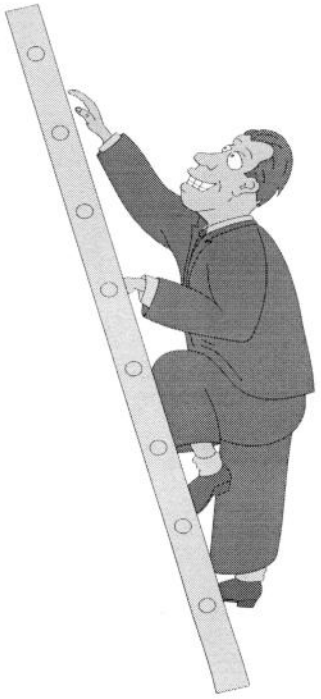
Estill County, Ky Rt 89



Value Eng. Team #1

KY TRANSPORTATION

DEPARTMENT OF HIGHWAYS

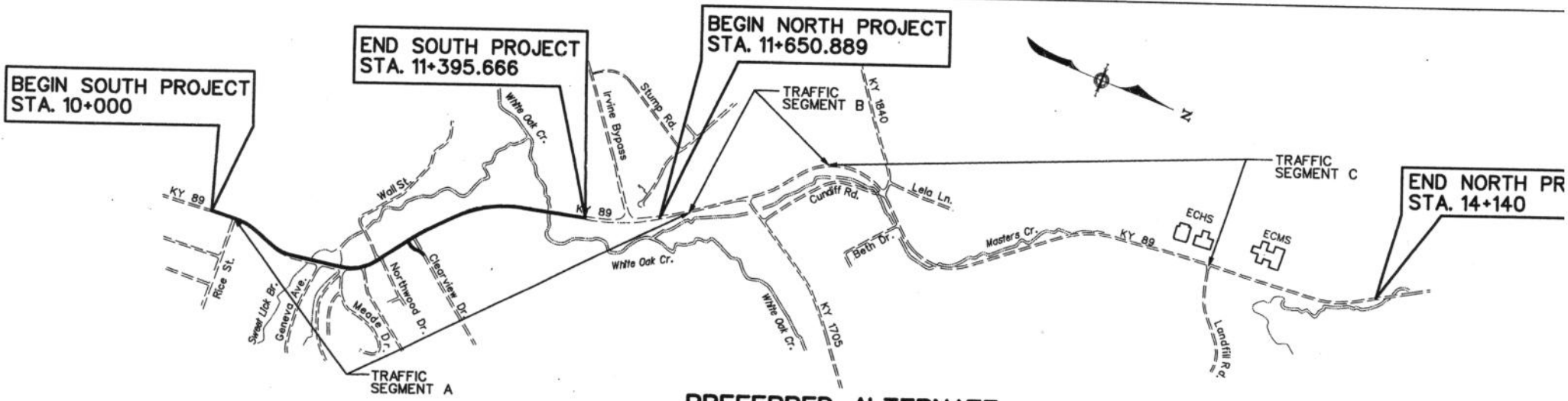
PRELIMINARY PLANS OF
PROPOSED PROJECT

ESTILL COUNTY
KY 89 RELOCATION

ITEM NO. 10-363.00

FD04 033 0089 012-015 025 D

PREFERRED PRELIMINARY LINE AND GRADE PLANS



PREFERRED ALTERNATE

Value Engineering – Study Identification

Project: FD04-033-0089-012-015 025D Team: #1

Location: ESTILL COUNTY, KY 89 Date: 4-27-99

VE TEAM MEMBERS

Name	Title	Organization	Telephone
NEAL SHOEMAKER	BRIDGE ENGINEER	KYTC - D8	606-677-4017
MIKE MCGREGOR	ASSIT. RESIDENT	KYTC - D1	270-444-0087
RON GARDNER	BRIDGE MAINT.	KYTC - CO	502-564-4556
SIAMAK SHAFAGHI	EIT II	KYTC - C.O	502-564-3280
CLARENCE SCARBERRY	ASSIT. RESIDENT	KYTC - D12	606-297-3124
CHRIS KUNTZ	EIT II	KYTC - D1	270-444-0087

PROJECT DESCRIPTION

Length: 2.69 MILES	Cost: 6,013,622	Type of Funds: FD04
Design Speed: 90 KPH		Projected Traffic: 12,200 VPD TO 20,400 VPD
Projected Award Date: NOT SCHEDULED		

Major Project Elements: RECONSTRUCT AND WIDEN EXISTING ALIGNMENT OF KY 89 FROM STA. 104000 – 114400, RELOCATE AND CONSTRUCT NEW KY 89 FROM STA. 11+900 – 144330. CONSTRUCT 2-NEW BRIDGES. REPLACE AND IMPROVE EXISTING DRAINAGE STRUCTURES ON ALIGNMENT.

ROUTE CONDITION / GEOMETRY

Adjacent Segments:	Overall Route:
RURAL CONNECTORS ONLY APPROACHS TO KY 89 TO BE UPGRADED	KY 89 RELOCATION WILL BE A 2-LANE ROAD (3.6-METER LANES) WITH 3.0 METER PAVED SHOULDERS IN RURAL A 4.2 METER FLUSH

Investigation Phase – Sources

Date: 4-27-99 Team: #1

AUTHORIZING PERSONS

Name	Position	Telephone
ROBERT SEMONES	VE COORDINATOR KYTC	502-564-3280

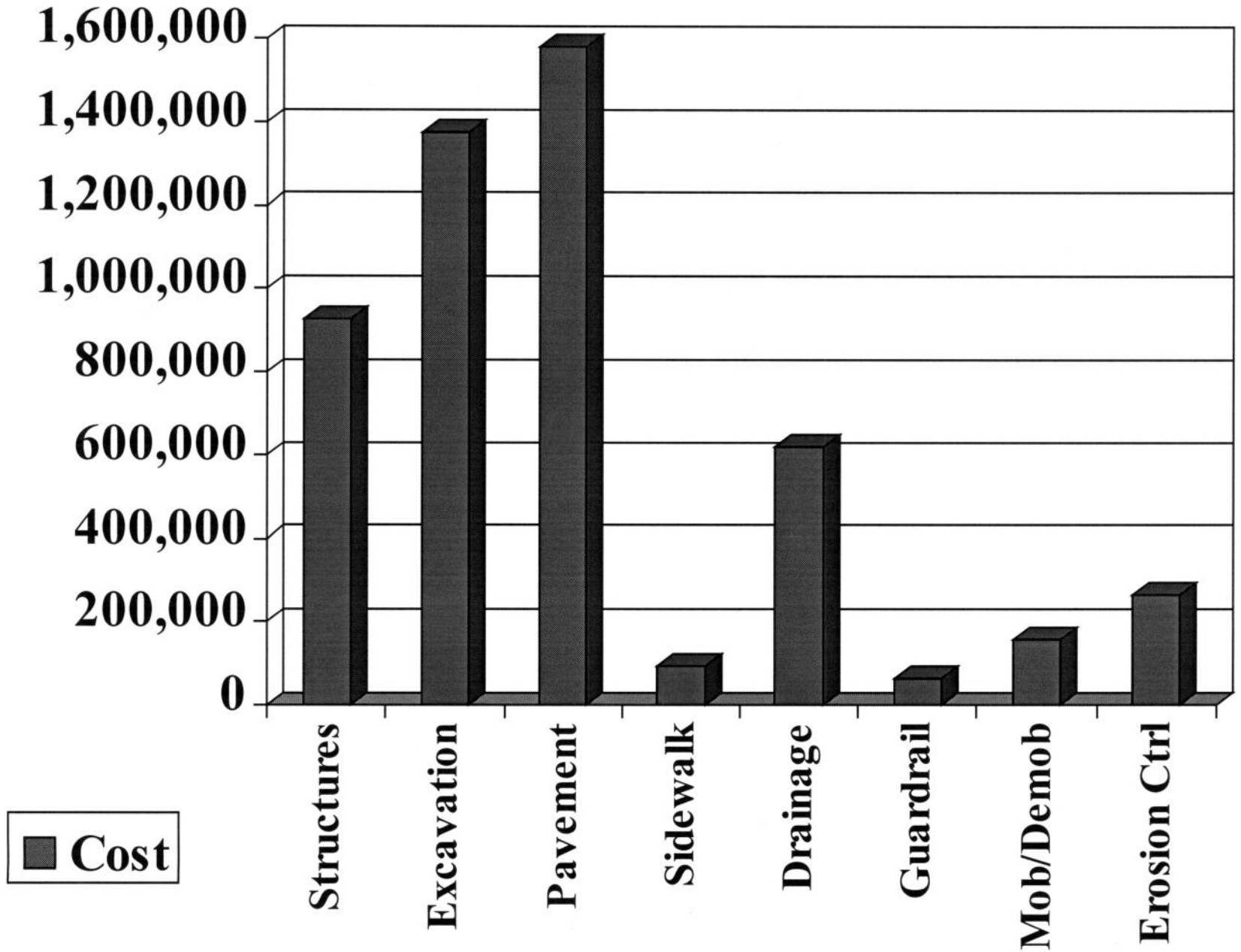
PERSONAL CONTACTS

Contacts	Telephone	Notes
JOHN T. SLUGANTZ	606-223-3999	GRW ENGINEERS
GREG S. GABBARD P.E.	606-223-3999	GRW ENGINEERS
ED SHANKS	606-677-4017	KYTC - DIST. 8 - BRIDGES
LARRY KERR PE	606-677-4017	KYTC - DIST. 8 - CONSTRUCTION/ CONTACT
BRIAN FLINT, P.E	317-842-7766	
DENNY ALLEY PE.	270-898-2431	KYTC - DIST 1 - OPERATIONS

DOCUMENTS / ABSTRACTS

References	Notes
KYTC DESIGN MANUEL	
KYTC STANDARD SPECIFICATIONS	
KYTC STANDARD DRAWINGS	
CONTECT CONSTRUCTION PRODUCTS	ALUM. BOX CULVERT
VALUE ENGINEERING MANUEL	MOD I WORKSHOP, DAMES & MOORE
KYTC MAINT COST REPORTS	
AVG BID PRICES 1997 - KYTC	

Cost Model


1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
Structures
Excavation
Pavement
Sidewalk
Drainage
Guardrail
Mob/Demob
Erosion Ctrl
Cost

Investigation Phase – Function Analysis

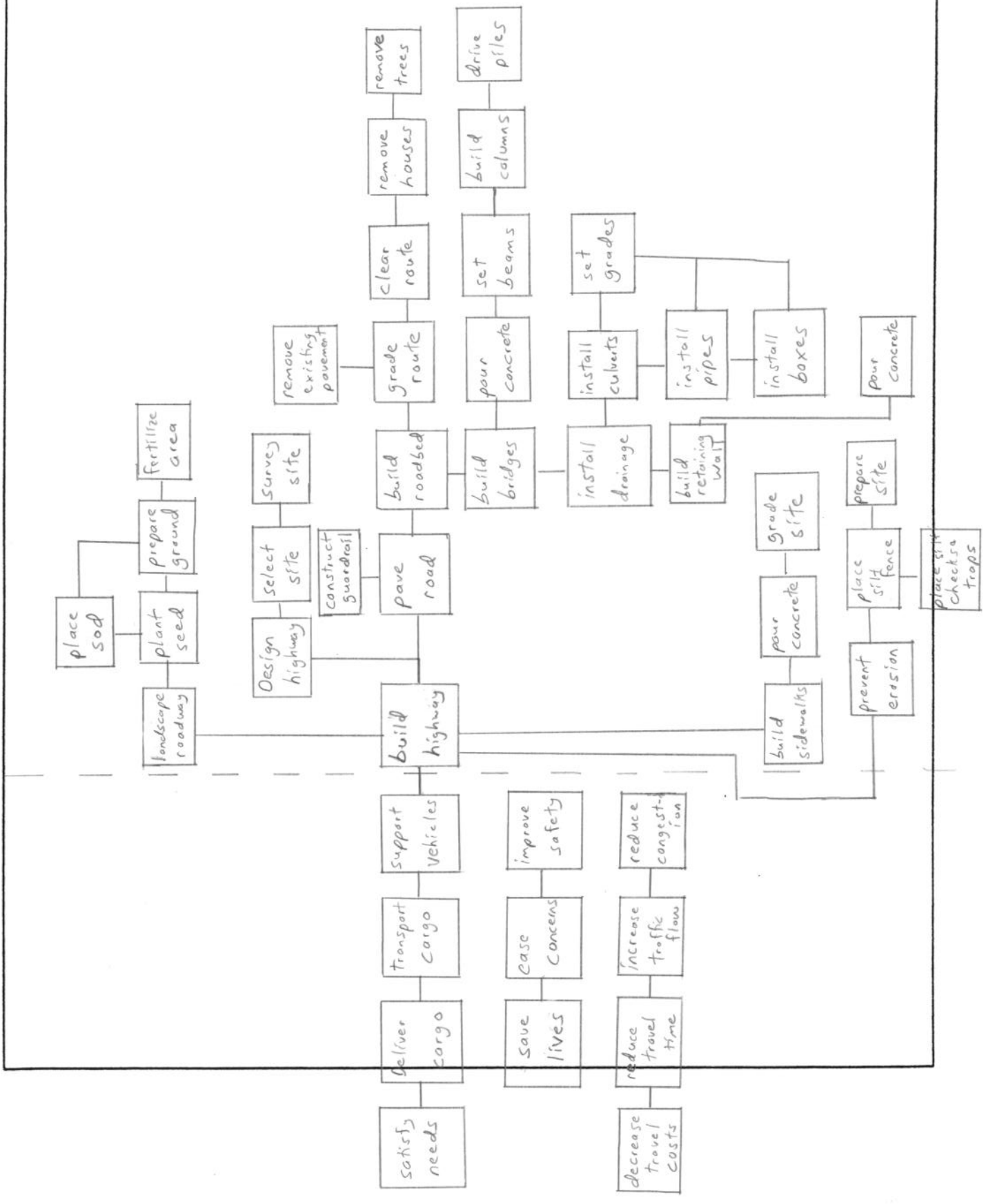
Project: FDOA 033 0089 012-015 025 D (ESTILL CO.) **Team No.** 1

Overall Project Function: IMPROVE SIGHT DISTANCE & WIDEN **Date:** 4-27-99

ITEM #	Description	FUNCTION		Cost	Worth	Comments
		Verb	Noun			
	PAVEMENT	CARRY	TRAFFIC	1,578,366	1,428,630	SALVAGE PAVEMENT IF POSSIBLE
	EXCAVATION	CONST.	GRADE	1,374,275	1,174,275	CAN EXCAV. BE REDUCED
	BRIDGE	SPAN	CREEK	436,575	361,525	CAN BRIDGE BE NARROW
	CULVERT	CONVEY	WATER	491,000	395,000	SHORTEN
	MOD. - DEM.	TRANSPORT	EQUIPMENT	157,800	134,365	ADJUST FOR REVISED TOTAL

Investigation Phase – FAST Diagram

Date: 4-27-99 Team: #1



Speculation Phase – Brainstorming

Date: _____ Team: #1

Item: ROADWAY

Function: PROVIDE TRAVEL

1.) DO NOTHING
2.) ADJUST ALIGNMENT @ 10+513 (8 TO 10 FT)
3.) ADJUST DRIVEWAYS
4.) BRIDGE @ WHITE OAK CK (MEDIANS DS.W)
5.) SIDEWALKS FROM 60" TO 42"
6.) PAVEMENT REDUCTION DUE TO MILLING
7.) NORTH ALIGNMENT (VERT & HORZ) EXCAVATION
8.) NORTH ALIGNMENT (HORZ. TO MH'S HOUSE) @ 13+400 TO 13+500
9.) NORTH 12+00 RCBC
10.) TRAFFIC CONTROL
11.) ADJUST DEMOB & MOB
12.) ELIMINATE SIDEWALK ON RT. C/L
13.) NEW ALUM BOX CULVERT @ 10+500
14.) ALIGNMENT OF CLEARVIEW DR. APPROACH
15.) SHEET (9) PRIVATE DRIVE
16.) SEED NOT SOD
17.) H2O REDUCTION
18.) NORTH SECTION PAVED SHOULDERS RURAL ROADS 10' TO 8'
19.) BORDER ON URBAN APPROACHES
20.) # OF BOXES – DBI TYPE 13G

Item: _____

Function: _____

Evaluation Phase

Date: 4-28-99 Team No. #1

IDEA #	CREATIVE IDEA LISTING	IDEA EVALUATION		IDEA RATING
		Advantages	Disadvantages	
1	NORTH SECTION PAVED SHOULDER REDUCTION	REDUCTION OF ASPHALT, D.G.A, & EXCAVATION	PARTIAL REDUCTION IN SAFETY & SPACE	1
2	MODIFY BRIDGE @ WHITE OAK CREEK	REDUCTION IN COSTS; DIMINISHES PEDESTRIAN CONFUSION	REDUCED AREA FOR POTENTIAL PEDESTRIANS; DECREASED SAFETY	2
3	EXTENSION OF CULVERT @ STATION 10+500	RAPID & EASIER CONSTRUCTION; PROVIDES NEWER STRUCTURE ENTIRELY	INCREASES TRAFFIC CONTROL; POTENTIAL COST INCREASE;	3
4	WIDTH REDUCTION OR PARTIAL ELIMINATION OF SIDEWALKS	COST REDUCTION; EASE OF CONSTRUCTION; REDUCE CONGESTION @ HOMES	LIMITS AREAS FOR WHEELCHAIRS	4
5	MODIFICATION OF NORTH END ALIGNMENT TO MISS HOUSE @ 13+450	ELIMINATES RELOCATION OF RESIDENT; REDUCES COST	PUTS RESIDENT IN BETWEEN TWO ROADS; RESIDENT'S DISSATISFACTION	5

Evaluation Phase – Matrix Analysis

Date: 4-28-99 Idea: Shoulder Reduction

Decrease shoulder width on rural section

Alternatives	Weights	Performs Function 10	Cost 8	Safety 10	Maint. 6	Const. 5	Aesthetics 3		Totals	Rank
Orig - 12' shoulder		5/50	3/24	5/50	5/30	5/25	5/15		194	2
Alt 1 - 10' shldr		5/50	4/32	5/50	4/24	5/25	5/15		196	1
Alt 2 - 8' shldr		4/40	5/40	3/30	4/24	3/15	5/15		164	3

NOTE: First Alternative is the Original Design Item

Evaluation Phase – Matrix Analysis

Date: 4-28-99 Idea: BRIDGE @ WHITE OAK

Alternatives	Weights	MEET FUNCTION	SAFETY	COST	CONSTRUCTION	MAINTENANCE	AESTHETICS		Totals	Rank
		Criteria								
		10	9	9	7	4	5			
ORIGINAL DESIGN		5 / 50	5 / 45	3 / 27	3 / 21	4 / 16	5 / 25		184	3
Alt 1 reduce wid. 4.4m		5 / 50	4 / 36	5 / 45	5 / 35	5 / 20	3 / 15		201	1
Alt 2 reduce wid. 3.2m		5 / 50	4 / 36	4 / 36	5 / 35	5 / 20	4 / 20		197	2

NOTE: First Alternative is the Original Design Item

1 POOR
2 MEDIOCRE
3 AVERAGE
4 GOOD
5 EXCELLENT

Evaluation Phase – Matrix Analysis

Date: 4-28-99 Idea: _____

CULVERT EXTENSION 14m
3000mm X 1500mm
R.C.B.C.
STATION ± 10+500

ORIGINAL COST ₱25,000.00

Alternatives	Weights	Criteria: Fuction	Safety	Cost	Construction	Maint.	Aesthetics		Totals	Rank
		10	6	9	8	5	3			
Orig. RCBC		5/50	5/30	5/45	3/24	5/20	4/12		181	1
Alt - Aluminum Box		5/50	4/24	3/27	5/40	4/20	5/15		176	2

NOTE: First Alternative is the Original Design Item

Evaluation Phase – Matrix Analysis

Date: 4-28-99 Idea: sidewalks

Reduce size or eliminate sidewalks

Alternatives	Weights	Function 8	Cost 5	Safety 7	Maint 2	Const 5	Aesthetics 9		Totals	Rank
Orig - 60" both sides		5/40	2/10	5/35	4/8	3/15	5/45		153	2
Alt 1 - 42" both sides		5/40	3/15	5/35	4/8	3/15	5/45		158	1
Alt 2 - 42" one side (minus bridge)		3/24	4/20	3/21	5/10	4/20	3/27		122	4
elim. right side										
Alt 3 - 42" one side		3/24	5/25	2/14	5/10	5/25	3/27		125	3
elim. right side elim. Clearview appr.										

NOTE: First Alternative is the Original Design Item

Evaluation Phase – Matrix Analysis

Date: 4-28-99 Idea: Miss 2 houses

Change Alignment to Miss 2 houses

Alternatives	Weights	Function 10	Safety 9	Cost 9	Const 7	Maint 4	Aesthetics 4		Totals	Rank
Orig take houses		5/50	5/45	4/36	5/35	5/20	5/20		206	–
Alt 1 leave houses		5/50	4/36	5/45	5/35	5/20	5/20		206	–

NOTE: First Alternative is the Original Design Item

VALUE ENGINEERING RECOMMENDATION

FORM 20 DEC 1996

PROJECT: KY 89 Relocation

LOCATION: Estill County

STUDY DATE: 4-30-30

IDENTIFICATION NUMBER: 10-363.01

FUNCTION OF COMPONENT BEING CHANGED: Store vehicles

DESCRIPTIVE TITLE OF RECOMMENDATION: Change width of paved shoulder on north end of project

ORIGINAL DESIGN:

The original design called for a 3.6 m shoulder with a 3.0 m paved shoulder.

RECOMMENDED CHANGE:

The recommended change is to construct a 3.0 m shoulder with a 2.4 m paved shoulder.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	$1,802,700	$106,210	$1,908,910
RECOMMENDED DESIGN	$1,687,300	$100,000	$1,787,300
ESTIMATED SAVINGS OR (COST)	$115,400	$6,210	$121,610

ADVANTAGES:

The advantage of reducing the width of the paved shoulder from 3.0m to 2.4m is a cost savings in two areas. The first savings will be in the reduction of asphalt and DGA used in the construction of the shoulder. The second savings will be from a reduction in roadway excavation due to the smaller width of the roadbed.

DISADVANTAGES:

The disadvantage of reducing the shoulder is a safety concern. A wider shoulder will allow more room for vehicles in trouble and add to the comfort of the motoring public. The smaller shoulder will also be more difficult to construct.

JUSTIFICATION:

The justification for using a smaller shoulder is based on the cost estimate and the safety factor. Using a reduced shoulder will result in over $121,000 of savings. Also the Kentucky Highway Design Manual calls for a 2.4m shoulder for a road of this type. Therefore, the proposed alternative has a lower cost and a shoulder considered to be safe according to Kentucky design practices.

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: 10-363.00

3.6m Shoulder - (3.0 paved) Advantages

- 3.0m paved shoulder easier to construct
- Wider shoulder will be safer for disabled vehicles and will be more comfortable to drive on

Disadvantages

- Increased cost due to higher amount of pavement needed and higher amount of roadway excavation due to the wider roadbed
- Increased resurfacing cost due to the higher amount of pavement needed

3.0m shoulder (2.4 paved) Advantages

- Reduced initial cost due to reduction in pavement and roadway excavation
- Reduced resurfacing cost
- Still meets Design Manual criteria

Disadvantages

- 2.4m shoulder more difficult to construct
- Reduction in safety compared to original design

VALUE ENGINEERING RECOMMENDATION

DISCUSSION CONTINUED

IDENTIFICATION NUMBER: 10-363.00

Comparison

- Overall cost reduction of $121,600
- Proposed alternative and original both meet Design Manual criteria
- Original design will be easier to construct
- Proposed alt. will have lower replacement cost

Proposed alt. is justified since reduced cost outweighs constructability issues and proposed alt considered safe design by KY Standards.

VALUE ENGINEERING RECOMMENDATION

FORM: 30 DEC 1996

COST ESTIMATE - FIRST COST

IDENTIFICATION NUMBER: 10-363

Cost Item	Units	Unit Cost		Original Design		Recommended Design	
		$/Unit	Source Code	Num of Units	Total $	Num of Units	Total $
Roadway Exc	m^3	5	1	288,100	1,440,500	278,600	1,393,000
Asphalt Surf	mton	33	1	1058	34,900	846	28,000
Asphalt Base	mton	34	1	5640	191,800	4512	153,400
DGA	mton	17	1	7970	135,500	6642	112,900
Total					1,802,700		1,687,300

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

IDENTIFICATION NUMBER: 10-363

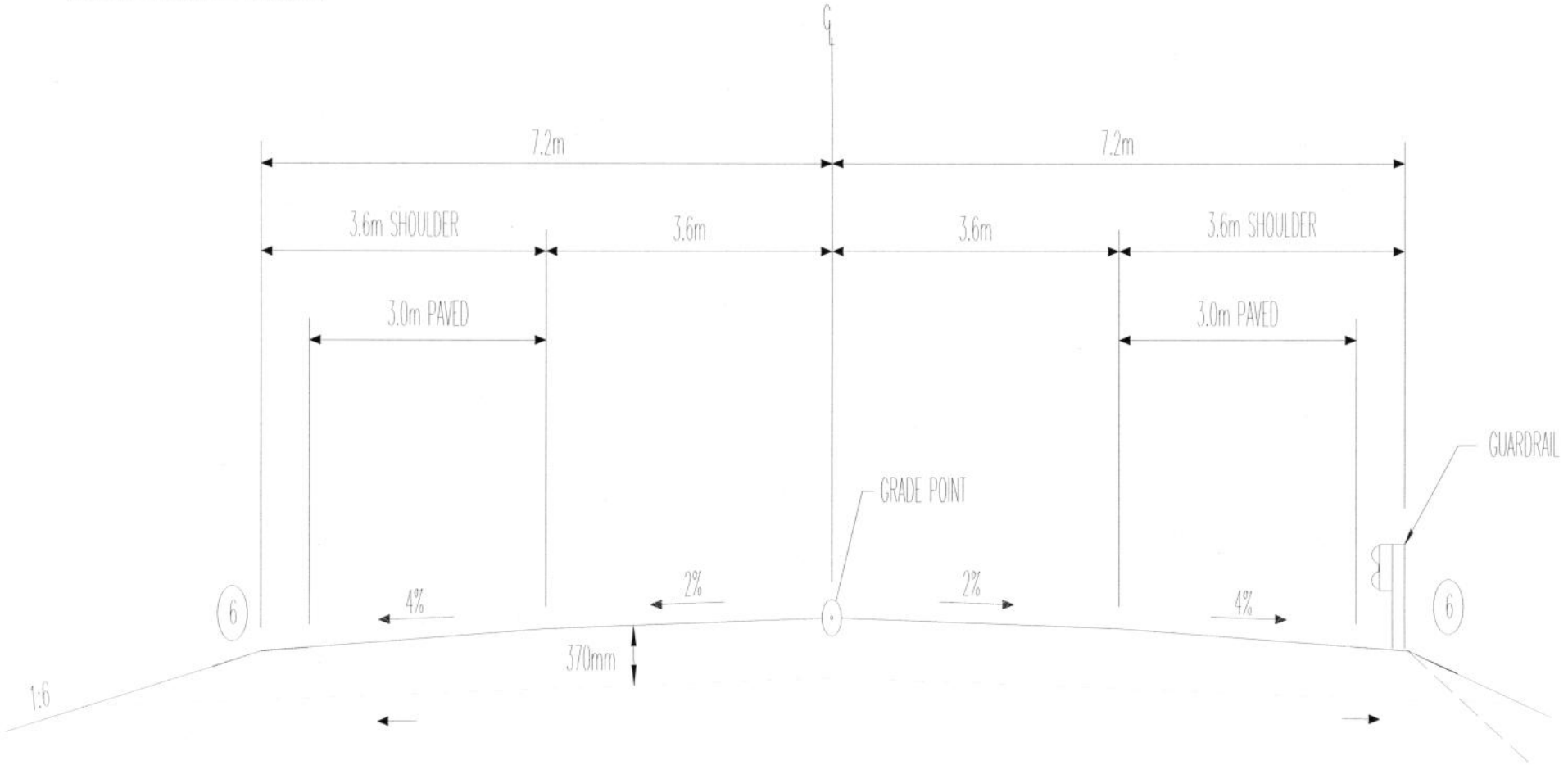
PRESENT WORTH METHOD
LIFE CYCLE PERIOD (YEARS) = 25 yrs
ANNUAL PERCENTAGE RATE = 4%

Dollars in table are $ times 1,000

Initial Costs				Original Design PW $		Reccomd Design PW $
Roadway Exc				1,440.5		$1,393.0
Asphalt				226.7		181.4
DGA				135.5		112.9
Sub Totals of Initial Costs PW $				1,802.7		1,687.3

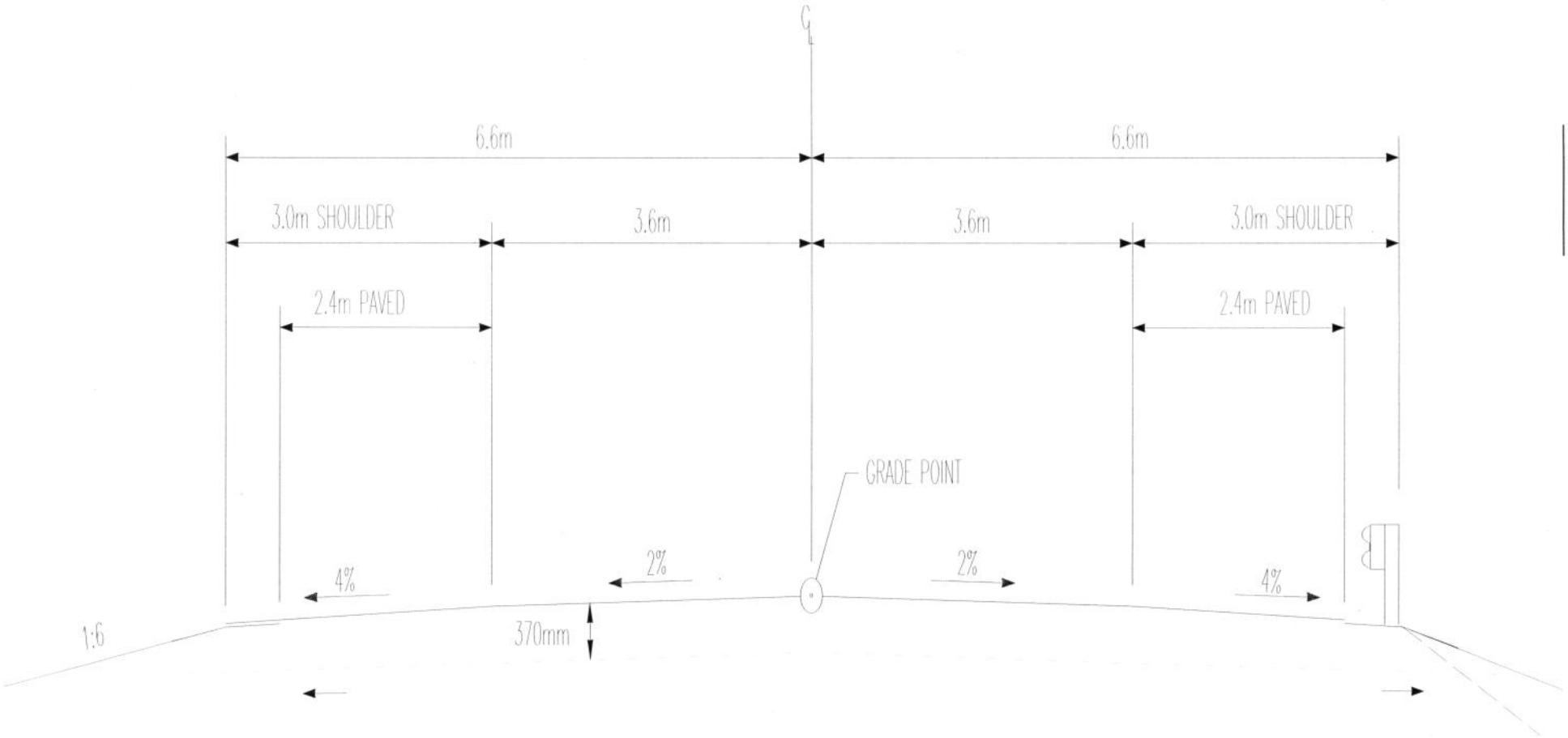
Later Costs Single Expenditure	In The Yr	PW Factor	Original Design		Recommended Design	
			Est $	PW $	Est $	PW $
Resurfacing	10 yr	0.6756	29.1	19.66	23.3	15.74
Resurfacing	20 yr	0.4564	29.1	13.28	23.3	10.63
Sub Total of Single Expenditure Costs PW $				32.94		26.73

Later Costs Annual Expense	For How Many Yrs	PW Factor	Original Design		Recommended Design	
			Est $	PW $	Est $	PW $
Maintenance	25 yrs	15.622	4.69	73.27	4.69	73.27
Sub Totals of Annual Expense Costs PW $				73.27		73.27
Totals PW $ for Original & Recommended				1908.91		1,787.3
Total PW $ Savings (or Added Cost) for Recommended Design						121.61



2 - LANE RURAL NORMAL CUT/FILL SECTION

● 2-Lane rural original



2 - LANE RURAL NORMAL CUT/FILL SECTION

• 2 Lane Rural Proposed Alternative

VALUE ENGINEERING RECOMMENDATION

FORM 20 DEC 1996

PROJECT: KY 89 RELOCATION - ESTILL COUNTY

LOCATION: ESTILL COUNTY

STUDY DATE: 4/30/99

IDENTIFICATION NUMBER: 10-363.01

FUNCTION OF COMPONENT BEING CHANGED: SPAN CREEK

DESCRIPTIVE TITLE OF RECOMMENDATION: MODIFY BRIDGE @ WHITE OAK CREEK

ORIGINAL DESIGN: THE ORIGINAL BRIDGE DESIGN WAS 12m - 20m - 12m 3 SPAN BRIDGE WITH TYPE 3 P.C.I. BEAMS. THE ORIGINAL WIDTH OF THE BRIDGE WAS 16.2 METERS, THIS INCLUDIED A 1.6 METER SIDE WALK ON SIDE OF THE BRIDGE AND A 3.6 METER FLUSH MEDIAN.

RECOMMENDED CHANGE: THE RECOMMENDED CHANGE TO THE ORIGNAL DESIGN IS TO SHORTEN THE WIDTH OF THE 3 SPAN BRIDGE. WE PROPOSE TO DELETE THE 1.6 METER SIDEWALKS ON EACH SIDE OF THE BRIDGE. ALSO, WE PROPOSE TO REDUCE THE WIDTH OF THE FLUSH MEDIAN FROM 3.6 METERS TO 2.4 METERS. THE TOTAL REDUCTION IN WIDTH OF THE BRIDGE IS 4.4 METERS.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	$ 336,575	$ 86,100	$422,675
RECOMMENDED DESIGN	$ 248,162	$ 53,200	$301,362
ESTIMATED SAVINGS OR (COST)	$ 88,413	$ 32,900	$ 121,313

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: 10-363.01

ORIGINAL DESIGN RECOMMENDED 3-SPAN BRIDGE (12m-20m-12m) TYPE III PCIB OVER WHITE OAK CREEK TO REPLACE EXISTING 9000 mm X 3000 mm CONCRETE ARCH. ORIGINAL DESIGN TYPICAL RECOMMENDED 3600 mm FLUSH MEDIAN, (2) 3600 mm, (2) 600 mm SHOULDERS, (2) BARRIER WALLS (500 mm) AND 1600 mm SIDEWALKS ON EACH SIDE OF BRIDGE. TOTAL OUT-TO-OUT 16200 mm.

V.E. RECOMMENDATION IS TO ELIMINATE SIDEWALKS, REDUCE FLUSH MEDIANS TO (2) 1200 mm TOTAL 2400 mm & ELIMINATE COPINGS. TOTAL REDUCTION OF DECK WIDTH OF 4.4 METERS. REDUCTION IN DECK WIDTH WILL ELIMINATE 44 L.M. OF TYPE III PCI BEAMS. THIS REDUCTION IN DECK AREA WILL ALSO ALLOW SAVINGS IN THE SUBSTRUCTURE TOTAL OUT-TO-OUT FOR V.E. RECOMMENDATION IS 11800 mm.

DECK REDUCTION OF 4.4 m X 44 m = 193.60 m^2

VALUE ENGINEERING RECOMMENDATION

IDENTIFICATION NUMBER: 10-363.01 Page 2 of 5

ADVANTAGES: BY REDUCING THE WIDTH OF THE BRIDGE OVER WHITE OAK CREEK, WE CAN DIMINISH THE CONFUSION OF PEDESTRIANS. THERE ARE SIDEWALKS LEADING UP TO THE BRIDGE, BUT THERE ARE NOT SIDEWALK BEYOND THE BRIDGE. THEREFORE, WHY CONTINUE THE SIDEWALKS ONTO THE BRIDE WHEN THEY WILL JUST END WHEN THE BRIDGE ENDS. ALSO, THERE IS A SIGNIFICANT COST SAVINGS THAT COMES ALONG WITH THE WIDTH REDUCTION OF THE BRIDGE.

DISADVANTAGES: THERE WILL BE LESS AREA FOR THOSE PEDESTRIANS THAT MIGHT CHOOSE TO WALK ACROSS THE BRIDGE. THERE WILL BE SOME REDUCTION IN SAFETY BECAUSE THERE WILL NOT BE A BARRIER WALL BETWEEN THE TRAFFIC AND PEDESTRIANS.

JUSTIFICATION: THE SIDEWALK ELIMINATION STILL ALLOWS FOR ADEQUATE PEDESTRIAN TRAFFIC FLOW & SAFETY, WHILE SAVING $ 121,000. ALSO, THE REDUCTION IN MEDIAN WIDTH DOES NOT COMPROMISE SAFETY, BUT SAVED A SIGNIFICANT AMOUNT OF FUNDS.

VALUE ENGINEERING RECOMMENDATION

FORM: 30 DEC 1996

COST ESTIMATE - FIRST COST

IDENTIFICATION NUMBER: 10-363.01

Cost Item	Units	Unit Cost		Original Design		Recommended Design	
		$/Unit	Source Code	Num of Units	Total $	Num of Units	Total $
BRIDGE OVER	Sq. M.	456.60	9004	737.10	336,525	543.50	248,162.10
WHITE OAK CREEK							

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 30 DEC. 1996 **COST ESTIMATE - O & M (LIFE CYCLE) COST**

IDENTIFICATION NUMBER: 10-363.01

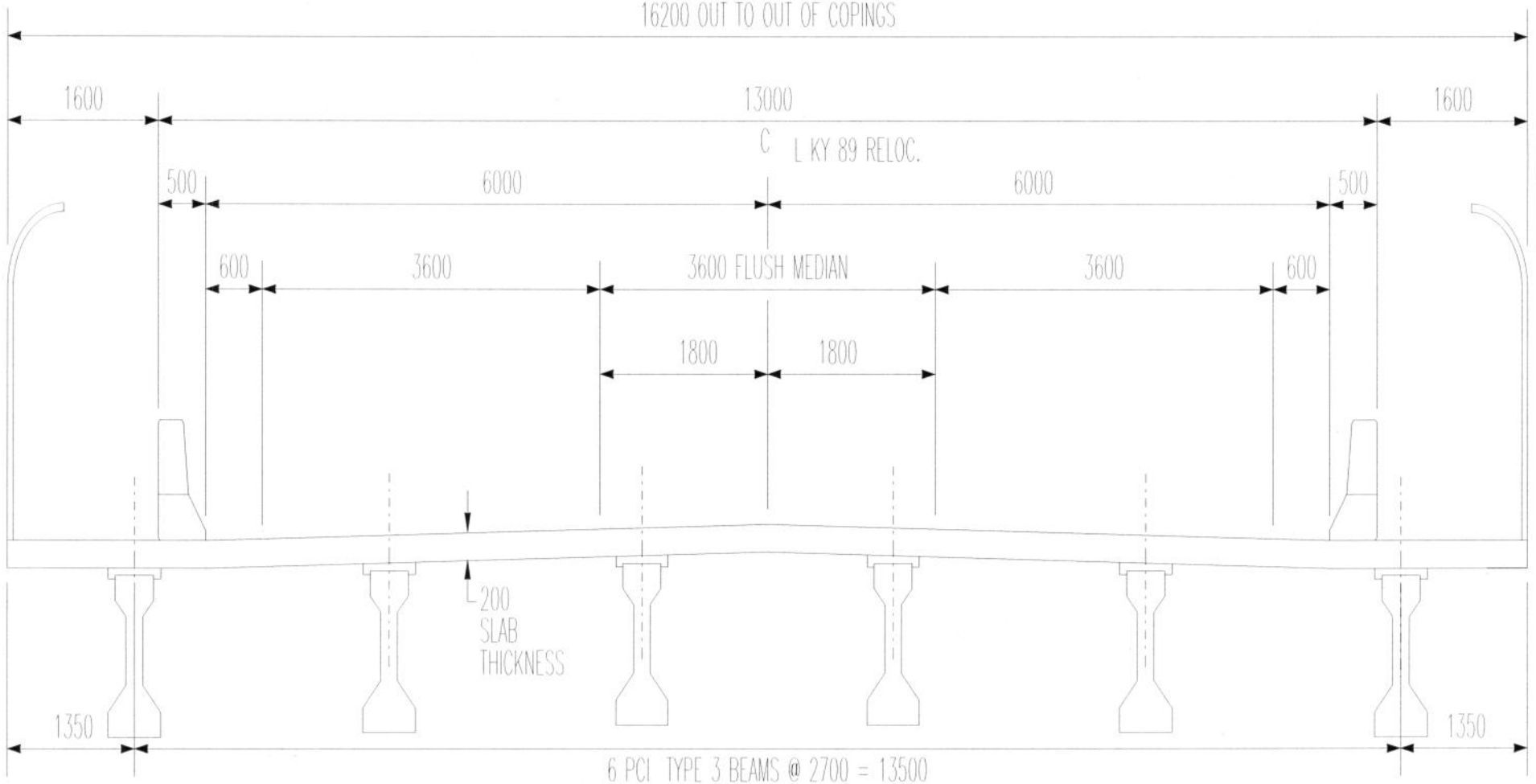
PRESENT WORTH METHOD
LIFE CYCLE PERIOD (YEARS) = 25
ANNUAL PERCENTAGE RATE = 4%

Dollars in table are $ times 1,000

Initial Costs				Original Design PW $		Reccomd Design PW $
BRIDGE OVER WHITE OAK CREEK				337		248
Sub Totals of Initial Costs PW $				337		248

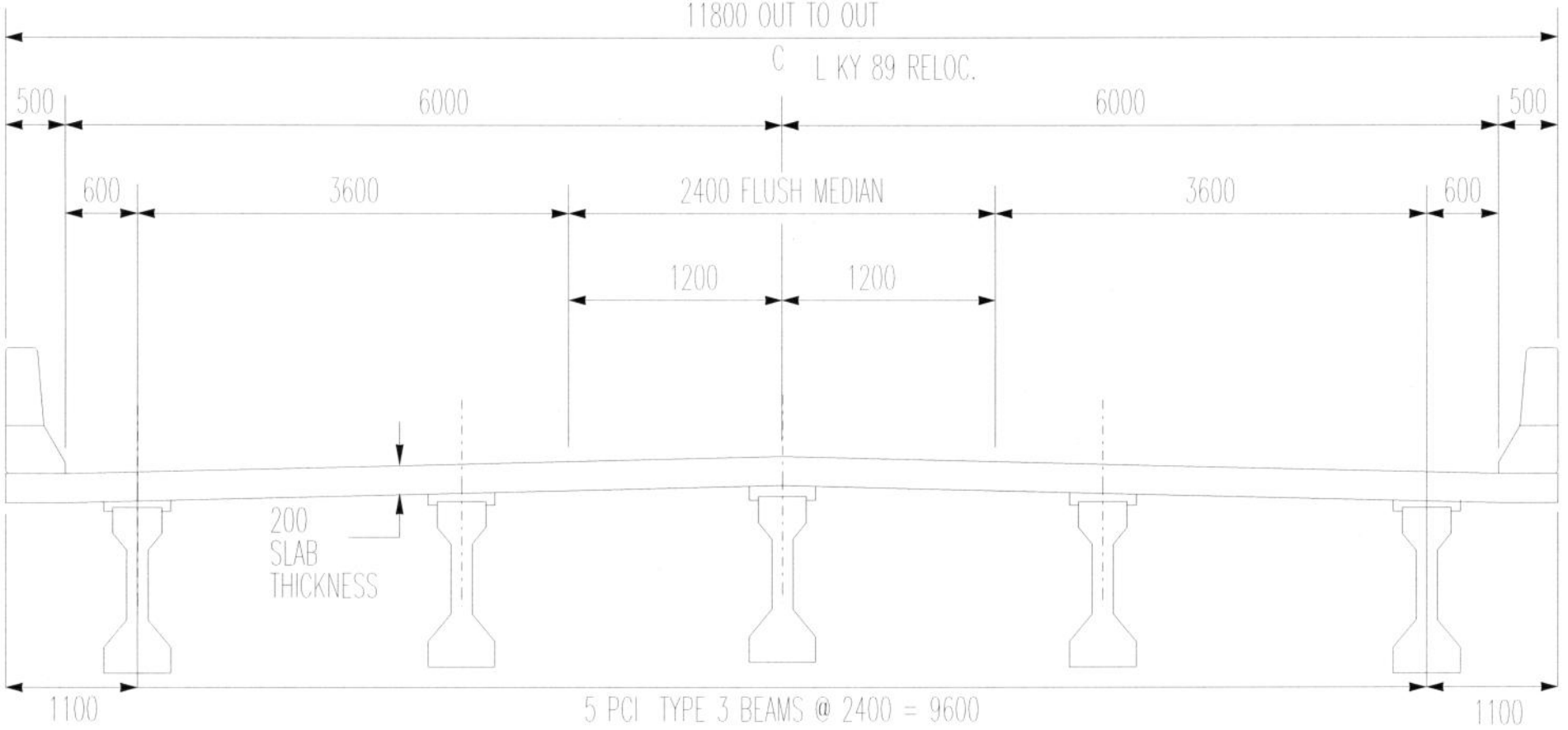
Later Costs Single Expenditure	In The Yr	PW Factor	Original Design		Recommended Design	
			Est $	PW $	Est $	PW $
REPAIR COPING	15	0.5553	3	1.7	NA	NA
Sub Total of Single Expenditure Costs PW $						

Later Costs Annual Expense	For How Many Yrs	PW Factor	Original Design		Recommended Design	
			Est $	PW $	Est $	PW $
STRIPING (395m)	25	15.622	0.4	6.3	0.4	6.3
SNOW & ICE	25	15.622	5	78.1	3	46.9
Sub Totals of Annual Expense Costs PW $				86.1		53.2
Totals PW $ for Original & Recommended				423.10		301.20
Total PW $ Savings (or Added Cost) for Recommended Design						
121.90						



TYPICAL BRIDGE SECTION
~~BRIDGE OVER WHITE OAK CREEK~~

Original Bridge



TYPICAL BRIDGE SECTION
~~BRIDGE OVER WHITE OAK CREEK~~

Preferred Alternative Bridge

VALUE ENGINEERING RECOMMENDATION

FORM 20 DEC 1996

PROJECT: KY 89 Relocation - Estill County

Page 1 of

LOCATION: Estill County

STUDY DATE: April 30, 1999

IDENTIFICATION NUMBER: 10-363.01

FUNCTION OF COMPONENT BEING CHANGED: Sidewalk

DESCRIPTIVE TITLE OF RECOMMENDATION:

Sidewalk Reduction

ORIGINAL DESIGN:

1.5m width Sidewalks on both sides on Relocated Road - and thraough White Oak Bridge

Original Length 2109m

RECOMMENDED CHANGE:

Redue the width to 1.07m and eliminate the side walks from White Oak Bridge

Reduced Length 2061m.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	95,000	49,000	# 144,000
RECOMMENDED DESIGN	66,000	39,000	# 105,000
ESTIMATED SAVINGS OR (COST)	29,000	10,000	# 39,000

VALUE ENGINEERING RECOMMENDATION

IDENTIFICATION NUMBER: 10-36301 Page of

ADVANTAGES:

COST REDUCTION BASED ON A TYPICAL 1.07 METER SIDEWALK WIDTH.

DISADVANTAGES:

Reduction of width [illegible] to [illegible].

JUSTIFICATION:

DEMONSTRATED THROUGH MATRIX ANALYSIS.

See Matrix and PW Study.

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: Page 1A of

Our V.E team lookat the orginal design and 3 Alternates

Original Design - 1.5m wide sidewalks on both side of roadway and thrue White Oak Bridge

Alternate 1 Reduce the width to 1.07m and remove sidewalk thrue White Oak Bridge.

Alternate 2 Reduce width to 1.07m, Removed sidewalk thrue White Oak Bridge and eliminate the sidewalk from the redisidental side of project.

Alternate 3 Same as 2 plus eliminate the New Clearview Appa.

Original Cost $94.890	Matrix Ranking	2
Alt #1 Cost $66,158		1
Alt #2 Cost $33,090		4
Alt #3 Cost $22,298		3

Our team selected Alternate #1 as the best choice. Alt #2 and #3 where the least expensives but not the first choice in the evaluation phase Our team decided 1.07m (42 inch) sidewalks on both side of the road was the best Alternate Sidewalks thrue White Oak Bridge were retained, 0% Alternate 1 was selected. This alternate meets the width requirement for wheel chair use

VALUE ENGINEERING RECOMMENDATION

DISCUSSION CONTINUED

IDENTIFICATION NUMBER: Page of

VALUE ENGINEERING RECOMMENDATION

FORM: 30 DEC 1996

COST ESTIMATE - FIRST COST

IDENTIFICATION NUMBER: 10-363.01 Page of

Cost Item	Units	Unit Cost		Original Design		Recommended Design	
		$/Unit	Source Code	Num of Units	Total $	Num of Units	Total $
Sidewalk	SQM	30.00	2220	3163	$94,890	2205	$66,158

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

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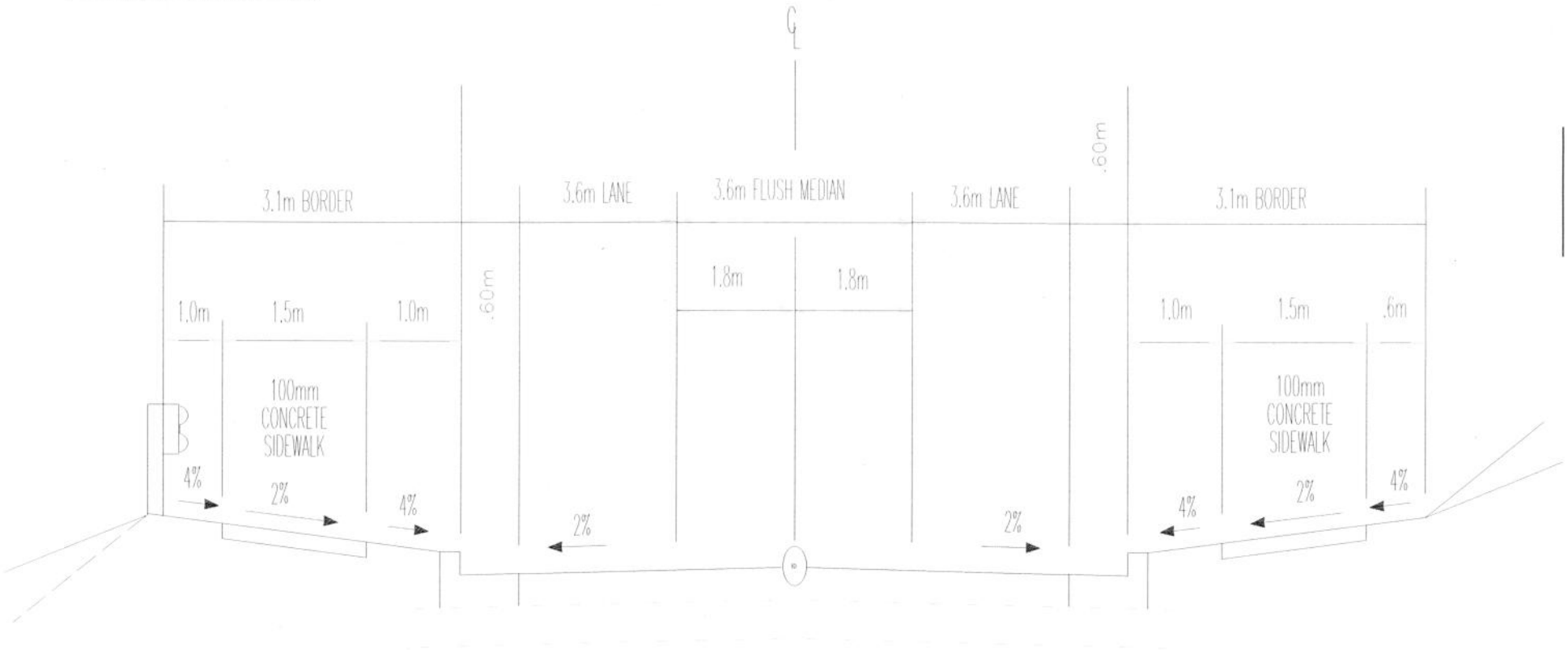
PRESENT WORTH METHOD
LIFE CYCLE PERIOD (YEARS) = 25
ANNUAL PERCENTAGE RATE = 4%

Dollars in table are $ times 1,000

Initial Costs				Original Design PW $		Reccomd Design PW $
sidewalk				95		66
Sub Totals of Initial Costs PW $				95		66

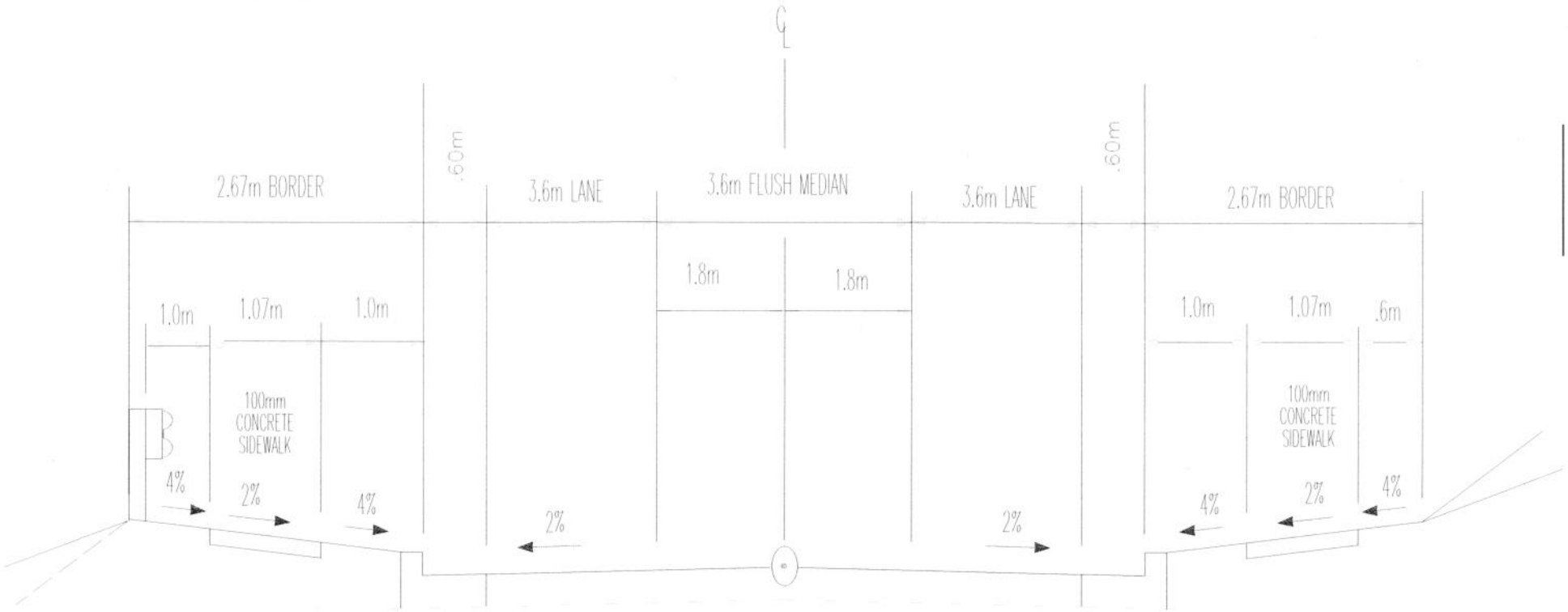
Later Costs Single Expenditure	In The Yr	PW Factor	Original Design		Recommended Design	
			Est $	PW $	Est $	PW $
Replacement 20%	10	.6756	19	13	13	9
Replacement 20%	15	.5553	19	11	13	7
Replacement 20%	20	.4564	19	9	13	6
Sub Total of Single Expenditure Costs PW $				33		23

Later Costs Annual Expense	For How Many Yrs	PW Factor	Original Design		Recommended Design	
			Est $	PW $	Est $	PW $
Maintance	25	15.622	1	16	1	16
Sub Totals of Annual Expense Costs PW $				16		16
Totals PW $ for Original & Recommended				144		105
Total PW $ Savings (or Added Cost) for Recommended Design						39



3 – LANE URBAN NORMAL FILL/CUT SECTION

3-Lane urban original



3 – LANE URBAN NORMAL FILL/CUT SECTION

●3 Lane Urban Proposed Alternative