

VALUE ENGINEERING

4/30/99

PROPOSAL

KENTUCKY 121 – SECTION 1

GRAVES COUNTY

Value Engineering – Study Identification

Project: NEW ROUTE KY 121 Team: # 2
 Location: MAYFIELD-AURORA SECT. 1 Date: 4-27-99

STA. 15+856.680 TO 20+527.935

VE TEAM MEMBERS

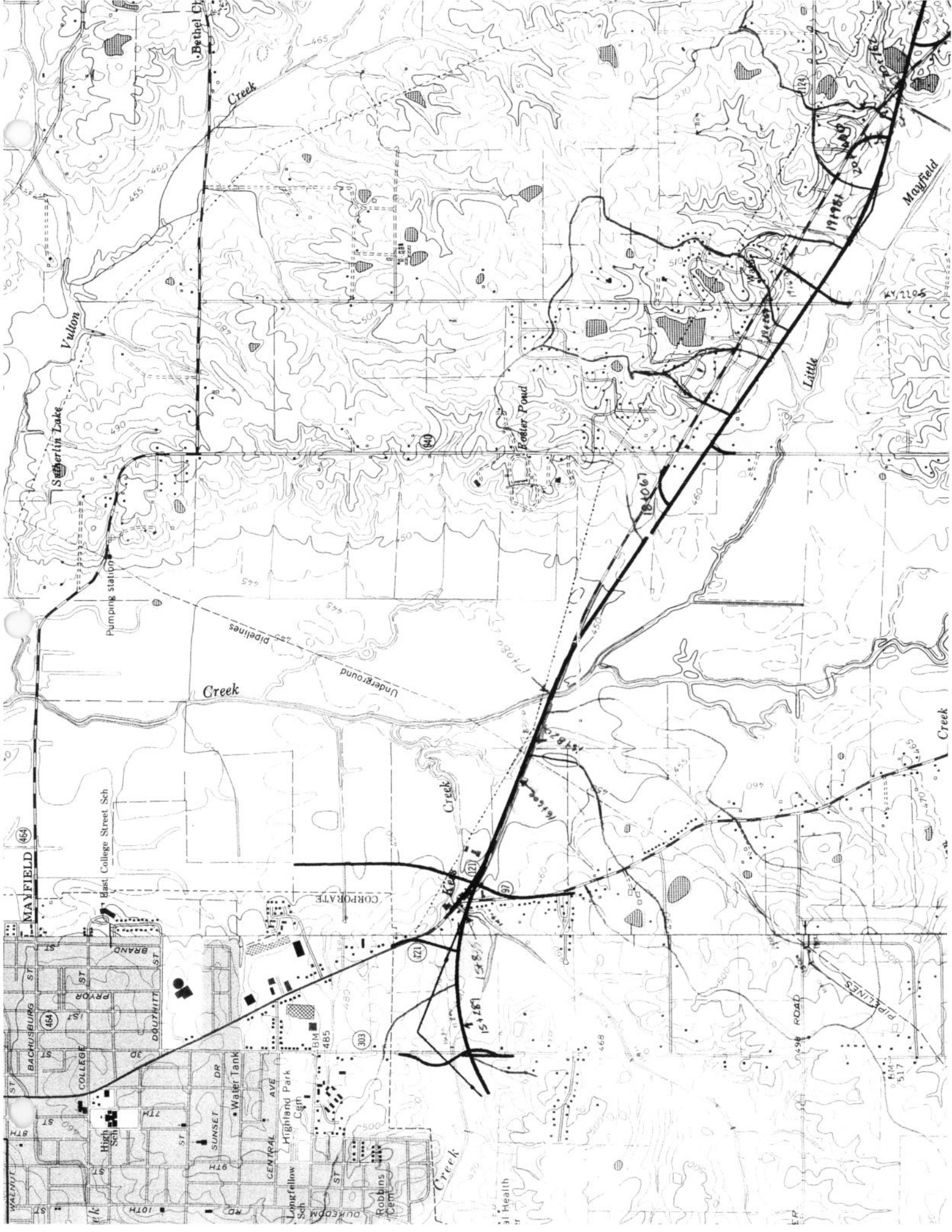
Name	Title	Organization	Telephone
MIKE WEST	ASST. TRAFFIC ENGR D-11	DEPT OF HWYS	606-598-2145
CRYSTAL MAPEL	CONSTRUCTION D-10	"	606-666-8841
DAVID WOLFORD	CONST ENGR D-4	"	502-252-8909
JOHN BOTTOM	DRAINAGE C.O.	"	502-564-3280
LENNY AUSBROOKS	DESIGN	"	270-746-7898
DENNY ALVEY	MAINT ENGR D-1	"	502-898-2431
TAMRA WILSON	TRAFFIC ENGR D-8	"	606-677-4017

PROJECT DESCRIPTION

Length: <u>4,671.255M</u>	Cost:	Type of Funds: <u>FEDERAL</u>
Design Speed: <u>100 KPH</u>		Projected Traffic: <u>10,700 DVH 2022</u>
Projected Award Date:		
Major Project Elements:		
<p>RELOCATE KY 121 TO IMPROVE TRAFFIC FLOW, TRAFFIC SAFETY, AND DRAINAGE</p> <p>GRADE + DRAIN STRUCTURES TWIN 100M PCIB BRIDGE TWIN 44M PCIB BRIDGE TWIN 30M PCIB BRIDGE CULVERTS SURFACE</p>		

ROUTE CONDITION / GEOMETRY

Adjacent Segments:	Overall Route:



Investigation Phase - Sources

Date: 4-27-99 Team: #2

AUTHORIZING PERSONS

Name	Position	Telephone
JOHN SACKSTEDER	DIRECTOR - DESIGN	502-564-3280
DEXTER NEWMAN	DIRECTOR - CONSTRUCTION	
BILL CRACE	DIRECTOR - OPERATIONS	
WAYNE MDSLEY	DIST 1 - COE	

PERSONAL CONTACTS

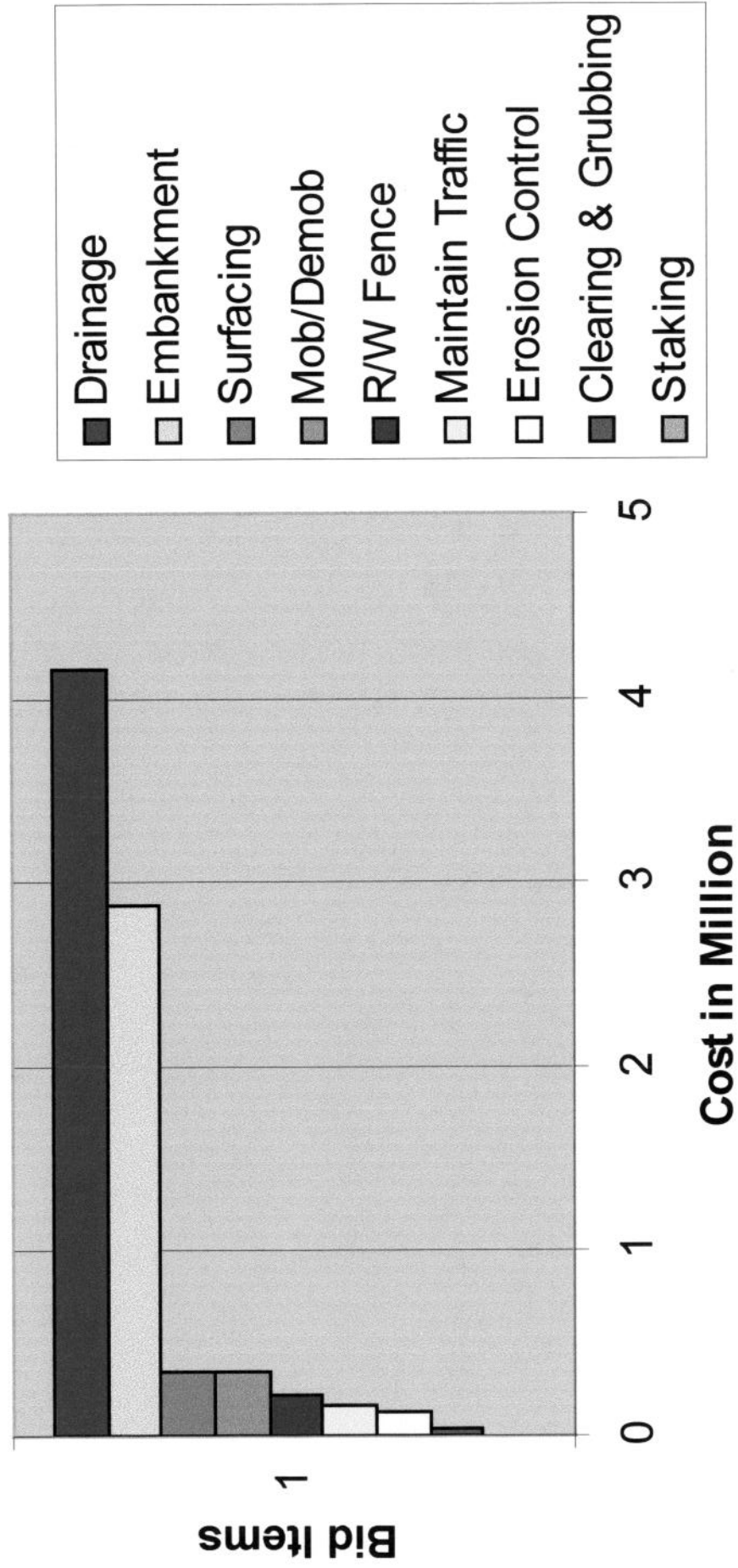
Contacts	Telephone	Notes
DARRELL TAYLOR	444-9691	F&H
BOB CLYMEL	502-444-9691	F&H
STEVE JAMES	746-7098	HIGHWAY DIST 3 PROJECT ENG.
TOM HURT	564 3280	DRAINAGE C.O. > HYDRAULICS
GARY POOLE	564 3280	DRAINAGE C.O.
ANANIAS CALVIN	564 3280	DESIGN C.O. - SHOULDER WIDTH
BILL HORNBECK	564-4560	BRIDGES - AVG COST
ALLEN THOMAS	270-898-2431	BRIDGE ENGR D-1
GARY VALENTINE	502-766-5066	DESIGN ENGR D-4
STEVE HALLDRAN	502-564-4780	DIST LIASON BRIDGES CO

DOCUMENTS / ABSTRACTS

References	Notes
PROJECT PLANS	LAYOUT, PROFILE, CROSS SECTIONS
DESIGN MANUAL	SHOULDER WIDTH
AASHTO DESIGN MANUAL	# LANE
STANDARD SPECIFICATION	
KTDID	DRAINAGE
USGS	REGINALIZATION OF PEAK DISCHARGES FOR STREAMS IN KY
DRAINAGE MANUAL	DRAINAGE

K.A.R.S ACCIDENT SYSTEM L TURN ACCIDENTS

Investigation Phase - Cost Model

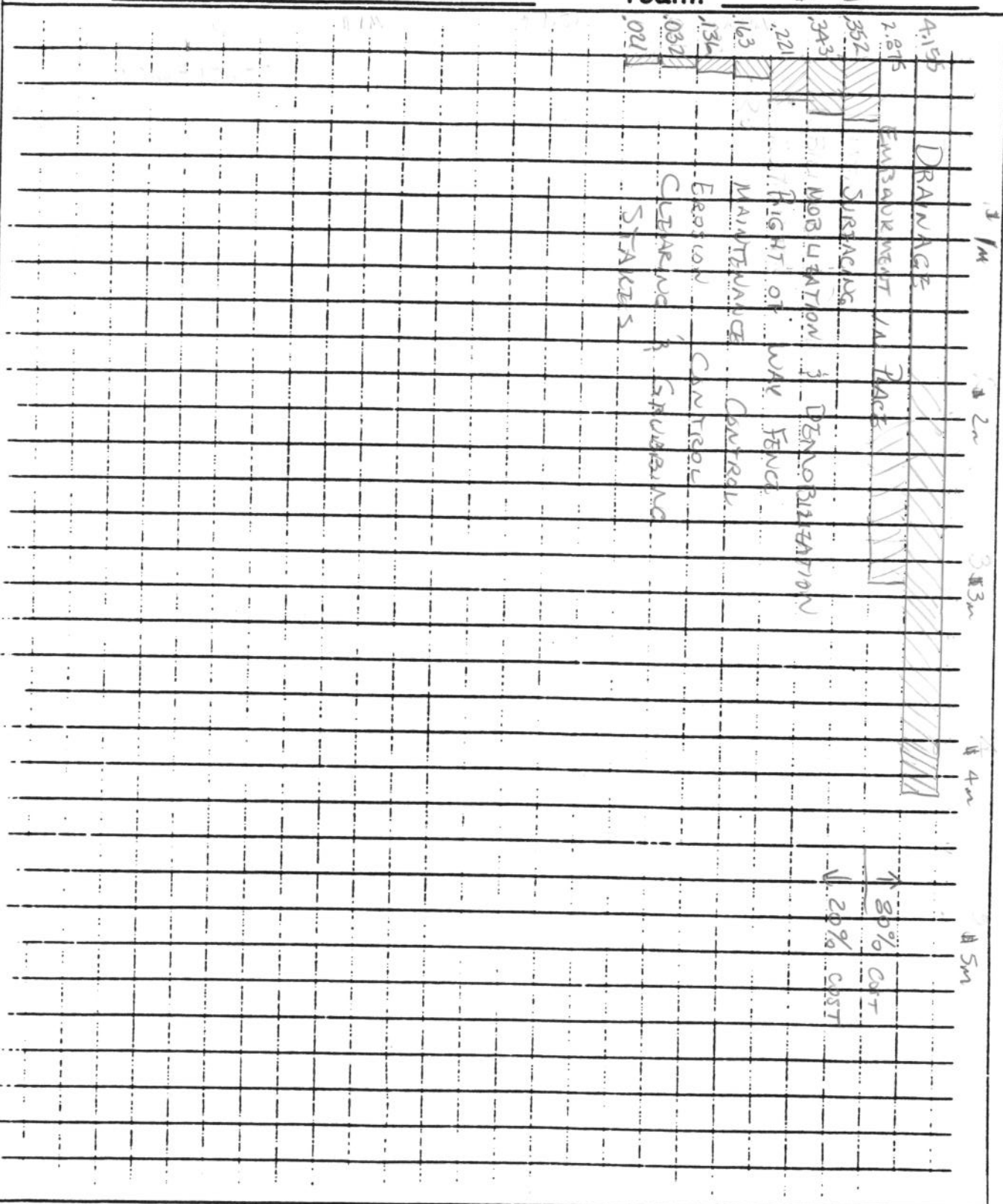


Plot

Investigation Phase - Cost Model

Date: 4-27-99

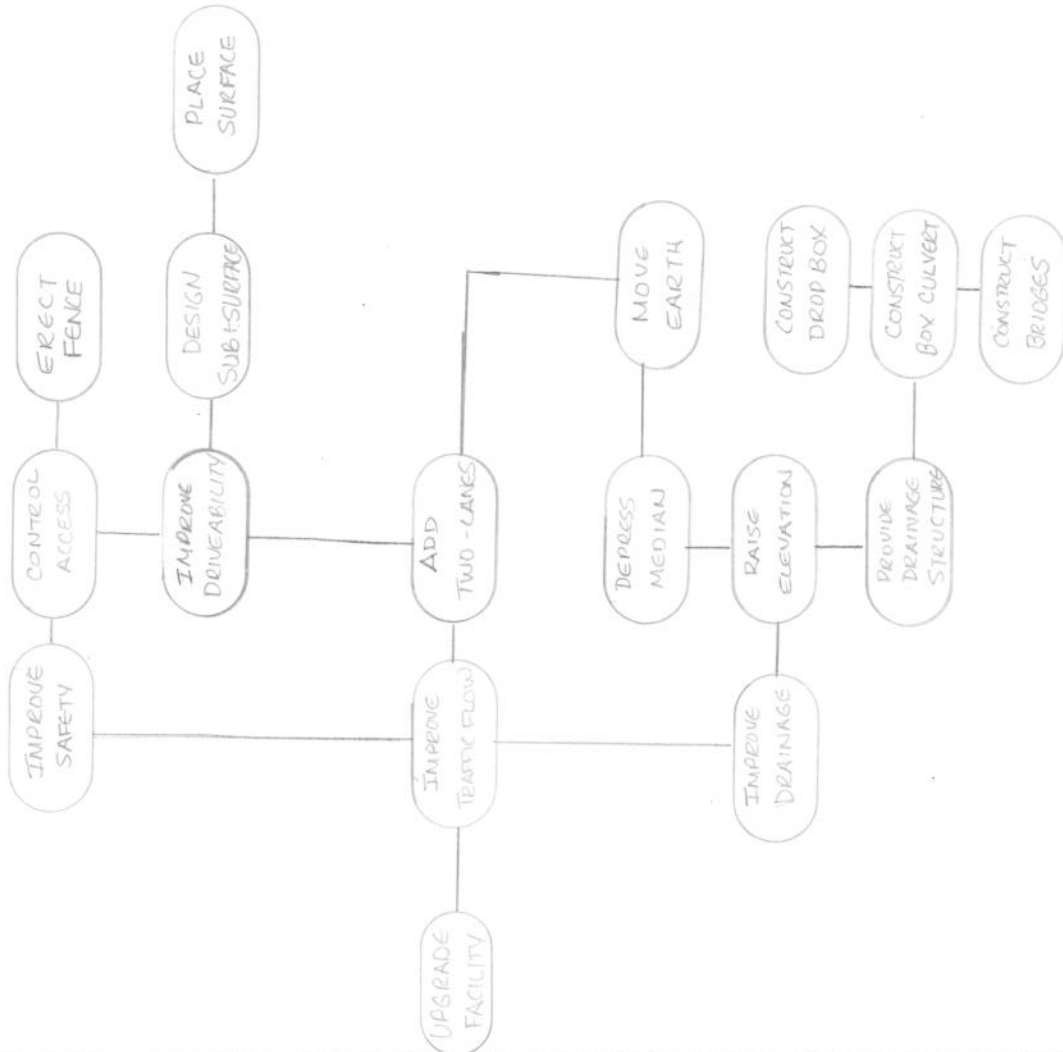
Team: # 2



Investigation Phase - FAST Diagram

Date: 4-27-99

Team: #2



Speculation Phase - Brainstorming

Date: 4-28-99Team: Item: Function: Item: Function:

- X 1. ~~DO NOTHING~~
2. ~~ELIMINATE 2 LANES~~
3. ~~CHIP SEAL MEDIAN~~
4. ~~WIDEN EXISTING ROAD~~
5. ~~ELIMINATE TURN LANES~~
6. ~~ELIMINATE BRIDGE~~
7. ~~ELIMINATE G-RAIL WHERE SLOPE FLARE H/W EXIST~~
8. ~~REDUCE FILL~~
9. ~~PVC/POLY PIPE~~
10. ~~METAL END SECTIONS~~
11. ~~COMBINE SECTION I + II~~
12. ~~ELIMINATE CONC. ENTRANCE~~
13. ~~PHASE PROJECT FOR TRAFFIC CONTROL~~
14. ~~REDUCE SHOULDER 10'-8'~~
15. ~~INCLUDE SURFACE IN THIS PROJECT~~
16. ~~ADJUST ALIGNMENT NORTH @ 18+650~~
17. ~~ELIMINATE FENCE ON 2/1~~
18. ~~2 LANE 4 LANE ULTIMATE~~

Evaluation Phase

Team No. #2			
IDEA EVALUATION			
IDEA #	CREATIVE IDEA LISTING	Advantages	Disadvantages
		IDEA EVALUATION	IDEA RATING
1	ELIMINATE TURN LANES	REDUCE FILL REDUCE PAVEMENT COST REDUCE BRIDGE WIDTH	REDUCE SAFETY
2	ELIMINATE BRIDGE	REDUCE COST REDUCE TIME	REDUCTION IN CONVEYANCE
3	REDUCE FILL	REDUCE COST LESS ENBRACHMENT TO PLANE FLOOD	LOSS OF DRAINAGE ROADWAY
4	EXTEND SECTION 1 INTO SECTION 2	REDUCE UNIT COST EMBANKMENT REDUCE BORROW	INCREASE PAVEMENT COST TO SEC. 1 MOVING PROJ. MONEY CONTRACT LENGTH?
5	PHASE PROJECT FOR TRAFFIC CONTROL	REDUCE COST OF DEFRACTION IMPROVE SAFETY	MORE DESIGN TIME
6	REDUCE SHOULDER 10'-8"	REDUCE PAVEMENT COST	REDUCE SAFETY

Evaluation Phase - Matrix Analysis

Date: 4-29-99 Idea: 1

		Criteria						Totals	Rank
		FUNCTION	COST	CONSTRUCTION	SAFETY	MAINTENANCE			
ELIMINATE 44 M BRIDGE									
Alternatives	Weights	8	10	6	4	4			
ORIGINAL		3 24	2 20	2 12	3 12	3 12		80	2
CULVERT		3 24	4 40	4 24	4 16	3 12		116	1

NOTE: First Alternative is the Original Design Item

Evaluation Phase - Matrix Analysis

Date: 4-29-99 Idea: 2

		Criteria						Totals	Rank
		FUNCTION	COST	SAFETY	CONSTRUCTION	MAINTENANCE			
ELIMINATE TURN LANE									
Alternatives	Weights	3	7	9	7	4			
ORIGINAL		39	214	545	321	312	101	2	
TAKE OUT		39	535	327	535	520	126	1	

NOTE: First Alternative is the Original Design Item

Evaluation Phase - Matrix Analysis

Date: 4-29-99 Idea: 3

		Criteria							
		FUNCTION	SAFETY	COST	MAINTENANCE				
REDUCE SHOULDER 12'-10' W/ FULL WIDTH PAVEMENT BRIDGES 42'-40'									
Alternatives	Weights	9	10	7	7			Totals	Rank
12' (3.6M)	2	27	40	21	21			109	2
10' (3.0M)	2	18	30	35	28			111	1

NOTE: First Alternative is the Original Design Item

Evaluation Phase - Matrix Analysis

Date: 4-29-99 Idea: 4

<p>EXTEND SECTION 1 INTO SECTION 2</p>	Criteria								
	EDUCTION								
	COST								

Alternatives	Weights								Totals	Rank
ORIGINAL	2	16	2	16					32	2
EXTENSION	4	32	3	24					56	1

NOTE: First Alternative is the Original Design Item

VALUE ENGINEERING RECOMMENDATION

FORM 20 DEC 1996

PROJECT: MAYFIELD - AURORA (KY 121 SEC. 1)

Page 1 of 4

LOCATION:

STUDY DATE: 4-29-99

IDENTIFICATION NUMBER: 1

FUNCTION OF COMPONENT BEING CHANGED: HANDLE OVERFLOW

DESCRIPTIVE TITLE OF RECOMMENDATION: ELIMINATE 44M BRIDGE
REPLACE WITH BOX CULVERT

ORIGINAL DESIGN:

44M PCIB BRIDGE ACTING AS OVERFLOW STRUCTURE
FOR MAYFIELD CREEK WATERSHED. STA 16+800
100 M PCIB BRIDGE ACTING AS OVERFLOW STRUCTURE
FOR MAYFIELD CREEK WATERSHED. STA 16+560

RECOMMENDED CHANGE:

ELIMINATE 44M PCIB BRIDGE
REPLACE WITH 6000MMX 1500MM R.C.B.C (50.3 M LENGTH)

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	809600	56900	866500
RECOMMENDED DESIGN	94900	—	94900
ESTIMATED SAVINGS OR (COST)			771,600

VALUE ENGINEERING RECOMMENDATION

IDENTIFICATION NUMBER: |

Page 2 of 4

ADVANTAGES:

REDUCED COST
SPEED OF CONSTRUCTION - TIME SAVINGS

DISADVANTAGES:

POSSIBLE REDUCTION OF WATER CONVEYANCE

JUSTIFICATION:

100M PCIB BRIDGE @ STA 16+560 WAS INCREASED FROM CURRENT BRIDGE SIZE BY ~~A~~ 40 M. DUE TO THE INCREASE CONVEYANCE AREA OF THIS LOCATION, WE RECOMMEND A ^{50.3M LONG} 6000MM X 1500MM R.C.B.C. @ STA 16+800 TO REPLACE 44M PCIB BRIDGE. THIS WILL REDUCE THE COST OF THE PROJECT BY \$771,600 PRESENT WORTH. THE CONSTRUCTION OF A 6000MM X 1500MM R.C.B.C. WILL BE CONSIDERABLY LESS CONSTRUCTION TIME THAN THE 44M PCIB BRIDGE.

VALUE ENGINEERING RECOMMENDATION

COST ESTIMATE - FIRST COST

FORM: 30 DEC 1996

IDENTIFICATION NUMBER: /

Page 3 of 4

Cost Item	Units	Unit Cost		Original Design		Recommended Design	
		\$/Unit	Source Code	Num of Units	Total \$	Num of Units	Total \$
44M DCIB BRIDGE	EACH	352,000	1	2	704,000		
6000MM X 1500MM RCBC X 50.3M	CUM	187	7			453	82,500
ENGINEERING+CONTR	15%		1		105600		12400
*							
				TOTAL	809600		94900

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

VALUE ENGINEERING RECOMMENDATION

FORM: 30 DEC. 1996

COST ESTIMATE - O & M (LIFE CYCLE) COST

IDENTIFICATION NUMBER: /

Page 4 of 4

PRESENT WORTH METHOD

LIFE CYCLE PERIOD (YEARS) = 50

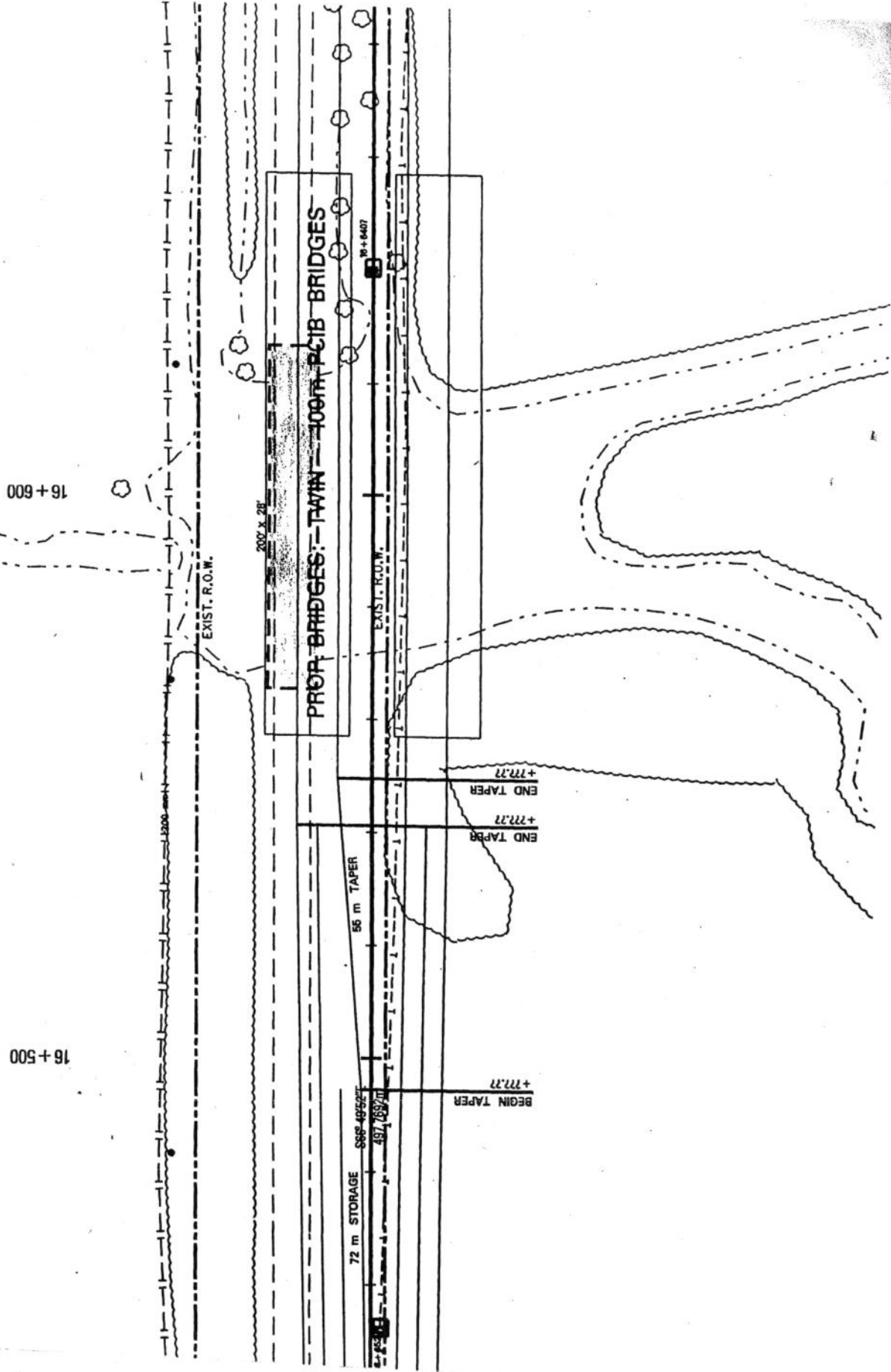
ANNUAL PERCENTAGE RATE = 4%

Dollars in table are \$ times 1,000

Initial Costs				Original Design PW \$		Recommd Design PW \$
44M PCIB BRIDGE				809.6		94.9
RC BC 6000MM X 1500MM						94.9
Sub Totals of Initial Costs PW \$				809.6		94.9
Later Costs Single Expenditure	In The Yr	PW Factor	Original Design		Recommended Design	
			Est \$	PW \$	Est \$	PW \$
OVERLAY	15	.5553	66.6	36.6	—	—
OVERLAY	30	.3083	66.6	20.3	—	—
* OVERLAY @ \$123/M ²						
Sub Total of Single Expenditure Costs PW \$				56.9		—
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				866.5		94.9
Total PW \$ Savings (or Added Cost) for Recommended Design						771.6

BRIDGE / OVERTLOW STRUCTURE

Exist. Length = 61 m
Cons. Prop. Length = 100 m
Why is overflow bridge longer than bridge over main channel?



Bridge - Overtlow Structure

Exist. Length = 40 m

Cons. Prop. Length = 44 m

Our Prop. Structure → 1.5 m x 6 m x 50 m
Single Barrel
Culvert

16+800

200 mm

PROP. BRIDGES:
TWIN - 44m RCIB BRIDGES

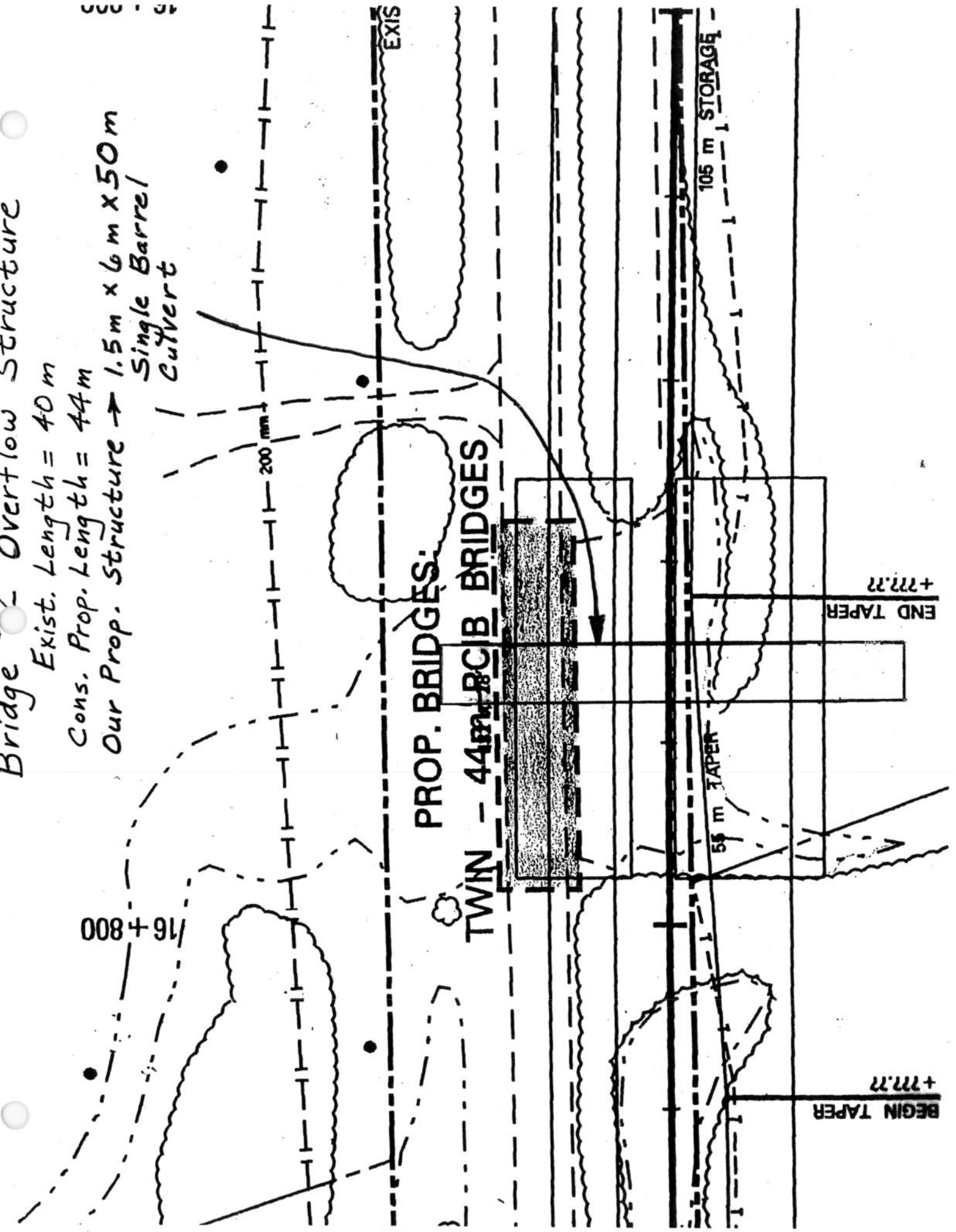
EXIS

105 m STORAGE

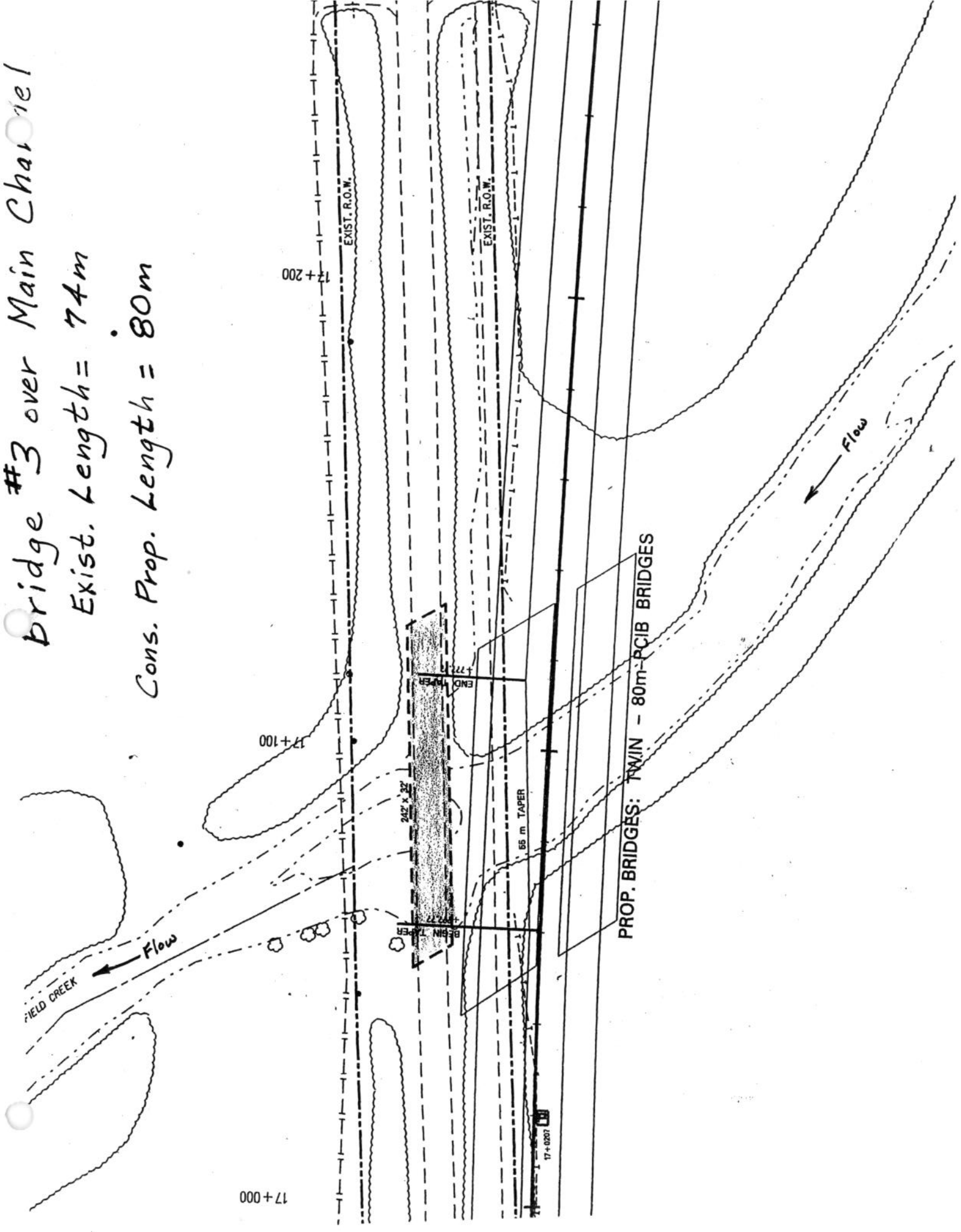
55 m TAPER

BEGIN TAPER +777.77

END TAPER +777.77



Bridge #3 over Main Channel
Exist. Length = 74m
Cons. Prop. Length = 80m



VALUE ENGINEERING RECOMMENDATION

FORM 20 DEC 1996

PROJECT: *MAYFIELD-AURORA (KY 121 SEC. 1)*

Page 1 of 4

LOCATION:

STUDY DATE: *4-29-99*

IDENTIFICATION NUMBER: *2*

FUNCTION OF COMPONENT BEING CHANGED: *FACILITATE LEFT-TURN*

DESCRIPTIVE TITLE OF RECOMMENDATION: *ELIMINATE LEFT-TURN LANE INTO FIELD ENTRANCE*

ORIGINAL DESIGN:

LEFT-TURN STORAGE LANES WERE PROVIDED FOR BOTH PUBLIC ACCESS AND PRIVATE (FIELD) ACCESS ON THE ENTIRE JOB. ELEVEN (11) ENTRANCES ARE FIELD ENTRANCES.

RECOMMENDED CHANGE:

ELIMINATE LEFT-TURN LANE INTO FIELD ENTRANCES. PROVIDE LEFT-TURN LANE ONLY FOR PUBLIC ACCESS.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	<i>1,066,500</i>	<i>152,400</i>	<i>1,218,900</i>
RECOMMENDED DESIGN	<i>767,900</i>	<i>113,700</i>	<i>881,600</i>
ESTIMATED SAVINGS OR (COST)			<i>337,300</i>

VALUE ENGINEERING RECOMMENDATION

IDENTIFICATION NUMBER: 2

Page 2 of 4

ADVANTAGES:

REDUCES FILL

REDUCES SURFACE + DGA

REDUCES ONE LANE WIDTH ON 80M PCIB BRIDGE

DISADVANTAGES:

REDUCES SAFETY TO LEFT-TURN TRAFFIC

JUSTIFICATION:

THE LEFT-TURN MOVEMENTS INTO THE FIELD ENTRANCES WOULD BE MINIMAL. THIS SECTION WAS NOT FOUND TO HAVE A LEFT-TURN ACCIDENT HISTORY. THE COST BENEFIT RATIO OF THE ADDITIONAL TURN-LANE JUSTIFIES ELIMINATION

413,800

VALUE ENGINEERING RECOMMENDATION

FORM: 30 DEC 1996

COST ESTIMATE - FIRST COST

IDENTIFICATION NUMBER: 2

Page 3 of 4

Cost Item	Units	Unit Cost		Original Design		Recommended Design	
		\$/Unit	Source Code	Num of Units	Total \$	Num of Units	Total \$
EMBANKMENT IN PLACE	CUM	5.00/cu	1	12,400	62,000	4800	24,000
BIT CONC SURF CLASS 1-20/30	MTON	40.00/MTON	1	565	22,600	220	18,800
BIT CONC BASE CLASS K	MTON	35.00/MTON	1	1180	41,300	460	16,100
DGA BASE	MTON	20.00/MTON	1	565	11,300	220	4,400
TWIN 80M PCI BRIDGE	SQ.M	*600/SQ.M	1	1317	790,200	1024	614,400
ENGR + CONTS		15%			139,100		100,200
-							
* TAKEN FROM	COST	DE					
				TOTAL	927,400		667,900
				WITH ENGR + CONTS	1,066,500		767,900

- 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: 2

Page 4 of 4

PRESENT WORTH METHOD

LIFE CYCLE PERIOD (YEARS) = 25 HIGHWAY/50 BRIDGE

ANNUAL PERCENTAGE RATE = 4%

Dollars in table are \$ times 1,000

Initial Costs				Original Design PW \$		Recommd Design PW \$
TURN-LANES BRIDGE + GRADE				1066.5		767.9
Sub Totals of Initial Costs PW \$				1066.5		767.9
Later Costs Single Expenditure	In The Yr	PW Factor	Original Design		Recommended Design	
			Est \$	PW \$	Est \$	PW \$
RESURFACE	15	.5553	22.6	12.5	8.8	4.9
OVERLAY	15	.5553	162	90	126	70
OVERLAY	30	.3083	162	49.9	126	38.8
* 9/23 SQ/M OVERLAY						
Sub Total of Single Expenditure Costs PW \$				152.4		113.7
Later Costs Annual Expense	For How Many Yrs	PW Factor	Original Design		Recommended Design	
			Est \$	PW \$	Est \$	PW \$
	15					
Sub Totals of Annual Expense Costs PW \$						
Totals PW \$ for Original & Recommended				1218.9		881.6
Total PW \$ Savings (or Added Cost) for Recommended Design						337.3

VALUE ENGINEERING RECOMMENDATION

FORM 20 DEC 1996

PROJECT: MAYFIELD-AURORA (KY 121 SECT. 1)

Page 1 of 4

LOCATION:

STUDY DATE: 4-29-99

IDENTIFICATION NUMBER: 3

FUNCTION OF COMPONENT BEING CHANGED: PROVIDE SAFETY

DESCRIPTIVE TITLE OF RECOMMENDATION: REDUCTION OF SHOULDER
FROM 3.6 M TO 3.0 M

ORIGINAL DESIGN:

3.6 METER SHOULDERS (1.5 M PAVED AND 2.1 M
DENSE GRADE) WERE ORIGINALLY PROPOSED.

RECOMMENDED CHANGE:

REDUCE THE SHOULDERS TO 3.0 METER (2.4 M PAVED
AND 0.6 M DENSE GRADE)

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	\$10,427,950	\$10,633	\$10,438,583
RECOMMENDED DESIGN	\$10,049,575	\$10,245	\$10,059,820
ESTIMATED SAVINGS OR (COST)	\$378,375	\$388	\$378,763

VALUE ENGINEERING RECOMMENDATION

IDENTIFICATION NUMBER: 3

Page 2 of 4

ADVANTAGES:

PAVEMENT COSTS ARE REDUCED.
BRIDGE WIDTHS WERE REDUCED.

DISADVANTAGES:

MARGINAL REDUCTION IN SAFETY.

JUSTIFICATION:

3.0 METER SHOULDERS STILL IN COMPLIANCE
WITH DESIGN MANUAL REQUIREMENTS.

VALUE ENGINEERING RECOMMENDATION

FORM: 30 DEC 1996

COST ESTIMATE - FIRST COST

IDENTIFICATION NUMBER: 3

Page 3 of 4

Cost Item	Units	Unit Cost		Original Design		Recommended Design	
		\$/Unit	Source Code	Num of Units	Total \$	Num of Units	Total \$
<i>PAVEMENT:</i>							
<i>ASPHALT SURFACE</i>	<i>M-TON</i>	<i>40⁰⁰</i>	<i>1</i>	<i>8232</i>	<i>329,280</i>	<i>7832</i>	<i>313,280</i>
<i>ASPHALT BASE</i>	<i>M-TON</i>	<i>35²⁷</i>	<i>1</i>	<i>40830</i>	<i>1,440,074</i>	<i>39505</i>	<i>1,393,341</i>
<i>DGA</i>	<i>M-TON</i>	<i>20⁰⁰</i>	<i>1</i>	<i>53741</i>	<i>1,074,820</i>	<i>50977</i>	<i>1,019,540</i>
<i>EMBANKMENT</i>	<i>CUM</i>	<i>5⁰⁰</i>	<i>1</i>	<i>564,000</i>	<i>2,820,000</i>	<i>547,080</i>	<i>2,735,400</i>
<i>BRIDGES</i>	<i>Sq. M</i>	<i>4600⁰⁰</i>	<i>1</i>	<i>5735</i>	<i>3,441,000</i>	<i>5462</i>	<i>3,277,200</i>
<i>SUBTOTAL</i>					<i>9,105,174</i>	<i>8,738,761</i>	
<i>ENGR & CONTG:</i>		<i>15%</i>		<i>1,365,776</i>		<i>1,310,814</i>	
<i>TOTALS</i>					<i>\$10,427,950</i>	<i>\$ 10,049,575</i>	
					<i>SAVINGS \$</i>	<i>378,375</i>	

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: 3

Page 4 of 4

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 \$		Recommd Design PW \$
<u>10'SHLD(5'PAV.)</u>				<u>10427.9</u>		
<u>8' PAVED</u>						<u>10049.5</u>
Sub Totals of Initial Costs PW \$						
Later Costs Single Expenditure	In The Yr	PW Factor	Original Design		Recommended Design	
			Est \$	PW \$	Est \$	PW \$
<u>RESURFING</u>	<u>12</u>	<u>.6246</u>	<u>329</u>	<u>205.6</u>	<u>313</u>	<u>195.5</u>
Sub Total of Single Expenditure Costs PW \$				<u>205.6</u>		<u>195.5</u>
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				<u>10,633.5</u>		<u>10245.0</u>
Total PW \$ Savings (or Added Cost) for Recommended Design						

PREPARED BY	_____	DATE	_____
CHECKED BY	_____	DATE	_____
APPROVED BY	_____	DATE	_____

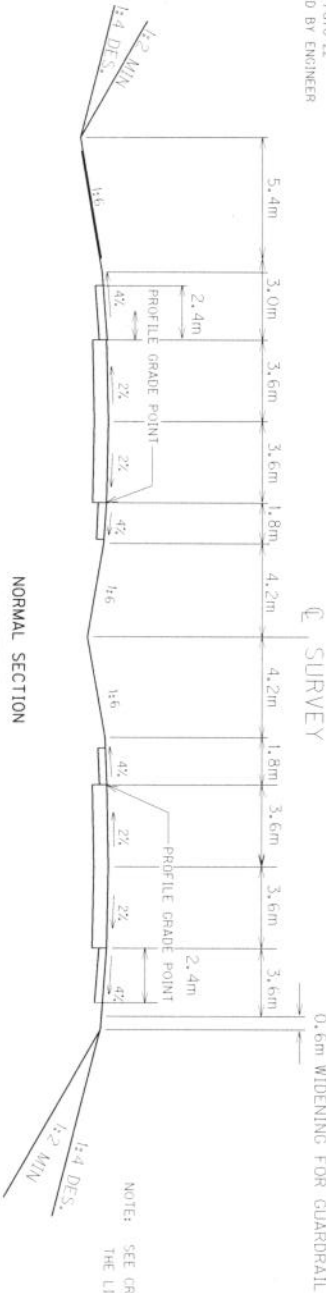
PAVEMENT SCHEDULE

200mm OGA BASE
100mm DB-11 PG64-22
65mm ASPHALT BASE CLASS 1P PG64-22
65mm ASPHALT BASE CLASS 1P PG64-22
70mm ASPHALT BASE CLASS 1P PG70-22
30mm ASPHALT SURFACE CLASS 1P 40/20 PG70-22
ASPHALT MATERIAL FOR TACK AS DIRECTED BY ENGINEER

MAINLINE TYPICAL SECTION
DEPRESSED MEDIAN
(STA 15+856.680 TO STA 29+527.935)

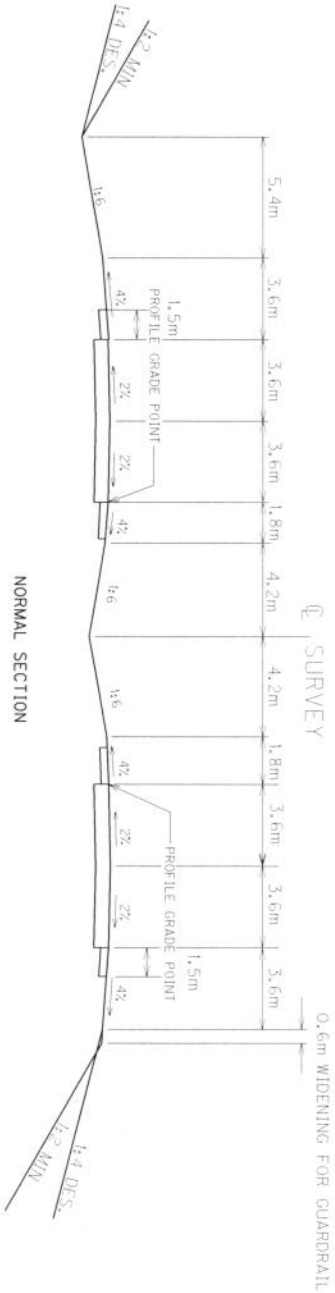
PROPOSED

☐ SURVEY



NORMAL SECTION

☐ SURVEY



NORMAL SECTION

NOTES: SEE GROSS-SECTIONS FOR SLOPES OUTSIDE THE LIMITS OF THE SHOULDER

COUNTY	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
GRAVES			

VALUE ENGINEERING RECOMMENDATION

FORM 20 DEC 1996

PROJECT: MAYFIELD - AURORA (KY 121 SEC 1)

Page 1 of 4

LOCATION: GRAVES COUNTY

STUDY DATE: 4-29-99

IDENTIFICATION NUMBER: 4

FUNCTION OF COMPONENT BEING CHANGED: PROJECT LIMITS

DESCRIPTIVE TITLE OF RECOMMENDATION: INCREASE PROJECT LIMITS
TO BALANCE EMBANKMENT QUANTITIES.

ORIGINAL DESIGN:

ORIGINAL DESIGN REQUIRED 500,000 CUM. OF EMBANKMENT BARROW
FROM STATION 15+856 TO STATION 20+580.

RECOMMENDED CHANGE:

INCREASE ENDING PROJECT LIMITS TO STATION 22+260

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	3,220 M		3,220 M
RECOMMENDED DESIGN	2,875 K		2,875 K
ESTIMATED SAVINGS OR (COST)	345 K		345 K

VALUE ENGINEERING RECOMMENDATION

IDENTIFICATION NUMBER: 4

Page 2 of 4

ADVANTAGES:

- BY INCREASING ENDING STATION A CUT SECTION COULD BE USED TO BALANCE CUT/FILL.
- UNIT COST IS DECREASED
- REDUCE MOBILIZATION AND DEMOBILIZATION

DISADVANTAGES:

- HAUL DISTANCE HAS BEEN INCREASED,
- INCREASE MAINTAIN AND CONTROL TRAFFIC.

JUSTIFICATION:

BALANCE EARTH WORK QUANTITIES.

IF THE PROJECT IS INCREASED TO STATION 22+260 FROM 20+580, 345 K CUM. OF MATERIAL COULD BE OBTAINED.

VALUE ENGINEERING RECOMMENDATION

FORM: 30 DEC, 1996

COST ESTIMATE - O & M (LIFE CYCLE) COST

IDENTIFICATION NUMBER: 4

Page 4 of 4

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

LIFE CYCLE COST N/A

Dollars in table are \$ times 1,000

Initial Costs				Original Design PW \$		Recomd Design PW \$
EMBANKMENT				3220 k		2,875 k
Sub Totals of Initial Costs PW \$				3220 k		2,875 k
Later Costs Single Expenditure	In The Yr	PW Factor	Original Design		Recommended Design	
			Est \$	PW \$	Est \$	PW \$
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 \$
Sub Totals of Annual Expense Costs PW \$						
Totals PW \$ for Original & Recommended				3220k		2,875 k
Total PW \$ Savings (or Added Cost) for Recommended Design						345 k