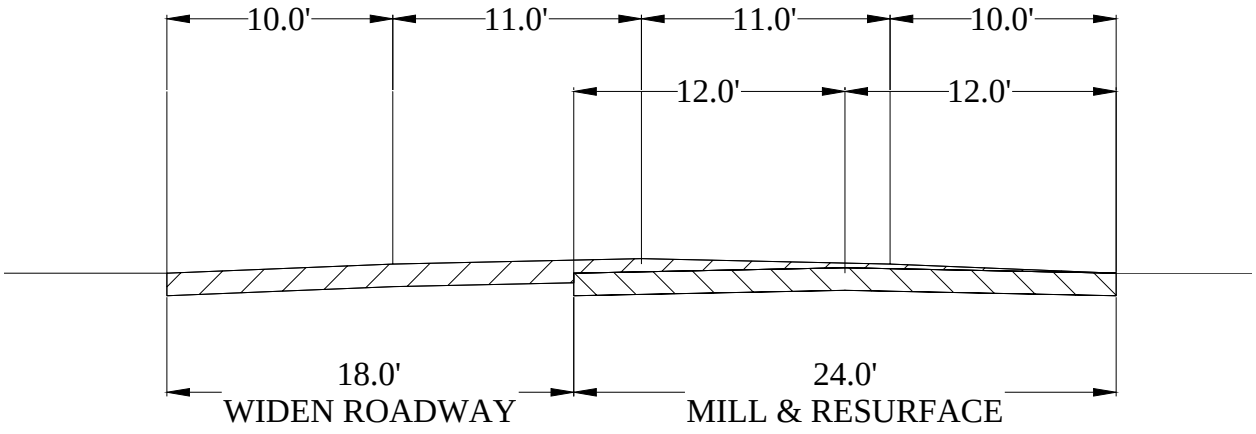
(4) WIDEN 3 FT FOR GUARDRAIL

(5) JUSTIFICATION FOR THE DESIGN SPEED SHALL BE BASED UPON COMPREHENSIVE ANALYSIS OF EXISTING ROADWAY GEOMETRICS, ADJACENT ROADWAY FEATURES, AND PURPOSE AND NEED FOR THE PROJECT. DOCUMENTATION SHALL BE INCLUDED IN THE DESIGN EXECUTIVE SUMMARY.

(6) "NA" REFERS TO "BETTERMENT STANDARDS ARE NOT APPLICABLE" WITHOUT ADDITIONAL ANALYSIS.

It was decided the Value Engineering Alternative Typical Section can be applied to the existing alignment from the beginning of the project to KY 409 by reducing the Design Speed to 45 MPH, and then raising the Design Speed to 55 MPH to the end of the project.

It is also understood there may be locations on the existing alignment that minor revision to the alignment may have to be made to meet the 45 MPH Design Criteria. The Value Engineering Team noticed the existing roadway is posted for a 45 MPH Speed Limit in the vicinity of the numerous residences located at the south end of the project. And north of the intersection of KY 409 would be a good point to increase the Speed Limit back to 55 MPH.



VALUE ENGINEERING ALTERNATIVE TYPICAL SECTION

Construction of this typical would begin with placing a temporary barrier to 3’ to the right of the left edge of existing pavement leaving 21’to provide for 2 – 10’ lanes to maintain traffic on. The widened roadway would then be constructed up to the elevation of the existing pavement. Then the existing pavement could be milled and resurface to the Value Engineering Profile with only minor drop offs and with a few temporary lane closures.

PAVEMENT - "PRACTICAL SOLUTION"
VALUE ENGINEERING ALTERNATIVE NUMBER 3
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
ROADWAY EXCAVATION	CY	$3.50	3,842,988	$13,450,458	2,305,792.8	$8,070,275
12' LANES FROM VE 1	LS	$5,155,143.62	1.0	$5,155,144	0.0	$0
11' LANES FROM VE 1	LS	$4,857,847.70	0.0	$0	1.0	$4,857,848
12' SHOULDERS/10' PAVED FROM VE 2	LS	$2,954,272.30	1.0	$2,954,272	0.0	$0
10' SHOULDERS/5' PAVED FROM VE 2	LS	$2,062,826.85	0.0	$0	1.0	$2,062,827
SUBTOTAL				**$21,559,874**		**$14,990,949**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		6.5%		$1,541,532		$1,071,853
TRAFFIC CONTROL/MOT		0.0%		$0		$0
CONTINGENCY		10.0%		$2,155,987		$1,499,095
GRAND TOTAL				**$25,257,393**		**$17,561,898**

POSSIBLE SAVINGS: $7,695,495

VII. DEVELOPMENT PHASE

C. DESIGN COMMENTS

1. ALTERNATIVE PAVEMENT BIDS

It is assumed the "As Proposed" pavement design will be bid for this project. In today's markets the price of oil is very volatile, which creates a variation in the unit prices of materials used to pave the highway. The Value Engineering Team recommends that an "Alternative Pavement Design Bid System" be used to give the contractor the opportunity to bid the lowest priced pavement that he can provide at the time of the letting.

This system would provide the quantities for each of the 3 equivalent alternatives:

- Maximum Asphalt pavement design
- Maximum Aggregate pavement design
- Concrete pavement design

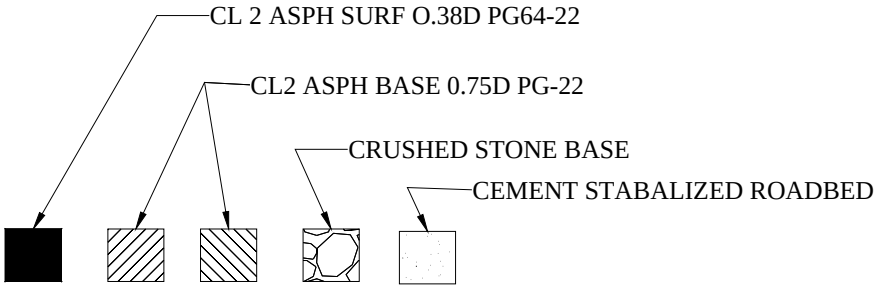
This system allows the contractor to bid the lowest pavement design he can provide based upon the economic conditions at the time of the bid. KYTC's pavement design analysis spread sheet identifies the Maximum Asphalt Design as the most economical with the unit prices provided, but a contractor may use entirely different unit prices for his favored pavement design.

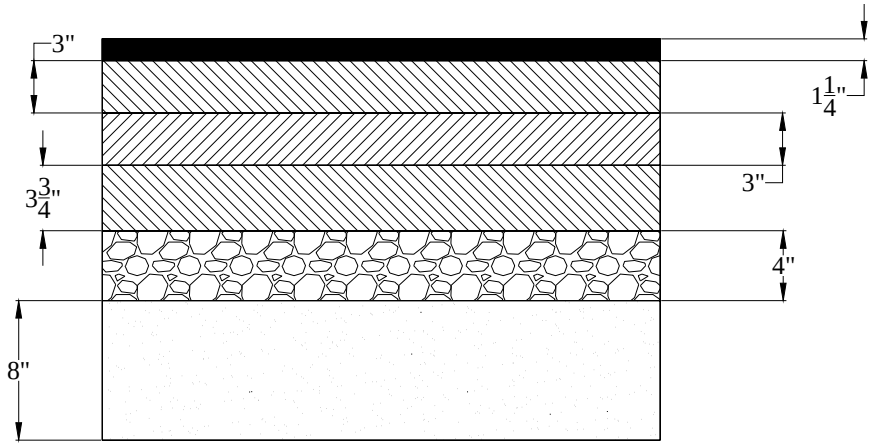
VII. DEVELOPMENT PHASE

C. DESIGN COMMENTS

1. ALTERNATIVE PAVEMENT BIDS

For this project the following designs are:





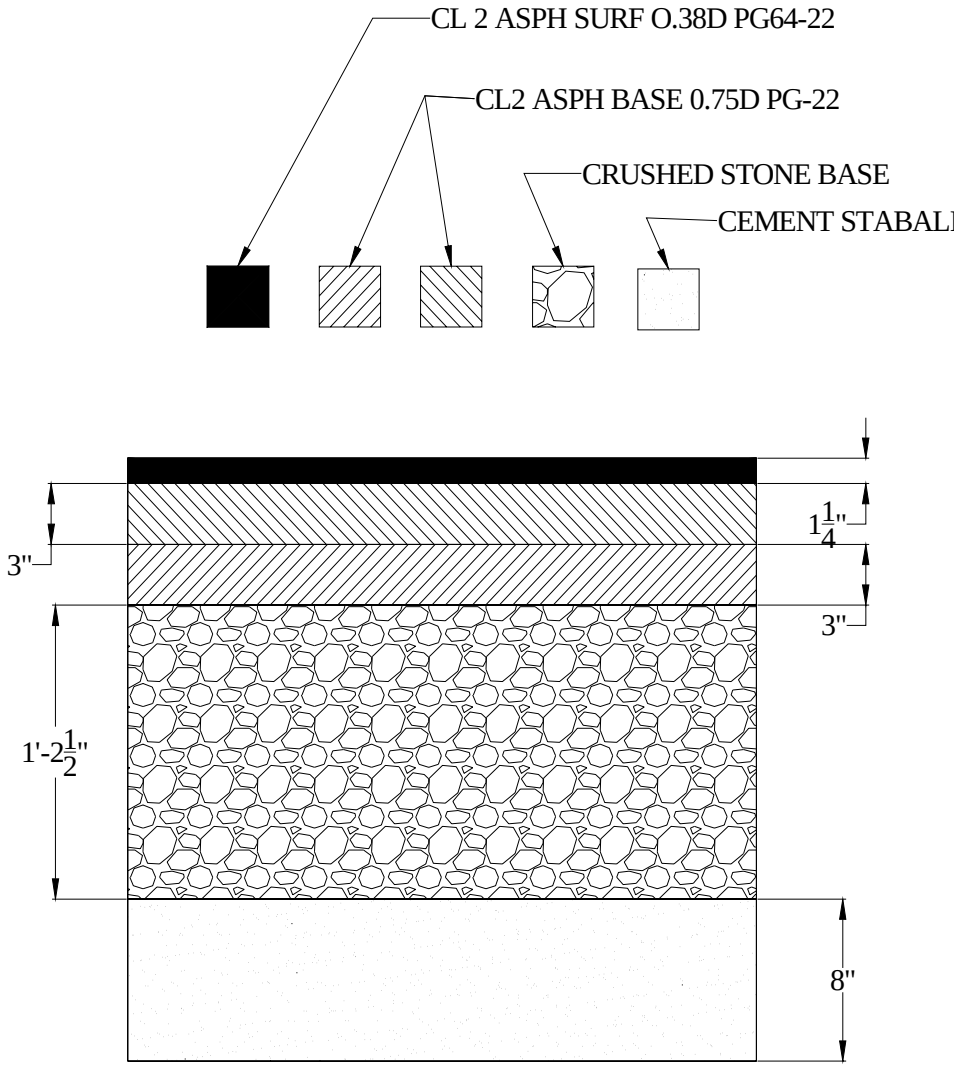
MAXIMUM ASPHALT (AS PROPOSED):

- 1 – 1 ¼" LAYER OF CL2 ASPH, SURF. O.38E PG64-22
- 2 – 3" LAYERS OF CL2 ASPH. BASE 0.75E, PG64-22
- 1 – 3¾" LAYER OF CL2 ASPH. BASE 0.75E, PG64-22
- 1 – 4" LAYER OF CRUSHED STONE BASE
- 8" CHEMICALLY TREATED SUBGRADE (CEMENT)
- Initial construction cost - **$4,918,416**

VII. DEVELOPMENT PHASE

C. DESIGN COMMENTS

1. ALTERNATIVE PAVEMENT BIDS



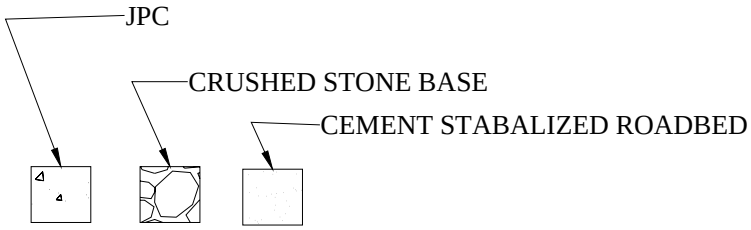
MAXIMUM AGGREGATE:

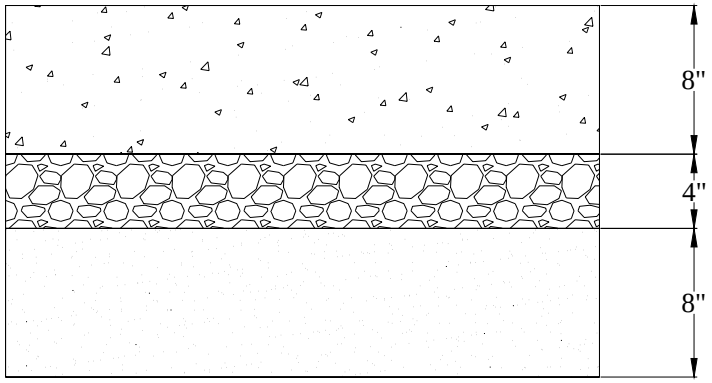
- 1 – 1 ¼" LAYER OF CL2 ASPH, SURF. O.38E PG64-22
- 2 – 3" LAYERS OF CL2 ASPH. BASE 0.75E, PG64-22
- 1 – 14.5" LAYER OF CRUSHED STONE BASE
- 8" CHEMICALLY TREATED SUBGRADE (CEMENT)
- Initial construction cost - **$5,644,044**

VII. DEVELOPMENT PHASE

C. DESIGN COMMENTS

1. ALTERNATIVE PAVEMENT BIDS





CONCRETE:

- 1 – 8” LAYER OF JPC
- 1 – 4” LAYER OF CRUSHED STONE BASE
- 8” CHEMICALLY TREATED SUBGRADE (CEMENT)
- Initial construction cost - **$6,212,096**

VII. DEVELOPMENT PHASE

COST COMPARISON SHEET BACK UP CALCULATIONS

Maximum Asphalt Design

	Default Layer Thickness (in.)				User Defined Thickness (in.)			Final Design Thickness (in.)		
	Design	SN	Nominal	SN	Mainline	Shoulder	SN	Mainline	Shoulder	SN
Surface	1.25	0.55	1.25	0.55	1.25	1.25	0.55	1.25	1.25	0.55
Base Total (in) 8.4										
Layer 1	4.22	1.69	3.00	1.20	3.00	3.00	1.20	3.00	3.00	1.20
Layer 2	4.21	1.68	3.00	1.20	3.00	0.00	1.20	3.00	0.00	1.20
Layer 3	0.00	0.00	3.00	1.20	3.75	0.00	1.50	3.75	0.00	1.50
Layer 4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drainage Blanket-Ty II-Asphalt	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crushed Stone Base	4.00	0.56	4.00	0.56	4.00	10.75	0.56	4.00	10.75	0.56
Stabilized Roadbed	8.00	0.88	8.00	0.88	8.00	8.00	0.88	8.00	8.00	0.88
		5.36		SN 5.59		Total SN	5.89		Total SN	5.89
						Check Structure			Check Structure	

Maximum Aggregate Design

Required Structural Number= 5.71

	Default Layer Thickness (in.)				User Defined Thickness (in.)			Final Design Thickness (in.)		
	Design	SN	Nominal	SN	Mainline	Shoulder	SN	Mainline	Shoulder	SN
Surface	1.25	0.55	1.25	0.55	1.25	1.25	0.55	1.25	1.25	0.55
Base Total (in) 5.8										
Layer 1	2.90	1.16	2.75	1.10	3.00	3.00	1.20	3.00	3.00	1.20
Layer 2	2.89	1.16	3.00	1.20	3.00	0.00	1.20	3.00	0.00	1.20
Layer 3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Layer 4		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drainage Blanket-Ty II-Asphalt	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crushed Stone Base	14.07	1.97	14.00	1.96	14.50	17.50	2.03	14.50	17.50	2.03
Stabilized Roadbed	8.00	0.88	8.00	0.88	8.00	8.00	0.88	8.00	8.00	0.88
		5.72		SN 5.69		Total SN	5.86		Total SN	5.86
						Check Structure			Check Structure	

Concrete Pavement Design

	Default Layer Thickness (in.)				User Defined Thickness (in.)		Final Design Thickness (in.)	
	Design	SN	Nominal	SN	Mainline	Shoulder	Mainline	Shoulder
JPC Pavement Thickness (in)	8.0		8.0		8.0	0.00	8.00	0.00
AC Shoulder Surface						1.25		1.25
AC Shoulder Base								
Layer 1						3.00		3.00
Layer 2						0.00		0.00
Layer 3						0.00		0.00
Layer 4						0.00		0.00
JPC Pavement Drainage Blanket	0.0		0.0		0.00	0.00	0.00	0.00
Crushed Stone Base	4.0		4.0		4.00	7.75	4.00	7.75
Stabilized Roadbed	8.0		8.0		8.0	8.0	8.00	8.00

Maximum Asphalt Design — Initial Cost: 4,918,416 — -14.75% Less than lowest initial cost alternate

	Driving Lane Material Selection			Shoulder Material Selection		
	Item Code	Description	Unit Cost	Item Code	Description	Unit Cost
Surface	301	CL 2 ASPH SURF 0.38D PG64-22	75.56	301	CL 2 ASPH SURF 0.38D PG64-22	75.56
Base						
Layer 1	221	CL 2 ASPH BASE 0.75D PG64-22	56.69	221	CL 2 ASPH BASE 0.75D PG64-22	56.69
Layer 2	221	CL 2 ASPH BASE 0.75D PG64-22	56.69	#N/A		#N/A
Layer 3	221	CL 2 ASPH BASE 0.75D PG64-22	56.69	#N/A		#N/A
Layer 4	#N/A		#N/A	#N/A		#N/A
Drainage Blanket	#N/A		#N/A	#N/A		#N/A
Aggregate Base	3	Crushed Stone Base	23.70	3	Crushed Stone Base	23.70
Stab. Roadbed	8	Cement Stabilized Roadbed	1.60	8	Cement Stabilized Roadbed	1.60

Maximum Aggregate Design — Initial Cost: 5,644,044 — 12.86% Greater than lowest initial cost alternate

	Item Code	Description	Unit Cost			
Surface	301	CL 2 ASPH SURF 0.38D PG64-22	75.56	301	CL 2 ASPH SURF 0.38D PG64-22	75.56
Base						
Layer 1	221	CL 2 ASPH BASE 0.75D PG64-22	56.69	221	CL 2 ASPH BASE 0.75D PG64-22	56.69
Layer 2	221	CL 2 ASPH BASE 0.75D PG64-22	56.69	#N/A		#N/A
Layer 3	#N/A		#N/A	#N/A		#N/A
Layer 4	#N/A		#N/A	#N/A		#N/A
Drainage Blanket	#N/A		#N/A	#N/A		#N/A
Aggregate Base	3	Crushed Stone Base	23.70	3	Crushed Stone Base	23.70
Stab. Roadbed	8	Cement Stabilized Roadbed	1.60	8	Cement Stabilized Roadbed	1.60

Concrete Pavement Design — Initial Cost: 6,212,096 — 20.83% Greater than lowest initial cost alternate

JPC Pavement	2084	JPC Pavement-8 inch	57.76	JPC Shoulder	#N/A	#N/A
				Asphalt Shoulder Surface	301	CL 2 ASPH SURF 0.38D PG64-22	75.56
				Asphalt Shoulder Base			
				Layer 1	221	CL 2 ASPH BASE 0.75D PG64-22	56.69
				Layer 2	#N/A		#N/A
				Layer 3	#N/A		#N/A
				Layer 4	#N/A		#N/A
Drainage Blanket	#N/A		#N/A		#N/A		#N/A
Aggregate Base	3	Crushed Stone Base	23.70		1	Crushed Stone Base	23.70
Stab. Roadbed	8	Cement Stabilized Roadbed	1.60		8	Cement Stabilized Roadbed	1.60

INITIAL CONSTRUCTION Maximum Asphalt Design

	CODE	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT PRICE		AMOUNT	
			ROADBED PREPARATION					
	8	Cement Stabilized Roadbed	0.000		1.60		0.00	
			TRAFFIC LANES					
Surface	301	CL 2 ASPH SURF 0.38D PG64-22	0.092	ton	75.56		6.93	
Base Layer 1	221	CL 2 ASPH BASE 0.75D PG64-22	0.220	ton	56.69		12.47	
Base Layer 2	221	CL 2 ASPH BASE 0.75D PG64-22	0.220	ton	56.69		12.47	
Base Layer 3	221	CL 2 ASPH BASE 0.75D PG64-22	0.275	ton	56.69		15.59	
Base Layer 4	#N/A		0.000	ton	#N/A		0.00	
MTV	338	ASPHALT PLACEMENT WITH MTV	0.807	ton	1.80		1.45	
Drainage Blkt	#N/A		0.000	ton	#N/A		0.00	
Aggregate	3	Crushed Stone Base	0.307	ton	23.70		7.27	
				SUBTOTAL		$	56.18	
			SHOULDERS					
Surface	301	CL 2 ASPH SURF 0.38D PG64-22	0.076	ton	75.56		5.77	
Base Layer 1	221	CL 2 ASPH BASE 0.75D PG64-22	0.183	ton	56.69		10.39	
Base Layer 2	#N/A		0.000	ton	#N/A		0.00	
Base Layer 3	#N/A		0.000	ton	#N/A		0.00	
Base Layer 4	#N/A		0.000	ton	#N/A		0.00	
Drainage Blkt	#N/A		0.000	ton	#N/A		0.00	
Aggregate	3	Crushed Stone Base	0.687	ton	23.70		16.28	
				SUBTOTAL		$	32.44	

TOTAL COST		88.62	PER FOOT
LENGTH OF PROJECT		5.20	MILES
MAINT. OF TRAFFIC	$	52,000.00	
User Cost	$	-	
COST OF PROJECT	$	4,918,415.99	

INITIAL CONSTRUCTION Maximum Aggregate Design

	CODE		ITEM DESCRIPTION	QUANTITY	UNIT	UNIT PRICE		AMOUNT
			ROADBED PREPARATION					
		8	Cement Stabilized Roadbed	0.000		1.60		0.00
			TRAFFIC LANES					
Surface	301		CL 2 ASPH SURF 0.38D PG64-22	0.092	ton	75.56		6.93
Base Layer 1	221		CL 2 ASPH BASE 0.75D PG64-22	0.220	ton	56.69		12.47
Base Layer 2	221		CL 2 ASPH BASE 0.75D PG64-22	0.220	ton	56.69		12.47
Base Layer 3	#N/A			0.000	ton	#N/A		0.00
Base Layer 4	#N/A			0.000	ton	#N/A		0.00
MTV	338		ASPHALT PLACEMENT WITH MTV	0.532	ton	1.80		0.96
Drainage Blkt	#N/A			0.000	ton	#N/A		0.00
Aggregate	3		Crushed Stone Base	1.112	ton	23.70		26.35
					SUBTOTAL		$	59.17
			SHOULDERS					
Surface	301		CL 2 ASPH SURF 0.38D PG64-22	0.08	ton	75.56		5.77
Base Layer 1	221		CL 2 ASPH BASE 0.75D PG64-22	0.18	ton	56.69		10.39
Base Layer 2	#N/A			0.00	ton	#N/A		0.00
Base Layer 3	#N/A			0.00	ton	#N/A		0.00
Base Layer 4	#N/A			0.00	ton	#N/A		0.00
Drainage Blkt	#N/A			0.00	ton	#N/A		0.00
Aggregate	3		Crushed Stone Base	1.12	ton	23.70		26.50
					SUBTOTAL		$	42.66

TOTAL COST	$	101.84	PER FOOT
LENGTH OF PROJECT		5.20	MILES
MAINT. OF TRAFFIC	$	52,000.00	
User Cost	$	-	
COST OF PROJECT	$	5,644,043.75	

INITIAL CONSTRUCTION JPC Design

	CODE	ITEM DESCRIPTION		QUANTITY	UNIT	UNIT PRICE		AMOUNT	
				ROADBED PREPARATION					
	8	Cement Stabilized Roadbed		0.000		1.60		0.00	
				TRAFFIC LANES					
	2084	JPC Pavement-8 inch		1.333	SQ YD	58		77.01	
	#N/A			0.000	TON	#N/A		0.00	
	3	Crushed Stone Base		0.307	TON	23.70		7.27	
					SUBTOTAL		$	84.28	
				SHOULDERS					
JPC Shoulder	#N/A		0	0.000	SQ YD	#N/A		0.00	
AC Surface	301	CL 2 ASPH SURF 0.38D PG64-22		0.076	ton	75.56		5.77	
AC Base 1	221	CL 2 ASPH BASE 0.75D PG64-22		0.183	ton	56.69		10.39	
AC Base 2	#N/A			0.000	ton	#N/A		0.00	
AC Base 3	#N/A			0.000	ton	#N/A		0.00	
AC Base 4	#N/A			0.000	ton	#N/A		0.00	
Drainage Blanket	#N/A			0.000	ton	#N/A		0.00	
Aggregate Base	1	Crushed Stone Base		0.495	ton	23.70		11.73	
					SUBTOTAL		$	27.90	
					TOTAL COST		$	112.18	PER FOOT
					LENGTH OF PROJECT			5.20	MILES
					MAINT. OF TRAFFIC		$	52,000.00	
					User Cost		$	-	
					COST OF PROJECT		$	6,212,096.04	

VIII. 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.

RECOMMENDATION NUMBER 1-

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This Value Engineering Alternative adjusts the vertical alignment**.**

If this recommendation can be implemented, there is a possible savings of ***$9,270,054.***

RECOMMENDATION NUMBER 2-

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This Value Engineering Alternative will place waste in false cuts.

If this recommendation can be implemented, there is a possible savings of ***$738,045.***

RECOMMENDATION NUMBER 3-

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This Value Engineering Alternative will let the project as a separate grade and drainage contract and a separate surface contract.

If this recommendation can be implemented, there is a possible savings of ***$1,271,906.***

RECOMMENDATION NUMBER 4-

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This Value Engineering Alternative will construct 11' lanes.

If this recommendation can be implemented, there is a possible savings of ***$824,719.***

RECOMMENDATION NUMBER 5-

The Value Engineering Team recommends that the Value Engineering alternative be implemented. This Value Engineering Alternative will construct 10' shoulders/5' paved.

If this recommendation can be implemented, there is a possible savings of ***$1,832,191.***

RECOMMENDATION NUMBER 6-

The Value Engineering Team recommends that the Value Engineering alternative be implemented. This Value Engineering Alternative use "Practical Solutions" for existing alignment.

If this recommendation can be implemented, there is a possible savings of ***$7,695,495.***

SR 7 - ELLIOTT COUNTY
VALUE ENGINEERING STUDY PRESENTATION
DECEMBER 5, 2008

NAME	AFFILIATION	PHONE
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