VALUE ENGINEERING STUDY

OF

I-64 MAJOR WIDENING

ITEM NUMBERS: 5-2035.40, 5-2035.70 & 5-65.40/.41 Extension

Frankfort, Kentucky

January 12-16, 2009

Prepared by:

VE GROUP, L.L.C.

In Association With:

KENTUCKY TRANSPORTATION CABINET

VALUE ENGINEERING STUDY TEAM LEADER

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DATE

TABLE OF CONTENTS

TABLE OF CONTENTS

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. The study was performed during the week of January 12-16, 2009.

The subject of the study was the reconstruction of I-64.

PROJECT DESCRIPTION

The project consists of; Section 5 from milepost 35.900 to milepost 38.184, Section 7 from milepost 43.332 to milepost 47.700, and Section 8 from milepost 47.700 to milepost 53.120. The project will widen I-64 in median to provide 6-lane limited access facility between Louisville and Frankfort, Kentucky. All mainline structures in Sections 5, 7, and 8 will be widened to accommodate six lanes of traffic.

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- PAVEMENT/BASE DESIGN

The Value Engineering Team recommends that Value Engineering Alternative Number 1 be implemented. This Value Engineering Alternative r***evises the asphalt pavement design.***

If this recommendation can be implemented, there is a possible savings of ***$3,677,750.***

RECOMMENDATION NUMBER 2- GOOSE CREEK BRIDGES

The Value Engineering Team recommends that Value Engineering Alternative Number 3 be implemented. This Value Engineering Alternative uses conspan over the roadway and bridge.

If this recommendation can be implemented there is a possible savings of ***$ 1,514,439.***

If Value Engineering Alternative Number 3 cannot be implemented then the Value Engineering Alternative Team recommends that Value Engineering Alternative Number 2 be implemented. ***This Value Engineering Alternative uses a shorter two span bridge with walls outside the flood zone.***

If this recommendation can be implemented, there is a possible savings of ***$1,151,644.***

RECOMMENDATION NUMBER 3- BENSON CREEK BRIDGES

The Value Engineering Team recommends that Value Engineering Alternative Number 2 be implemented. ***This Value Engineering Alternative uses a single span bridge with walls outside the flood zone.***

If this recommendation can be implemented, there is a possible savings of ***$935,533.***

RECOMMENDATION NUMBER 4- SOUTH BENSON CREEK BRIDGES

The Value Engineering Team recommends that Value Engineering Alternative Number 2 be implemented***. This Value Engineering Alternative uses a single span bridge with walls outside the flood zone.***

If this recommendation can be implemented, there is a possible savings of ***$1,303,201.***

I. EXECUTIVE SUMMARY

RESULTS – AREAS OF FOCUS

RECOMMENDATION NUMBER 5- GUIST CREEK BRIDGES

The Value Engineering Team recommends that Value Engineering Alternative Number 2 be implemented. ***This Value Engineering Alternative uses a single span bridge with walls outside the flood zone.***

If this recommendation can be implemented, there is a possible savings of ***$1,303,201***.

RECOMMENDATION NUMBER 6-KY 151 INTERCHANGE BRIDGES

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. ***This Value Engineering Alternative uses a single span bridge with pile bents with walls.***

If this recommendation can be implemented, there is a possible savings of ***$439,410.***

RECOMMENDATION NUMBER 7-KY 1665 BRIDGES

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. ***This Value Engineering Alternative uses a single span bridge with pile bents with walls.***

If this recommendation can be implemented, there is a possible savings of ***$541,182.***

RECOMMENDATION NUMBER 8-CARDWELL LANE BRIDGES

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. ***This Value Engineering Alternative uses a single span bridge with pile bents with walls.***

If this recommendation can be implemented, there is a possible savings of ***$433,806.***

RECOMMENDATION NUMBER 9-BOX CULVERTS

The Value Engineering Team recommends that Value Engineering Alternative Number 1 be implemented. ***This Value Engineering Alternative uses a different type of lightweight fill.***

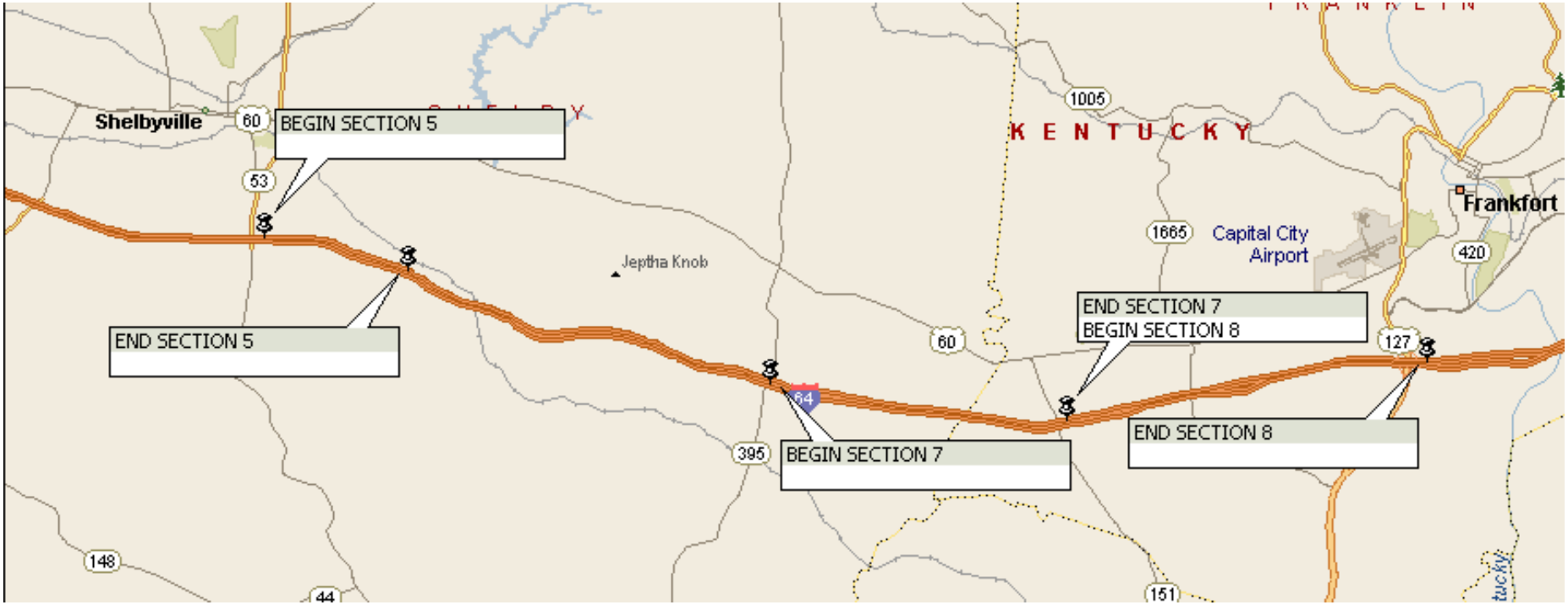
If this recommendation can be implemented, there is a possible savings of ***$1,173,995.***

RECOMMENDATION NUMBER 10-MOT/EARTHWORK/CROSSOVERS

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. ***This Value Engineering Alternative moves the projects limits.***

If this recommendation can be implemented, there is a possible savings of ***$951,240.***

II. LOCATION OF PROJECT



III. TEAM MEMBERS AND PROJECT DESCRIPTION

TEAMMEMBERS

NAME	AFFILIATION	EXPERTISE	PHONE/ EMAIL
William F. Ventry, P.E., C.V.S.-LIFE	VE GROUP	Team Leader	850/627-3900
Tom Hartley, P.E., C.V.S	VE GROUP	Roadway/ Traffic	850/627-3900
Matt Looney	KYTC	Construction	502/564-4255
Charles Allen, P.E.	KYTC	Design	502/564-3280
Jim Miracle, P.E.	KYTC	Bridge	502/564-4560
Siamak Shafaghi, P.E.	KYTC	Quality Assurance	502/564-3280
Jennifer McCleve, P.E.	KYTC	Utilities	502/564-3210

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IV. INVESTIGATION PHASE

VALUE ENGINEERING STUDY BRIEFING *I-64 MAJOR WIDENING* **January 12, 2009**		
NAME	**AFFILIATION**	**PHONE**
Dan Hite	KYTC	502/564-3280
Siamak Shafaghi	KYTC	502/564-3280
Tom Hartley	VE Group	850/627-3900
Joette Fields	KYTC	502/564-3280
Greg Sharp	ENTRAN	859/233-2100
Adam McLain	ENTRAN	859/233-2100
Todd Van Behren	WMB	859/299-5226
Wallace Bennett	WMB	859/299-5220
Daryl Carter	ENTRAN	859/233-2100
Gleen Hardin	ENTRAN	859/233-2100
Jennifer McClure	KYTC	502/564-3210
James Napier	WMB	859/299-5226
Jim Miracle	KYTC	502/564-4560
Daniel Byers	WMB	859/299-5226
Charles Allen	KYTC	502/564-3280
Matt Looney	KYTC	502/564-4255
Bill Ventry	VE Group	850/627-3900

IV. INVESTIGATION PHASE

STUDY RESOURCES *I-64 MAJOR WIDENING* **January 12-16, 2009**		
NAME	**AFFILIATION**	**PHONE**
Chris Casey	ACH Foam Technologies	678/908-9092
Craig Ashbey	KYTC, Drainage	502/564-3280
Leo Frank	KYTC-Pavement	502/564-3280
Paul Looney	KYTC-Roadway/Design	502/564-3280
Bob Farley	KYTC-Roadway/Design	502/564-3280
Steve Mays	Contech Construction Products, Inc	800/526-3999
David Moses	KYTC-Roadway/Design	502/564-3280

IV. INVESTIGATION PHASE

FUNCTIONAL ANALYSIS WORKSHEET

I-64 MAJOR WIDENING

January 12-16, 2009

ITEM	FUNCT. VERB	FUNCT. NOUN	* TYPE	COST	WORTH	VALUE INDEX
Roadway Excavation	Establish	Grades	B	$ 7,400,000	$ 7,400,000	1.0
Pavement and Base	Add Support	Capacity Vehicles	B S	$ 37,000,000	$ 34,000,000	1.1
Goose Creek Bridges	Eliminate Span	Conflict Creek	B B	$ 2,800,000	$ 1,800,000	1.6
KY 1472 Grade Separation	Eliminate	Conflict	B	$ 1,100,000	$ 1,100,000	1.0
Benson Creek Bridges	Span	Creek	B	$ 4,400,000	$ 2,000,000	2.2
KY 1665 Bridges	Avoid	Conflict	B	$ 1,900,000	$ 1,000,000	1.9
Cardwell Lane Bridges	Avoid	Conflict	B	$ 1,800,000	$ 1,000,000	1.8
Box Culverts	Convey	Water	B	$ 1,700,000	$ 800,000	2.1
Maintenance of Traffic	Maintain	Traffic	B	$ 2,200,000	$ 1,800,000	1.2
Drainage	Convey	Water	B	$ 2,000,000	$ 2,000,000	1.0
KY 151 Bridges	Avoid	Conflict	B	$ 2,100,000	$ 1,100,000	1.9
South Benson Creek Bridges	Span	Creek	B	$ 3,200,000	$ 1,600,000	1.8

***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. PAVEMENT/BASE DESIGN

B. GOOSE CREEK BRIDGE

C. 1. BENSON CREEK BRIDGES

C. 2. SOUTH BENSON CREEK BRIDGES

C. 3. GUIST CREEK BRIDGES

D. 1. KY 151 INTERCHANGE BRIDGES

D. 2. KY 1665 BRIDGES

D. 3. CARDWELL LANE BRIDGES

E. BOX CULVERTS

F. MAINTENANCE OF TRAFFIC/EARTHWORK/CROSSOVERS

V. SPECULATION PHASE

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

A. PAVEMENT/BASE DESIGN

- Revise the pavement design to provide an adequate/economical design for asphalt.
- Revise the pavement design to use a concrete.

B. GOOSE CREEK BRIDGE

- Use a bridge over the roadway and a culvert for the creek.
- Use a shorter two span bridge with walls outside the flood zone.
- Use Con Span for roadway and creek

C. 1. BENSON CREEK BRIDGES
C. 2. SOUTH BENSON CREEK BRIDGES
C. 3. GUIST CREEK BRIDGES

- Use a box culvert, if feasible.
- Use a single span bridge with walls outside the flood zone.

D. 1. KY 151 INTERCHANGE BRIDGES
D. 2. KY 1665 BRIDGES
D. 3. CARDWELL LANE BRIDGES

- Use a single span bridge with pile bents with walls.

E. BOX CULVERTS

- Use a different type of lightweight fill.
- Use walls and no fill.

F. MAINTENANCE OF TRAFFIC/EARTHWORK/CROSSOVERS

- Move the limits of the project.

VI. EVALUATION PHASE

A. ALTERNATIVES

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

A. PAVEMENT/BASE DESIGN

Value Engineering Alternative Number 1: ***Revise the pavement design to provide an adequate/economical design for asphalt***

Value Engineering Alternative Number 2: ***Revise the pavement design to use a concrete***

B. GOOSE CREEK BRIDGE

Value Engineering Alternative Number 1: ***Use a bridge over the roadway and a culvert for the creek***

Value Engineering Alternative Number 2: ***Use a shorter two span bridge with walls outside the flood zone***

Value Engineering Alternative Number 3: ***Use Con Span for roadway and creek***

C. 1. BENSON CREEK BRIDGES
C. 2. SOUTH BENSON CREEK BRIDGES
C. 3. GUIST CREEK BRIDGES

Value Engineering Alternative Number 1: ***Use a box culvert, if feasible***

Value Engineering Alternative Number 2: ***Use a single span bridge with walls outside the flood zone***

D. 1. KY 151 INTERCHANGE BRIDGES
D. 2. KY 1665 BRIDGES
D. 3. CARDWELL LANE BRIDGES

Value Engineering Alternative: ***Use a single span bridge with pile bents with walls***

E. BOX CULVERTS

Value Engineering Alternative Number 1: ***Use a different type of lightweight fill***

Value Engineering Alternative Number 2: ***Use walls and no fill***

F. MAINTENANCE OF TRAFFIC/EARTHWORK/CROSSOVERS

Value Engineering Alternative: ***Move the limits of the project***

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. PAVEMENT/BASE DESIGN

"As Proposed": **Match the existing pavement thickness.**

Advantages

- None apparent

Disadvantages

- May be thicker pavement than required
- Higher construction cost

Conclusion

Carry forward for further development

Value Engineering Alternative Number 1: ***Revise the pavement design to provide an adequate/economical design for asphalt.***

Advantages

- Lower construction cost
- Less construction time
- Less roadway excavation

Disadvantages

- Lower structural number

Conclusion

Carry forward for further development

A. PAVEMENT/BASE DESIGN

Value Engineering Alternative Number 2: Revise the pavement design to use a concrete.

Advantages

- Possible lower construction cost
- Longer service life

Disadvantages

- More difficult construction than asphalt
- May be longer construction time

Conclusion

Carry forward for further development

B. GOOSE CREEK BRIDGES

<u>"As Proposed":</u> **Three span bridges over both the roadway and creek**

<u>Advantages</u>

- Ample hydraulic opening

<u>Disadvantages</u>

- Higher construction cost
- Higher maintenance cost

<u>Conclusion</u>

Carry forward for further development

Value Engineering Alternative Number 1: ***Use a bridge over the roadway and a box culvert for the creek, if feasible***

<u>Advantages</u>

- Low construction cost
- Less construction time
- Lower future maintenance

<u>Disadvantages</u>

- Possible permitting issues with box culvert

<u>Conclusion</u>

Carry forward for further development

Value Engineering Alternative Number 2: ***Use a shorter two span bridge with walls outside the flood zone***

<u>Advantages</u>

- Medium construction cost
- Medium future maintenance cost

<u>Disadvantages</u>

- None apparent

<u>Conclusion</u>

Carry forward for further development

B. GOOSE CREEK BRIDGES

Value Engineering Alternative Number 3: Use Con Span for roadway and creek.

Advantages

- Shorter construction time
- Less bridge deck to freeze in winter
- Lower construction cost
- Helps balance the earthwork for the project

Disadvantages

- More complicated MOT
- Tunnel effect for drivers going through the conspan

Conclusion

Carry forward for further development

C. 1. BENSON CREEK BRIDGES
C. 2. SOUTH BENSON CREEK BRIDGES
C. 3. GUIST CREEK BRIDGES

"As Proposed": **Three span bridges**

Advantages

- Shorter span lengths
- Future flexibility

Disadvantages

- Higher construction cost
- Higher maintenance cost
- Longer construction time

Conclusion

Carry forward for further development

Value Engineering Alternative Number 1: Use a box culvert, if feasible

Advantages

- Low construction cost
- Less construction time
- Less future maintenance cost

Disadvantages

- Possible permitting issues for culvert
- Possible hydraulic issues

Conclusion

Carry forward for further development

VI. EVALUATION PHASE

B. ADVANTAGES AND DISADVANTAGES *(continued)*

C. 1. BENSON CREEK BRIDGES
C. 2. SOUTH BENSON CREEK BRIDGES
C. 3. GUIST CREEK BRIDGES

Value Engineering Alternative Number 2: ***Use a single span bridge with walls outside the flood zone***

Advantages

- Medium construction cost
- Medium maintenance cost

Disadvantages

- None apparent

Conclusion

Carry forward for further development

D. 1. KY 151 INTERCHANGE BRIDGES
D. 2. KY 1665 BRIDGES
D. 3. CARDWELL LANE BRIDGES

"As Proposed": **Three span bridges**

Advantages

- None apparent

Disadvantages

- Higher construction cost
- Higher maintenance cost because more bridge area
- Longer construction time

Conclusion

Carry forward for further development

Value Engineering Alternative: ***Use a single span bridge with pile bents with walls***

Advantages

- Lower construction cost
- Less construction time
- Less future maintenance cost

Disadvantages

- None apparent

Conclusion

Carry forward for further development

E. BOX CULVERTS

"As Proposed": **Lightweight concrete fill over existing boxes**

Advantages

- Good recovery area
- Helps balance earthwork

Disadvantages

- Higher fill cost

Conclusion

Carry forward for further development

Value Engineering Alternative Number 1: Use a different type of lightweight fill

Advantages

- Less maintenance
- Lower construction cost
- Good recovery area

Disadvantages

- None apparent

Conclusion

Carry forward for further development

Value Engineering Alternative Number 2: Use walls and no fill

Advantages

- Lower construction cost
- Less environmental impacts

Disadvantages

- Requires a barrier
- Less use of excess fill

Conclusion

Carry forward for further development

F. MAINTENANCE OF TRAFFIC/EARTHWORK/CROSSOVERS

"As Proposed": **Two different MOT schemes**

Advantages

- None apparent

Disadvantages

- End of one project does not match the beginning of the next project
- Would be major problem if both project were let at or near the same time

Conclusion

Carry forward for further development

Value Engineering Alternative: ***Move the limits of the project***

Advantages

- Would eliminate the MOT conflict
- Would eliminate the borrow requirement on one project
- Would eliminate one crossover

Disadvantages

- Requires part of design on one project to be put on other project

Conclusion

Carry forward for further development

VII. DEVELOPMENT PHASE

A. PAVEMENT/BASE DESIGN

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

B. GOOSE CREEK BRIDGE

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

C.1. BENSON CREEK BRIDGES

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

C.2. SOUTH BENSON CREEK BRIDGES

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

C.3. GUIST CREEK BRIDGES

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

D.1. KY 151 INTERCHANGE BRIDGES

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

D.2. KY 1665 BRIDGES

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

D.3. CARDWELL LANE BRIDGES

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

VII. DEVELOPMENT PHASE

E. BOX CULVERTS

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

F. MAINTENANCE OF TRAFFIC/EARTHWORK/CROSSOVERS

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

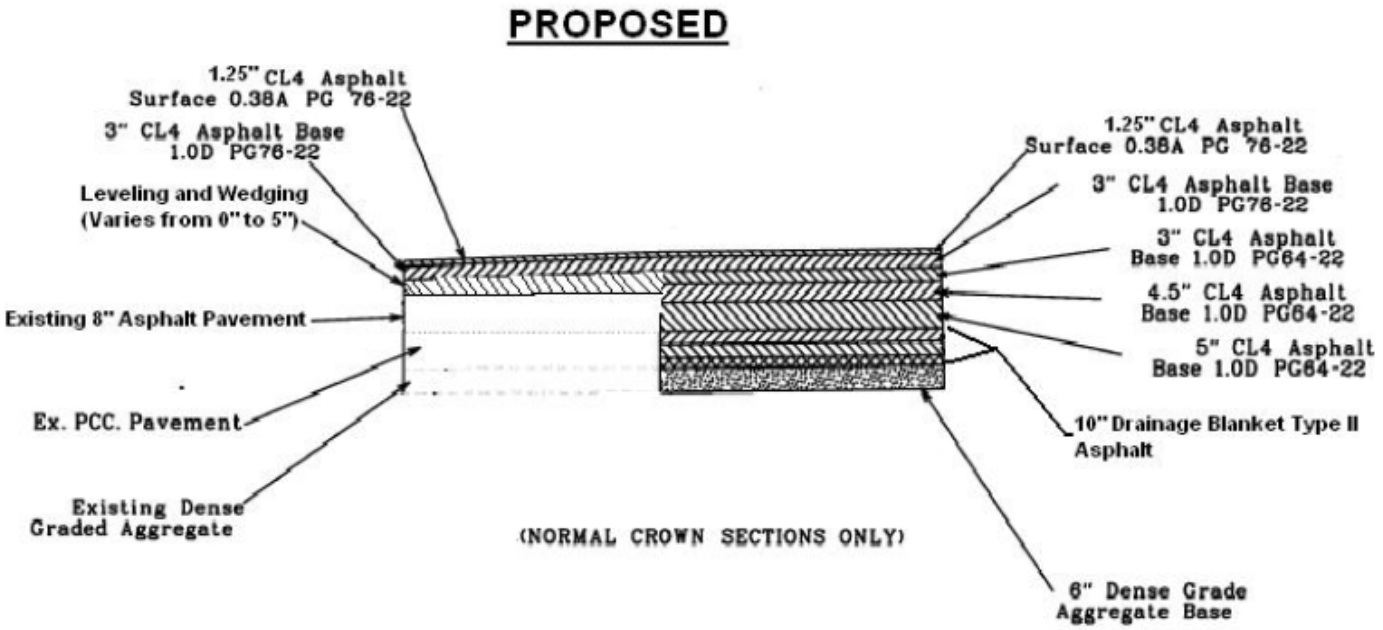
VII. DEVELOPMENT PHASE

A. Pavement/Base Design

1. "As Proposed"

Pavement Typical Section "As Proposed"

Items Number 05-2035.40 and 05-2035.70 as proposed include widening the existing roadway 36' to the median in Bifurcated sections and 30' to the median in Common sections. The final configuration has a Grade Point shift in Normal Crown sections of 10' and 2' to the median in the Bifurcated and Common sections, respectively. This Grade point shift would make it necessary to correct for the new cross-slopes with Asphalt material, and would require a wedge over the existing lanes, and an additional uniform lift of material in the widened portion of the Tangent, Bifurcated areas of the projects. This additional material would be necessary so your final surface grades match, and you could maintain your internal drainage by matching the bottom grade of you pavement structure.

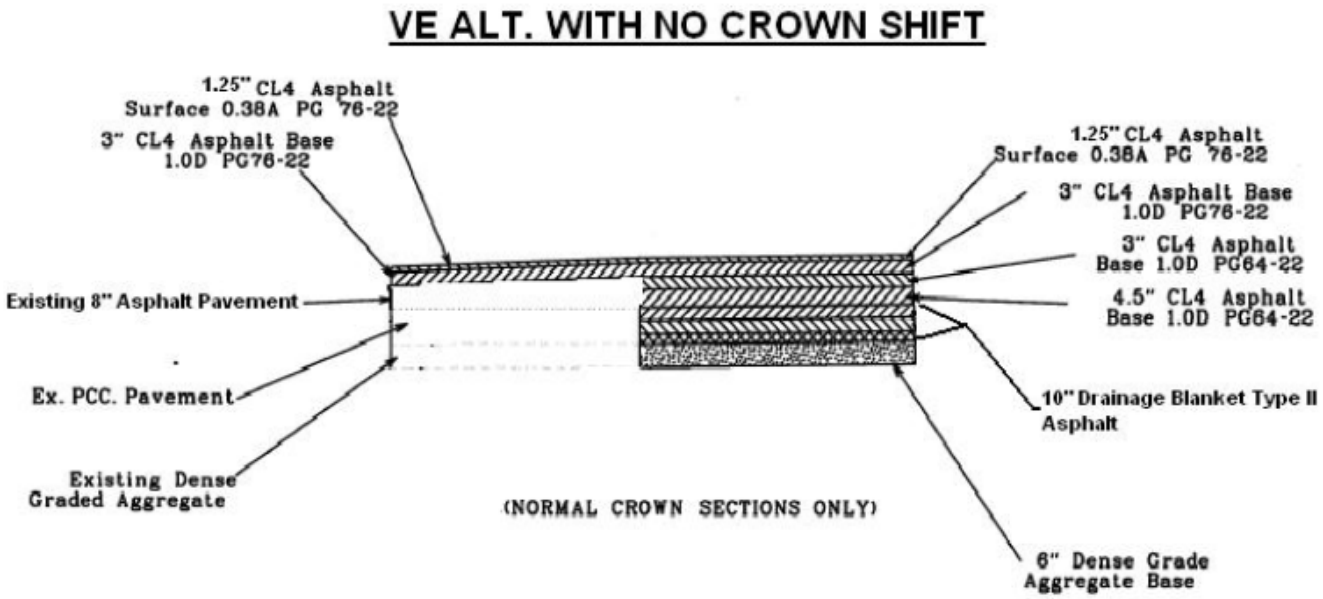


VII. DEVELOPMENT PHASE

A. Pavement/Base Design

2. Value Engineering Alternative

The Value Engineering team is proposing the elimination of the planned 10’ crown shift in Tangent, Bifurcated sections. This change would move the crown of the road from between the slow and middle lane to the outer edge of the slow lane in the new configuration after widening. Elimination of this shift would remove the need for the 0 to 5” Level and Wedge course for crown point correction. This proposed change would also eliminate a the need for a 5” lift of Asphalt base material in the widening section that was required to ensure the final grades matched.



ELIMINATE 10' CROWN SHIFT
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
CL4 Asph base 1.0D PG 64-22	Tons	$50.00	64,585	$3,229,250	-	$0
Level and Wedging PG 64-22	Tons	$50.00	8,970	$448,500		$0
SUBTOTAL				**$3,677,750**		**$0**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		0.0%		$0		$0
TRAFFIC CONTROL/MOT		0.0%		$0		$0
CONTINGENCY		0.0%		$0		$0
GRAND TOTAL				**$3,677,750**		**$0**

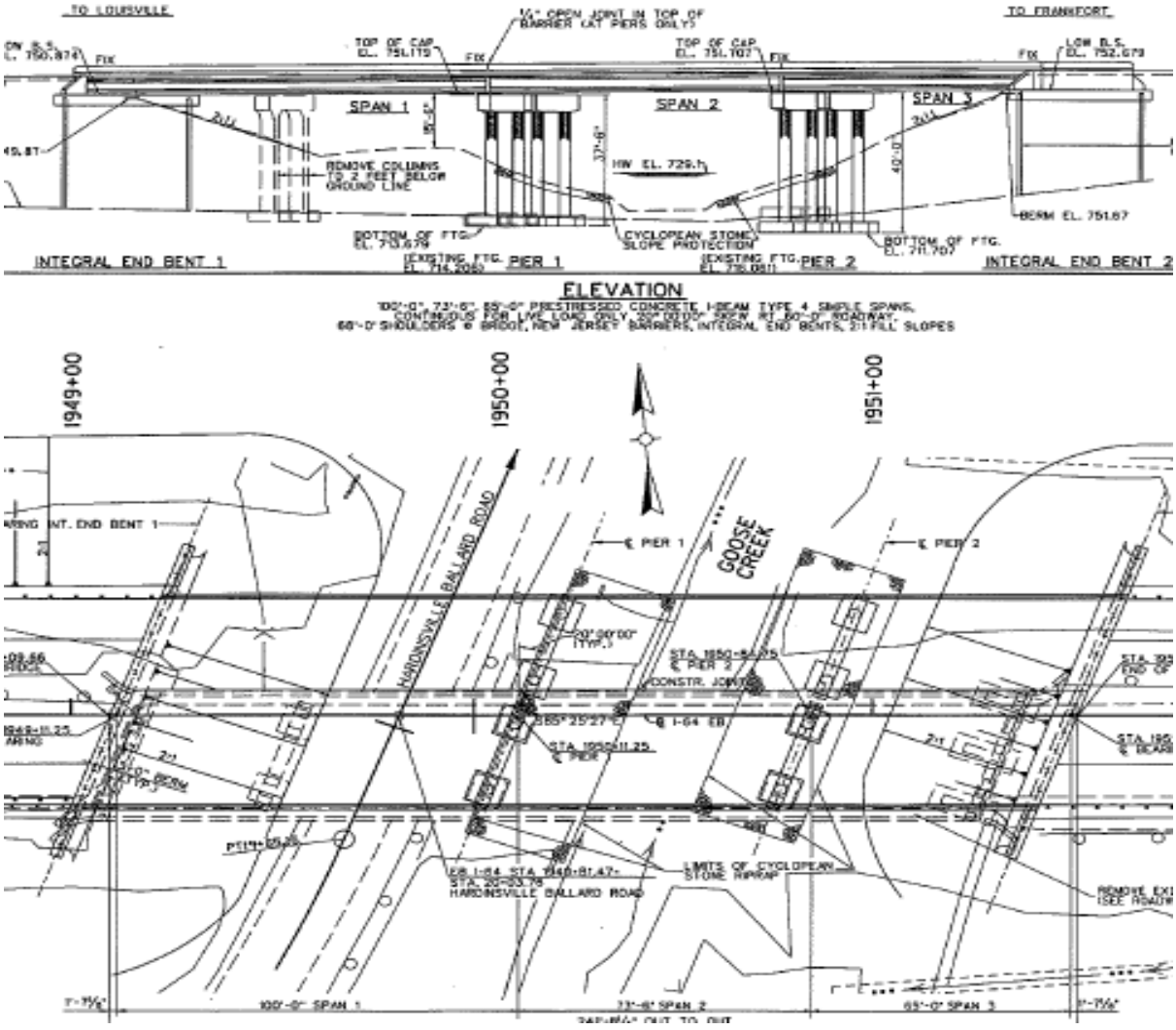
POSSIBLE SAVINGS: $ 3,677,750

VII. DEVELOPMENT PHASE

B. Goose Creek Bridge

1. "As Proposed"

The proposed 3-span bridge over Goose Creek and Hardinsville Ballard Road has spans of 100', 73.5', and 65' for a total length of 238.5'. The first span bridges Hardinsville Ballard Road while span 2 bridges Goose Creek. The construction of both piers is anticipated to require some degree of rock excavation due to the proposed footings being approximately 2 to 3' deeper than the existing.



AS PROPOSED
I-64 BRIDGE OVER GOOSE CREEK AND HARDINSVILLE BALLARD ROAD

VII. DEVELOPMENT PHASE

B. Goose Creek Bridge

2. Value Engineering Alternative Number 1

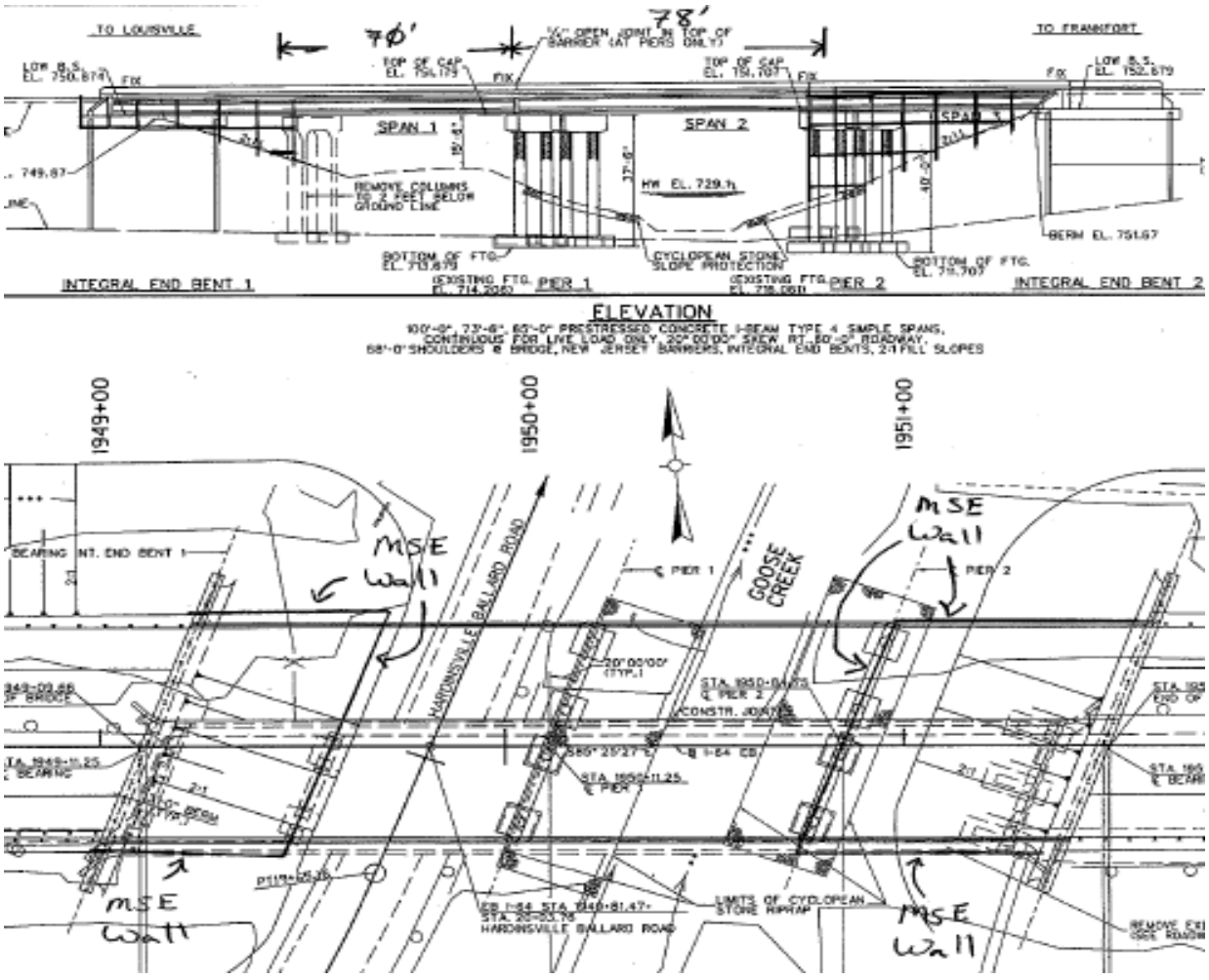
The Value Engineering recommends constructing a single span bridge to cross Hardinsville Ballard Road. It is recommended that the approximate 80’ wide Goose Creek span be cleared by utilizing a triple 13’x11’ box culvert. The Value Engineering Alternative will reduce approximately 138’ of bridge length; eliminate the piers; decrease construction duration; decrease construction cost; and future maintenance needs. The feasibility of utilizing a culvert to bridge Goose Creek must be further analyzed before selecting this alternative. Permitting issues may preclude this alternative’s selection.

VII. DEVELOPMENT PHASE

B. Goose Creek Bridge

Value Engineering Alternative Number 2

The Value Engineering recommends constructing a two span bridge to cross Hardinsville Ballard Road and Goose Creek with MSE walls constructed beyond the flood zone. This bridge would have spans of approximately 70' and 78', totaling 148'. The 70' span would clear the Hardinsville Ballard Road while the 78' span would cross Goose Creek. The Value Engineering Alternative will eliminate a pier; decrease construction cost; and future maintenance needs.



VALUE ENGINEERING ALTERNATIVE NUMBER 2
I-64 BRIDGE OVER GOOSE CREEK AND HARDINSVILLE BALLARD ROAD

I - 64 BRIDGES OVER GOOSE CREEK
VALUE ENGINEERING ALTERNATIVE NUMBER 2
COST COMPARISON SHEET

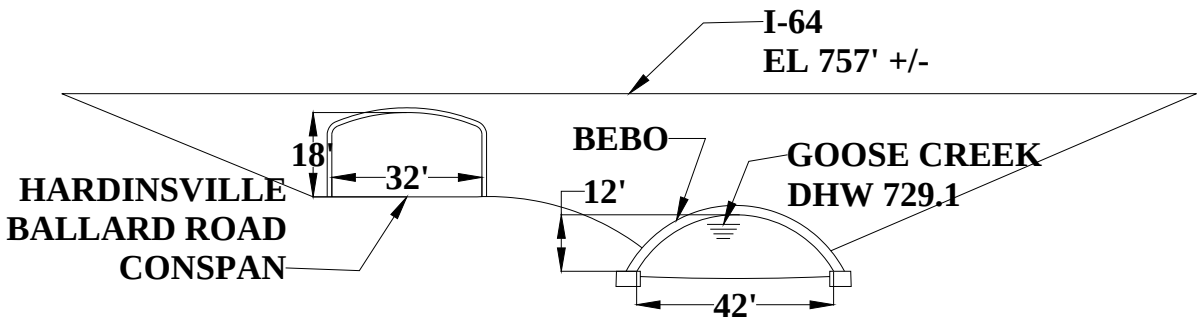
DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Bridge Cost per Deck Area	SF	$91.91	30452.0	$2,798,843	17760.0	$1,632,322
MSE Wall	SF	$60.00	0.0	$0	2800.0	$168,000
Pavement	SY	$56.00	0.0	$0	1410.2	$78,972
Earthwork	CY	$6.90	0.0	$0	10000.0	$69,000
SUBTOTAL				**$2,798,843**		**$1,948,294**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		4.5%		$151,138		$105,208
TRAFFIC CONTROL/MOT		10.0%		$279,884		$194,829
CONTINGENCY		20.0%		$559,769		$389,659
GRAND TOTAL				**$3,789,634**		**$2,637,990**

POSSIBLE SAVINGS: $ 1,151,644

B. Goose Creek Bridge

3. Value Engineering Alternative Number 3

The Value Engineering Team Recommends replacing the twin bridges over Hardinsville Ballard Road and Goose Creek with precast culverts. These culverts will be approximately 324’ long; and the Hardinsville Ballard Road CONSPAN Culvert will be 32’ wide and 18’ high with the Goose Creek BEBO Culvert will be 42’ wide and 12’ high as shown below.



VALUE ENGINEERING ALTERNATIVE GOOSE CREEK CROSSING

I-64 will be constructed on the embankment over the culverts and will consume some of the excess excavation material on the project. It will also eliminate the bridge maintenance requirement and the risk of the bridge deck freezing before the pavement.

These culverts can be constructed early in the project and fill material placed in the median to provide for temporary/permanent pavement placement to 2-lanes of traffic in each direction. The bridges can be demolished and the remainder of the fill and pavement can be placed.

BOX CULVERT AT GOOSE CREEK
VALUE ENGINEERING ALTERNATIVE NUMBER 3
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
EB BRIDGE OVER GOOSE CREEK	LS	$1,387,971.00	1.0	$1,387,971	0.0	$0
WB BRIDGE OVER GOOSE CREEK	LS	$1,399,334.00	1.0	$1,399,334	0.0	$0
BEBO OVER GOOSE CREEK 42' X 15' X 324'	LF	$1,774.69	0.0	$0	324.0	$575,000
CONSPAN OVER HARDINSVILLE ROAD - 30' X 18' X 310'	LF	$2,006.17	0.0	$0	324.0	$650,000
ROADWAY	SY	$56.00	0.0	$0	3226.7	$180,693
EARTHWORK	CY	$6.90	0.0	$0	38133.3	$263,120
SUBTOTAL				**$2,787,305**		**$1,668,813**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		4.5%		$150,514		$90,116
TRAFFIC CONTROL/MOT		10.0%		$278,731		$166,881
CONTINGENCY		20.0%		$557,461		$333,763
GRAND TOTAL				**$3,774,011**		**$2,259,573**

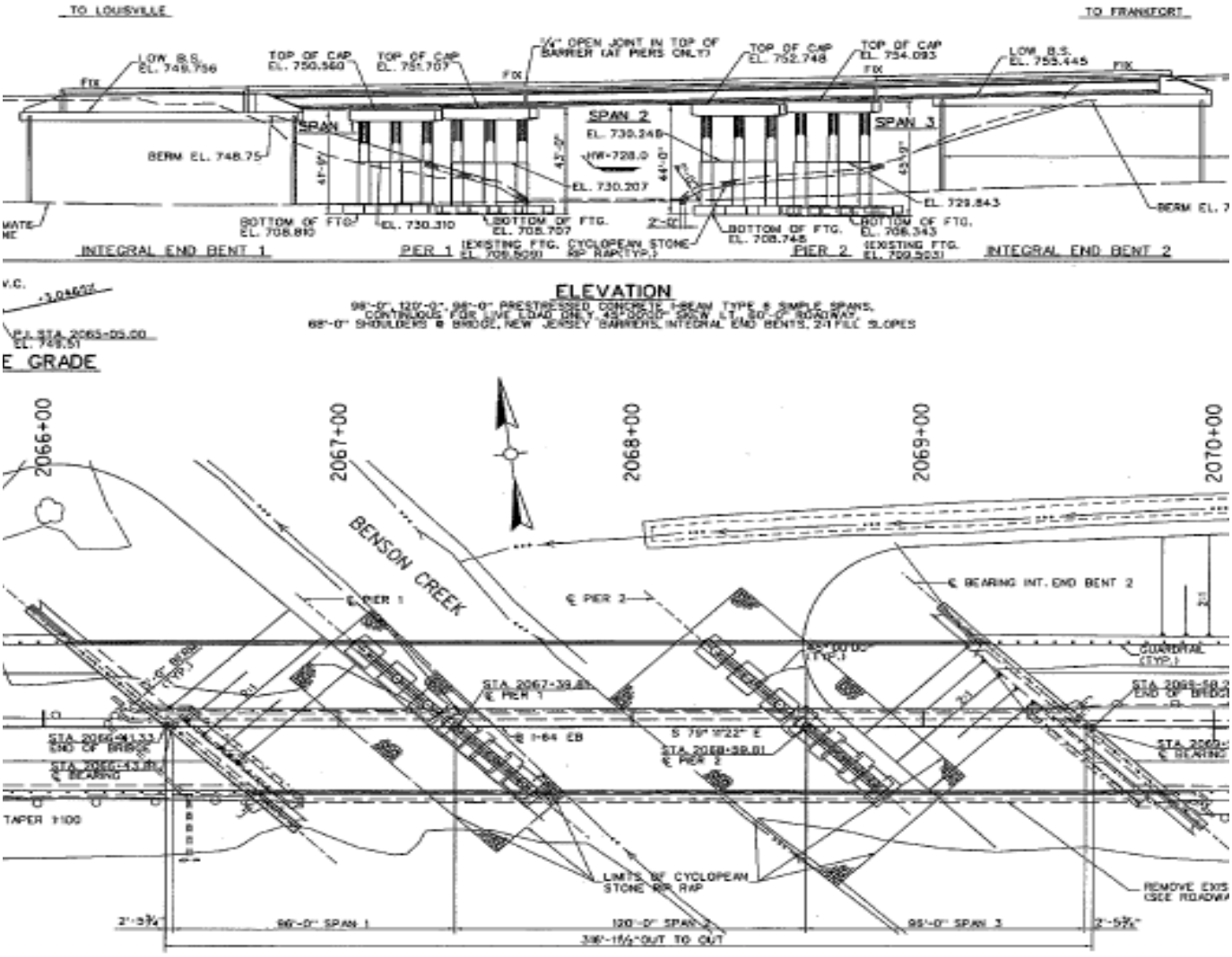
POSSIBLE SAVINGS: $1,514,438

VII. DEVELOPMENT PHASE

C.1. Benson Creek Bridges

1. "As Proposed"

The proposed 3-span bridge over Benson Creek has spans of 96', 120', and 96' for a total length of 312'. The construction of both piers is anticipated to require some degree of rock excavation due to the proposed footings being approximately 1 to 2' deeper than the existing and Pier 1 cuts further into the west side slope.



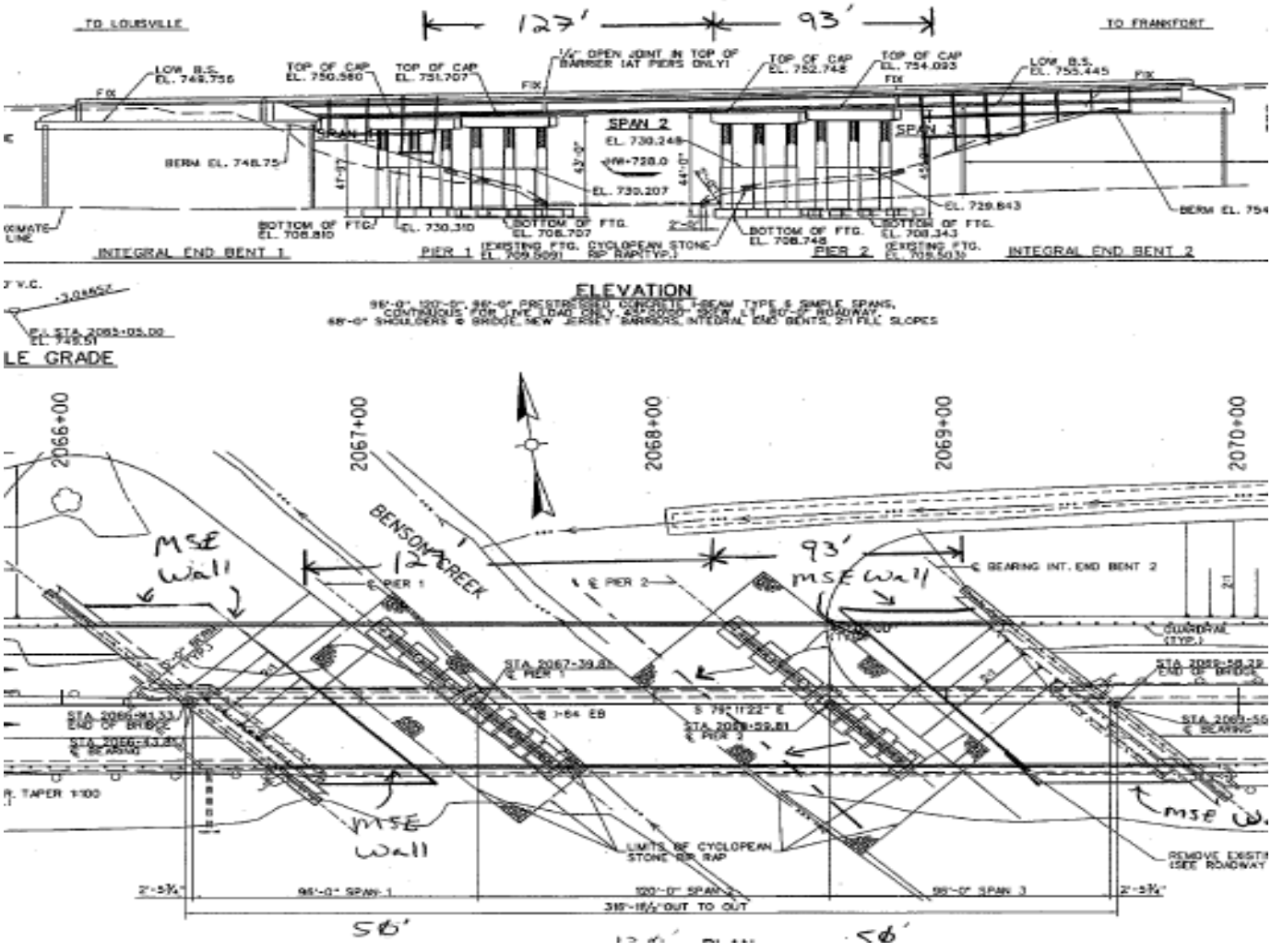
AS PROPOSED I-64 BRIDGE OVER BENSON CREEK

VII. DEVELOPMENT PHASE

C. 1. Benson Creek Bridges

2. Value Engineering Alternative Number 2

The Value Engineering recommends constructing a two span with 127’ and 93’ for a total of 220’ to bridge Benson Creek with MSE walls. The Value Engineering Alternative will eliminate a bridge pier; decrease construction cost; and future maintenance needs. In order to maintain adequate hydraulic flow area and to avoid scour issues, the walls must be constructed outside of the flood zone.



VALUE ENGINEERING ALTERNATIVE NUMBER 2
I-64 BRIDGE OVER BENSON CREEK

I - 64 BRIDGES OVER BENSON CREEK
VALUE ENGINEERING ALTERNATIVE NUMBER 2
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Bridge Cost per Deck Area	SF	$112.56	39936.0	$4,495,196	26460.0	$2,978,338
MSE Wall	SF	$60.00	0.0	$0	11650.0	$699,000
Pavement	SY	$56.00	0.0	$0	1497.3	$83,851
Earthwork	CY	$6.90	0.0	$0	6241.7	$43,068
SUBTOTAL				**$4,495,196**		**$3,804,256**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		4.5%		$242,741		$205,430
TRAFFIC CONTROL/MOT		10.0%		$449,520		$380,426
CONTINGENCY		20.0%		$899,039		$760,851
GRAND TOTAL				**$6,086,496**		**$5,150,962**

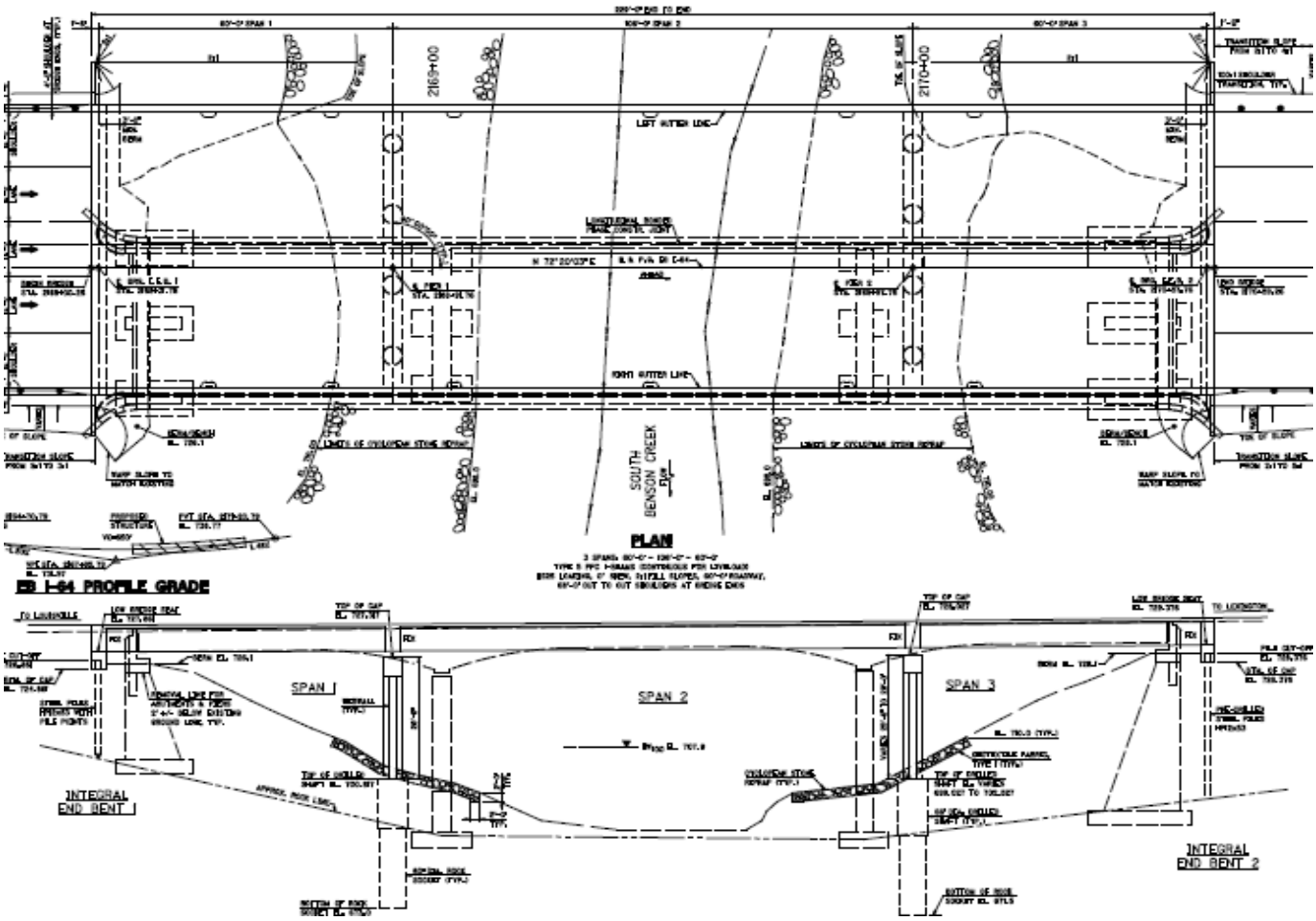
POSSIBLE SAVINGS: $935,533

VII. DEVELOPMENT PHASE

C.2. South Benson Creek Bridges

1. "As Proposed"

The proposed 3-span bridge over South Benson Creek has spans of 60', 106', and 60' for a total length of 226'. The construction of both piers is anticipated to require some degree of rock excavation due to the proposed drilled shafts being significantly deeper than the existing footings.



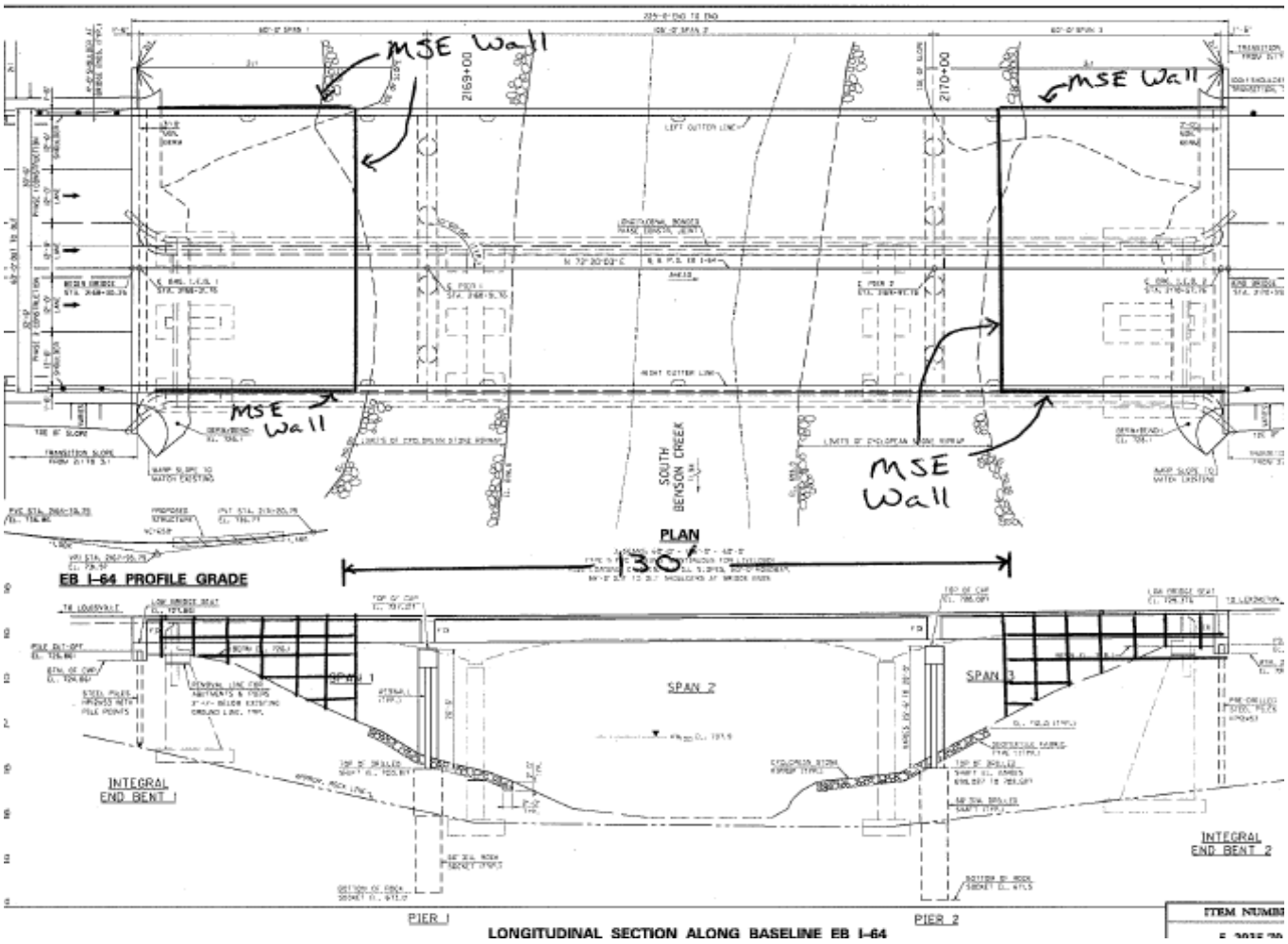
AS PROPOSED I-64 BRIDGE OVER SOUTH BENSON CREEK

VII. DEVELOPMENT PHASE

C.2. South Benson Creek Bridges

2. Value Engineering Alternative Number 2

The Value Engineering recommends constructing a single span of 130’ to bridge South Benson Creek with MSE walls. The Value Engineering Alternative will eliminate bridge piers; decrease construction cost; and future maintenance needs. In order to maintain adequate hydraulic flow area and to avoid scour issues, the walls must be constructed outside of the flood zone.



VALUE ENGINEERING ALTERNATIVE NUMBER 2
I-64 BRIDGE OVER SOUTH BENSON CREEK

I - 64 BRIDGES OVER S. BENSON CREEK
VALUE ENGINEERING ALTERNATIVE NUMBER 2
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Bridge Cost per Deck Area	SF	$108.92	28,854.0	$3,142,778	16,380.0	$1,784,110
MSE Wall	SF	$60.00	0.0	$0	4,746.0	$284,760
Pavement	SY	$56.00	0.0	$0	1,386.0	$77,616
Earthwork	CY	$6.90	0.0	$0	4,900.0	$33,810
SUBTOTAL				**$3,142,778**		**$2,180,296**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		4.5%		$169,710		$117,736
TRAFFIC CONTROL/MOT		10.0%		$314,278		$218,030
CONTINGENCY		20.0%		$628,556		$436,059
GRAND TOTAL				**$4,255,321**		**$2,952,120**

POSSIBLE SAVINGS: $1,303,201

VII. DEVELOPMENT PHASE

C.3. Guist Creek Bridges

1. "As Proposed"

"Existing"

The existing bridge over Guist Creek that carries westbound traffic has spans of 55', 77', and 55' for a total length of 187'. The existing bridge over Guist Creek that carries eastbound traffic has spans of 74', 103', and 74' for a total length of 251'.

VII. DEVELOPMENT PHASE

C.3. Guist Creek Bridges

2. Value Engineering Alternative

The Value Engineering recommends constructing a single span bridge of undetermined length to cross Guist Creek. The Value Engineering Alternative will eliminate bridge piers; decrease construction cost; and future maintenance needs. In order to maintain adequate hydraulic flow area and to avoid scour issues, the walls must be constructed outside of the flood zone.

I - 64 BRIDGES OVER GUIST CREEK (SAMPLE)
VALUE ENGINEERING ALTERNATIVE NUMBER 1
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Bridge Cost per Deck Area	SF	$108.92	28,854.0	$3,142,778	16,380.0	$1,784,110
MSE Wall	SF	$60.00	0.0	$0	4,746.0	$284,760
Pavement	SY	$56.00	0.0	$0	1,386.0	$77,616
Earthwork	CY	$6.90	0.0	$0	4,900.0	$33,810
SUBTOTAL				**$3,142,778**		**$2,180,296**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		4.5%		$169,710		$117,736
TRAFFIC CONTROL/MOT		10.0%		$314,278		$218,030
CONTINGENCY		20.0%		$628,556		$436,059
GRAND TOTAL				**$4,255,321**		**$2,952,120**

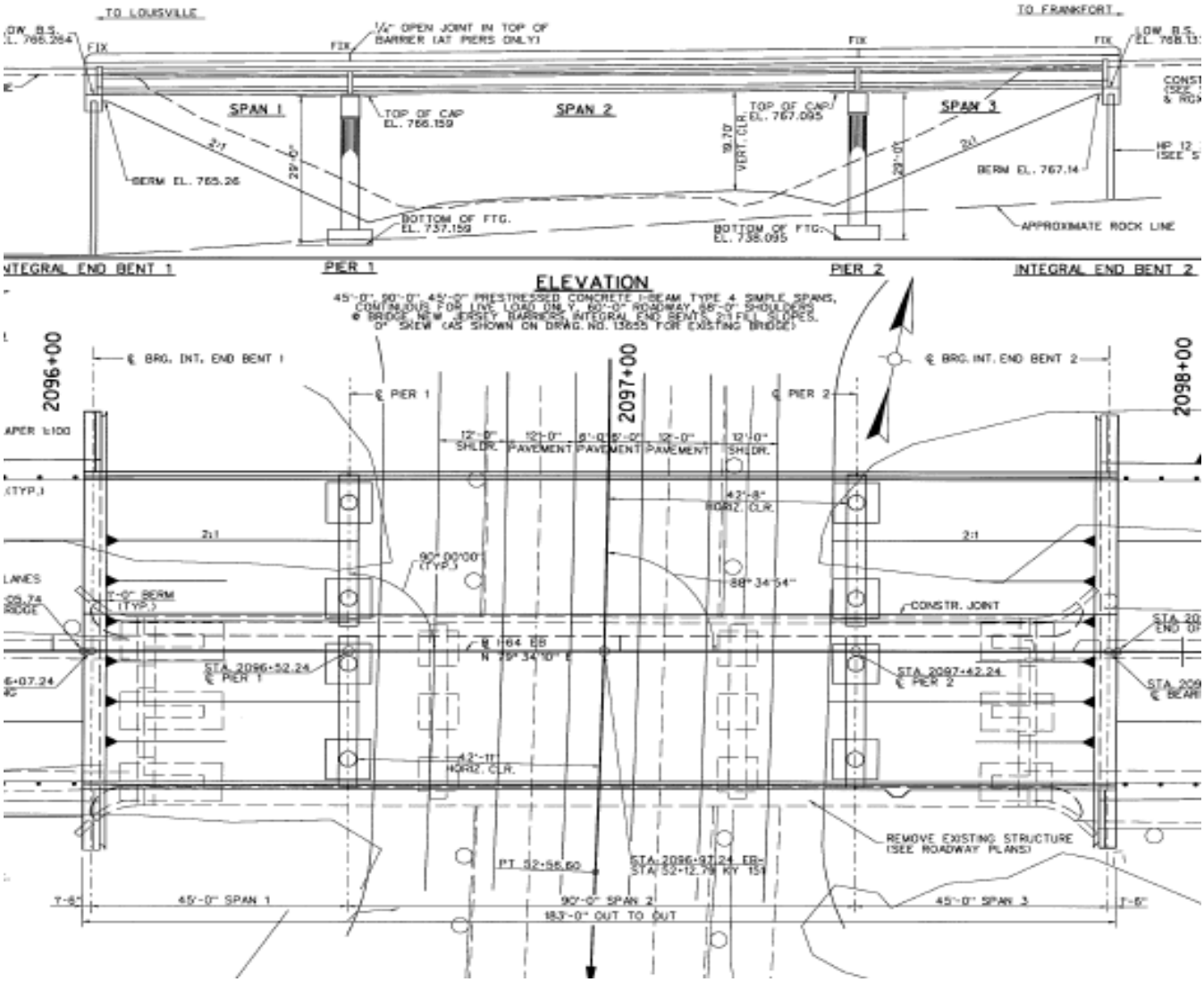
POSSIBLE SAVINGS: $1,303,201

VII. DEVELOPMENT PHASE

D.1. KY 151 Interchange Bridges

1. "As Proposed"

The proposed 3-span bridge over KY 151 has spans of 45', 90', and 45' for a total length of 180'. The construction of both piers is anticipated to require some degree of rock excavation due to excavations for the proposed footings. This design will also result in significant side slope excavation.



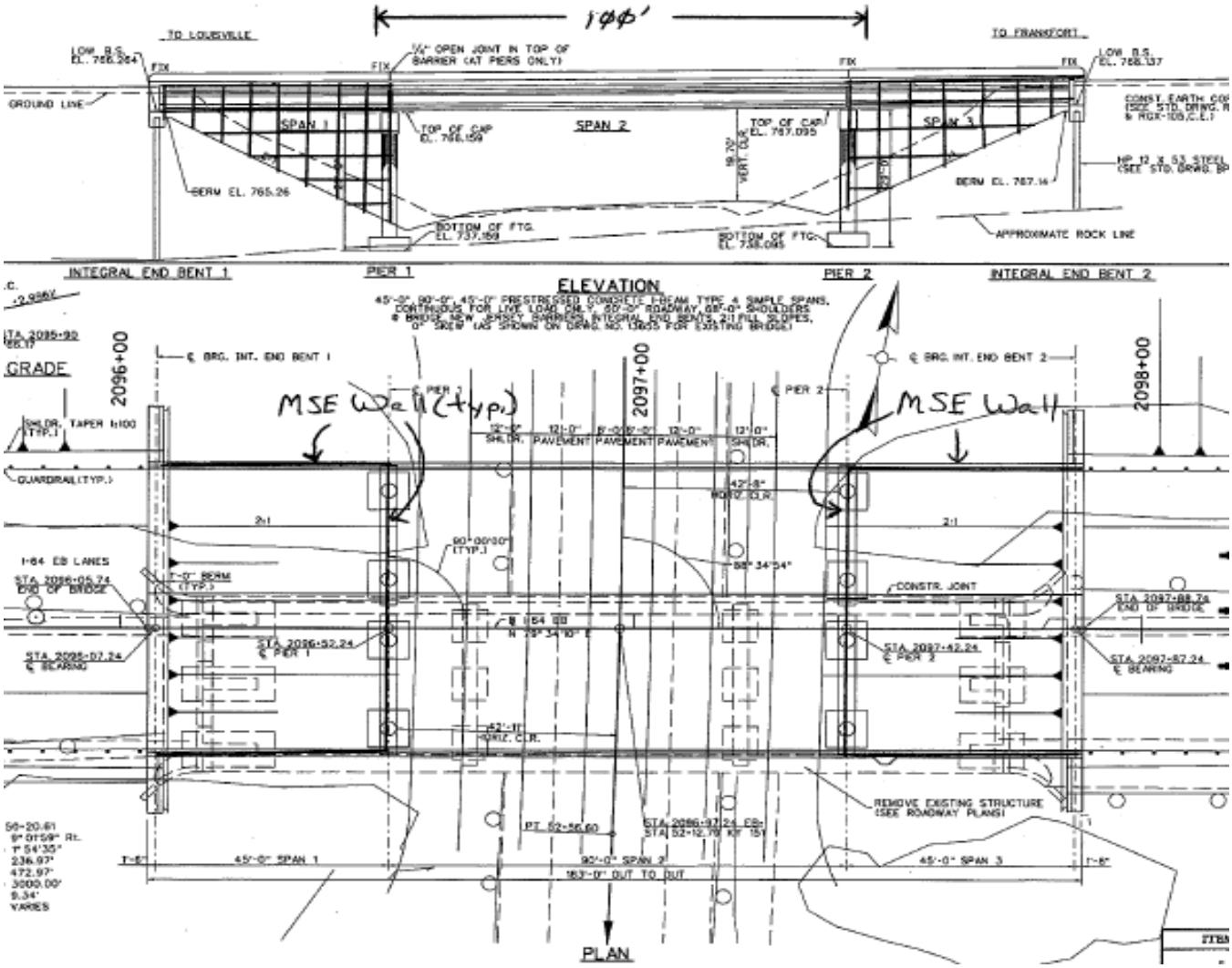
AS PROPOSED I-64 BRIDGE OVER KY 151

VII. DEVELOPMENT PHASE

D.1. KY 151 Interchange Bridges

2. Value Engineering Alternative

The Value Engineering recommends constructing a single span of 100’ to bridge KY 151 with MSE walls. The Value Engineering Alternative will eliminate bridge piers; decrease construction cost; and future maintenance needs.



VALUE ENGINEERING ALTERNATIVE
I-64 BRIDGE OVER KY 151

I - 64 BRIDGES OVER KY 151
VALUE ENGINEERING ALTERNATIVE NUMBER 1
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Bridge Cost per Deck Area	SF	$89.61	23,058.0	$2,066,227	12,600.0	$1,129,086
MSE Wall	SF	$60.00	0.0	$0	8,208.0	$492,480
Pavement	SY	$56.00	0.0	$0	1,162.0	$65,072
Earthwork	CY	$6.90	0.0	$0	7,980.0	$55,062
SUBTOTAL				**$2,066,227**		**$1,741,700**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		4.5%		$111,576		$94,052
TRAFFIC CONTROL/MOT		10.0%		$206,623		$174,170
CONTINGENCY		20.0%		$413,245		$348,340
GRAND TOTAL				**$2,797,672**		**$2,358,262**

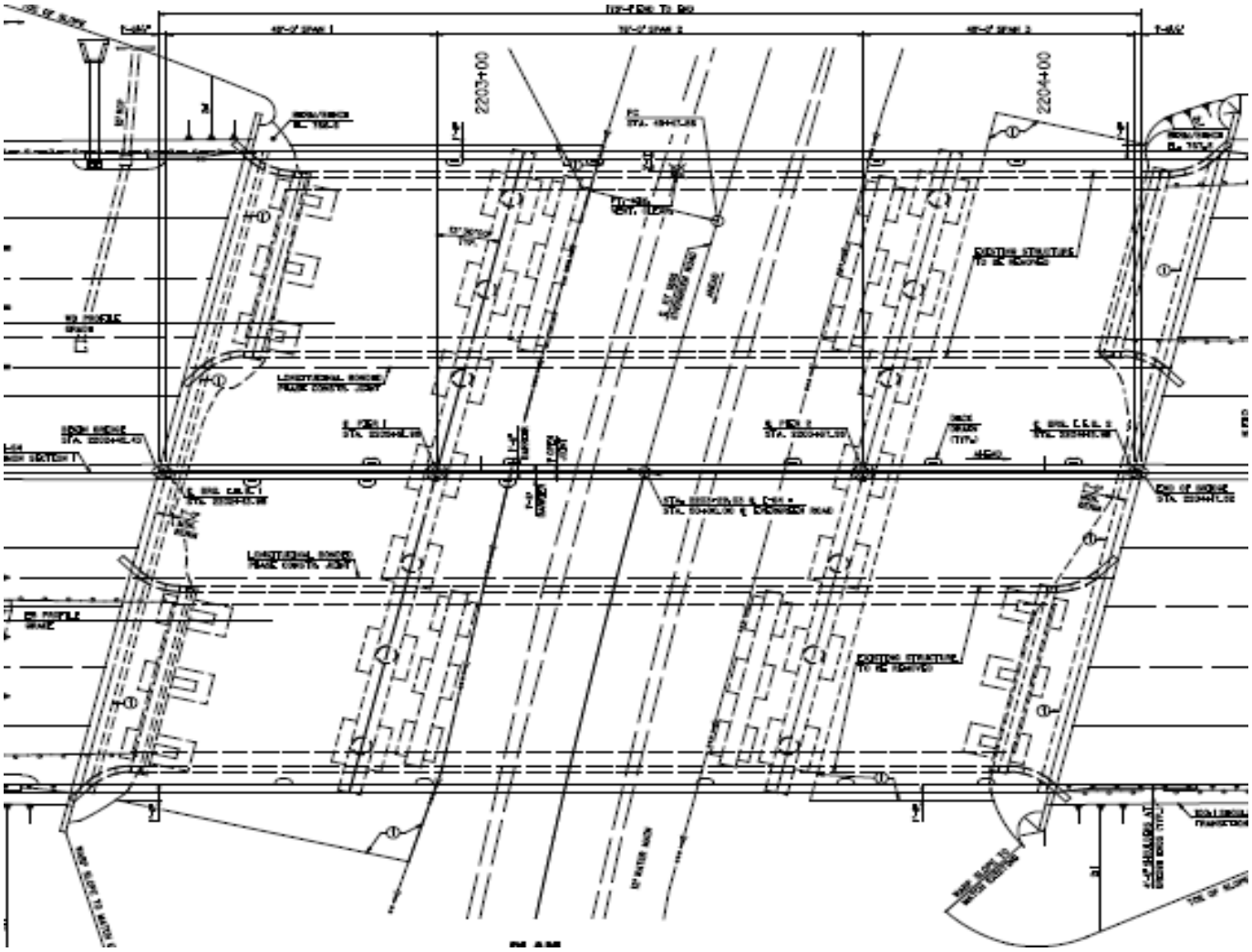
POSSIBLE SAVINGS: $439,410

VII. DEVELOPMENT PHASE

D.2. KY 1665 Bridges

1. "As Proposed"

The proposed 3-span bridge over KY 1665 has spans of 48', 76', and 48' for a total length of 172'. The construction of both piers is anticipated to require some degree of rock excavation due to excavations for the proposed footings.



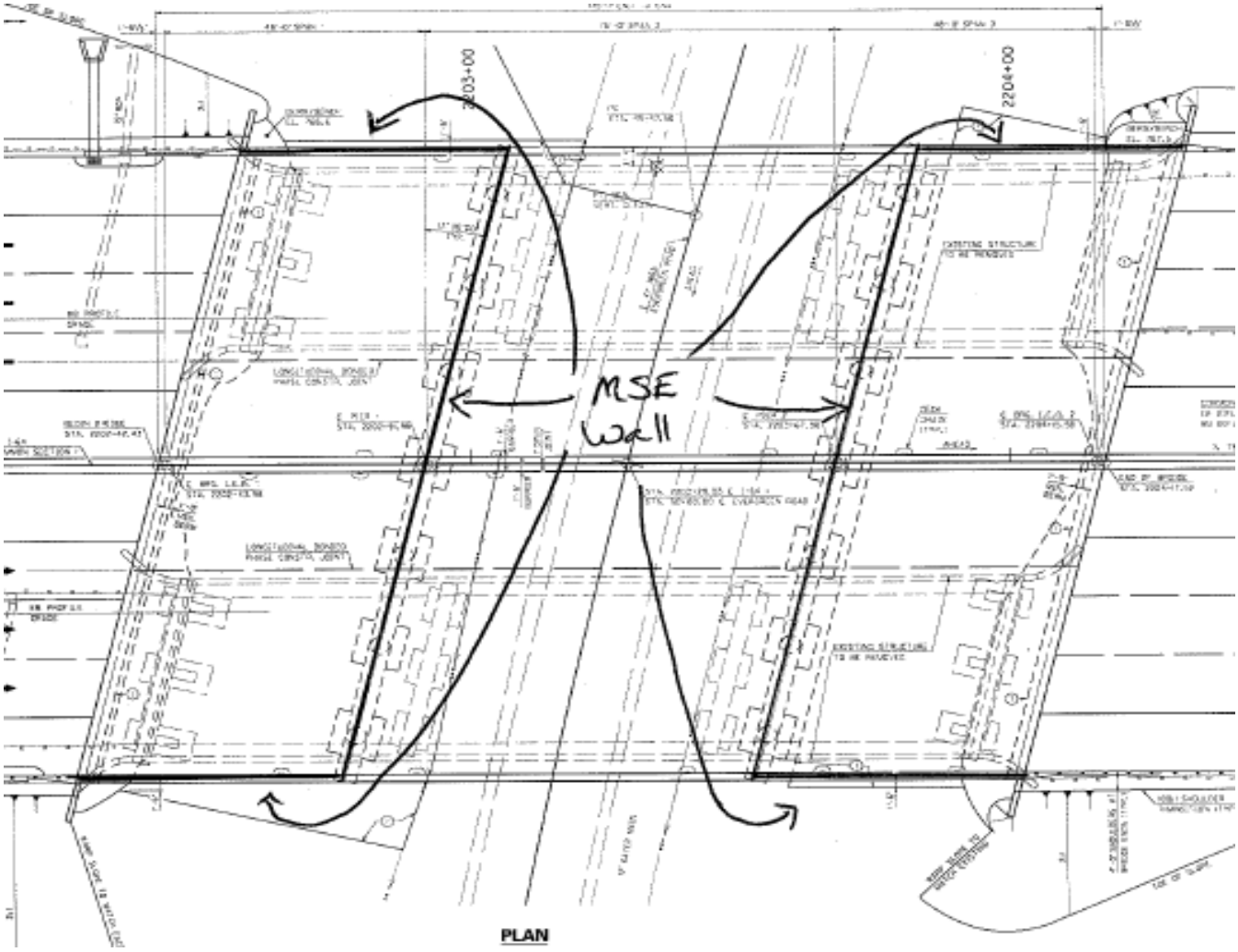
AS PROPOSED I-64 BRIDGE OVER KY 1665

VII. DEVELOPMENT PHASE

D.2. KY 1665 Bridges

2. Value Engineering Alternative

The Value Engineering Team recommends constructing a single span of 86’ to bridge KY 1665 with MSE walls. The Value Engineering Alternative will eliminate bridge piers; decrease construction cost; and future maintenance needs.

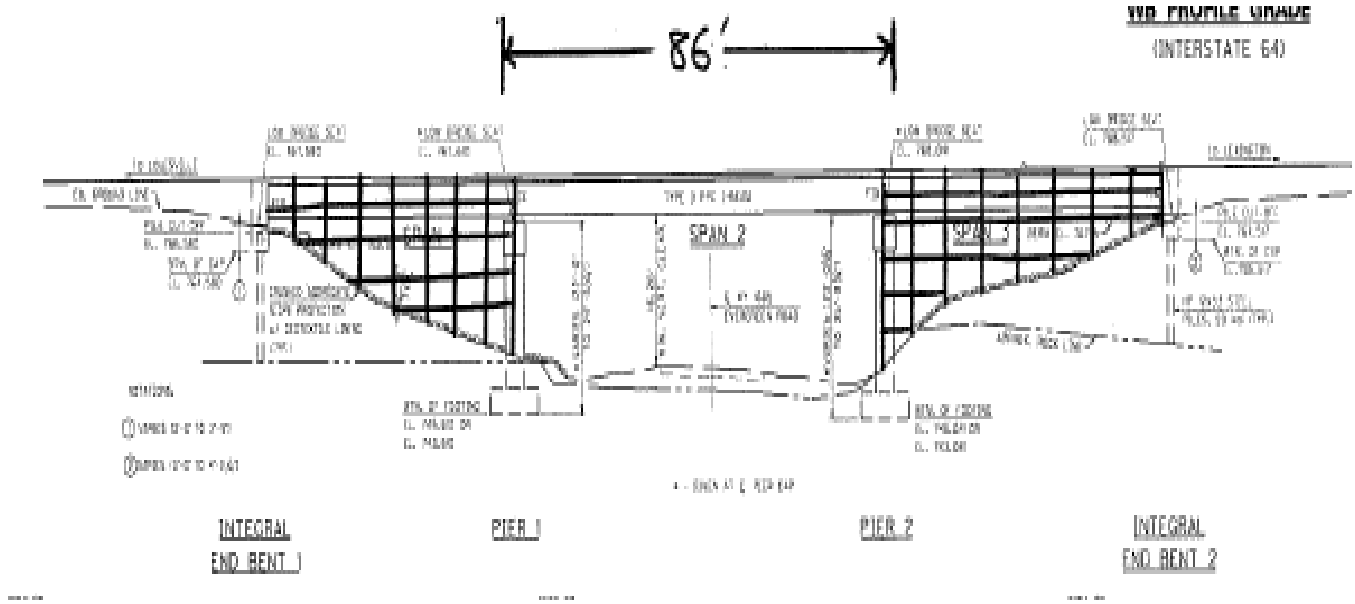


VALUE ENGINEERING ALTERNATIVE
I-64 BRIDGE OVER KY 1665

VII. DEVELOPMENT PHASE

D.2. KY 1665 Bridges

2. Value Engineering Alternative



I - 64 BRIDGES OVER EVERGREEN RD.(1665)
VALUE ENGINEERING ALTERNATIVE NUMBER 1
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Bridge Cost per Deck Area	SF	$82.03	22,703.0	$1,862,327	9,854.9	$808,399
MSE Wall	SF	$60.00	0.0	$0	9,040.0	$542,400
Pavement	SY	$56.00	0.0	$0	1,427.6	$79,944
Earthwork	CY	$6.90	0.0	$0	4,622.2	$31,893
SUBTOTAL				**$1,862,327**		**$1,462,636**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		4.5%		$100,566		$78,982
TRAFFIC CONTROL/MOT		10.0%		$186,233		$146,264
CONTINGENCY		20.0%		$372,465		$292,527
GRAND TOTAL				**$2,521,591**		**$1,980,409**

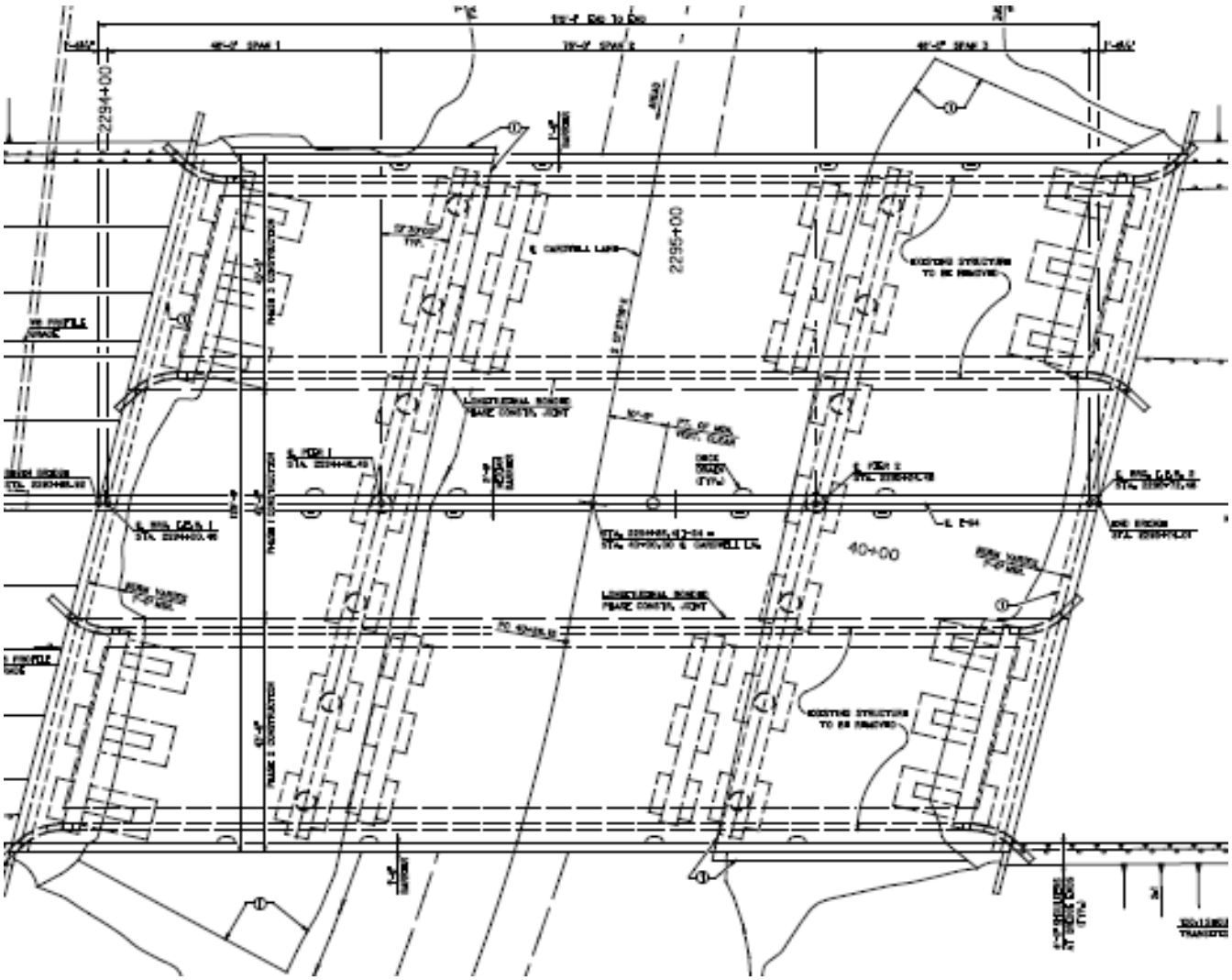
POSSIBLE SAVINGS: $541,182

VII. DEVELOPMENT PHASE

D.3. Cardwell Lane Bridges

1. "As Proposed"

The proposed 3-span bridge over Cardwell Lane has spans of 48', 76', and 48' for a total length of 172'. The construction of both piers is anticipated to require minimal rock excavation.



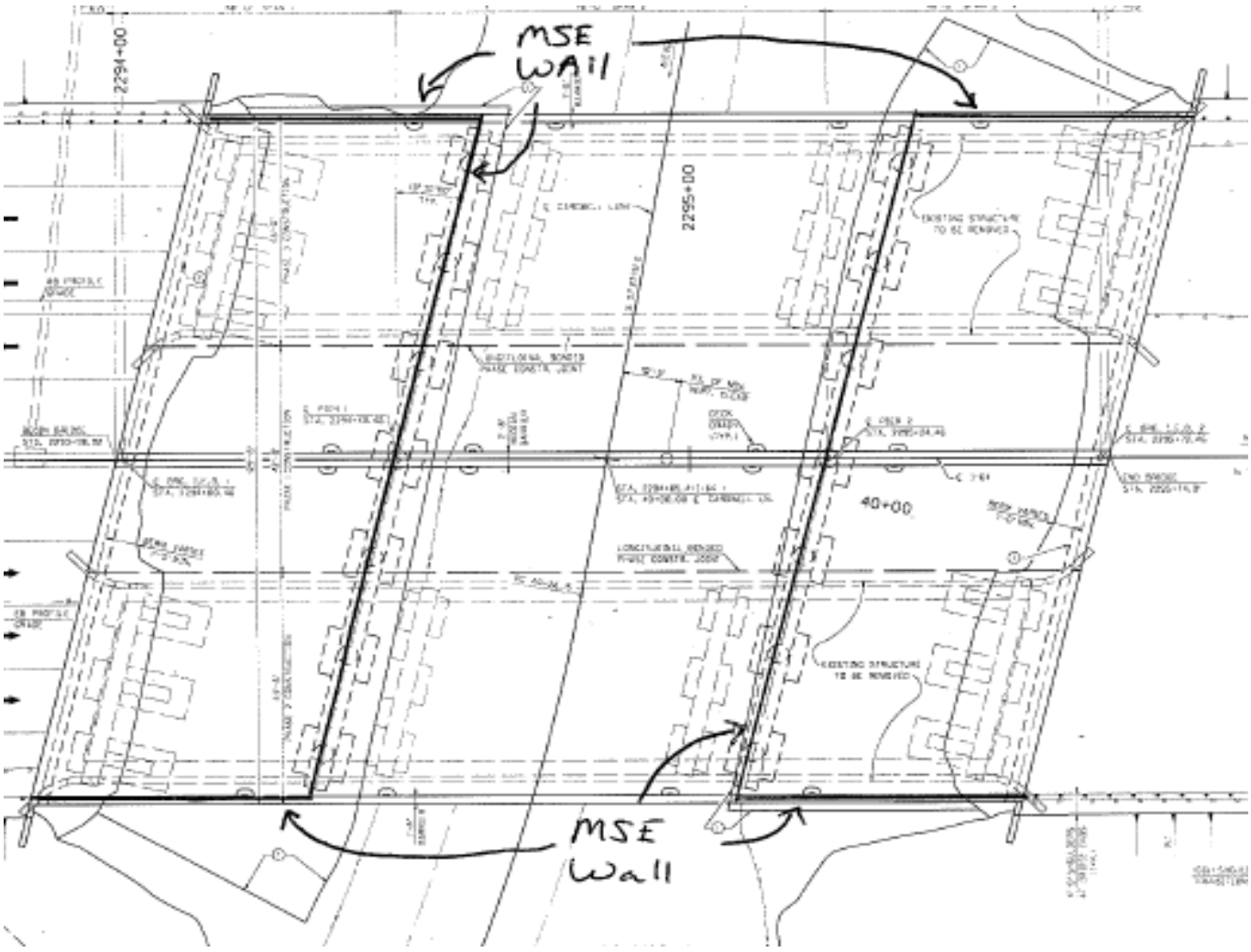
AS PROPOSED I-64 BRIDGE OVER CARDWELL LANE

VII. DEVELOPMENT PHASE

D.3. *Cardwell Lane Bridges*

2. Value Engineering Alternative

The Value Engineering Team recommends constructing a single span of 86’ to bridge Cardwell Lane with MSE walls. The Value Engineering Alternative will eliminate bridge piers; decrease construction cost; and future maintenance needs.

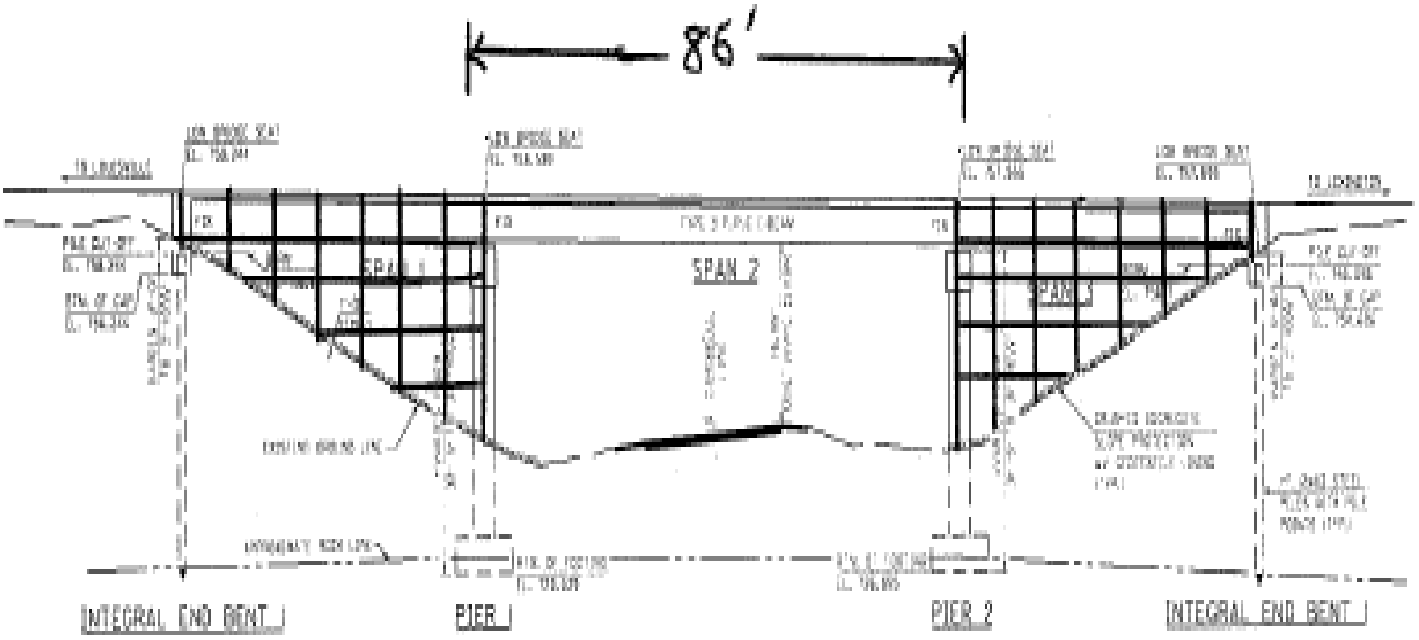


VALUE ENGINEERING ALTERNATIVE
I-64 BRIDGE OVER CARDWELL LANE

VII. DEVELOPMENT PHASE

D.3. *Cardwell Lane Bridges*

2. Value Engineering Alternative



I - 64 BRIDGES OVER CARDWELL LANE
VALUE ENGINEERING ALTERNATIVE NUMBER 1
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Bridge Cost per Deck Area	SF	$75.86	22,703.0	$1,722,250	11,180.0	$848,115
MSE Wall	SF	$60.00	0.0	$0	7,476.0	$448,560
Pavement	SY	$56.00	0.0	$0	1,280.3	$71,699
Earthwork	CY	$6.90	0.0	$0	4,853.3	$33,488
SUBTOTAL				**$1,722,250**		**$1,401,861**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		4.5%		$93,001		$75,701
TRAFFIC CONTROL/MOT		10.0%		$172,225		$140,186
CONTINGENCY		20.0%		$344,450		$280,372
GRAND TOTAL				**$2,331,926**		**$1,898,120**

POSSIBLE SAVINGS: $433,806

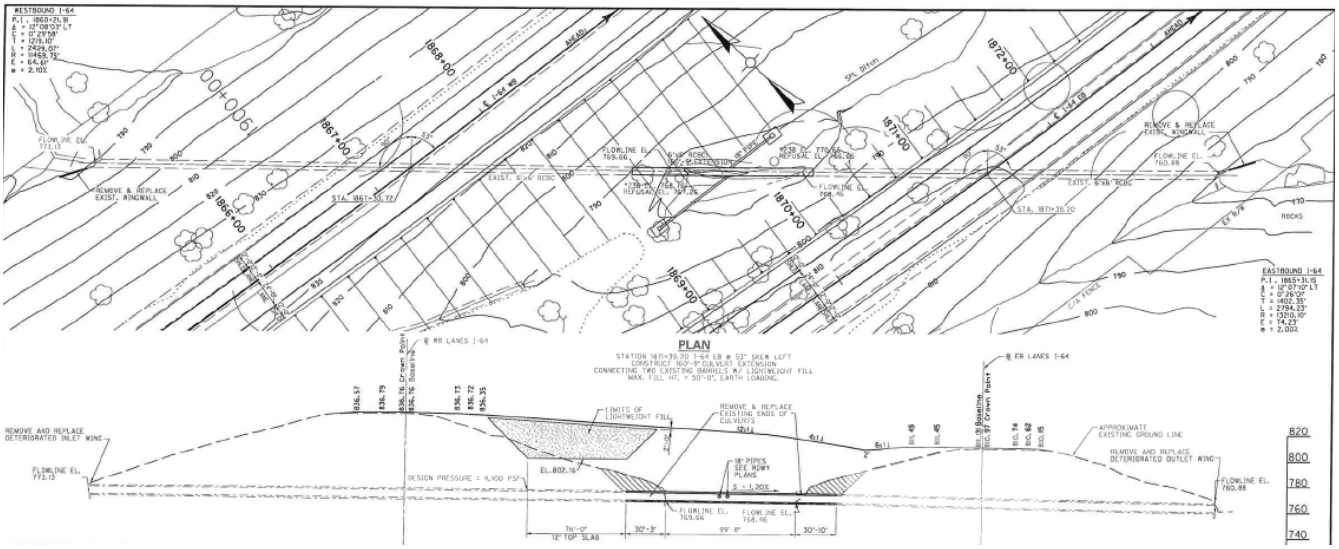
VII. DEVELOPMENT PHASE

E. Box Culverts

1. "As Proposed"

The widening fill will exceed the design loads of 5 Reinforced Concrete Box Culverts (RCBC). These culverts were design with variable depth top slabs in order to reduce the amount of concrete and steel used in their construction. In order not to exceed the design loads, the design calls for light weight concrete fill that has a density of 30 LBS/CF to reduce the load on the culvert's top slab,. The cost of the light weight fill is estimated to be $155/CY and the project will require approximately 7140 CY of light weight fill.

The locations of the box culverts requiring light weight fill are as follows:

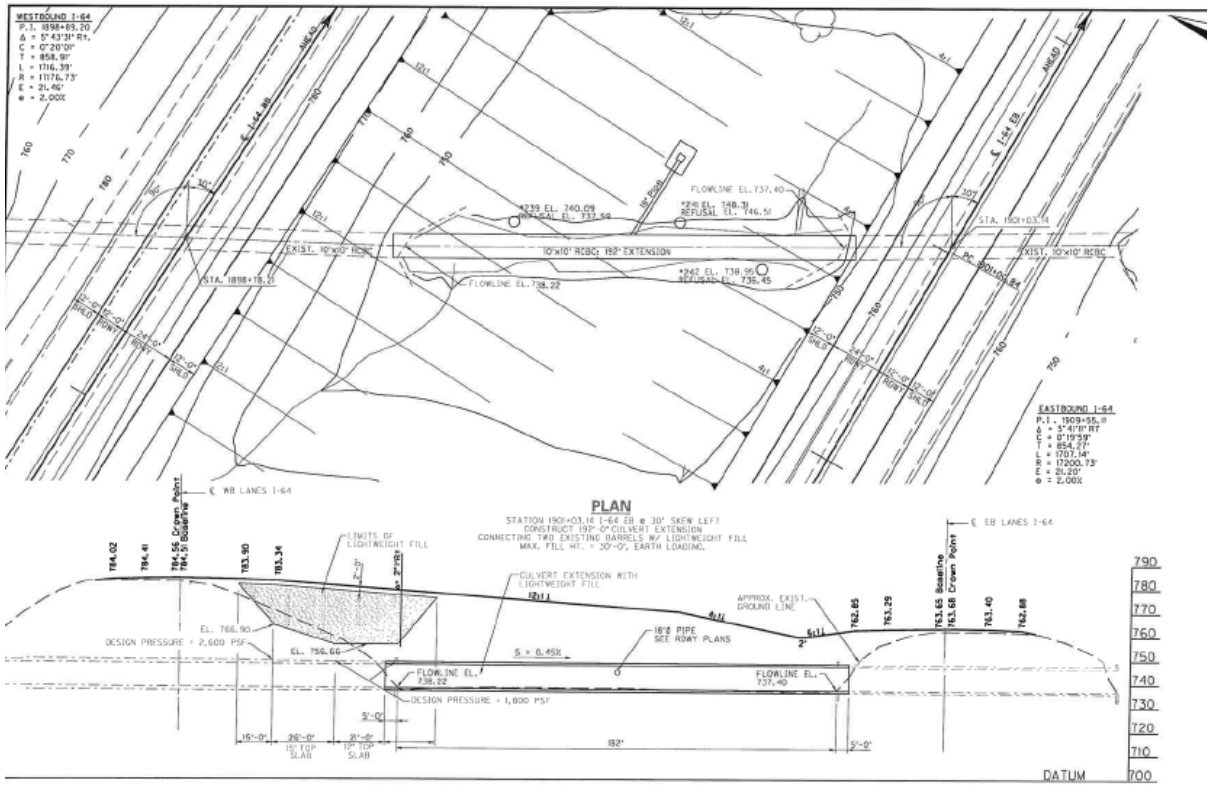


STA 1869+35

VII. DEVELOPMENT PHASE

E. Box Culverts

1. "As Proposed"

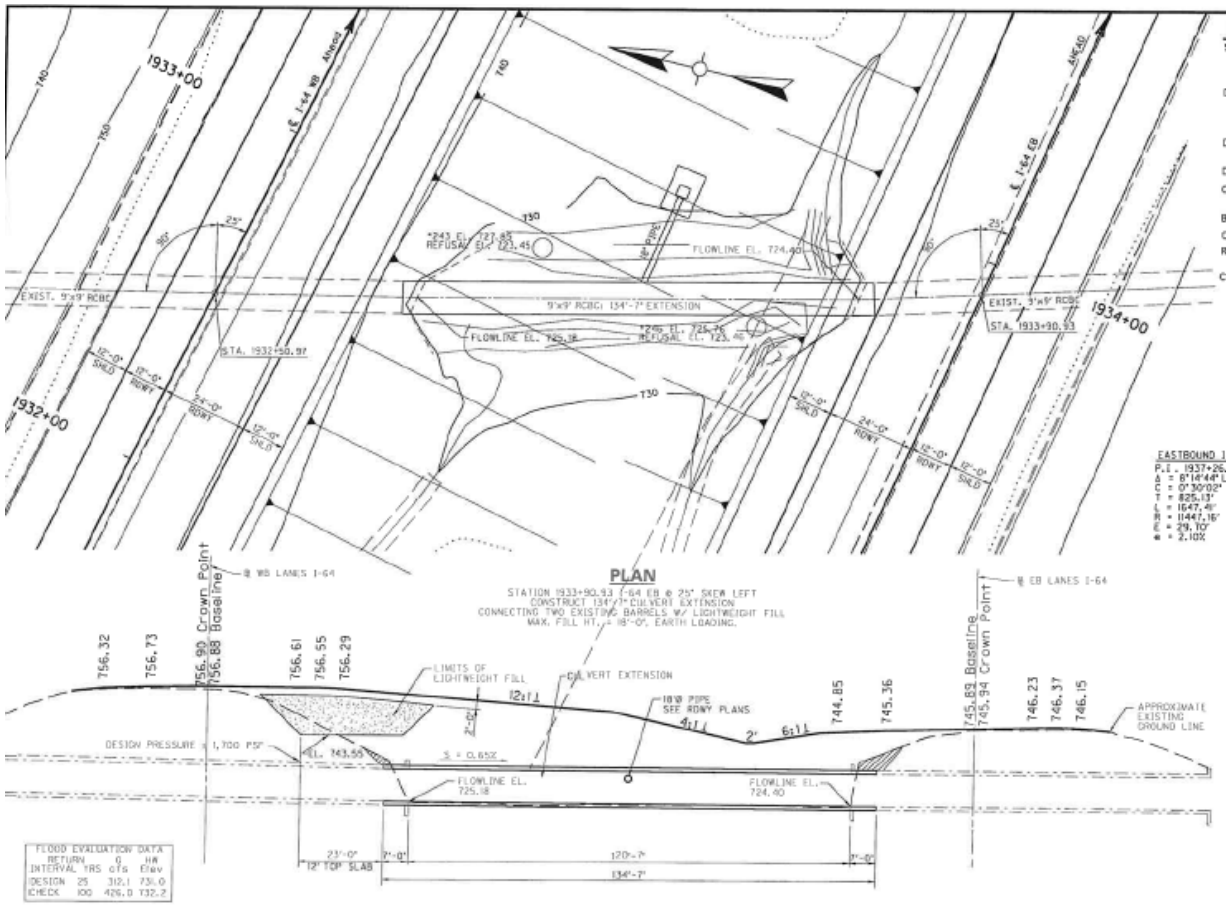


STA 1899+90

VII. DEVELOPMENT PHASE

E. Box Culverts

1. "As Proposed"

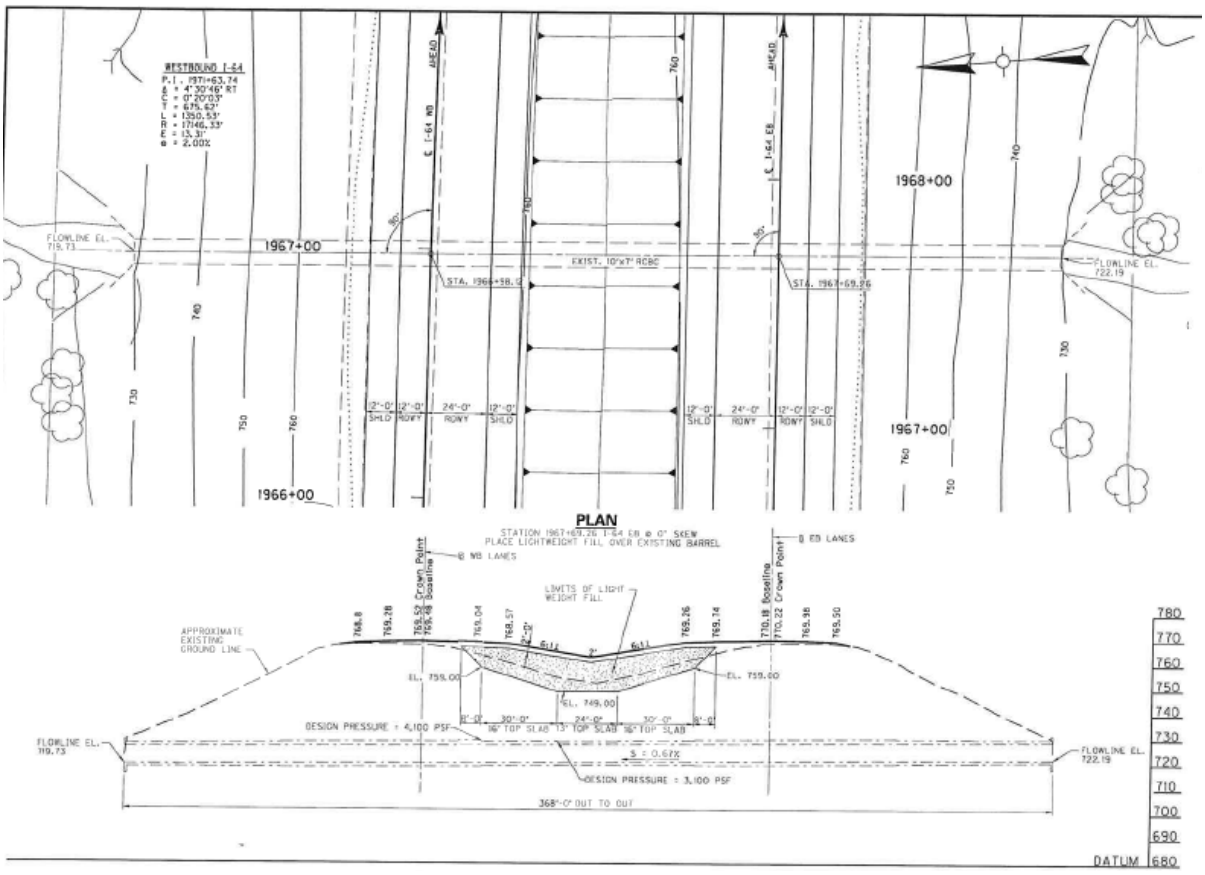


STA 1933+21

VII. DEVELOPMENT PHASE

E. Box Culverts

1. "As Proposed"

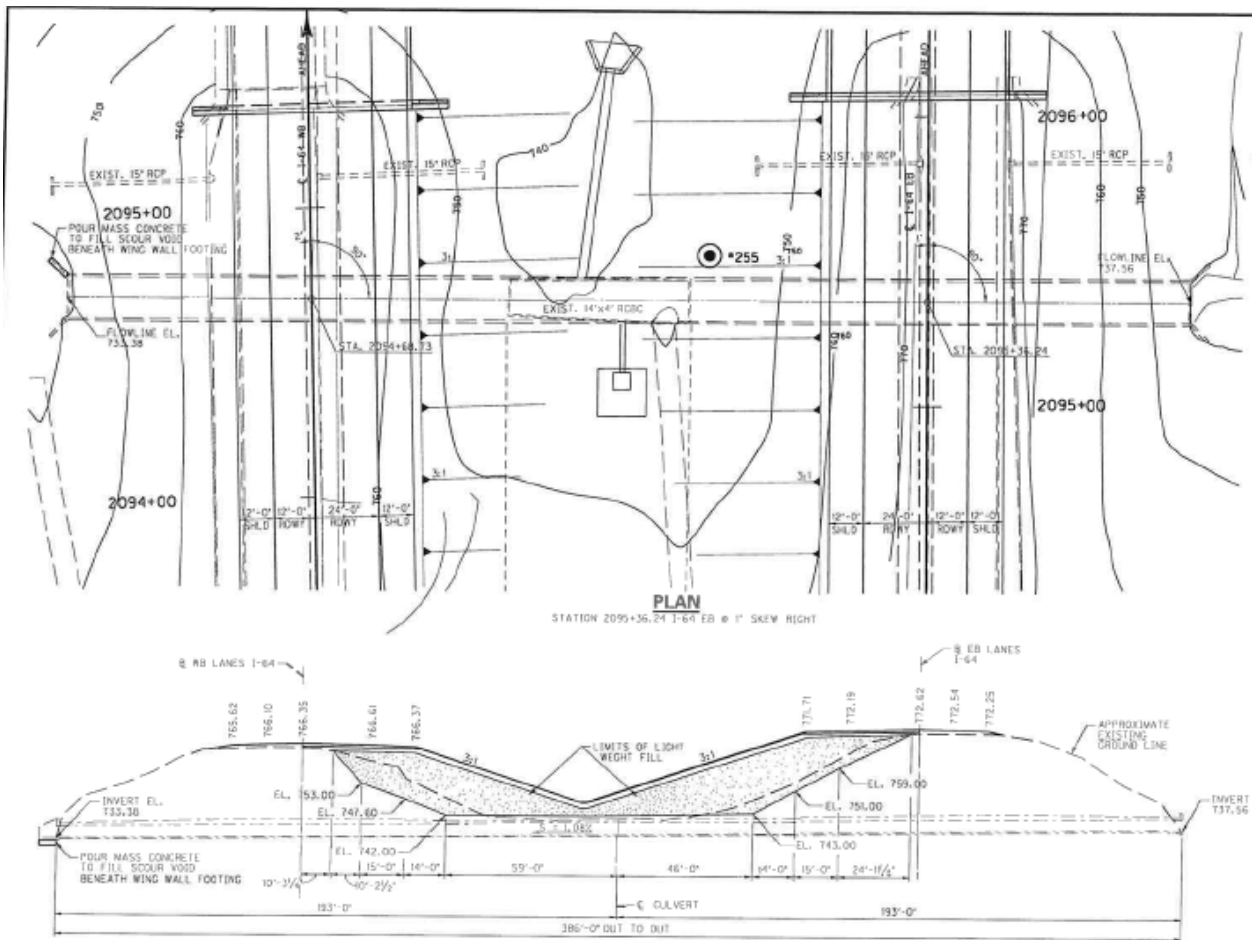


STA 1967+34

VII. DEVELOPMENT PHASE

E. Box Culverts

1. "As Proposed"



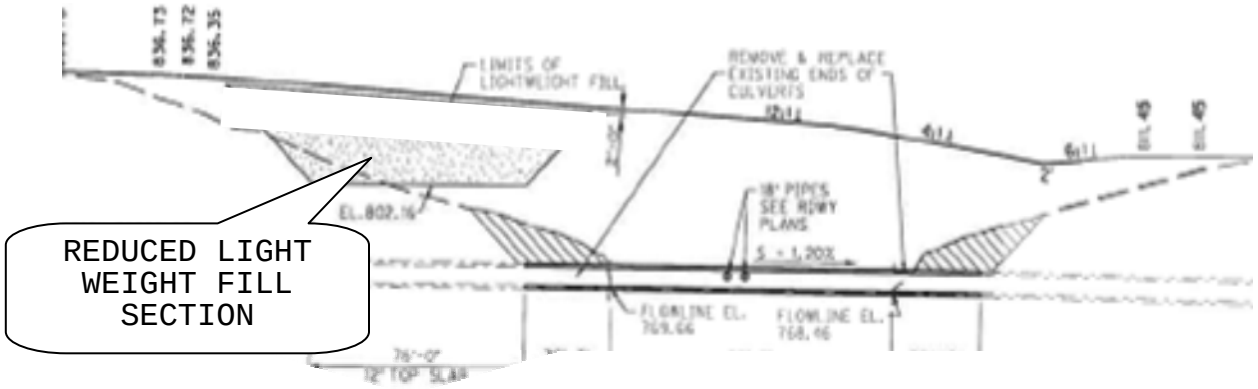
STA 2095+02

E. Box Culverts

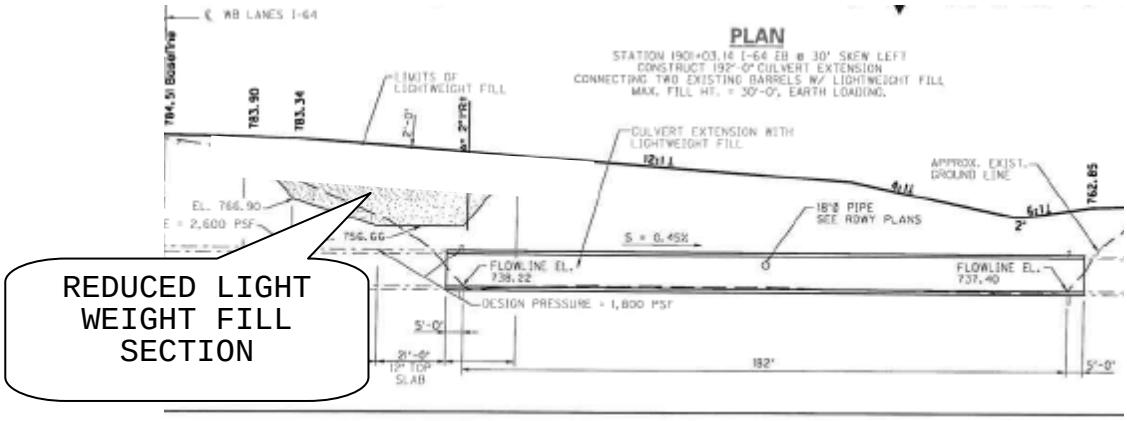
2. Value Engineering Alternative Number 1

The Value Engineering Team recommends using the alternative light weight material GEOFOAM. This product has a density ranging from less than 1 LBS/CF to 3 LBS/CF depending on the specifications required. It is assumed the requirements/specification will be satisfied by the product that has a density of approximately 1.25 LBS/CF at a cost of $113/CY to furnish and place the material. The quantity of light weight fill will be reduced because it is much less dense than the proposed 30 LBS/CF. Based on a providing an average of 30 LBS/CF it will take approximately 71.5% of the volume to be GEOFOAM and 28.5% of the volume to be embankment.

An additional benefit of using the Geofoam is that by reducing the volume of light weight fill, more of the waste excavation material can be used on the project.



STA 1869+35

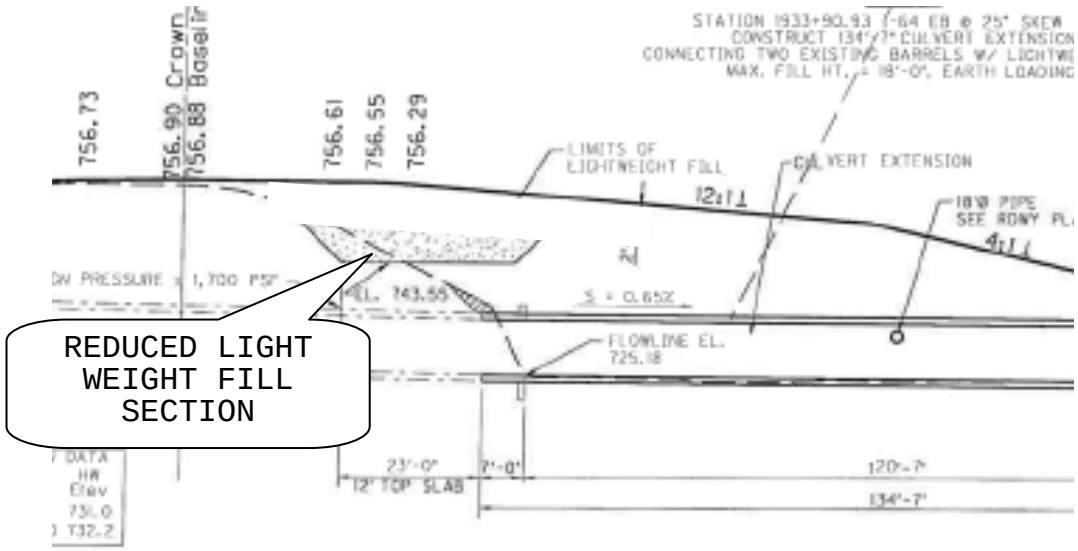


STA 1899+90

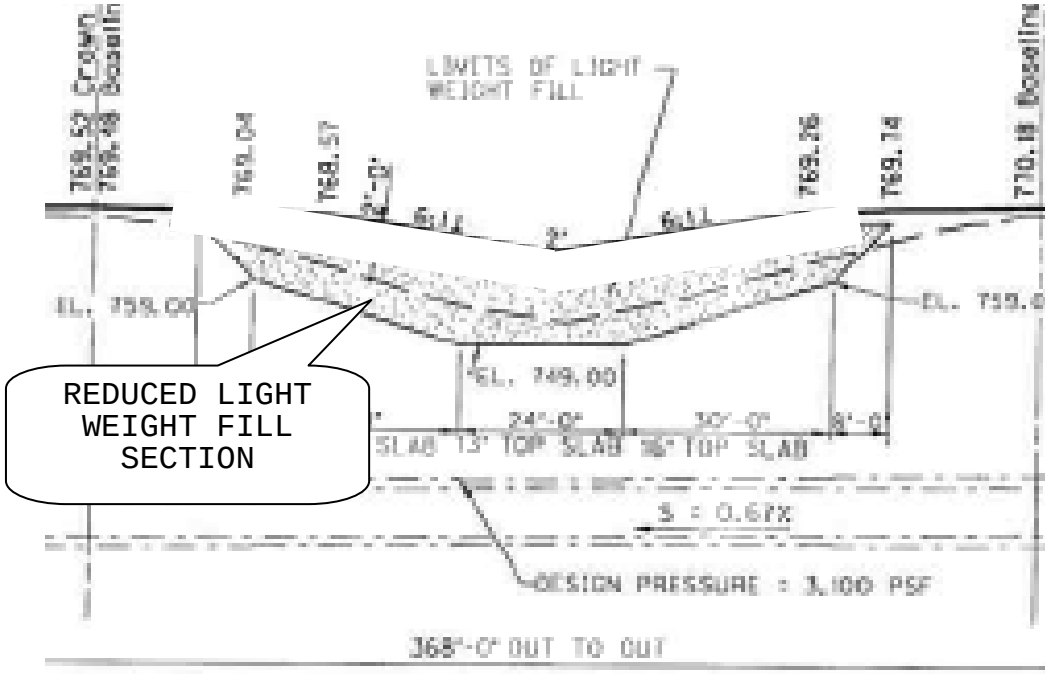
VII. DEVELOPMENT PHASE

E. Box Culverts

2. Value Engineering Alternative Number 1

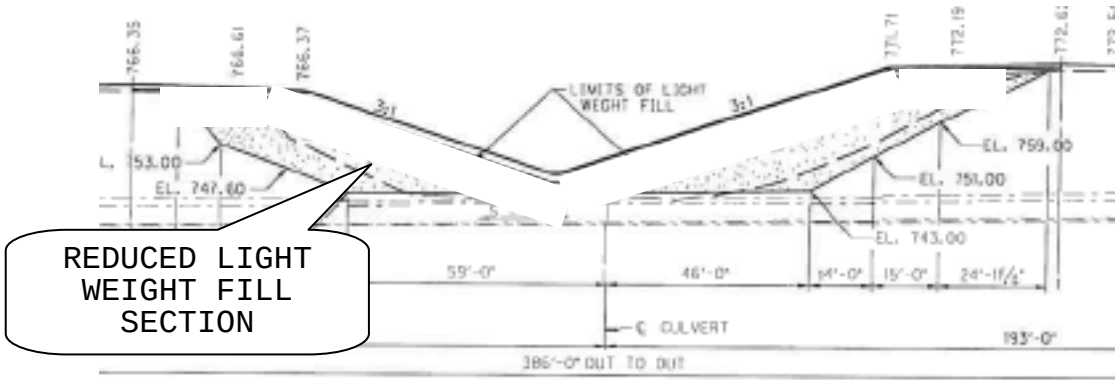


STA 1933+21



STA 1967+34

2. Value Engineering Alternative Number 1



STA 2095+02

BOX CULVERT/LIGHT WEIGHT FILL SUMMARY
VALUE ENGINEERING ALTERNATIVE NUMBER 1
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
CULVERT @ STA 1869+35	LS		1.0	$414,526.95	1.0	$217,193
CULVERT @ STA 1933+21	LS		1.0	$199,142	1.0	$159,675
CULVERT @ STA 1967+34	LS		1.0	$168,000	1.0	$40,492
CULVERT @ STA 1899+90	LS		1.0	$429,632	1.0	$287,551
CULVERT @ STA 2095+02	LS		1.0	$476,580	1.0	$115,914
SUBTOTAL				**$1,687,881**		**$820,825**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		4.5%		$91,146		$44,325
TRAFFIC CONTROL/MOT		10.0%		$168,788		$82,082
CONTINGENCY		20.0%		$337,576		$164,165
GRAND TOTAL				**$2,285,391**		**$1,111,397**

POSSIBLE SAVINGS: $1,173,995

BOX CULVERT/LIGHT WEIGHT FILL AT STA 1869+35
VALUE ENGINEERING ALTERNATIVE NUMBER 1
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
CLASS "A" CONCRETE	CY	$401.82	218.5	$87,798	218.5	$87,798
STEEL REINFORCEMENT	LB	$0.83	29,466.0	$24,457	29,466.0	$24,457
LIGHT WEIGHT FILL (CONCRETE)	CY	$155.00	1,625.0	$251,875	0.0	$0
LIGHT WEIGHT FILL (GEOFOAM)	CY	$113.00	0.0	$0	463.1	$52,333
REMOVE CONCRETE MASONARY	CY	$325.00	99.3	$32,273	99.3	$32,273
FOUNDATION PREPARATION	LB	$10,000.00	1.0	$10,000	1.0	$10,000
ROADWAY EXCAVATION	CY	$6.90	0.0	$0	1,161.9	$8,017
ROADWAY EXCAVATION (OFF SITE DISPOSAL)	CY	$5.00	1,625.0	$8,125	463.1	$2,316
SUBTOTAL				**$414,527**		**$217,193**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		4.5%		$22,384		$11,728
TRAFFIC CONTROL/MOT		10.0%		$41,453		$21,719
CONTINGENCY		20.0%		$82,905		$43,439
GRAND TOTAL				**$561,269**		**$294,079**

POSSIBLE SAVINGS: $267,191

BOX CULVER AT STA 1933+21
VALUE ENGINEERING ALTERNATIVE NUMBER 1
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
CLASS "A" CONCRETE	CY	$401.82	226.2	$90,892	226.2	$90,892
STEEL REINFORCEMENT	LB	$0.83	29,371.0	$24,378	29,371.0	$24,378
LIGHT WEIGHT FILL (CONCRETE)	CY	$155.00	325.0	$50,375	0.0	$0
LIGHT WEIGHT FILL (GEOFOAM)	CY	$113.00	0.0	$0	92.6	$10,467
REMOVE CONCRETE MASONARY	CY	$325.00	67.3	$21,873	67.3	$21,873
FOUNDATION PREPARATION	LB	$10,000.00	1.0	$10,000	1.0	$10,000
ROADWAY EXCAVATION	CY	$6.90	0.0	$0	232.4	$1,603
ROADWAY EXCAVATION (OFF SITE DISPOSAL)	CY	$5.00	325.0	$1,625	92.6	$463
SUBTOTAL				**$199,142**		**$159,675**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		4.5%		$10,754		$8,622
TRAFFIC CONTROL/MOT		10.0%		$19,914		$15,968
CONTINGENCY		20.0%		$39,828		$31,935
GRAND TOTAL				**$269,638**		**$216,200**

POSSIBLE SAVINGS: $53,438

BOX CULVER AT STA 1967+34
VALUE ENGINEERING ALTERNATIVE NUMBER 1
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
CLASS "A" CONCRETE	CY	$401.82	0.0	$0	0.0	$0
STEEL REINFORCEMENT	LB	$0.83	0.0	$0	0.0	$0
LIGHT WEIGHT FILL (CONCRETE)	CY	$155.00	1,050.0	$162,750	0.0	$0
LIGHT WEIGHT FILL (GEOFOAM)	CY	$113.00	0.0	$0	299.3	$33,815
REMOVE CONCRETE MASONARY	CY	$325.00	0.0	$0	0.0	$0
FOUNDATION PREPARATION	LB	$10,000.00	0.0	$0	0.0	$0
ROADWAY EXCAVATION	CY	$6.90	0.0	$0	750.8	$5,180
ROADWAY EXCAVATION (OFF SITE DISPOSAL)	CY	$5.00	1,050.0	$5,250	299.3	$1,496
SUBTOTAL				**$168,000**		**$40,492**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		4.5%		$9,072		$2,187
TRAFFIC CONTROL/MOT		10.0%		$16,800		$4,049
CONTINGENCY		20.0%		$33,600		$8,098
GRAND TOTAL				**$227,472**		**$54,826**

POSSIBLE SAVINGS: $172,646

BOX CULVER AT STA 1899+90
VALUE ENGINEERING ALTERNATIVE NUMBER 1
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
CLASS "A" CONCRETE	CY	$401.82	413.4	$166,112	413.4	$166,112
STEEL REINFORCEMENT	LB	$0.83	63,569.0	$52,762	63,569.0	$52,762
LIGHT WEIGHT FILL (CONCRETE)	CY	$155.00	1,170.0	$181,350	0.0	$0
LIGHT WEIGHT FILL (GEOFOAM)	CY	$113.00	0.0	$0	333.5	$37,680
REMOVE CONCRETE MASONARY	CY	$325.00	57.1	$18,558	57.1	$18,558
FOUNDATION PREPARATION	LB	$5,000.00	1.0	$5,000	1.0	$5,000
ROADWAY EXCAVATION	CY	$6.90	0.0	$0	836.6	$5,772
ROADWAY EXCAVATION (OFF SITE DISPOSAL)	CY	$5.00	1,170.0	$5,850	333.5	$1,667
SUBTOTAL				**$429,632**		**$287,551**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		4.5%		$23,200		$15,528
TRAFFIC CONTROL/MOT		10.0%		$42,963		$28,755
CONTINGENCY		20.0%		$85,926		$57,510
GRAND TOTAL				**$581,722**		**$389,345**

POSSIBLE SAVINGS: $192,377

BOX CULVER AT STA 2095+02
VALUE ENGINEERING ALTERNATIVE NUMBER 1
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
CLASS "A" CONCRETE	CY	$401.82	2.2	$884	2.2	$884
STEEL REINFORCEMENT	LB	$0.83	206.0	$171	206.0	$171
LIGHT WEIGHT FILL (CONCRETE)	CY	$155.00	2,970.0	$460,350	0.0	$0
LIGHT WEIGHT FILL (GEOFOAM)	CY	$113.00	0.0	$0	846.5	$95,649
REMOVE CONCRETE MASONARY	CY	$325.00	1.0	$325	1.0	$325
FOUNDATION PREPARATION	LB	$5,000.00	0.0	$0	0.0	$0
ROADWAY EXCAVATION	CY	$6.90	0.0	$0	2,123.6	$14,652
ROADWAY EXCAVATION (OFF SITE DISPOSAL)	CY	$5.00	2,970.0	$14,850	846.5	$4,232
SUBTOTAL				**$476,580**		**$115,914**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		4.5%		$25,735		$6,259
TRAFFIC CONTROL/MOT		10.0%		$47,658		$11,591
CONTINGENCY		20.0%		$95,316		$23,183
GRAND TOTAL				**$645,289**		**$156,947**

POSSIBLE SAVINGS: $488,342

BACK UP CALCULATIONS:

DENSITY	DIRT	CONC	FOAM	
LBS/CF	100	30	2	
1869+35				
	CY	CF	WEIGHT	
CONCRETE FILL	1625	43875	1,316,250	AS PROPOSED
EARTH FILL			4,387,500	
REDUCTION			3,071,250	
FOAM FILL	478	12904	25,809	
EARTH FILL	1147	30971	3,097,059	
REDUCTION			3,071,250	
1899+90				
	CY	CF	WEIGHT	
CONCRETE FILL	1170	31590	947,700	AS PROPOSED
EARTH FILL			3,159,000	
REDUCTION			2,211,300	
FOAM FILL	344.1	9291.2	18,582	
EARTH FILL	825.9	22299	2,229,882	
REDUCTION			2,211,300	
1933+21				
	CY	CF	WEIGHT	
CONCRETE FILL	325	8775	263,250	AS PROPOSED
EARTH FILL			877,500	
REDUCTION			614,250	
FOAM FILL	95.6	2580.9	5,162	
EARTH FILL	229	6194.1	619,412	
REDUCTION			614,250	
1967+34				
	CY	CF	WEIGHT	
CONCRETE FILL	1050	28350	850,500	AS PROPOSED
EARTH FILL			2,835,000	
REDUCTION			1,984,500	
FOAM FILL	309	8338.2	16,676	
EARTH FILL	741	20012	2,001,176	
REDUCTION			1,984,500	
2095+02				
	CY	CF	WEIGHT	
CONCRETE FILL	2970	80190	2,405,700	AS PROPOSED
EARTH FILL			8,019,000	
REDUCTION			5,613,300	
FOAM FILL	874	23585	47,171	
EARTH FILL	2096	56605	5,660,471	
REDUCTION			5,613,300	

FOAM CONTROL™

FOAM-CONTROL EPS

GEOFOAM

CONTROL,
NOT COMPROMISE.

YOU'RE IN CONTROL OF YOUR GEOTECHNICAL SOLUTIONS WITH FOAM-CONTROL EPS GEOFOAM.

Materials. Labor. Costs. Foam-Control® Geofoam means control, not compromise.

Foam-Control Geofoam is engineered to give you the greatest possible control for your project application: from design and timelines, to materials and costs, and —ultimately—control over your results. The advantages to using Foam-Control Geofoam include:

- Predictable material behavior
- Manufactured to meet ASTM D6817
- Variety of Types to meet specific project requirements
- Super lightweight compared to other fills
- Inert in long-term burial conditions, no leachates
- Easily shaped in field or supplied prefabricated
- Perform Guard® termite protection available
- Cost effective solution
- Long-lasting, strong, and stable
- Contains no CFC, HCFC, or HFC

This looks like a job for Geofoam.

In the construction industry, Foam-Control Geofoam is among the most versatile lightweight materials available. Traditional earth materials are heavy and can cause settlement, instability or lateral pressures. Other fill materials such as foamed concrete, waste tires, soil, woodchips, wood fiber, etc., have higher densities and are variable in their makeup. They also have limitations in handling and can be weather sensitive, thus requiring staged construction and/or preloading, surcharging and draining, etc.

Ready to Install.

Foam-Control Geofoam maximizes onsite installation efficiency: material arrives ready to place, no weather delays, material can be prefabricated or cut at the jobsite, no staging required, material can be inventoried, production efficiency improved, and it is easy to handle.

With Foam-Control Geofoam, you're the master of your materials.

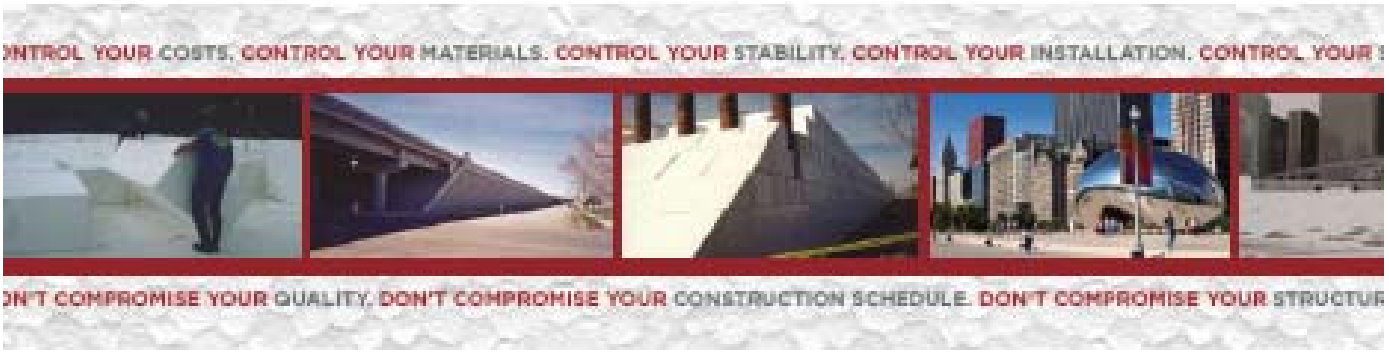
Proven to Perform.

Geofoam has been used in various applications worldwide for over 40 years. Foam-Control meets ASTM D6817, "Standard Specification for Rigid Cellular Polystyrene Geofoam." Foam-Control Geofoam manufacturers offers a warranty that ensure performance. Foam-Control Geofoam can stand up to all industry tests— and has.

In addition to a range of standard Types, your local Foam-Control EPS Geofoam manufacturer can work with you to tailor a custom grade to meet your project specific requirements.

Foam-Control Geofoam with Perform Guard.

One of the most destructive forces anywhere is termites. Foam-Control Geofoam products can be manufactured with Perform Guard, a proven and safe additive, that effectively resists termites.*

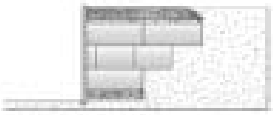


Foam-Control EPS Geofoam Solves Problems for these Common Applications:

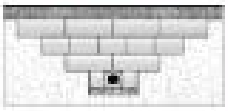
Lightweight Roads

Foundations

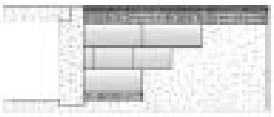
Retaining Walls



Weight Reduction for Utilities



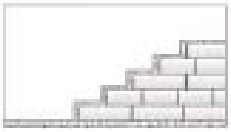
Bridge Abutments



Weight Reduction for Structures

Side Hills

Elevation Changes/ Stadium Seating



FOAM CONTROL EPS

CONTROL, NOT COMPROMISE.

Fill face-off: Choosing Foam-Control Geofoam over other fill materials.

- Extremely lightweight to reduce lateral or bearing loads
- Predictible engineered performance
- Various Types available to meet project specific strength requirements
- Can be installed in various weather conditions
- Foam-Control with Perform Guard® protects against termites

Perform Guard® TERMITE RESISTANT

*Perform Guard is not a barrier, but should be used in conjunction with a total Pest Management Program available from a reputable Pest Control Operator.

ETTLEMENT. CONTROL YOUR LATERAL LOADS. CONTROL YOUR LIABILITY. CONTROL YOUR BEARING LOADS. CONTROL YOUR ELE

AL INTEGRITY. DON'T COMPROMISE YOUR LONGTERM PERFORMANCE. DON'T COMPROMISE YOUR DESIGN. DON'T COMPROMISE Y

Size and Shape.

Foam-Control Geofoam is produced in block form and is easily positioned at the work site.

Standard sizes:

- 4' (1.2 m) widths
- 8' (2.4 m) up to 16' (4.8 m) lengths
- 3" (75 mm) to 30" (760 mm) thickness

Custom sizes and fabrication are available to meet any project requirement.

GeoGripper® Plate.

The Foam-Control GeoGripper Plate is a galvanized steel multi-barbed connector. It is used to restrain rigid foam moving laterally in "layer over layer" applications. Its single piece/two-sided barb design allows for excellent connection between layers in a one-step application.

Other Geotechnical Solutions.

Your Foam-Control manufacturer also offers these companion technologies:

- Insulated Drainage Panels
- Elasticized Geofoam
- Compressible Inclusions

It's more than a foam. It's a family.

When you choose Foam-Control Geofoam, you're not sending your order off to some mysterious factory. You're collaborating with a team of experts who work with you every step of the way. We're here to answer your questions, solve your problems, and do everything we can to make sure your project proceeds smoothly—and ends successfully.

Foam-Control Geofoam products are manufactured by AFM Corporation's network of licensed manufacturers throughout North America and the world. AFM licensed facilities adhere to strict, consistent standards to ensure uniformly high-quality Geofoam products.

This network allows us to offer engineers, designers and contractors the best of both worlds: the resources of the country's largest provider of Geofoam products, and the superior attention and customer service of a local supplier.

Ready to take control? Start here.

If you're starting to wonder how Foam-Control Geofoam can contribute to your next project, here's how to find out: Just contact your nearest Foam-Control Geofoam manufacturer. They'll be happy to give you a design consultation, information about Foam-Control Geofoam products, pricing, and the answers to all your questions.

Specifications and Installation Guidelines.

Contact a sales rep and download Foam-Control Geofoam documentation at www.geofoam.com. Please consult Foam-Control Geofoam TechData for complete Specifications and Installation guidelines.

FOAM CONTROL

Foam-Control EPS
(800) 255-0176 General Information
(800) 255-3906 Technical Information
www.geofoam.com

CONTROL,
NOT COMPROMISE.

FOAM CONTROL EPS

GEOFOAM

Foam-Control EPS Geofoam is a cellular plastic material that is strong, but has very low density (1% of traditional earth materials.) It is a manufactured in block form and meets ASTM D6817, "Standard Specification for Rigid, Cellular Polystyrene Geofoam." Foam-Control EPS Geofoam is available in a range of Types to provide control of structural integrity and cost effectiveness.

The information given is deemed to be timely, accurate, and reliable for the use of Foam-Control EPS Geofoam. Each project using Foam-Control EPS Geofoam should be designed by a professional engineer. The engineer or project specifications should be consulted to determine the ASTM D6817 Type required for your project loading conditions.

Foam-Control EPS Geofoam Properties

Property		ASTM D6817						
		EPS12	EPS15	EPS19	EPS22	EPS29	EPS39	EPS46
Density[1], min.	lb/ft³ (kg/m³)	0.70 (11.2)	0.90 (14.4)	1.15 (18.4)	1.35 (21.6)	1.80 (28.8)	2.40 (38.4)	2.85 (45.7)
Compressive Resistance[1] @ 1% deformation, min.	psi psf (kPa)	2.2 320 (15)	3.6 520 (25)	5.8 840 (40)	7.3 1050 (50)	10.9 1570 (75)	15.0 2160 (103)	18.6 2680 (128)
Elastic Modulus[1], min	psi (kPa)	220 (1500)	360 (2500)	580 (4000)	730 (5000)	1090 (7500)	1500 (10300)	1860 (12800)
Flexural Strength[1], min.	psi (kPa)	10.0 (69)	25.0 (172)	30.0 (207)	40.0 (276)	50.0 (345)	60.0 (414)	75.0 (517)
Water Absorption[1] by total immersion, max.,	volume %	4.0	4.0	3.0	3.0	2.0	2.0	2.0
Oxygen Index[1], min.	volume %	24.0	24.0	24.0	24.0	24.0	24.0	24.0
Bouyancy Force	lb/ft³ (kg/m³)	61.7 (990)	61.5 (980)	61.3 (980)	61.1 (980)	60.6 (970)	60.0 (960)	59.5 (950)
Additional Properties for Compressible Applications								
Compressive Resistance[1] @ 5% deformation, min.	psi psf (kPa)	5.1 730 (35)	8.0 1150 (55)	13.1 1890 (90)	16.7 2400 (115)	24.7 3560 (170)	35.0 5040 (241)	43.5 6260 (300)
Compressive Resistance[1] @ 10% deformation, min.	psi psf (kPa)	5.8 840 (40)	10.2 1470 (70)	16.0 2300 (110)	19.6 2820 (135)	29.0 4180 (200)	40.0 5760 (276)	50.0 7200 (345)

[1] See ASTM D6817 Standard for test methods and complete information

WWW.GEOFOAM.COM

FOAM CONTROL EPS

GEOFOAM

Foam-Control EPS Geofoam is used in ground fill applications where a lightweight fill material is required to reduce stresses on underlying or adjoining soils/structures.

Ready to Use.

Foam-Control EPS Geofoam maximizes onsite installation efficiency: material arrives ready to place, no weather delays, material can be prefabricated or cut at the jobsite, no staging required, material can be inventoried, production efficiency improved, and it is easy to handle.

Design Loads.

For most applications, long-term design loads should not exceed the linear elastic range of Foam-Control EPS Geofoam. Combined live and dead load stresses should not exceed the compressive resistance at 1% strain.

In general earthwork applications (such as levees, dikes, berms, etc.) uplift buoyancy force must be counteracted with overburden or restraint devices, such as geogrids, geomembranes, hold down devices, etc.

Size and Shape.

Foam-Control EPS Geofoam is produced in block form and is easily positioned at the work site. Standards sizes:

- 4' (1.2 m) widths
- 8' (2.4 m) up to 16' (4.8 m) lengths
- 1" (25 mm) to 36" (914 mm) thickness

Other sizes and fabrication can be provided by the manufacturer.

Exposure to Water and Water Vapor.

The mechanical properties of Foam-Control EPS Geofoam are unaffected by moisture. Exposure to water or water vapor does not cause swelling.

Temperature Exposure/Flame Retardants.

Foam-Control EPS Geofoam is able to withstand the rigors of temperature cycling, assuring long-term performance.

Although flame retardants used in the manufacture of Foam-Control EPS Geofoam provide an important margin of safety, Foam-Control Geofoam must be considered combustible.

The maximum recommended long-term exposure temperature for Foam-Control EPS Geofoam is 165°F (74°C).

Adhesives, Coatings, and Chemicals.

Solvents which attack Foam-Control EPS Geofoam include esters, ketones, ethers, aromatic, and aliphatic hydrocarbons and their emulsions, among others. If Foam-Control EPS Geofoam is to be placed in contact with materials (or their vapors) of unknown composition, pretest for compatibility at maximum exposure temperature.

Quality Assurance.

Foam-Control EPS Geofoam meets or exceeds the requirements of ASTM D6817, "Standard Specification for Rigid, Cellular Polystyrene Geofoam." Foam-Control EPS is monitored for Quality Control and Listed by Underwriters Laboratories Inc.

Resistance to Termites, Mold, and Mildew.

Foam plastics have been shown to become termite infested under certain exposure conditions. Foam-Control EPS with Perform Guard® provides resistance to termite infestation. Please review literature on Foam-Control EPS with Perform Guard for complete information.

Perform Guard® TERMITE RESISTANT

Foam-Control EPS Geofoam will not decompose and will not support mold or mildew growth. Foam-Control EPS Geofoam provides no nutrient value to plants or animals.

Storage.

Foam-Control EPS Geofoam stands up well to normal short-term weather conditions encountered during installation.

Long-term exposure to sunlight causes yellowing and a slight embrittlement of the surface due to ultraviolet light. This has little effect on mechanical properties. If stored outdoors, cover Foam-Control EPS Geofoam with opaque polyethylene film, tarps, or similar material.

Foam-Control EPS Geofoam should be ballasted in windy conditions, both in storage and as placed.

Warranty.

Foam-Control EPS Geofoam Licensees offer a product warranty ensuring physical properties.

SPECIFICATIONS

SECTION 31 23 23.43 EPS GEOFOAM

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes expanded polystyrene (EPS) Geofoam.
B. Related Sections: Sections related to this section include:
1. Earthworks: Division 31 Earthworks sections.

1.02 REFERENCES

A. ASTM D6817 - Standard Specification for Rigid, Cellular Polystyrene Geofoam.

1.03 SUBMITTALS

A. Submit EPS Geofoam manufacturer's product literature and TechData, including:
1. Physical properties in compliance with ASTM D6817 Type specified.
2. 20-year physical property warranty.
B. Shop drawings showing EPS Geofoam block layout.
C. Quality Assurance: Submit the following:
1. Test Compliance: Summary of test compliance with specified performance characteristics and physical properties.
2. Certificates: Manufacturer shall supply a product certificate showing evidence of Third Party Quality Control.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver EPS Geofoam labeled with material Type.
B. Store above ground, and protected from moisture and sunlight prior to installation.
C. Product should not be exposed to open flame or other ignition sources.

1.05 WARRANTY

A. Provide EPS Geofoam 20-year warranty covering the long-term physical property of expanded polystyrene Geofoam.

PART 2 – PRODUCTS

2.01 MANUFACTURER

Note to Specifier Insert the name and address of the local Licensed Foam-Control EPS Geofoam supplier.
A. Local Supplier:_____
B. AFM Corporation
211 S. River Ridge Circle, Suite 102A
Burnsville, Minnesota 55337
Telephone (800) 255-0176; Fax (952) 474-2074
www.foam-control.com

2.02 EPS GEOFOAM

A. Foam-Control EPS Geofoam in compliance with ASTM D6817.
B. Select one or more of the Foam-Control EPS Geofoam Types from the listings as follows, as required by the project:
1. Foam-Control EPS Geofoam: ASTM D6817 [Type EPS12], [Type EPS15], [Type EPS22], [Type EPS29], [Type EPS39].
C. All Foam-Control EPS Geofoam blocks shall be treated by the manufacturer with a tested and proven termite treatment for below grade applications, 3 year minimum field exposure. The treatment shall be EPA registered, meet requirements of ICC ES EG239, and be recognized in an ICC ES report.

2.03 GEOGRIPPER PLATES

A. GeoGripper® plates shall be used to restrain EPS Geofoam from moving laterally in layer over layer applications. The GeoGripper plate shall be manufactured by AFM Corporation. The plate shall be made of galvanized or stainless steel with two-sided multi-barbed design capable of piercing geofoam. Each plate shall be capable of a lateral holding strength of 60 lbs.
Note to Specifier It is the responsibility of the designer/engineer to determining the suitability and number of GeoGripper Plates. Two plates for each 4' x 8' section of EPS block is a minimum recommendation to minimize block to block movement during installation.

PART 3 – EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's EPS Geofoam product data; including technical bulletins.

3.02 PREPARATION AND INSTALLATION

A. Site Verification of Conditions: Verify conditions of substrate, grade and other conditions which affect installation of geofoam.
B. Installation: [Specify instructions to suit project requirements.]

3.03 PROTECTION

A. Protection: Protect installed product and finish surfaces from damage during construction as required.

INSTALLATION GUIDELINES

Installation.

Please refer to ASTM D7180, "Standard Guide for use of Expanded Polystyrene (EPS) Geofoam in Geotechnical projects."

For most applications utilizing solid subgrades the following guidelines apply.

Subgrade Preparation.

1. Clear and grub site.
2. Excavate existing soil if required.
3. At design engineer's discretion, place geotextile over graded surface, i.e., soft soils, etc.
4. Dewater site as required.
5. Place a sand pad/leveling course over the prepared surface, 2" (50 mm) thickness minimum. Level to +-1/2" per 10' (10 mm per 3 meters) horizontal. Sand pad surfaces should be above ground water level at time of Foam-Control EPS Geofoam placement.

Placement.

1. At time of material delivery, verify identification marks on face of the product. Use material of proper Type only and as specified. Field sampling and testing of the Foam-Control EPS Geofoam will be as specified by the Engineer. Properties of density and compressive resistance shall be verified in accordance with the specification.
2. Material is placed as required by the engineer and as shown on the drawings.
3. Blocks of Foam-Control EPS Geofoam should be placed tightly on the prepared sand pad/leveling course (sand must not be frozen). If multiple layers of Foam-Control EPS Geofoam are required, orient successive layers of blocks at 90° to previous layer. Offset block joints between layers.
4. In order to facilitate construction during precipitation or when frost or icing is encountered, horizontal restraint between layers of Foam-Control EPS Geofoam may be desired. Use of GeoGripper Plates placed between horizontal layers of blocks should occur. Consult GeoGripper Plate literature for plate specifications.
5. Commence with the placement of overlying materials as quickly as practical.
6. In pavement design for cold regions where differential icing may occur, provide an adequate thickness of a well graded (must contain a high degree of fines) subbase mix which will retain moisture. Most designs are adequate with sub-base thickness of 20" to 32" (500 mm to 800 mm) placed over the Foam-Control EPS Geofoam.

AFM FOAM CONTROL

Foam-Control EPS products are manufactured by AFM Corporation licensees.

0705-0350-E

FOAM CONTROL

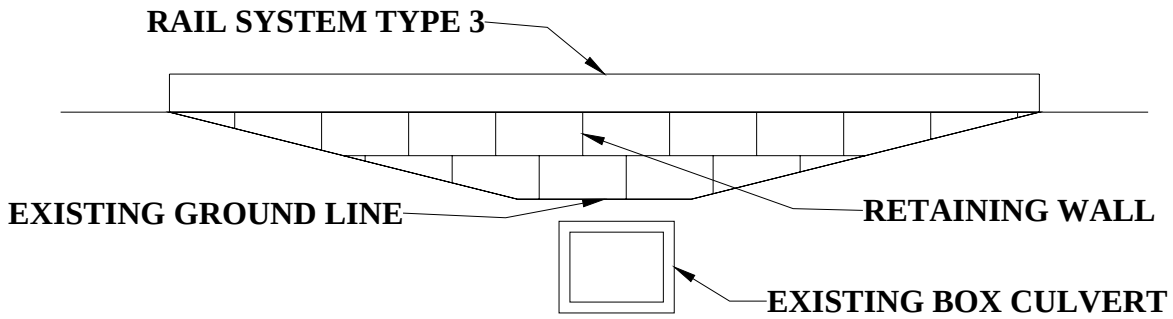
Foam-Control EPS
(800) 255-0176 General Information
(800) 255-3908 Technical Information
www.geofoam.com

CONTROL,
NOT COMPROMISE.

E. Box Culverts

3. Value Engineering Alternative Number 2

The Value Engineering Team evaluated the possibility of not adding more cover to the RCBC's at these 5 locations by constructing retaining walls and adding a barrier to allow for the existing ground line to remain over the culverts.



VALUE ENGINEERING ALTERNATIVE NUMBER 2
APPLICATION TO BOX CULVERTS

After taking a closer look at the plans, it was discovered that two of the culverts were in the narrow median section and this alternative does not work in those locations. In addition adding the barrier at the inside edge of should is not desirable since the design adds an obstacle in the clear zone.

The Value Engineering Team also noticed this alternative would increase the amount of waste earthwork material on the project by limiting the onsite areas for disposal.

This alternative is not recommended for implementation.

BOX CULVERT/LIGHT WEIGHT FILL SUMMARY
VALUE ENGINEERING ALTERNATIVE NUMBER 2
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
CULVERT @ STA 1869+35	LS		1.0	$414,526.95	1.0	$185,619
CULVERT @ STA 1933+21	LS		1.0	$199,142	1.0	$156,407
CULVERT @ STA 1899+90	LS		1.0	$429,632	1.0	$290,228
SUBTOTAL				**$1,043,301**		**$632,254**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		4.5%		$56,338		$34,142
TRAFFIC CONTROL/MOT		10.0%		$104,330		$63,225
CONTINGENCY		20.0%		$208,660		$126,451
GRAND TOTAL				**$1,412,630**		**$856,072**

POSSIBLE SAVINGS: $556,558

VII. DEVELOPMENT PHASE

F. Maintenance of Traffic/Earthwork/Crossovers

1. "As Proposed"

Proposed Project Limits and associated issues for Item Numbers 05-2035.40 and 05-2035.70, Interstate 64.

Item Number 05-2035.40 as proposed begins at Station 1860+00 (4.47 miles West of KY 151) and ends at Station 2129+40 (0.63 miles East of KY 151). Item Number 05-2035.70 as proposed begins at Station 2120+00 (0.45 miles East of KY 151) and ends at Station 2398+50 (0.37 miles East of US 127).

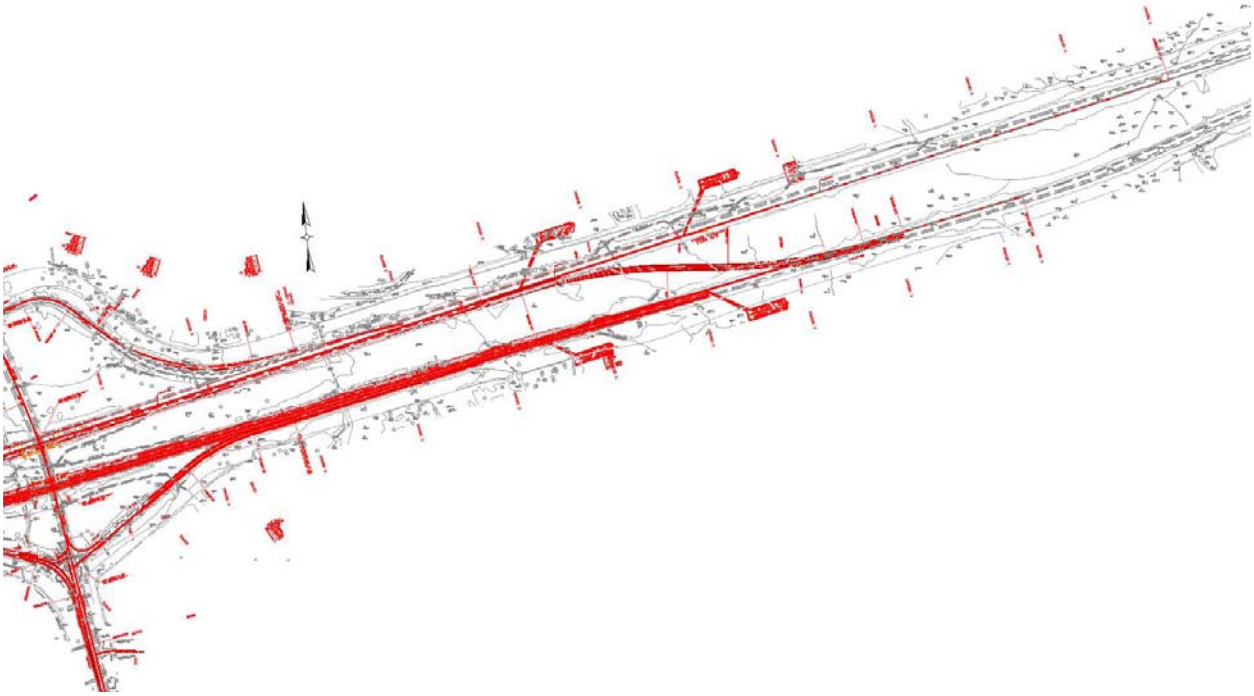
As proposed Item Number 05-2035.40 has 739,218 CY of Roadway Excavation with 136,275 CY of material to be wasted off-site. This creates the necessity of an offsite waste area and would include additional costs for hauling and disposing of excess material.

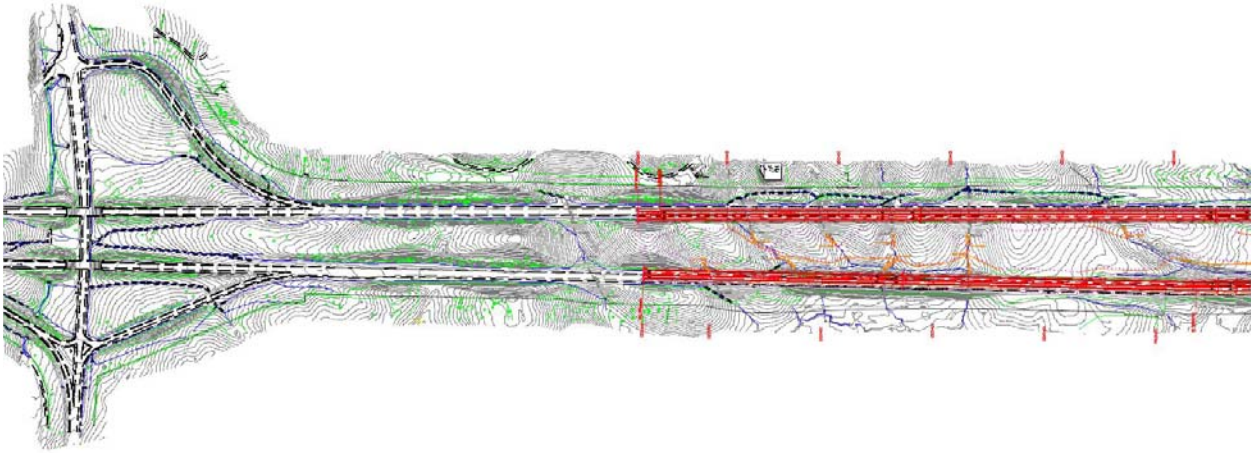
Item Number 05-2035.70 has 168,358 CY of Embankment in Place and would require a borrow totaling 10,945 CY. This makes it necessary to find an offsite borrow area and would add additional cost for hauling and placing said material.

VII. DEVELOPMENT PHASE

F. Maintenance of Traffic/Earthwork/Crossovers

1. "As Proposed"





F. Maintenance of Traffic/Earthwork/Crossovers

2. Value Engineering Alternative

Option "A" Extend project limits of 05-2035.40

This alternate proposes extending the project ending point from proposed station 2129+40 to approximate station 2190+00. (Extend to common section 1 in 05-2035.70)

Benefits

This would help to balance earthwork between two jobs. Currently 05-2035.70 is shown as a borrow job. This would add a fill area and potential onsite waste area in 05-2035.70 to provide a place to use more of the waste material from 05-2035.40, thus lessening Roadway Excavation quantities and eliminating need for borrow on 05-2035.70. This would provide for more balanced projects. 05-2035.70 as proposed needs approximately 30, 829 CY of Borrow between the beginning of the project and common section 1.

This proposal would eliminate need for construction crossover at station 2115+00 (bifurcated section) and move this crossover to a common section at new project end station.

If projects happen to let together or around same time frame this would allow traffic currently all on WB side (05-2035.40) to remain there and flow into next job without requiring crossover at all.

This proposal would have a savings of **$951,240**.

Disadvantages

Would need to construct slip ramp from KY 151 onramp to EB 64 over to where traffic is flowing on WB lanes.

Option "B" Combine 2 projects

Combine 05-2035.40 and 05-2035.70 into one project for construction phase.

Benefits

Eliminate potential coordination conflicts between two adjoining contractors. Without cooperation the need for additional material on one project (05-2035.7) and waste on the other (05-2035.40) would have been a problem. Eliminates need for borrow on 05-2035.70 and potential offsite waste site for 05-2035.40.

This proposal would have a savings of **$951,240**.

Potential savings in Mobilization and Demobilization quantities as same contractor would have work and would only need to move in and out once to complete both projects.

Design would need to modify MOT at East end of 05-2035.40 to have all traffic in WB lanes until common section at East end of 05-2035.70.

Would eliminate need to construct crossover at station 2115+00 with savings in roadway excavation and paving quantities.

Disadvantages

Would need to construct slip ramp from KY 151 onramp to EB 64 over to where traffic is flowing on WB lanes.

Option "C" Ensure MOT plans match at adjoining ends.

Need to provide MOT plan that would be contingent on jobs being let at separately, but ongoing during same time frame.

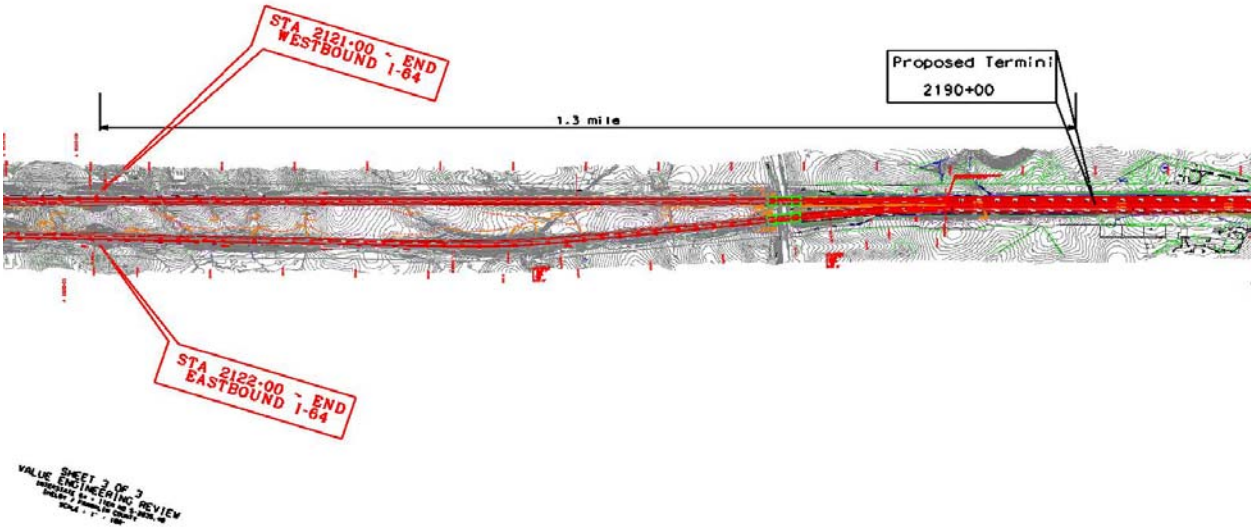
The west end 05-2035.70 currently has phased construction with traffic remaining in EB and WB lanes respectively. If this project was let while 05-2035.40 was ongoing then a plan would need to be drawn up to leave all traffic in WB lanes going into 05-2035.70. There is a great potential for scheduling conflict if two contractors were not on same schedule for traffic switches. This would lead to a high likelihood of change orders for delays or modifications during construction to MOT plan.

Of the 3 options this one seems to be the least desirable due to requirement that 2 projects coordinate traffic switches to a high degree.

VII. DEVELOPMENT PHASE

F. Maintenance of Traffic/Earthwork/Crossovers

2. Value Engineering Alternative



PROJECT LIMITS CHANGE
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
ROADWAY EXCAVATION	CY	$10.00	739,218	$7,392,180	896,631	$8,966,310
EMBANKMENT IN PLACE	CY	$15.00	168,358	$2,525,370	-	$0
SUBTOTAL				**$9,917,550**		**$8,966,310**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		0.0%		$0		$0
TRAFFIC CONTROL/MOT		0.0%		$0		$0
CONTINGENCY		0.0%		$0		$0
GRAND TOTAL				**$9,917,550**		**$8,966,310**

POSSIBLE SAVINGS: $951,240

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- PAVEMENT/BASE DESIGN

The Value Engineering Team recommends that Value Engineering Alternative Number 1 be implemented. This Value Engineering Alternative r***evises the asphalt pavement design.***

If this recommendation can be implemented, there is a possible savings of ***$3,677,750.***

RECOMMENDATION NUMBER 2- GOOSE CREEK BRIDGES

The Value Engineering Team recommends that Value Engineering Alternative Number 2 be implemented. ***This Value Engineering Alternative uses a shorter two span bridge with walls outside the flood zone.***

If this recommendation can be implemented, there is a possible savings of ***$1,151,644.***

RECOMMENDATION NUMBER 3- BENSON CREEK BRIDGES

The Value Engineering Team recommends that Value Engineering Alternative Number 2 be implemented. ***This Value Engineering Alternative uses a single span bridge with walls outside the flood zone.***

If this recommendation can be implemented, there is a possible savings of ***$935,533.***

RECOMMENDATION NUMBER 4- SOUTH BENSON CREEK BRIDGES

The Value Engineering Team recommends that Value Engineering Alternative Number 2 be implemented***. This Value Engineering Alternative uses a single span bridge with walls outside the flood zone.***

If this recommendation can be implemented, there is a possible savings of ***$1,303,201.***

RECOMMENDATION NUMBER 5- GUIST CREEK BRIDGES

The Value Engineering Team recommends that Value Engineering Alternative Number 2 be implemented. ***This Value Engineering Alternative uses a single span bridge with walls outside the flood zone.***

If this recommendation can be implemented, there is a possible savings of ***$1,303,201***.

VIII. SUMMARY OF RECOMMENDATIONS

RESULTS – AREAS OF FOCUS

RECOMMENDATION NUMBER 6-KY 151 INTERCHANGE BRIDGES

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. ***This Value Engineering Alternative uses a single span bridge with pile bents with walls.***

If this recommendation can be implemented, there is a possible savings of ***$439,410.***

RECOMMENDATION NUMBER 7-KY 1665 BRIDGES

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. ***This Value Engineering Alternative uses a single span bridge with pile bents with walls.***

If this recommendation can be implemented, there is a possible savings of ***$541,182.***

RECOMMENDATION NUMBER 8-CARDWELL LANE BRIDGES

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. ***This Value Engineering Alternative uses a single span bridge with pile bents with walls.***

If this recommendation can be implemented, there is a possible savings of ***$433,806.***

RECOMMENDATION NUMBER 9-BOX CULVERTS

The Value Engineering Team recommends that Value Engineering Alternative Number 1 be implemented. ***This Value Engineering Alternative uses a different type of lightweight fill.***

If this recommendation can be implemented, there is a possible savings of ***$1,173,995.***

RECOMMENDATION NUMBER 10-MOT/EARTHWORK/CROSSOVERS

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. ***This Value Engineering Alternative moves the projects limits.***

If this recommendation can be implemented, there is a possible savings of ***$951,240.***

NAME	AFFILIATION	PHONE
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Matt Looney	KYTC	502/564-4255
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Wallace Bennett	WMB	859/299-5220
James Napier	WMB	859/299-5226
Dan Hite	KYTC	502/564-3280
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