REALIGNMENT OF US 460

MENIFEE COUNTY

AMERICAN CONSULTING ENGINEERS, PLC
Original Design Consultant

VALUE ENGINEERING TEAM #6

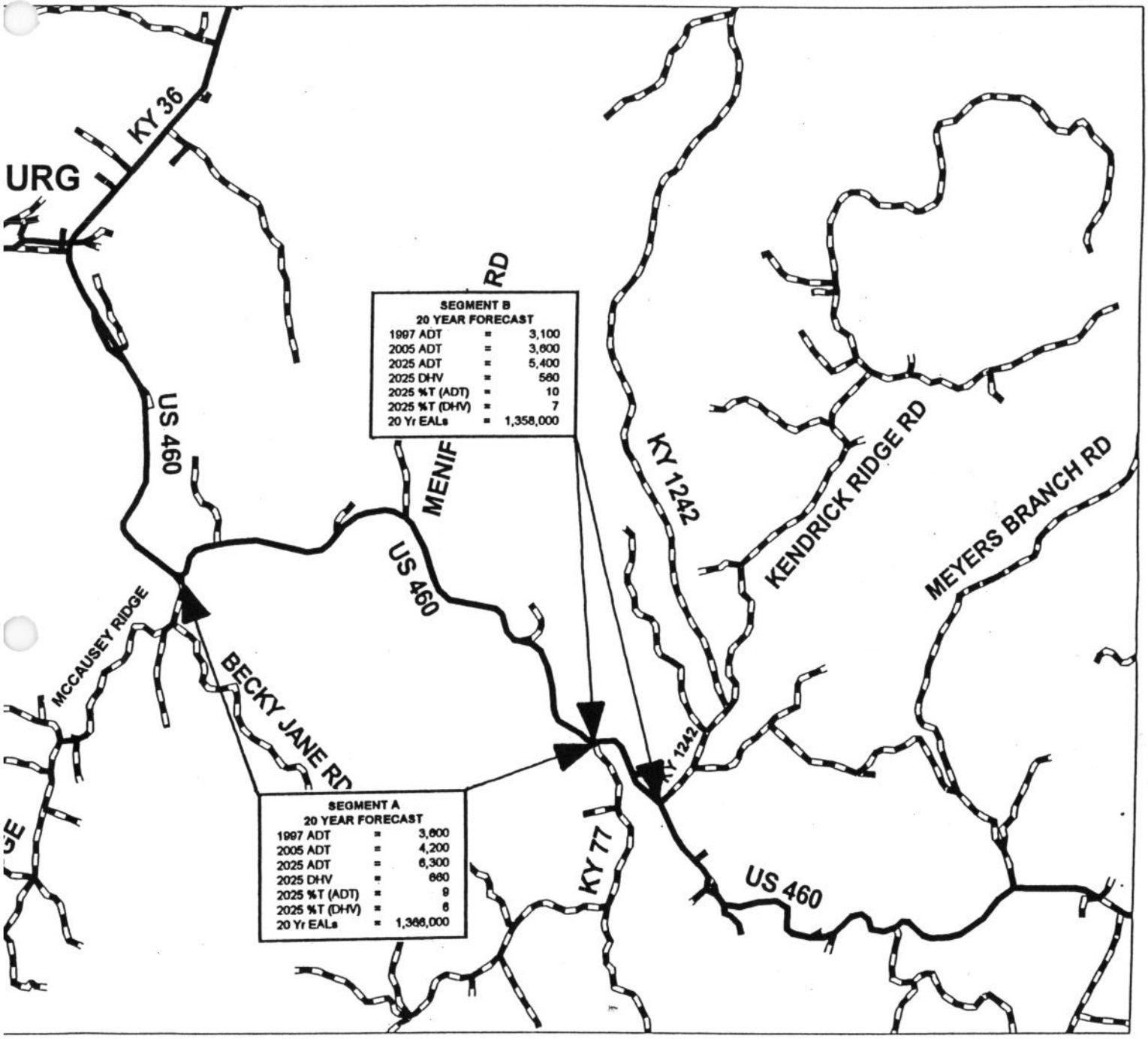
Jo Ann Clark
Keith Caudill
Randy Cox
Chad LaRue
David McDowell
Charlie Reichenbach
Bernie Sandman

Proposed Value Engineering Recommendations:

1. Raising the Grade from Station 71+800 to Station 73+800
2. Combining and Eliminating Entrances
3. Eliminating Existing Roadway

Menifee County - US 460

Item No. 10-117.00



FD52 083 0460 010-014 050 D; OSTPS 04602 057 SHEET ___ OF ___

Value Engineering – Study Identification

Project: Menifee County, US 460 **Team:** 6

Location: Frankfort, KY S.O.B **Date:** 4/26/99 - 4/30/99

VE TEAM MEMBERS

Name	Title	Organization	Telephone
Chad LaRue	Bridge Engineer	KY DOT D-5	502-367-6411
Randy Cox	Materials Engr.	KY DOT D-8	606-677-4017
Bernie Sandman	Transportation Engr I	KY DOT D-6	606-356-5300
David McDowell	Resident Engr.	KY DOT D-2	502-926-7915
Charlie Reichenbach	Transportation Engr	KY DOT D-12	606- 433-7791
Keith Caudill	Transp. Engr Supv.	KY DOT D-7	606-246-2355
JoAnn Clark	Area Engineer	FHWA	502-223-6742

PROJECT DESCRIPTION

Length: 4.680 KM	**Cost:** 6.78 M	**Type of Funds:** STPS, State
Design Speed: 90 Km/hr (55 mph)		**Projected Traffic:** 6300 ADT
Projected Award Date:		

Major Project Elements:

Grade, Drain, and Surfacing

ROUTE CONDITION / GEOMETRY

Adjacent Segments:	Overall Route:

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Investigation Phase – Sources

Date: 4/26/99 – 4/30/99 Team: 6

AUTHORIZING PERSONS

Name	Position	Telephone

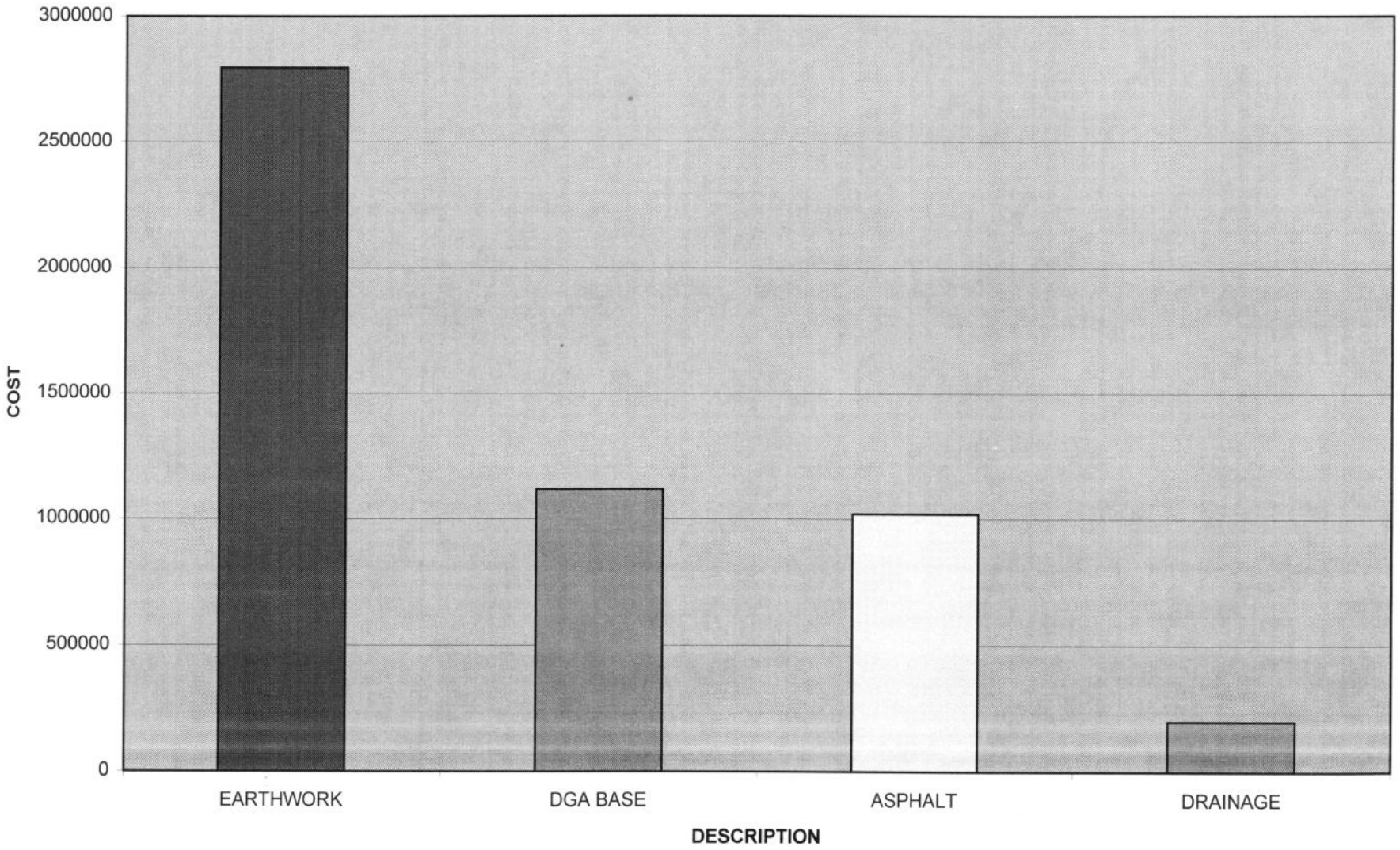
PERSONAL CONTACTS

Contacts	Telephone	Notes
Glenn A. Hardin	(606) 233-2100	American Consulting Engr. Manager, Civil Group
Paul Snesker	(502) 564-3280	Estimating Branch

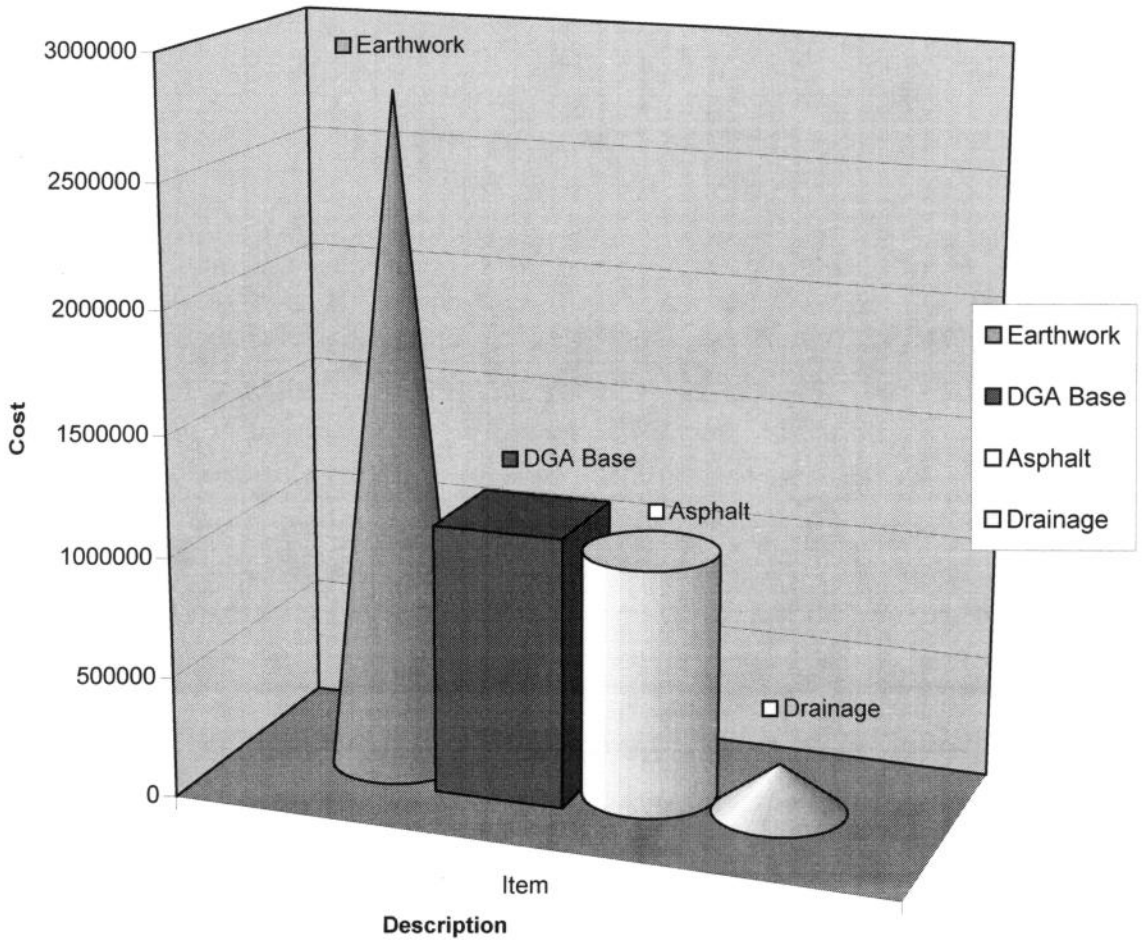
DOCUMENTS / ABSTRACTS

References	Notes
Standard Drawings	For roadway depth/width

COST MODEL


3000000
2500000
2000000
1500000
1000000
500000
0
COST
EARTHWORK
DGA BASE
ASPHALT
DRAINAGE
DESCRIPTION

Investigation Phase- Cost Model



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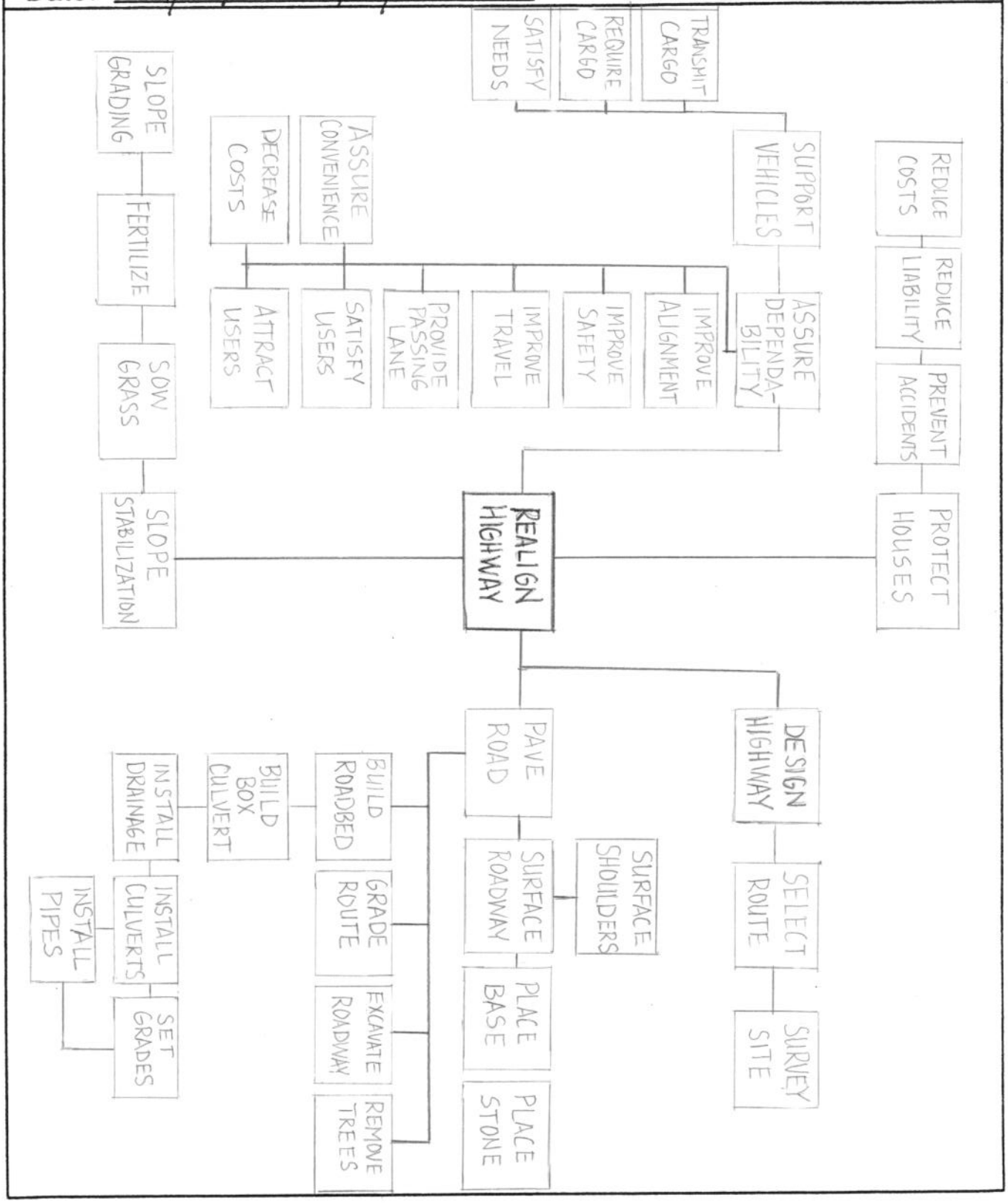
Investigation Phase – FAST Diagram

Date: 4/26/99 – 4/30/99 Team: 6



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Speculation Phase – Brainstorming

Date: 4/26/99 – 4/30/99 Team: 6

Item: _____ Function: _____	Item: _____ Function: _____
☐ Change Profile	
☐ Reduce Yardage	
☐ Minimize Right of Way	
☐ Alternative Culvert	
☐ Combining/ELiminating Entrances	
☐ Review Drainage	
☐ Review (Investigate) Alignment	
☐ Reduce Traffic Control	
☐ Eliminate Existing Roadway	
☐ Review Pavement Designs	
☐ Consider Holding Pond for Culvert	

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SHEET ____ OF ____

Investigation Phase – Function Analysis

Project: Menifee County, US 460,

Team No. 6

Overall Project Function: Grade, Drain and surfacing

Date: 4/26/99 - 4/30/99

ITEM #	Description	FUNCTION		Cost	Worth	Comments
		Verb	Noun			
2200	Roadway Excavation	Excavate	Roadway	2,793,580.00	2,653,901.00	
0001	DGA Base	Build	Roadbed	1,116,788.40	1,116,788.40	
0100	Surfacing	Surface	Roadway	1,019,644.30	1,019,644.30	
0400	Drainage	Drain	Roadway	198,555.50	258,555.50	

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Evaluation Phase

Date: 4/26/99 - 4/30/99 Team No. 6

IDEA #	CREATIVE IDEA LISTING	IDEA EVALUATION		IDEA RATING
		Advantages	Disadvantages	
1	Relocate and shorten KY 77 S.	Reduce costs, Reduce Right of Way, Reduce Yardage, Reduce Excavation	Redesign Costs, Reduced sight distance	NOT FEASIBLE
2	Alternative Culverts	Reduce Costs, Reduce Const. time	Shorter life, higher Maintenance	NOT FEASIBLE
3	Combine and Eliminate Entrances	Reduce Costs, Increase Safety	Public Relations	2
4	Eliminate Existing Roadway	Safety, Reduce Maintenance Costs.	Reduced Owners Convenience, Cost of Elimination	3
5	Raise Grade from Sta. 71+800 to Sta. 73+800	Reduce excavation, Reduce Costs, Improve Safety, reduce steepness of driveways	Increase Fill, Increase Right Of way in fill Area, Length pipes in fill Areas	1

SHEET ____ OF ____

Evaluation Phase – Matrix Analysis

Date: 4/26/99 – 4/30/99 Idea: Raising Grade

Raise Grade from Sta. 71+800 to Sta. 73+800

Alternatives	Weights	FUNCTION SERVED 10	COST 10	MAINTENANCE 5	CONSTRUCTABILITY 7	SAFETY 5			Totals	Rank
Original Design		4/40	3/30	4/20	4/28	4/20			138	2
Alt. #1 - Raise Grade		4/40	4/40	4/20	4/28	4/20			148	1

NOTE: First Alternative is the Original Design Item

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Evaluation Phase – Matrix Analysis

Date: 4/26/99 – 4/30/99 Idea: Combine and Eliminate Entrances

Combine and Eliminate Entrances

Alternatives	Weights	FUNCTION SERVED 10	COST 7	MAINTENANCE 5	CONSTRUCTABILITY 3	SAFETY 9			Totals	Rank
Original Design		4 / 40	2 / 14	3 / 15	4 / 12	3 / 27			108	2
Alt. #1 - Combine/Elim. Entrances		3 / 30	5 / 35	5 / 25	5 / 15	5 / 45			150	1

original

1 - Poor
2 - Fair
3 - Average
4 - Good
5 - Excellent

NOTE: First Alternative is the Original Design Item

FD52 083.0460 010-014 050-D; STPS 04602 057 SHEET ____ OF ____

Evaluation Phase – Matrix Analysis

Date: 4/26/99 – 4/30/99 Idea: Eliminate Existing Roadway

Criteria

Eliminate Existing Roadway
Left Sta. 72+675 to
Sta. 72+950

Alternatives	Weights	FUNCTION SERVED 10	COST 5	MAINTENANCE 10	CONSTRUCTABILITY 5	SAFETY 10			Totals	Rank
Original Design		4 40	5 25	3 30	3 15	3 30			140	2
Alt #1 - Elim. Existing Roadway		3 30	3 15	5 50	4 20	5 50			165	1

original →

1 - Poor
2 - Fair
3 - Average
4 - Good
5 - Excellent

NOTE: First Alternative is the Original Design Item

FD52 083.0460 010-014 050-D; STPS 04602 057 SHEET ____ OF ____

Evaluation Phase – Matrix Analysis

Date: 4/26/99 – 4/30/99 Idea: Alternative Culverts

Alternative Culverts

Alternatives	Weights	Criteria: Function Served (10)	Cost (10)	Maintenance (8)	Constructability (8)	Safety (5)			Totals	Rank
Original Design		4 / 40	3 / 30	5 / 40	3 / 24	5 / 25			159	1
Alt #1 Round Metal Pipe (7')		4 / 40	4 / 40	3 / 24	4 / 32	4 / 20			156	2

original →

5 – Excellent
4 – Good
3 – Average
2 – Fair
1 – Poor

NOTE: First Alternative is the Original Design Item

VALUE ENGINEERING RECOMMENDATION

COST ESTIMATE - O & M (LIFE CYCLE) COST

FORM: 30 DEC. 1996

IDENTIFICATION NUMBER: Proposal #4 Page of

PRESENT WORTH METHOD
LIFE CYCLE PERIOD (YEARS) = 25 years
ANNUAL PERCENTAGE RATE = 4%

Dollars in table are $ times 1,000

Initial Costs				Original Design PW $		Reccomd Design PW $
Construction Culvert				65		39
Sub Totals of Initial Costs PW $				65		39

Later Costs Single Expenditure	In The Yr	PW Factor	Original Design		Recommended Design	
			Est $	PW $	Est $	PW $
Replacement	25	0.3751	—	—	80	30
Sub Total of Single Expenditure Costs PW $				—		30

Later Costs Annual Expense	For How Many Yrs	PW Factor	Original Design		Recommended Design	
			Est $	PW $	Est $	PW $
Maintenance	25	15.622	1	16	1	16
Sub Totals of Annual Expense Costs PW $				16		16
Totals PW $ for Original & Recommended				81		85
Total PW $ Savings (or Added Cost) for Recommended Design						(-4)

FD52 083 0460 010-014 050-D; STPS 04602 057 SHEET ____ OF ____

Evaluation Phase – Matrix Analysis

Date: 4/26/99 – 4/30/99 Idea: Relocate and Shorten KY 77

Relocate and Shorten KY 77

Alternatives	Weights	Criteria: Function Served (10)	Cost (10)	Maintenance (5)	Constructability (8)	Safety (8)			Totals	Rank
original → Original Design		4 / 40	3 / 30	4 / 20	3 / 24	4 / 32			146	2
Alt. #1 - Relocate....		4 / 40	5 / 50	3 / 15	4 / 32	4 / 32			169	1

NOTE: First Alternative is the Original Design Item

Rating Scale:
1 - Poor
2 - Fair
3 - Average
4 - Good
5 - Excellent

VALUE ENGINEERING RECOMMENDATION

FORM 20 DEC 1996

PROJECT: FD52 083 0460 010-014 050D; OSTPS 04602 057

LOCATION: MENIFEE COUNTY, US460

STUDY DATE: APRIL 26,- APRIL 30, 1999

IDENTIFICATION NUMBER: PROPOSAL # 1, TEAM #6

FUNCTION OF COMPONENT BEING CHANGED: EXCAVATE ROADWAY

DESCRIPTIVE TITLE OF RECOMMENDATION: RAISE GRADE BETWEEN STA 71+800 AND STA 73+800 TO REDUCE ROADWAY EXCAVATION.

ORIGINAL DESIGN:

THE ROADWAY EXCAVATION CONTROLS THE EARTHWORK BID ITEM ON THIS PROJECT. THIS PROJECT HAS 77,604 CUBIC METERS OF WASTE. PLAN ROADWAY EXCAVATION IS 698,395 CUBIC METERS.

RECOMMENDED CHANGE:

THIS PROPOSAL WILL RAISE THE PLAN GRADE FOR 2000 METERS IN A VERTICAL SAG, BETWEEN STA 71+800 AND STA 73+800. THE PVI IN THE SAG AT STA 72+634 IS RAISED 2 METERS WITH NO CHANGE TO THE CREST PVI'S AT STA 72+113 AND STA 73+507. THE RESULT IS A MAXIMUM GRADE RAISE OF 1.75 METERS AT STATION 72+700. THIS RESULTS IN A 40,000 CUBIC METER ROADWAY EXCAVATION REDUCTION.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	$2,853,000	$3,850	$2,857,000
RECOMMENDED DESIGN	$2,696,000	$4,050	$2,700,000
ESTIMATED SAVINGS OR (COST)			$157,000

VALUE ENGINEERING RECOMMENDATION

IDENTIFICATION NUMBER: PROPOSAL # 1, TEAM #6 Page of

ADVANTAGES:

THIS PROPOSAL HAS A SUBSTANTIAL COST SAVINGS OF $160,000 INITIALLY. THE GRADE OF THE ROAD IS SLIGHTLY IMPROVED BY RAISING THE SAG BY 1.75 METERS. ALTHOUGH THE BID ITEM OF ROADWAY EXCAVATION IS REDUCED BY 40,000 CUBIC, THE WASTE IS REDUCED FROM 77,604 CUBIC METERS TO 7,604 CUBIC METERS. THIS MINIMIZES THE SIZE OF WASTE SITE NEEDED.

DISADVANTAGES:

SEVEN CROSS DRAIN PIPES HAD TO BE LENGTHED. THE TOTAL INCREASE OF CROSS DRAINS IS 27 METERS. MINIMAL RIGHT REVISIONS WILL BE REQUIRED. THIS SHOULD BALANCE OUT IN THAT LESS WILL BE NEEDED IN THE CUTS AND MORE IN FILLS. NO BUILDINGS ARE IN THE CHANGED R/W AREAS.

JUSTIFICATION:

THE COST SAVINGS OF $160,000 IS SIGNIFICANT. THE REDUCTION OF WASTE WILL MINIMIZE THE SIZE OF WASTE AREA REQUIRED. THIS CHANGE CAN BE MADE WITH NO REDUCTION IN SAFETY OR DRIVER COMFORT. WE HAVE LEARNED FROM THE PROJECT DESIGN ENGINEER THAT FINAL DESIGN HAS NOT BEEN STARTED. THEY ARE STILL WAITING FOR ENVIRONMENTAL APPROVAL. THEREFOR THIS CHANGE CAN BE MADE WITHOUT SLOWING DOWN THE PROJECT.

PROPOSAL #1 GRADE REVISION TEAM #6

	STATION	NEW ELEV.	ORIG. ELEV.		
	71+800	382.686	382.686		
PVC	71+813.272				
	71+900	383.789	383.765		
	72+000	384.149	384.038		
	72+100	383.764	383.502		
PVI	72+113.272			387.025	
	72+200	382.626	382.148		
	72+300	380.738	379.981		
	72+400	378.100	377.001		
	72+500	375.125	373.657		
	72+600	373.519	371.824	NEW	ORIG.
PVI	72+634.951			370.792	368.792
	72+700	373.586	371.839		
	72+800	375.325	373.700		
	72+900	378.058	376.659		
	73+000	380.800	379.627		
	73+100	383.516	382.595		
	73+200	386.283	385.563		
	73+300	388.388	387.910		
	73+400	389.038	388.703		
	73+500	388.233	388.033		
PVI	73+506.949			394.673	
	73+600	385.970	385.869		
	73+700	382.250	382.212		
	73+800	377.073	377.060		
PVT	73+806.949				

PROPOSAL #1 → EARTHWORK COMPUTATIONS GRADE REVISION TEAM #6

	LESS CUT		MORE FILL	
	END AREA	VOLUME	END AREA	VOLUME
71+800	0		0	
71+900	0		SMALL	203
72+000	0	455 m^3	$0.15 \times 27 = 4.05 m^2$	203
72+100	$0.26 \times 35 = 9.10 m^2$	1568	0	0
72+200	$0.53 \times 42 = 22.26 m^2$	1113	0	1443
72+300	0	3135	$0.74 \times 39 = 28.86 m^2$	1443
72+400	$1.10 \times 57 = 62.70 m^2$	3932	0	1305
72+500	$1.45 \times 11 = 15.95 m^2$	2365	$1.45 \times 18 = 26.10 m^2$	2460
72+600	$1.65 \times 19 = 31.35 m^2$	1568	$1.65 \times 14 = 23.10 m^2$	4130
72+700	0	3465	$1.70 \times 35 = 59.50 m^2$	2975
72+800	$1.65 \times 42 = 69.3 m^2$	9120	0	0
72+900	$1.45 \times 78 = 113.10 m^2$	8235	0	0
73+000	$1.20 \times 43 = 51.60 m^2$	2580	0	2600
73+100	0	0	$1.0 \times 52 = 52.00 m^2$	5720
73+200	0	0	$0.8 \times 78 = 62.4 m^2$	5020
73+300	0	805	$0.5 \times 76 = 38.0 m^2$	1900
73+400	$0.35 \times 46 = 16.10 m^2$	805	0	0
73+500	SMALL		SMALL	0
73+600	SMALL		SMALL	0
73+700	SMALL		SMALL	0
73+800	0		0	
TOTALS		⊗ 39,146		⊗ 29,402

⊗ WILL BE SLIGHTLY MORE DUE TO SIDE ROADS
∴ USE 40,000 m^3 LESS CUT; 30,000 m^3 LESS FILL

Σ 68,548 (USE 70,000 DUE TO SIDE ROADS)

TOTAL WASTE ORIGINAL 77,604 PROPOSED 9,054

DUE TO SIDE ROADS USE ↓ (7,604)

PROPOSAL #1

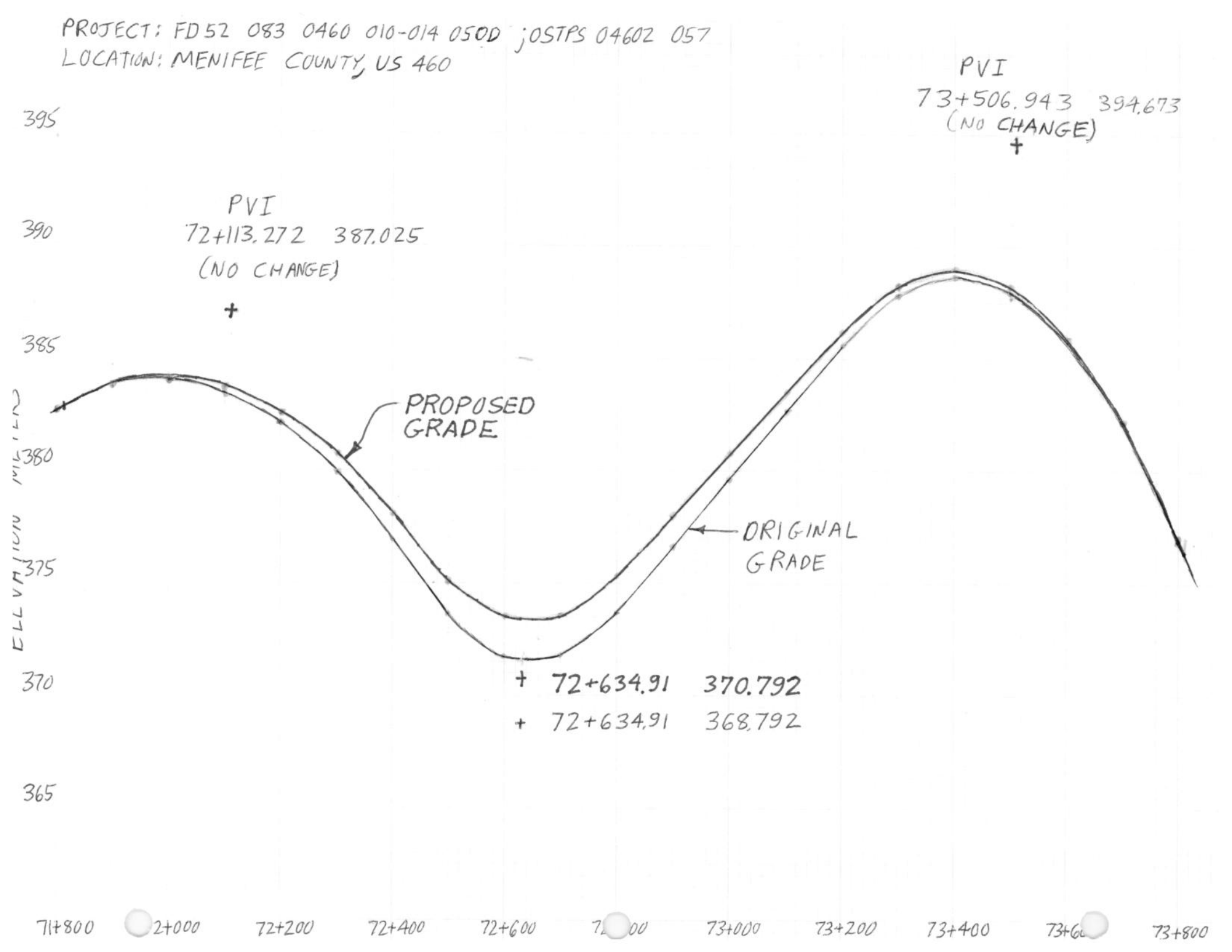
PIPE LENGTH CHANGES GRADE REVISION TEAM #6

CULVERT PIPES (450 mm)

STATION	INCREASE IN LENGTH
71+850	NO EFFECT
72+050	1 METER
72+170	2 METERS
72+290	3 METERS
72+500	6 METERS
72+700	7 METERS
73+060	5 METERS
73+240	3 METERS
73+770	NO EFFECT
TOTAL	27 METERS

X $101.57/METER = $2742.39

PROJECT: FD 52 083 0460 010-014 050D ; OSTPS 04602 057
LOCATION: MENIFEE COUNTY, US 460



VALUE ENGINEERING RECOMMENDATION

PAGE 1 DISCUSSION (to be later typed on page 1 as Original Design and Reommended Change). Restrict this discussion to this one page only.

FORM 30 DEC. 1996

IDENTIFICATION NUMBER: PROPOSAL #1, TEAM #6 Page 1A of

THE ORIGINAL DESIGN INCLUDES 698,395 CUBIC METTERS OF ROADWAY EXCAVATION. THE PROJECT YIELDS 77,604 CUBIC METERS OF WASTE. A SAG VERTICAL CURVE EXIST BETWEEN STA 71+800 AND 73+800.

THIS PROPOSAL RECOMMENDS RAISING THE P.I. @ STA 72+634 FROM 368.792 to 370.792. THE P.I's AT STA 72+113 AND STA 73+507 WILL BE UNCHANGED. RAISING THE GRADE WILL REDUCE THE ROADWAY EXCAVATION BY 40,000 CUBIC METERS. THE WASTE WILL BE REDUCED BY 10,000 CUBIC METERS IN THAT AN ADDITIONAL 30,000 CUBIC METERS WILL BE USED FOR FILL.

THE AFFECT TO CONNECTOR #2, KY77, AT STA 73+780 AND CONNECTOR #3 IS MINIMAL. THE AFFECT TO CONNECTOR #1, KY77, AT STA 73+371 IS LESS THAN 0.4 METER.

NINE CROSS DRAINS ARE AFFECTED. SEVEN 450 MM PIPES NEED TO BE LENGTHENED SLIGHTLY. THE TOTAL INCREASE IS 27 METERS OF 450 MM CULVERT PIPE.

R/W EFFECT IS MINIMAL. NO ADDITIONAL BUILDINGS WILL BE DISTURBED. SLIGHTLY MORE R/W IS NEEDED FOR FILLS AND SLIGHTLY LESS FOR CUTS.

SAFETY WILL SLIGHTLY IMPROVE BY FLATTENING 3 VERTICAL CURVES. SIGHT DISTANCE IMPROVES SLIGHTLY.

VALUE ENGINEERING RECOMMENDATION

FORM: 30 DEC, 1996 **COST ESTIMATE - O & M (LIFE CYCLE) COST**

IDENTIFICATION NUMBER: PROPOSAL #1, GRADE CHANGE Page of

PRESENT WORTH METHOD
LIFE CYCLE PERIOD (YEARS) = 25
ANNUAL PERCENTAGE RATE = 4%

Dollars in table are $ times 1,000

Initial Costs				Original Design PW $		Reccomd Design PW $
ROADWAY EXCAVATION				2,794		2,634
450MM CULVERT PIPE				59		62
Sub Totals of Initial Costs PW $				2,853		2,696

Later Costs Single Expenditure	In The Yr	PW Factor	Original Design		Recommended Design	
			Est $	PW $	Est $	PW $
CLEANING 450MM PIPES	8	0.7307	2.32	1.70	2.43	1.80
	16	0.5339	2.32	1.24	2.43	1.30
	24	0.3901	2.32	0.91	2.43	0.95
Sub Total of Single Expenditure Costs PW $				3.85		4.05

Later Costs Annual Expense	For How Many Yrs	PW Factor	Original Design		Recommended Design	
			Est $	PW $	Est $	PW $
Sub Totals of Annual Expense Costs PW $						
Totals PW $ for Original & Recommended				2,857		2700
Total PW $ Savings (or Added Cost) for Recommended Design						157

VALUE ENGINEERING RECOMMENDATION

FORM: 30 DEC 1996

COST ESTIMATE - FIRST COST

IDENTIFICATION NUMBER: PROPOSAL # 1 , TEAM #6 Page of

Cost Item	Units	Unit Cost		Original Design		Recommended Design	
		$/Unit	Source Code	Num of Units	Total $	Num of Units	Total $
ROADWAY EXCAVATION	C.M.	4.00	1	698,395	2,793,580	658,395	2,633,580
CULVERT PIPE 450MM	M.	101.57	1	580	58,910	607	61,653

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

VALUE ENGINEERING RECOMMENDATION

FORM 20 DEC 1996

PROJECT: Menifee County, US 460

LOCATION: Frankfort, KY S.O.B.

STUDY DATE: 4/26/99 - 4/30/99

IDENTIFICATION NUMBER: Team #6, Proposal #2

FUNCTION OF COMPONENT BEING CHANGED: Provides Additional Parcel Access to Proposed Roadway

DESCRIPTIVE TITLE OF RECOMMENDATION:

Combine and Eliminate Proposed Entrances

ORIGINAL DESIGN:

The designers placed entrances to provide several parcels access to the proposed roadway.

RECOMMENDED CHANGE:

We recommend the removal of eight entrances on the North Side and combine two other entrances into one entrance on the South side of the road.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	40,000	—	40,000
RECOMMENDED DESIGN	∅	—	∅
ESTIMATED SAVINGS OR (COST)	40,000		40,000

VALUE ENGINEERING RECOMMENDATION

PAGE 1 DISCUSSION (to be later typed on page 1 as Original Design and Reommended Change). Restrict this discussion to this one page only.

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IDENTIFICATION NUMBER: Page 1A of

Below is a list of entrances and locations that are proposed to be removed.

* The entrance to parcel 36 on Connector 2 at Sta. 0+950 Lt.
* The entrance to parcel 37 on Proposed US460 at Sta 71+750 Lt.
* The entrance to parcel 42 on Proposed US460 at Sta. 72+000 Lt.
* The entrance to pacel 53 on Proposed US460 at Sta. 72+450 Lt.
* The entrance to parcel 55 on Proposed US460 at Sta. 72+600 Lt.
* The entrance to parcel 58 on Proposed US460 at Sta. 72+980 Lt.
* The entrance to parcel 61 on Proposed US460 at Sta. 73+130 Lt.
* The entrance to parcel 88 on Proposed US460 at Sta. 74+300 Lt.

Combine the entrances at Sta. 70+300 Rt. and Sta. 70+350 Rt. into a single entrance at Sta. 70+325 Rt. This matches the existing conditions.

* NOTE: Parcel 36 and Parcel 37 have no existing entrances, all other parcels have access from the existing roadway.

VALUE ENGINEERING RECOMMENDATION

IDENTIFICATION NUMBER: Page of

ADVANTAGES: There are two major advantages to our proposal. The first advantage is the estimated $40,000 savings in construction costs of constructing the entrances. The second advantage is the added safety for the proposed roadway by eliminating access points to the roadway.

DISADVANTAGES: The primary disadvantage of this proposal is that property owners may not be receptive to this proposal because of their desires to have additional access to the new roadway

JUSTIFICATION: Despite the possible public relation problems this proposal is justifiable because these properties already have access to the existing roadway and will have access to the proposed roadway via the existing roadway. Having the property owners use the current entrances on the existing roadway reduces access points to the proposed roadway thus increasing the safety of the proposed roadway. We feel that with the estimated $40,000 in savings along with the added safety of the proposed roadway makes this a viable proposal.

VALUE ENGINEERING RECOMMENDATION

FORM: 30 DEC 1996

COST ESTIMATE - FIRST COST

IDENTIFICATION NUMBER: Team #6, Proposal #2 Page of

Cost Item	Units	Unit Cost		Original Design		Recommended Design	
		$/Unit	Source Code	Num of Units	Total $	Num of Units	Total $
149 Asphalt Surface Class I-O	MTON	$32.91	1	1838	60,488.58	1675	55,124.25
120 Asphalt Base Class T	MTON	$33.33	1	24,917	830,483.61	24,418	813,851.94
1 DGA Base	MTON	$15.60	1	71,589	1,116,788.40	70,900	1,106,040.00
Earthwork	CUM	$4.00	1	698,395	2,793,580	696,581	2,786,324.00
					4,801,340.59		4,761,340.19

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

VALUE ENGINEERING RECOMMENDATION

COST ESTIMATE - O & M (LIFE CYCLE) COST

FORM: 30 DEC. 1996

IDENTIFICATION NUMBER: Team #6, Proposal #2 Page of

PRESENT WORTH METHOD
LIFE CYCLE PERIOD (YEARS) = 25
ANNUAL PERCENTAGE RATE = 4%

Dollars in table are $ times 1,000

Initial Costs				Original Design PW $		Reccomd Design PW $
Construction				40		∅
Sub Totals of Initial Costs PW $						

Later Costs Single Expenditure	In The Yr	PW Factor	Original Design		Recommended Design	
			Est $	PW $	Est $	PW $
NONE						
Sub Total of Single Expenditure Costs PW $						

Later Costs Annual Expense	For How Many Yrs	PW Factor	Original Design		Recommended Design	
			Est $	PW $	Est $	PW $
NONE						
Sub Totals of Annual Expense Costs PW $						
Totals PW $ for Original & Recommended				40		∅
Total PW $ Savings (or Added Cost) for Recommended Design						
				40		∅

11 40,000

VALUE ENGINEERING RECOMMENDATION

FORM 20 DEC 1996

PROJECT: Menifee County, US 460

LOCATION: Frankfort, KY S.O.B.

STUDY DATE: 4/26/99 - 4/30/99

IDENTIFICATION NUMBER: Team #6 - Proposal #3

FUNCTION OF COMPONENT BEING CHANGED: Increase Safety/Eliminate Maintenance

DESCRIPTIVE TITLE OF RECOMMENDATION:

Eliminate Existing Roadway

ORIGINAL DESIGN:

Leave existing Roadway between station 72+675 to Station 72+950.

RECOMMENDED CHANGE:

Remove existing Roadway between station 72+675 to Station 72+950.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	—	25,221	25,221
RECOMMENDED DESIGN	14,253	—	(14,253)
ESTIMATED SAVINGS OR (COST)	—	—	10,968

VALUE ENGINEERING RECOMMENDATION

IDENTIFICATION NUMBER: Proposal #3, Team 6 Page of

ADVANTAGES:

- Improve safety by eliminating entrances.
- Eliminate maintenance and maintenance costs.
- Cost analysis reflects considerable savings.

DISADVANTAGES:

- Decreased Convenience to property owners.
- Higher initial Construction Cost.

JUSTIFICATION:

- The alternative is attractive for Several Reasons:
  1) Elimination of entrances thus improving safety aspects
  2) maintenance costs to the Section to be removed will be eliminated.
  3) Cost Savings will be approx. $11,000^{00}$

VALUE ENGINEERING RECOMMENDATION

PAGE 1 DISCUSSION (to be later typed on page 1 as Original Design and Reommended Change). Restrict this discussion to this one page only.

FORM 30 DEC. 1996

IDENTIFICATION NUMBER: Team 6, Proposal #3 Page 1A of

The original design is set up to leave as much at the existing road in as possible. Some sections were to be removed but this particular section was left in. Leaving this section in would be an advantage for the people living along the old route, however with the new entrances being provided this disadvantage is not as great.

Removing the old from station 72+675 to Station 72+950 mainline would be an advantage for several reasons. We would save approx. $ 11,000 by eliminating future maintenance, paving costs, and safety would be improved by taking traffic off this section thereby eliminating potential for accidents.

VALUE ENGINEERING RECOMMENDATION

COST ESTIMATE - O & M (LIFE CYCLE) COST

FORM: 30 DEC. 1996

IDENTIFICATION NUMBER: Proposal #3 Page of

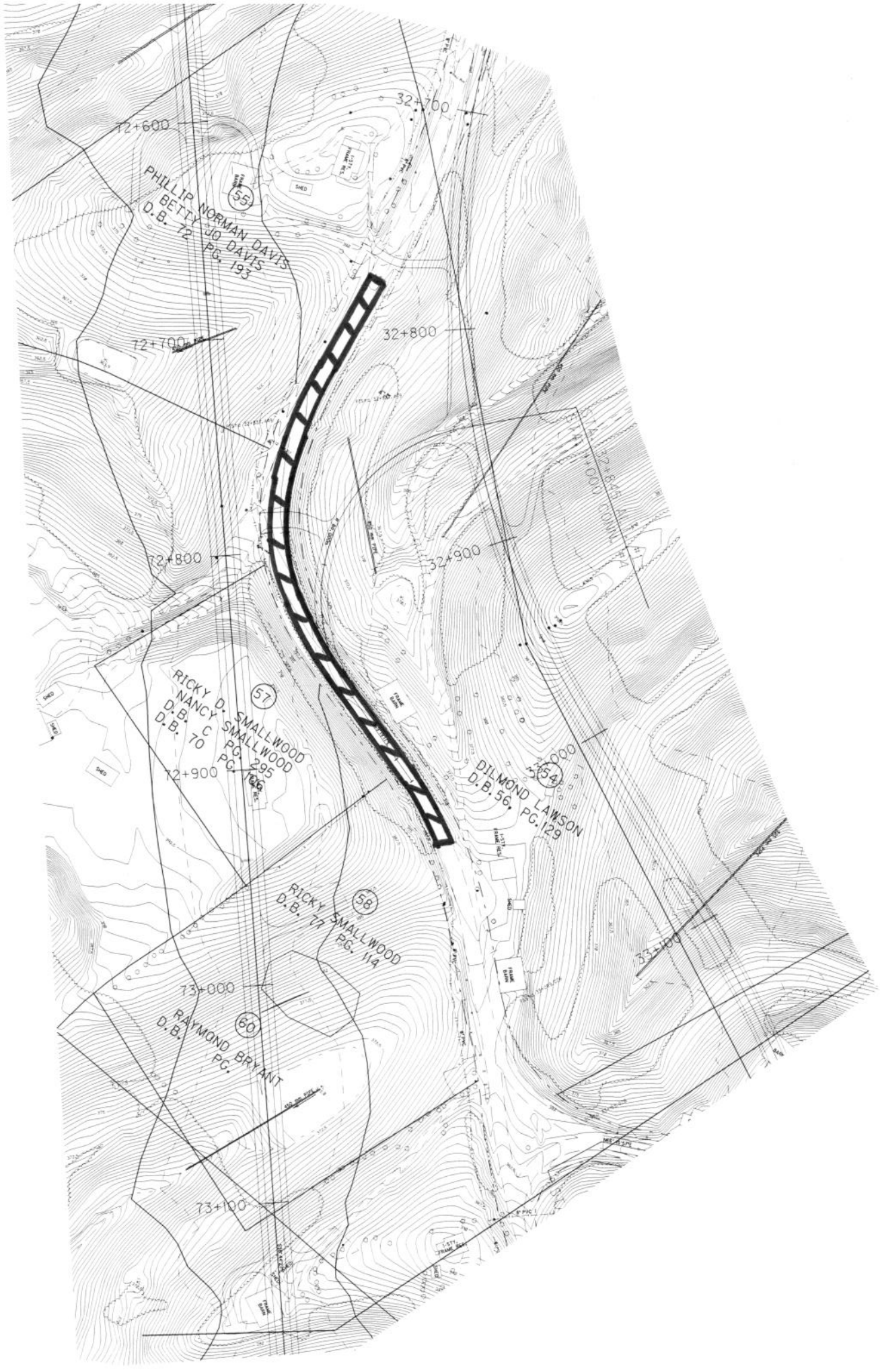
PRESENT WORTH METHOD
LIFE CYCLE PERIOD (YEARS) = 25 years
ANNUAL PERCENTAGE RATE = 4%

Dollars in table are $ times 1,000

Initial Costs				Original Design PW $		Reccomd Design PW $
Original Design				—		
Remove Pavement						14.2
Sub Totals of Initial Costs PW $				0		14.2

Later Costs Single Expenditure	In The Yr	PW Factor	Original Design		Recommended Design	
			Est $	PW $	Est $	PW $
Resurface	10	0.6756	9.14	6.2		
Resurface	25	0.3751	9.14	3.4		
Sub Total of Single Expenditure Costs PW $				9.6		0

Later Costs Annual Expense	For How Many Yrs	PW Factor	Original Design		Recommended Design	
			Est $	PW $	Est $	PW $
Annual Maint.	25	15.622	1	15.6		
Sub Totals of Annual Expense Costs PW $				15.6		0
Totals PW $ for Original & Recommended				25.2		14.2
Total PW $ Savings (or Added Cost) for Recommended Design						11.0


72+600
32+700
PHILLIP NORMAN DAVIS
BETTY JO DAVIS
D.B. 72 PG. 193
55
72+700
32+800
72+800
32+900
RICKY D. SMALLWOOD
NANCY SMALLWOOD
D.B. C PG. 295
D.B. 70 PG. 106
57
72+900
DILMOND LAWSON
D.B. 56, PG. 129
54
RICKY SMALLWOOD
D.B. 77 PG. 114
58
73+000
33+100
RAYMOND BRYANT
D.B.
PG.
60
73+100