VALUE ENGINEERING STUDY

OF

US 641

ITEM NUMBERS: 11-278.24 & 11-278.27

Caldwell/Crittenden County, Kentucky

April 7-11, 2008

Prepared by:

VE GROUP, L.L.C.

In Association With:

KENTUCKY TRANSPORTATION CABINET

VALUE ENGINEERING STUDY
TEAM LEADER

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

DATE

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I. EXECUTIVE SUMMARY

INTRODUCTION

This Value Engineering report summarizes the results of the Value Engineering Mod I Training and VE Study performed by VE Group for the Kentucky Transportation Cabinet. The study was performed during the week of April 7-11, 2008.

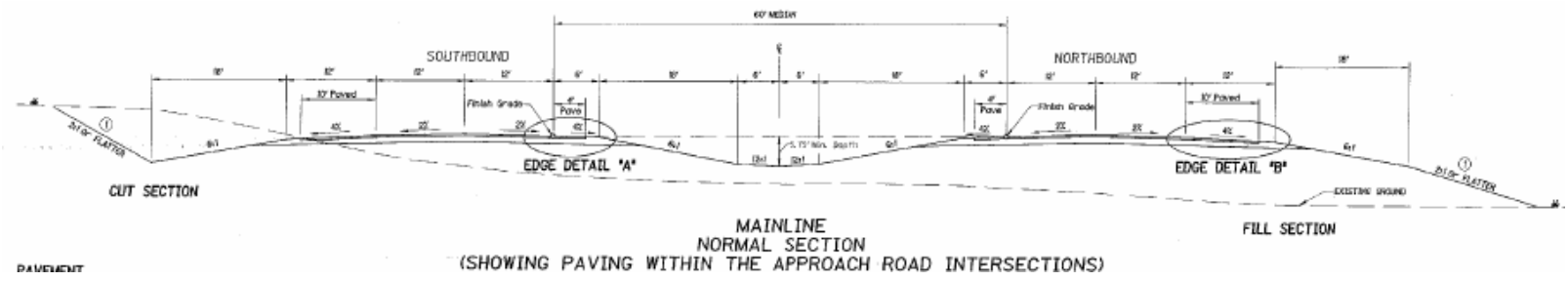
The subject of the study was realignment of US 641 from Fredonia, KY in Caldwell County to Marion, KY in Crittenden County.

PROJECT DESCRIPTION

This project will construct a new 5.6-mile 4-lane divided roadway east of the existing alignment bypassing Crayne, KY. The roadway will consist of:

- 4-12' lanes
- 2-12' outside shoulders (10' paved)
- 2-6' inside shoulders (6' paved)
- 60' median
- All included in a minimum 204' Right of Way

The work will includes twin 248' 2-span PCIB bridges over Livingston Creek. This alignment begins at elevation 435' and proceeds north over rolling terrain reaching a maximum elevation of approximately 668' and ends at the current alignment of US 641 at an elevation of 602'. Additional work includes constructing 4 box culverts along the alignment.



TYPICAL SECTION

I. EXECUTIVE SUMMARY

METHODOLOGY

The Value Engineering Team followed the basic Value Engineering procedure for conducting this type of analysis.

This process included the following phases:

1. Investigation
2. Speculation
3. Evaluation
4. Development
5. Presentation
6. Report Preparation

Evaluation criteria identified as a basis for the comparison of alternatives included the following:

- Traffic Control
- Construction Time
- Service Life
- Future Maintenance Cost
- Construction Cost
- Traffic Operations
- Utility Impacts

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 Number1:

The Value Engineering Team recommends that Value Engineering Alternative be implemented. This alternative proposes to not build the project.

If this recommendation can be implemented, there is a possible savings of ***$67,123,076.***

Recommendation Number 2:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will adjust the profile grades.

If this recommendation can be implemented, there is a possible savings of ***$1,599,942.***

Recommendation Number 3:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct a 36' median.

If this recommendation can be implemented, there is a possible savings of ***$888,065.***

Recommendation Number 4:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct a 2' Drainage Blanket.

If this recommendation can be implemented, there is a possible savings of ***$839,419.***

Recommendation Number 5:

The Value Engineering Team recommends that Value Engineering Alternative be implemented. This alternative will utilize existing US 64 and add passing lanes along with other minor improvements.

If this recommendation can be implemented, there is a possible savings of ***$28,821,483.***

I. EXECUTIVE SUMMARY

RESULTS – AREAS OF FOCUS

Recommendation Number 6:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will change Access Control to By Permit.

If this recommendation can be implemented, there is a possible savings of ***$1,333,018.***

Recommendation Number 7:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct a 2 – lane roadway.

If this recommendation can be implemented, there is a possible savings of ***$9,494,530.***

Recommendation Number 8:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will reduce the paved shoulders to 5'.

If this recommendation can be implemented, there is a possible savings of ***$477,356.***

Recommendation Number 9:

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

If this recommendation can be implemented, there is a possible savings of ***$758,408.***

Recommendation Number 10:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct a 3 – lane roadway.

If this recommendation can be implemented, there is a possible savings of ***$14,189,785.***

Recommendation Number 11:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct a Maximum Asphalt Pavement.

If this recommendation can be implemented, there is a possible savings of ***$6,189,410.***

I. EXECUTIVE SUMMARY

RESULTS – AREAS OF FOCUS

Recommendation Number 12:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct single span steel plate girder to shorten bridge.

If this recommendation can be implemented, there is a possible savings of ***$352,044.***

Recommendation Number 13:

The Value Engineering Team recommends that Value Engineering Alternative be implemented. This alternative proposes will construct Tangent Bridge.

If this recommendation can be implemented, there is a possible savings of ***$154,410.***

Recommendation Number 14:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct ditches with alternative ditch stabilization**.**

If this recommendation can be implemented, there is a possible savings of ***$570,844.***

Recommendation Number 15:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will not install fence.

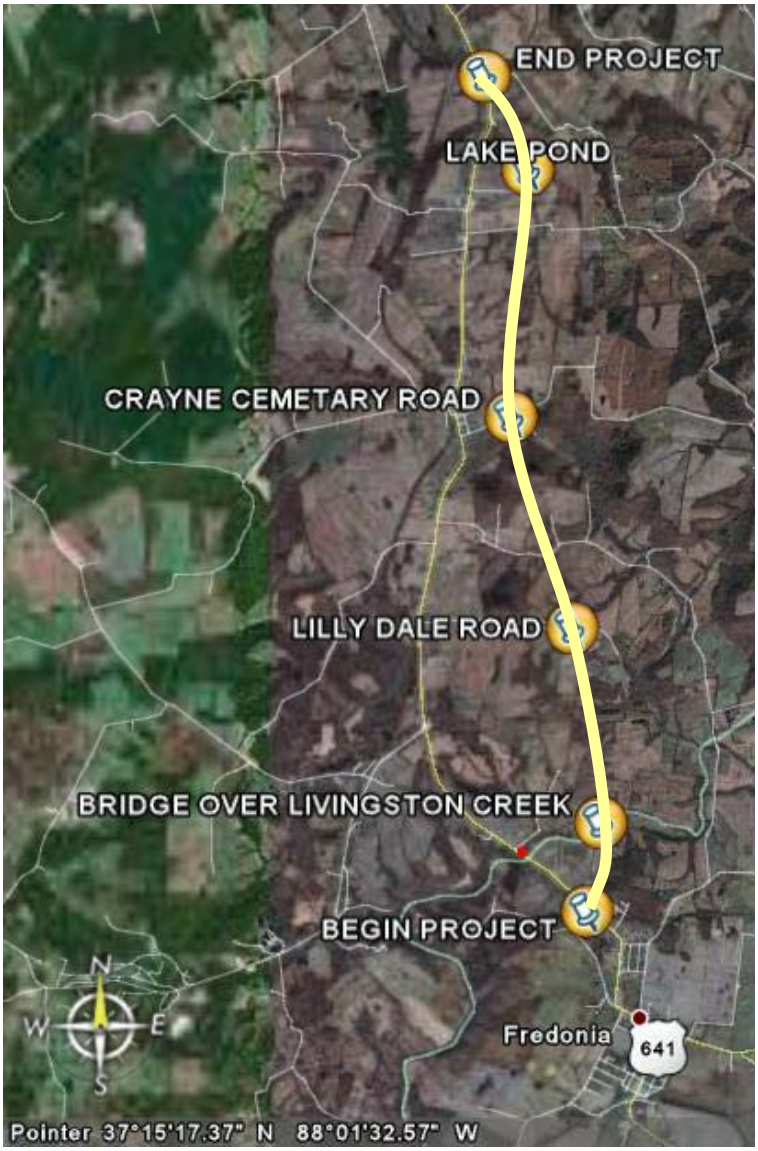
If this recommendation can be implemented, there is a possible savings of ***$471,564.***

Recommendation Number 16:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will install fence only where required.

If this recommendation can be implemented, there is a possible savings of ***$409,661.***

II. LOCATION OF PROJECT



LOCATION MAP

III. TEAM MEMBERS AND PROJECT DESCRIPTION

TEAM MEMBERS

NAME	AFFILIATION	EXPERTISE	PHONE E-MAIL
Thomas A Hartley, P.E., C.V.S.	VE Group	Team Leader	850/627-3900 thartley09@aol.com
Jerry Love, PhD, P.E., C.V.S.	VE Group	Team Leader	850/627-3900 geraldL2@bellsouth.net
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Chris Clifton	KYTC CO	R/W – Utilities	502/564-3210 Chris.Clifton@ky.gov
Chris Congleton	KYTC CO	Utilities	859/576-3796 Chris.Congleton@ky.gov
Brian Dunbar	KYTC D-8	Design	606/677-4017 Brian.Dunbar@ky.gov
Brad Eldridge	KYTC CO	C.O. Locations Engineer	502/564-3280 Brad.Eldridge@ky.gov
David Fields	KYTC D-11	Design	606/598-2145 David.Fields@ky.gov
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Bill Hanson	FHWA	Construction	860/659/6703 William.Hanson@fhwa.dot.us
Jason Harris	KYTC D-11	Construction	606/813-4540 Jason.Harris@ky.gov
Debbye Hassell	KYTC D-4	Design	270/766-5076 Debbye.Hassell@ky.gov
Sean House	KYTC CO	Geology	502/594-2374 Sean.House@ky.gov
Colin McCarthy	FHWA	Federal Aid Programs	573/223-6720 Colin.McCarthy@fhwa.dot.us

III. TEAM MEMBERS AND PROJECT DESCRIPTION

TEAM MEMBERS *(continued)*

NAME	AFFILIATION	EXPERTISE	PHONE
James Minckley	KYTC D-6	Construction	859/371-3045 James.Minckley@ky.gov
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Mindy Rockwell	KYTC CO	VE Assistant	502/564-4555 Mindy.Rockwell@ky.gob
Lloyd Seales	KYTC D-5	Permits - Construction	502/210-5449 Lloyd.Seales@ky.gov
Robert Semones	KYTC CO	VE Coordinator	502/564-4555 Robert.Semones@ky.gov
Chris Slone	KYTC CO	Geotech	502/564-2374 Chris.Slone@ky.gov
Quentin Smith	KYTC D-11	Design	606/598-2145 Quentin.Smith@ky.gov
Mary Westfall-Holbrook	KYTC D-12	Construction	606/433-7791 MaryW.Holbrook@ky.gov
Scott Wolf	FHWA	Design - Construction	502/223-6734 Scott.Wolf@fhwa.dot.gov.us

III. TEAM MEMBERS AND PROJECT DESCRIPTION

PROJECT DESCRIPTION

This project will construct a new 5.6-mile 4-lane divided roadway east of the existing alignment bypassing Crayne, KY. The roadway will consist of:

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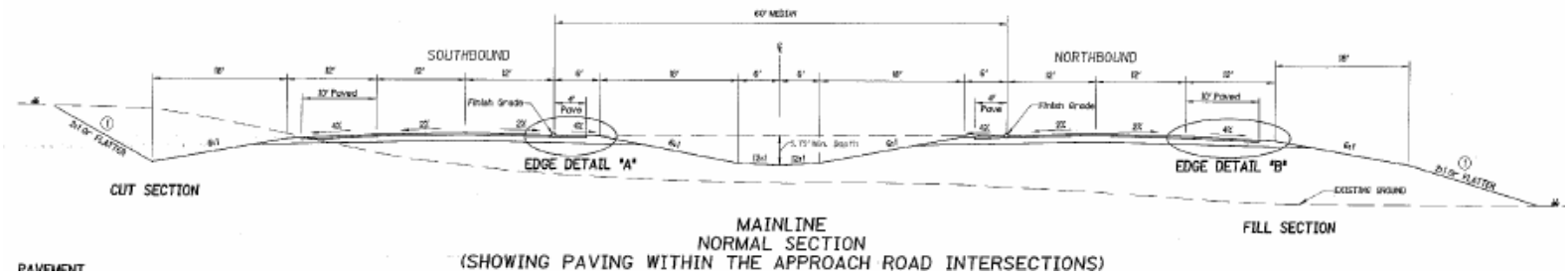

TYPICAL SECTION

IV. INVESTIGATION PHASE

VALUE ENGINEERING STUDY BRIEFING

US 641 APRIL 7, 2008		
NAME	**AFFILIATION**	**PHONE**
Thomas A Hartley, P.E., C.V.S.	VE Group	850/627-3900
Jerry Love, PhD, P.E., C.V.S.	VE Group	850/627-3900
James Minckley	KYTC D-6	859/371-3045
Conley Moren	KYTC D-11	606/813-0815
Joseph Mosley	KYTC D-11	606/813-6882
Bruce Napier	KYTC D-10	606/666-8841
Tala Quinio	KYTC D-5	502/210-5473
Aman Razavi	KYTC D-5	502/210-5400
Mindy Rockwell	KYTC CO	502/564-4555
Lloyd Seales	KYTC D-5	502/210-5449
Robert Semones	KYTC CO	502/564-4555
Chris Slone	KYTC CO	502/564-2374
Quentin Smith	KYTC D-11	606/598-2145
Mary Westfall-Holbrook	KYTC D-12	606/433-7791
Scott Wolf	FHWA	502/223-6734
Tim Choate	KYTC D-1	270/898-2431

IV. INVESTIGATION PHASE

VALUE ENGINEERING STUDY BRIEFING *(continued)*

US 641 APRIL 8, 2008		
NAME	**AFFILIATION**	**PHONE**
Jason Blackburn	KYTC D-10	606/666-8841
Chris Clifton	KYTC CO	502/564-3210
Chris Congleton	KYTC CO	859/576-3796
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Brad Eldridge	KYTC CO	502/564-3280
David Fields	KYTC D-11	606/598-2145
Joe Gossage	KYTC D-8	606/677-4017
Bill Hanson	FHWA	860/659/6703
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Debbye Hassell	KYTC D-4	270/766-5076
Sean House	KYTC CO	502/594-2374
Colin McCarth	FHWA	573/223-6720

IV. INVESTIGATION PHASE

FUNCTIONAL ANALYSIS WORKSHEET

US 641 FROM FREDONIA TO MARION

APRIL 11, 2008

ITEM	FUNCT. VERB	FUNCT. NOUN	* TYPE	COST	WORTH	VALUE INDEX
Pavement	**Support**	**Vehicles**	**B**	**$14,200,000**	**$12,000,000**	**1.18**
Earthwork	**Establish**	**Grades**	**B**	**$10,000,000**	**$5,000,000**	**2.00**
Right of Way	**Obtain**	**Rights**	**B**	**$3,500,000**	**$2,000,000**	**1.75**
Drainage Blanket	**Convey**	**Water**	**S**	**$3,000,000**	**$2,400,000**	**1.25**
Bridge	**Eliminate**	**Conflict**	**B**	**$1,300,000**	**$650,000**	**2.00**
Box Culvert # 1	**Eliminate**	**Conflict**	**B**	**$207,000**	**$153,500**	**2.00**
Box Culvert # 2	**Eliminate**	**Conflict**	**B**	**$127,000**	**$63,500**	**2.00**
Box Culvert # 3	**Eliminate**	**Conflict**	**B**	**$39,000**	**$19,500**	**2.00**
Box Culvert # 4	**Eliminate**	**Conflict**	**B**	**$507,000**	**$253,500**	**2.00**
Drainage	**Convey**	**Water**	**S**	**$870,000**	**$770,000**	**1.13**

***B – Basic S - Secondary**

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

IV. INVESTIGATION PHASE

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

A. EARTHWORK

B. DRAINAGE BLANKET

C. RIGHT OF WAY

D. PAVEMENT

E. BRIDGE

F. BOX CULVERT

G. DRAINAGE

H. WOVEN WIRE FENCE

V. SPECULATION PHASE

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

A. EARTHWORK

- Reduce Typical Section
- Adjust Grades
- Decrease Pavement Thickness
- No Build Option
- Balance Earthwork Quantities
- Reduce Median Width
- Utilize Excavated Rock In Embankments
- Bench Cuts
- Adjust Horizontal Alignment
- Use 2:1 Side Slopes
- Use Geo-foam
- Adjust Design Criteria
- Change Access Control to Permits
- Reduce Lane Widths to 11 Feet
- Porous Pavement

B. DRAINAGE BLANKET

- Utilize Porous Pavement
- Install Under drain Pipes
- Lime Stabilization
- Utilize Used Tires
- Locate Springs
- Reduce Thickness to Two (2) Feet
- Install Wick Drains
- Insitsu Rock
- No Build Option
- Increase Cuts To Obtain Rock For Drainage Blankets
- Bridge

V. SPECULATION PHASE

C. RIGHT OF WAY

- Adjust Horizontal Alignment
- No Build Option
- Utilize Existing Right-Of-Way
- Reduce Median Width
- Adjust Profile
- Decrease Pavement Thickness
- Retain Consultant To Acquire Right-Of-Way
- Design Build Option
- Change Access Control To Permits
- Steepen Cut Slopes
- Maximize Use Of Construction Easements
- Eliminate Access To Project
- Utilize Existing US 641
- Require Donated Right-Of-Way
- Reduce Typical Section Width

D. PAVEMENT

- Two Lane Roadway
- Portland Cement Concrete
- Utilize Geotextile Fabric
- Lime Stabilization
- Reduce Shoulder Widths
- Eliminate 4 Inch Drainage Blanket
- Reduce Pavement Depth
- Utilize Maximum Aggregate Pavement Option
- Utilize Dense Graded Aggregate Shoulders
- Chip Seal Shoulders
- No Build Option
- Resurface Existing Alignment
- Decrease Lane Widths to 11 Feet
- Bid Pavement Alternatives
- Utilize Grass Shoulders

V. SPECULATION PHASE

E. BRIDGE

- No Build Option
- Shorter Spans
- Steel Girders
- Lower Profile
- Reduce Bridge Width
- Tangent Bridge
- Relocate Bridge
- Isotropic Deck
- Toll Bridge
- Con Span/Box Culvert
- Bid Bridge Alternatives
- Single 4-Lane Bridge

F. BOX CULVERTS

- Reduce Typical Section
- Three Sided Culvert Bid Alternate
- Reduce Culvert Skews
- Pre-cast Culverts With Improved Inlets
- Utilize Pipe Culverts
- Metal Inverts
- Utilize Plastic Pipe Culverts
- Porous Pavement
- Short Bridge
- Upstream Retention Ponds
- Hand Pumps/Water Carriers?
- No Build Option

V. SPECULATION PHASE

G. DRAINAGE

- Reduce Lengths Of Pipe Culverts
- Reduce Typical Section
- Alternate Ditch Stabilization
- No Build Option
- Utilize Metal End Sections
- Elevate Inverts To Shorten Pipe Culverts
- Improve Inlets To Reduce Pipe Size
- Adjust Profiles To Reduce Culvert Lengths
- Steepen Hill Slopes
- Raise Drainage Structures
- Reduce Pipe Sizes And Increase Ditch Widths
- Utilize Energy Attenuation Outlets
- Porous Pavement

H. WOVEN WIRE FENCE

- No Build Option
- Utilize Barbed Wire
- Utilize Razor Wire
- Dingos (guard dogs)

VI. EVALUATION PHASE

A. ALTERNATIVES

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

A. EARTHWORK

Value Engineering Alternative Number 1: ***No Build.***

Value Engineering Alternative Number 2: ***Adjust Grades.***

Value Engineering Alternative Number 3: ***Construct 36' median.***

B. DRAINAGE BLANKET

Value Engineering Alternative: ***Construct a 2' Drainage Blanket.***

C. RIGHT OF WAY

Value Engineering Alternative Number 1: ***Eliminate Access to project during construction.***

Value Engineering Alternative Number 2: ***Utilize existing US 64; add passing lanes along with other minor improvements.***

Value Engineering Alternative Number 3: ***Change Access Control to By Permit.***

D. PAVEMENT

Value Engineering Alternative Number 1: ***Construct 2 – lane roadway.***

Value Engineering Alternative Number 2: ***Reduce paved shoulders to 5'.***

Value Engineering Alternative Number 3: ***Construct 11' lanes.***

Value Engineering Alternative Number 4: ***Construct 3 – lane roadway.***

Value Engineering Alternative Number 5: ***Redo Pavement Selection.***

E. BRIDGE

Value Engineering Alternative Number 1: ***Construct single span steel plate girder to shorten bridge.***

Value Engineering Alternative Number 2: ***Construct Tangent Bridge.***

Value Engineering Alternative Number 3: ***Construct Bridge with an Isotropic Deck.***

VI. EVALUATION PHASE

A. ALTERNATIVES

F. BOX CULVERT

Value Engineering Alternative Number 1: ***Construct 3 – sided culvert.***

Value Engineering Alternative Number 2: ***Reduce skew.***

Value Engineering Alternative Number 3: ***Construct pre-cast culvert with improved inlets.***

Value Engineering Alternative Number 4: ***Construct metal invert box.***

Value Engineering Alternative Number 5: ***Construct short bridge.***

G. DRAINAGE

Value Engineering Alternative Number 1: ***Construct ditches with alternative ditch stabilization.***

Value Engineering Alternative Number 2: ***More energy attenuated outlets.***

Value Engineering Alternative Number 3: ***Construct metal end sections.***

H. WOVEN WIRE FENCE

Value Engineering Alternative Number 1: ***Do not install fence.***

Value Engineering Alternative Number 2: ***Use only where required.***

VI. EVALUATION PHASE

B. ADVANTAGES AND DISADVANTAGES

The following Advantages and Disadvantages were developed for the Value Engineering Alternatives previously generated during the speculation phase. It also includes the Advantages and Disadvantages for the "As Proposed".

A. EARTHWORK

"As Proposed": **The proposed profile grades will excavate approximately 1,844,606 CY of material and require approximately 1,1624,777 CY of embankment that will result in a balanced earthwork project.**

Advantages

- No re-design required.
- No adjustment of Right of Way Requirements.

Disadvantages

- Increased cost to move fill.

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION.

Value Engineering Alternative Number 1: No Build.

Advantages

- Project money can be used elsewhere.
- No environmental impacts.
- No Right of Way Relocations.
- No disruption to traffic.

Disadvantages

- No improvement to roadway system.
- No encouragement of economic development.

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION.

A. EARTHWORK *(continued)*

Value Engineering Alternative Number 2: Adjust Grades.

Advantages

- Reduces amount of embankment required.
- Reduces amount of excavation required.
- Reduces Right of Way requirements.

Disadvantages

- None apparent.

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION.

Value Engineering Alternative Number 3: Construct 36' Median.

Advantages

- Reduces amount of embankment required.
- Reduces amount of excavation required.
- Reduces Right of Way requirements.

Disadvantages

- Reduces design speed.

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION.

B. DRAINAGE BLANKET

"As Proposed": **Construct a 5' thick drainage blanket over area where springs are present.**

Advantages

- Less risk of embankment washout.

Disadvantages

- Higher construction cost.

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION.

Value Engineering Alternative Number 1: Construct 2' Drainage Blanket.

Advantages

- Less cost.

Disadvantages

- Increased risk of embankment washout.

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION.

C. RIGHT OF WAY

"As Proposed": **The "As Proposed" design will require the acquisition of 258 +/- acres of Right of Way.**

Advantages

- Adequate Right of Way for 4 – lane typical section.

Disadvantages

- High Right of Way cost.

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION.

Value Engineering Alternative Number 1: Eliminate Access to project during construction.

Advantages

- Less temporary construction costs.
- Lower risk to the contractor.
- Easier construction

Disadvantages

- Loss of public/owner access.
- Cannot deny access to property owners by law.

Conclusion

DROPPED FROM FURTHER EVALUATION.

C. RIGHT OF WAY *(continued)*

Value Engineering Alternative Number 2: ***Utilize existing US-64 Right of Way, add passing lanes along with other minor improvements.***

Advantages

- Lower construction cost.
- Lower Right of Way Acquisition cost.
- Less environmental impacts.

Disadvantages

- Less operational improvements.
- More MOT required.
- Only partially addresses local agreements.

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION.

Value Engineering Alternative Number 3: ***Change Access Control to Permit.***

Advantages

- Lower Right of Way cost.

Disadvantages

- Less access control.
- Minor operational impacts.
- Increased risk.

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION.

D. PAVEMENT

"As Proposed": **Construct 4 – 12' lanes, 12' outside shoulders (10' paved), 6' inside shoulders (4' paved) with the maximum asphalt option – 4" DGA, 4" asphalt drainage blanket, 11 ½ " asphalt base, and 1 ¼ " surface course for the travel lanes and variable depth DGA, 4" asphalt base, and 1 ¼" surface course for the shoulders.**

Advantages

- None apparent.

Disadvantages

- High construction cost.
- High Right of Way Cost.

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION.

Value Engineering Alternative Number 1: Construct 2 – lane roadway.

Advantages

- Less construction cost.
- Less Right of Way Cost.
- Adequate capacity for traffic projections.

Disadvantages

- Low risk of not having sufficient capacity if economic development occurs in Marion.

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION.

Value Engineering Alternative Number 2: Reduce paved shoulders to 5'.

Advantages

- Lower construction cost.
- Reduces impervious.

Disadvantages

- May increase maintenance costs.

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION.

D. PAVEMENT

Value Engineering Alternative Number 3: Construct 11' lanes.

Advantages

- Lower construction cost.

Disadvantages

- May have minor negative traffic operational impacts with high percentage of truck traffic.

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION.

Value Engineering Alternative Number 4: Construct 3 – lane roadway.

Advantages

- Lower construction cost.

Disadvantages

- Less capacity than 4 – lane divided, but more than 2 – lane roadway.

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION.

Value Engineering Alternative Number 5: Redo Pavement Selection.

Advantages

- Possible Lower construction cost.

Disadvantages

- None apparent.

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION.

VI. EVALUATION PHASE

B. ADVANTAGES AND DISADVANTAGES (cont'd)

E. BRIDGE

"As Proposed": **Construct twin 41' wide X 248' long 2 – span (94', 154') bridges over Livingston creek.**

Advantages

- Reduces approach work.

Disadvantages

- High construction cost.
- Generous low member clearance.

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION.

Value Engineering Alternative Number 1: ***Construct single span steel plate girder to shorten bridge.***

Advantages

- May be lower cost.
- Possibly less construction time.
- Eliminates pier from flood plain.

Disadvantages

- Increases approach work – pavement/embankment.

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION.

Value Engineering Alternative Number 2: ***Construct Tangent Bridge.***

Advantages

- Lower construction cost.
- Less design difficulty.

Disadvantages

- None apparent.

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION.

E. BRIDGE

Value Engineering Alternative Number 3: Construct Bridge with an Isotropic Deck.

Advantages

- Lower construction time.

Disadvantages

- Transportation of deck section to site.
- High construction cost.

Conclusion

DROPPED FROM FURTHER EVALUATION.

F. BOX CULVERT

"As Proposed": **Construct 4 cast in place Reinforced Concrete Box Culverts on various skews – 10' X 8" Box @ Sta 235+00, 6' X 6' Box @ Sta 283+00, 10' X 8' Box @ Sta 348+00 and a double 14' X 10' Box @ Sta 368+00.**

Advantages

- Less maintenance.

Disadvantages

- Disturbs stream bed.
- Double box center wall may collect debris.
- Skews make boxes longer than needed.

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION.

Value Engineering Alternative Number 1: Construct 3 – sided culvert.

Advantages

- Minimizes impact to stream.
- Environmentally desirable.

Disadvantages

- Requires footers.
- Possible scour issues.
- High construction cost.

Conclusion

DROPPED FROM FURTHER EVALUATION.

Value Engineering Alternative Number 2: Reduce skew.

Advantages

- Better hydraulics.

Disadvantages

- Increased stream bed disturbance.

Conclusion

DROPPED FROM FURTHER EVALUATION.

F. BOX CULVERT

Value Engineering Alternative Number 3: Construct pre-cast culvert with improved inlets.

Advantages

- Quicker construction time.
- May reduce box culvert size.

Disadvantages

- None apparent.
- Higher construction cost.

Conclusion

DROPPED FROM FURTHER EVALUATION.

Value Engineering Alternative Number 4: Construct metal invert box.

Advantages

- Possible lower construction cost.

Disadvantages

- Possible lower service life.
- Higher maintenance.
- Shorter construction time.

Conclusion

DROPPED FROM FURTHER EVALUATION.

Value Engineering Alternative Number 5: Construct short bridge.

Advantages

- Open stream bed.

Disadvantages

- Higher construction cost.
- Higher maintenance costs.

Conclusion

DROPPED FROM FURTHER EVALUATION.

G. DRAINAGE

"As Proposed": **Construct ditch channels with Class II and III Channel Lining.**

Advantages

- Less maintenance (mowing).

Disadvantages

- High construction cost.
- Low acceptance in residential areas.

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION.

Value Engineering Alternative Number 1: ***Construct ditches with alternative ditch stabilization.***

Advantages

- Less construction cost.

Disadvantages

- Possible higher maintenance costs.

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION.

Value Engineering Alternative Number 2: ***More energy attenuated outlets***.

Advantages

- Reduces velocity of runoff.

Disadvantages

- Possible higher maintenance costs.
- Tend to silt up.

Conclusion

DROPPED FROM FURTHER EVALUATION.

G. DRAINAGE

Value Engineering Alternative Number 3: Construct metal end sections.

Advantages

- Less construction cost.

Disadvantages

- Possible higher maintenance costs.
- Lower service life.
- Compatibility with RCP.

Conclusion

DROPPED FROM FURTHER EVALUATION.

H. WOVEN WIRE FENCE

"As Proposed": **Install a woven wire fence along the US 641 Right of Way.**

Advantages

- More access control.

Disadvantages

- Disturbs stream bed.
- Center wall may collect debris.

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION.

Value Engineering Alternative Number 1: Do not install fence.

Advantages

- Lower construction cost.

Disadvantages

- Less access control.

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION.

Value Engineering Alternative Number 2: Use only where required.

Advantages

- Lower construction cost.

Disadvantages

- None apparent.

Conclusion

CARRY FORWARD FOR FURTHER EVALUATION.

VII. DEVELOPMENT PHASE

A. EARTHWORK

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

B. DRAINAGE BLANKET

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

C. RIGHT OF WAY

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

D. PAVEMENT

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE NUMBER 1
(3) VALUE ENGINEERING ALTERNATIVE NUMBER 2
(4) VALUE ENGINEERING ALTERNATIVE NUMBER 3
(5) VALUE ENGINEERING ALTERNATIVE NUMBER 4
(6) VALUE ENGINEERING ALTERNATIVE NUMBER 5

E. BRIDGE

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

VII. DEVELOPMENT PHASE

F. DRAINAGE

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

G. WOVEN WIRE FENCE

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

VII. DEVELOPMENT PHASE

A. EARTHWORK

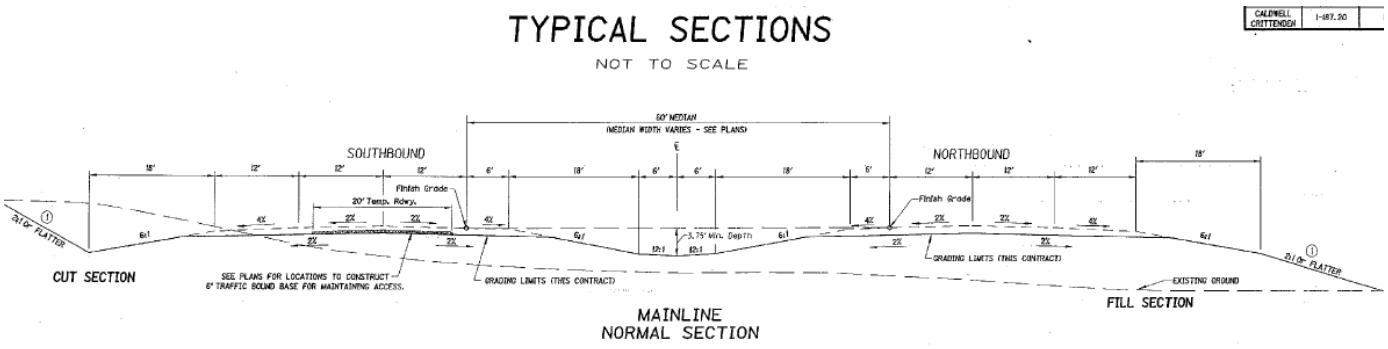
1. "As Proposed"

This project will construct a new 5.6-mile 4-lane divided roadway east of the existing alignment bypassing Crayne, KY. The roadway will consist of:

- 4-12' lanes
- 2-12' outside shoulders (10' paved)
- 2-6' inside shoulders (6' paved)
- 60' median
- All included in a minimum 204' Right of Way

The work will includes twin 248' 2-span bridges over Livingston Creek. This alignment begins at elevation 435' and proceeds north over rolling terrain reaching a maximum elevation of approximately 668' and ends at the current alignment of US 641 at an elevation of 602'. Additional work includes constructing 4 box culverts along the alignment.

The proposed profile grades will excavate approximately 1,844,606 CY of material and require approximately 1,1624,777 CY of embankment that will result in a balanced earthwork project.



AS PROPOSED CROSS SECTION

VII. DEVELOPMENT PHASE

A. EARTHWORK

2. Value Engineering Alternative Number 1

No build:

The Basic Function of this new roadway is to increase capacity. The existing US 641, according to the traffic counts and traffic projections indicate the roadway is operating at 26% capacity today and in the 2027 Design Year at 43%. It is therefore the recommendation of the VE Team to set these plans on the shelf and wait for a significant increase in projected traffic to complete the project.

EARTHWORK - NO BUILD
VALUE ENGINEERING ALTERNATIVE NUMBER 1
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
RIGHT OF WAY	LS	$3,500,000	1	$3,500,000	-	$0
UTILITY RELOCATION	LS	$37,500,000	1	$37,500,000	-	$0
CONSTRUCTION	LS	$26,123,076	1	$26,123,076	-	$0
SUBTOTAL				**$67,123,076**		**$0**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)				$0		$0
TRAFFIC CONTROL/MOT				$0		$0
CONTINGENCY				$0		$0
GRAND TOTAL				**$67,123,076**		**$0**

POSSIBLE SAVINGS: $67,123,076

VII. DEVELOPMENT PHASE

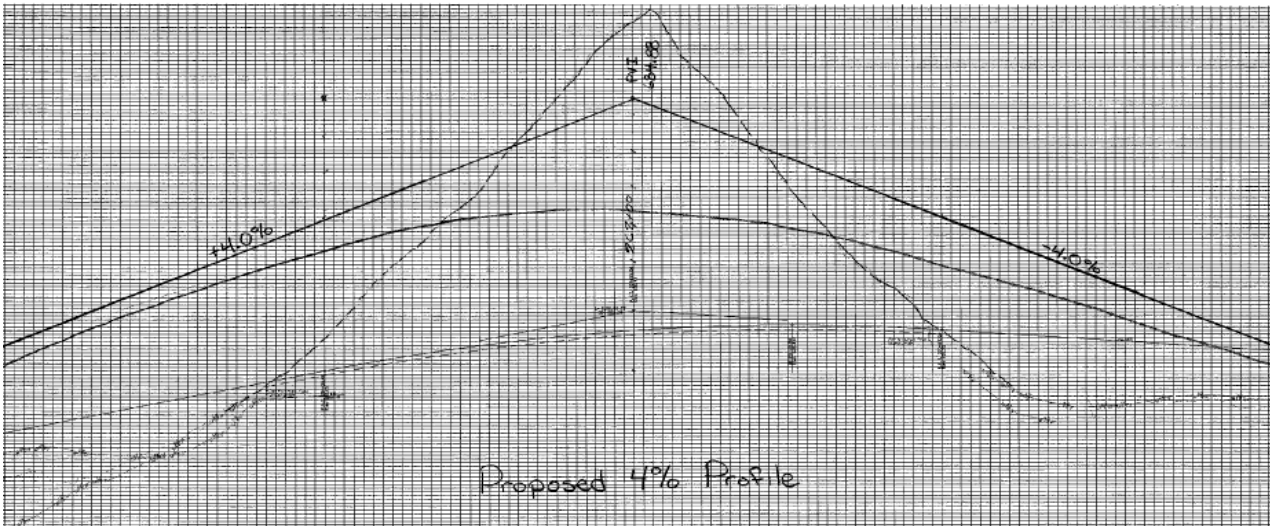
A. EARTHWORK

3. Value Engineering Alternative Number 2

Adjust Grades:

This Value Engineering Alternative focuses on the large cut from station 253+00 to 270+00. The As Proposed Design will excavate approximately 1,000,000 cubic yards of material in this section of the project – over half of the project total.

Increasing the profile grades to 4% on both sides of this hill will result in reduction of approximately 250,000 cubic yards.



VALUE ENGINEERING ALTERNATIVE NUMBER 2
4% GRADE

EARTHWORK - ADJUST GRADES
VALUE ENGINEERING ALTERNATIVE NUMBER 2
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Earthwork	CY	$5.50	1,897,315	$10,435,233	1,647,315	$9,060,233
SUBTOTAL				**$10,435,233**		**$9,060,233**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		5.8%		$663,620		$576,178
TRAFFIC CONTROL/MOT		0.0%		$0		$0
CONTINGENCY		10.0%		$1,043,523		$906,023
GRAND TOTAL				**$12,142,376**		**$10,542,434**

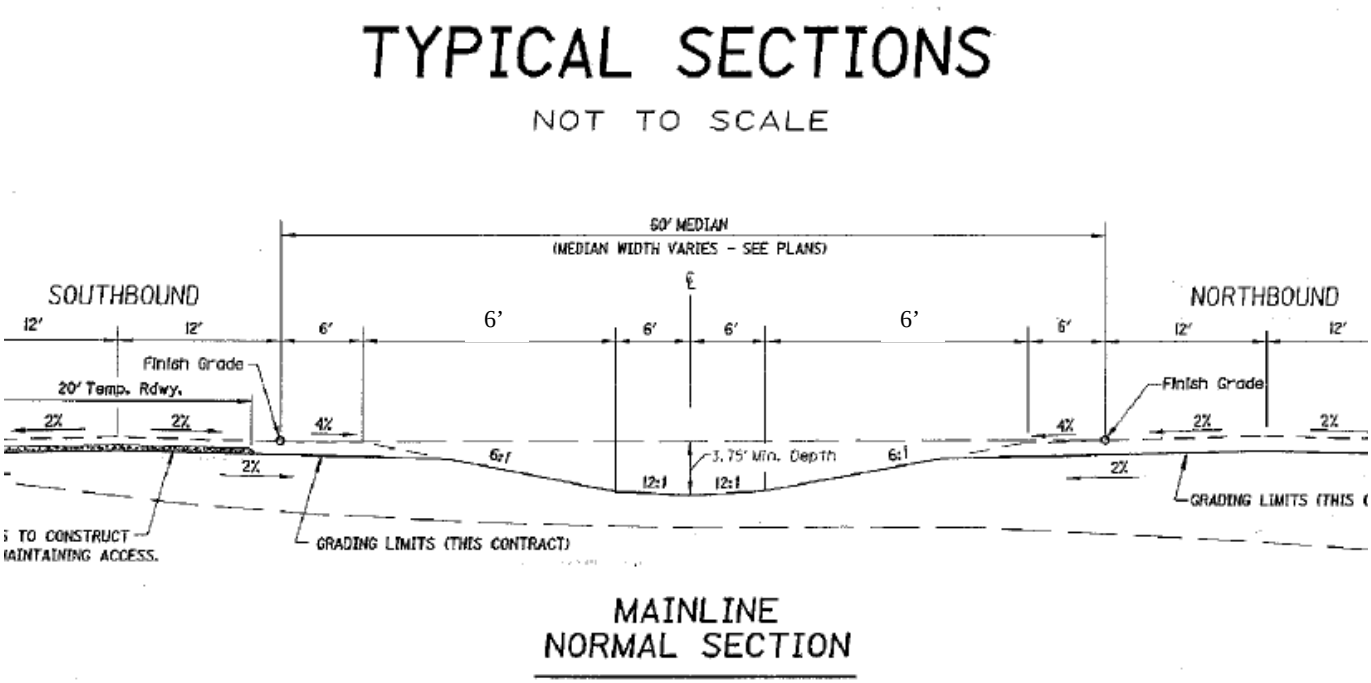
POSSIBLE SAVINGS: $1,599,942

VII. DEVELOPMENT PHASE

A. EARTHWORK

4. Value Engineering Alternative Number 3

This Value Engineering Alternative is to reduce the As Proposed 60’ - median width to a standard 36’ – median width widely used on Kentucky’s highways meeting this type of classification.



EARTHWORK - MEDIAN WIDTH
VALUE ENGINEERING ALTERNATIVE NUMBER 3
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Excavation	cuyd	$5.50	1,844,606	$10,145,333	1,724,706	$9,485,883
Seed and Protect	sqyd	$0.40	636,275	$254,510	566,605	$226,642
Clear and Grub	sqyd	$0.43	926,563	$398,422	856,894	$368,464
Granular Embankment	cuyd	$25.00	31,528	$788,200	30,863	$771,575
SUBTOTAL				**$11,586,465**		**$10,852,564**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		5.8%		$697,525		$653,001
TRAFFIC CONTROL/MOT		0.0%		$0		$0
CONTINGENCY		10.0%		$1,158,647		$1,085,256
RIGHT OF WAY	AC	$2,500	191.5	$478,750	177.0	$442,500
GRAND TOTAL				**$13,921,387**		**$13,033,321**

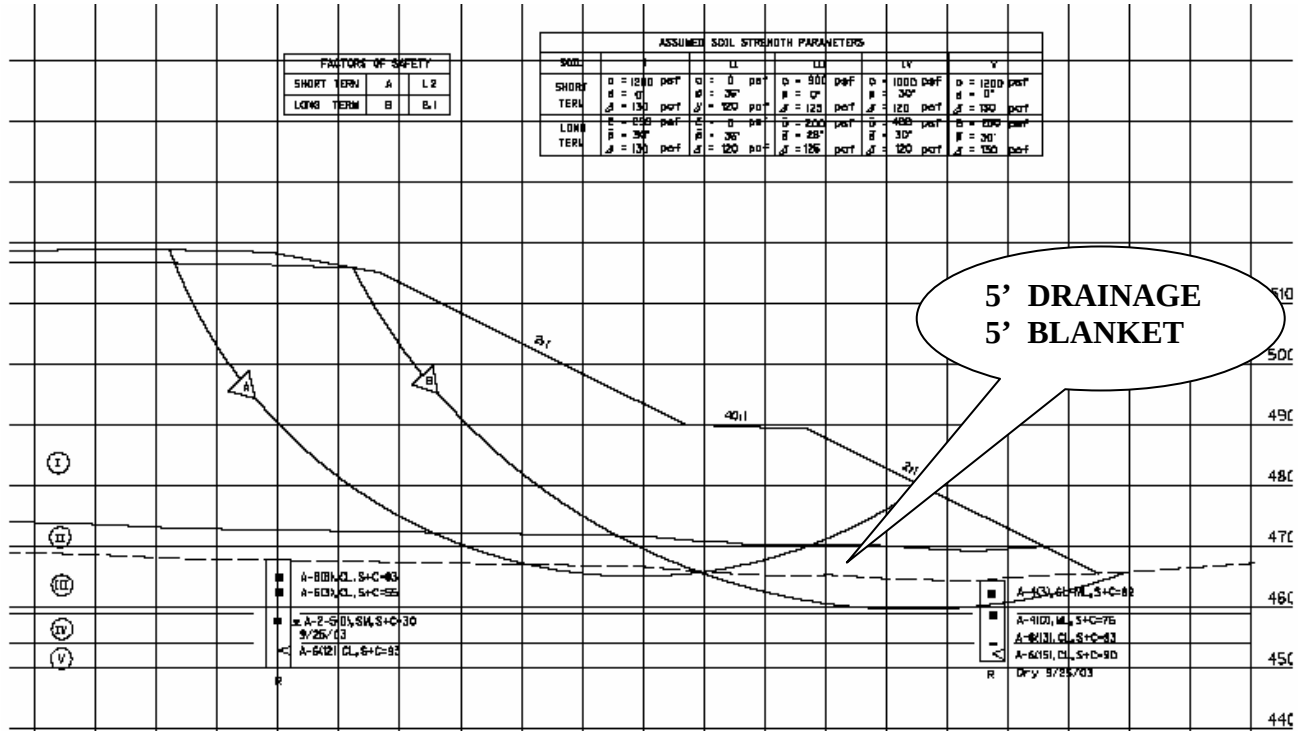
POSSIBLE SAVINGS: $888,065

VII. DEVELOPMENT PHASE

B. DRAINAGE BLANKET

1. "As Proposed"

Due to springs and seepage areas that were discovered during the subsurface investigation, a 5-foot drainage blanket is proposed from stations 157+00 to 166+00 and 171+50 to 185+00. The seepage areas were not well enough defined to incorporate spring boxes and pipe structures. The estimated cost for this drainage blanket is $1,898,430.



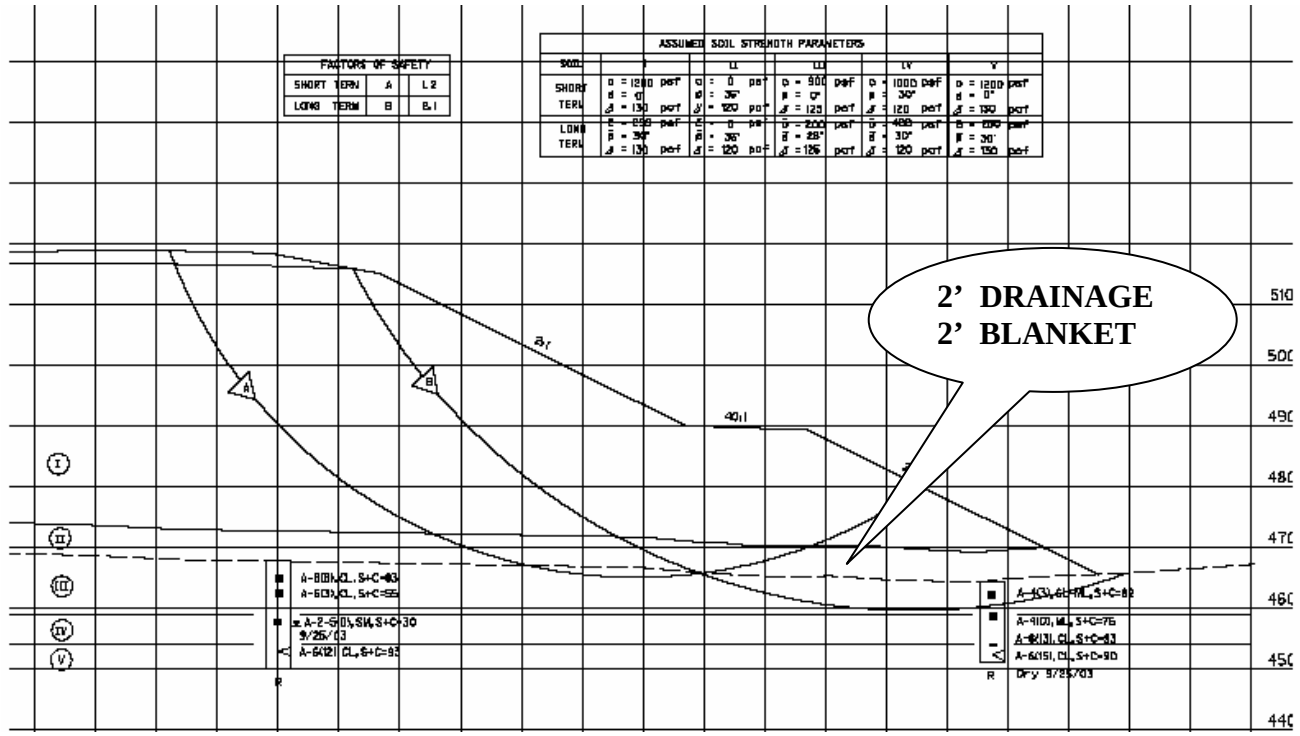
AS PROPOSED 5' DRAINAGE BLANKET – EMBANKMENT

VII. DEVELOPMENT PHASE

B. DRAINAGE BLANKET

2. Value Engineering Alternative

The Value Engineering Team recommends reducing the drainage blanket from 5 feet to 2 feet in order to reduce the amount of quantities on the project. The drainage blanket runs from toe to toe in order to maintain positive drainage. A two-foot drainage blanket will convey all the water from the seepage areas. The proposal will reduce the drainage blanket from 126,562 yd3 to 50,624 yd3. The estimate of $15.00 per yard would add to a project savings of $1,139,058.



VALUE ENGINEERING ALTERNATIVE
2' DRAINAGE BLANKET – EMBANKMENT

DRAINAGE BLANKET - EMBANKMENT
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
DRAINAGE BLANKET - EMBANKMENT	CY	$15.00	126,562	$1,898,430	50,625	$759,375
ROADWAY EXCAVATION	CY	$5.50	1,634,777	$8,991,274	1,710,714	$9,408,927
SUBTOTAL				**$10,889,704**		**$10,168,302**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		5.8%		$692,522		$646,645
TRAFFIC CONTROL/MOT		0.0%		$0		$0
CONTINGENCY		10.0%		$1,088,970		$1,016,830
GRAND TOTAL				**$12,671,196**		**$11,831,777**

POSSIBLE SAVINGS: $839,419

VII. DEVELOPMENT PHASE

B. DRAINAGE BLANKET

COST COMPARISON SHEET BACK UP CALCULATIONS

2’ X 126,562 CY/5’ = 50,625 CY VOLUME FOR 2’ DRAINAGE BLANKET

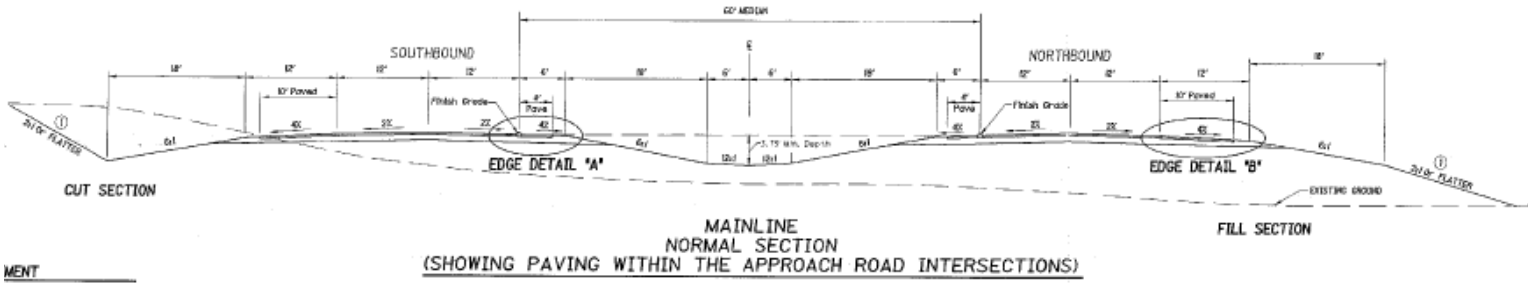
1,634,777 CY EMBANKMENT + (126,562 CY PROPOSED DRAINAGE BLANKET - 50,625 CY VE DRAINAGE BLANKET)

VII. DEVELOPMENT PHASE

C. RIGHT OF WAY

1. "As Proposed"

The "As Proposed" Partially Controlled Access 4 – lane divided roadway typical section for the 5.6 miles of US 641 on a new alignment as shown below will require the acquisition of approximately 258 acres of land from various owners. This computes to be an average width of 400' +/- for the typical section. In addition to the land costs there will be costs for severance damages to property due to loss of access.

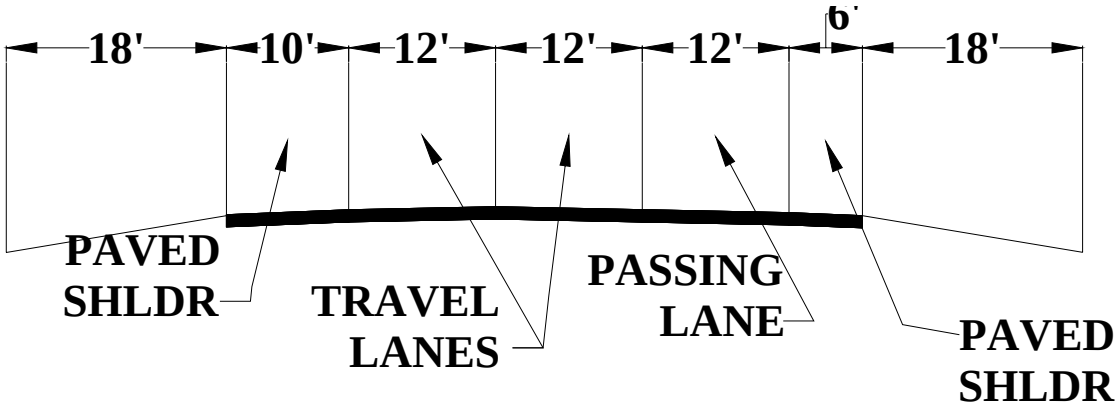


C. RIGHT OF WAY

2. Value Engineering Alternative Number 1

Utilize existing US-64 Right of Way, add passing lanes along with other minor improvements.

The Value Engineering Team Recommends making minor improvements where needed and to rehabilitate the existing roadway. The traffic demand does not warrant the construction of a 4 – lane divided roadway.



VALUE ENGINEERING ALTERNATIVE NUMBER 1
IMPROVE EXISTING US 641 TYPICAL SECTION

ROW - USE EXISTING US 641
VALUE ENGINEERING ALTERNATIVE NUMBER 1
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
AS PROPOSED CONSTRUCTION	LS	$26,123,076	1	$26,123,076	-	$0
REHAB EXISTING US 641	LS	$2,500,000	-	$0	1.0	$2,500,000
SUBTOTAL				**$26,123,076**		**$2,500,000**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		5.8%		$1,661,276		$158,986
TRAFFIC CONTROL/MOT		0.0%		$0		$250,000
CONTINGENCY		10.0%		$2,612,308		$250,000
ROW DAMAGES COST	ACRE	$560.00	1,538.310	$861,454	-	$0
ROW LAND COST	ACRE	$2,800.00	257.984	$722,355	-	$0
GRAND TOTAL				**$31,980,469**		**$3,158,986**

POSSIBLE SAVINGS: $28,821,483

VII. DEVELOPMENT PHASE

C. RIGHT OF WAY

COST COMPARISON SHEET BACK UP CALCULATIONS

Assume cost of property cost @ $2,800 per acre

Permanent Right of Way	252.81 acre		
Land Locked Property	5.31 acre		
Total	257.94 acre	@ $2,800 per ac	$722,232

Assume damages @ 20% of property cost, or $560 per acre

Severed ROW Left Side	639.28 acre		
Severed ROW Right Side	889.03 acre		
Total	1,528.31 acre	@ $560 per ac	$855,853

Total Estimated Cost of 'As Designed' $1,578,000

REHAB EXISTING US 641:

6.2 MILES X 5280 FT X 24 FT/9 SF/SY = 87,300 SY +/- PAVEMENT

MILL 3":

87,300 SY X 110 LBS/SY – IN X 3 "/2000 LBS/TN = 14,550 TN @ $20.52 = $298,268

PUT BACK 4" ASPHALT BASE:

87,300 SY X 110 LBS/SY – IN X 4 "/2000 LBS/TN = 19,206 TN @ $60.00 = $1,152,360

SURFACE COURSE:

87,300 SY X 110 LBS/SY – IN X 1 ¼ "/2000 LBS/TN = 6,002 TN @ $60.00 = $360,115

ADD 2 – PASSING LANES (ONE IN EACH DIRECTION ½ MILE LONG)

5280' X 12' / 9'/SY = 7040 SY

BASE COURSE:

7040 SY X 110 LBS/SY – IN X 11.5 "/2000 LBS/TN = 4,460 TN @ $60.00 = $267,168

SURFACE COURSE:

7040 SY X 110 LBS/SY – IN X 1 ¼ "/2000 LBS/TN = 484 TN @ $60.00 = $29,040

DRAINAGE LAYER:

7040 SY X 100 LBS/SY – IN X 4 "/2000 LBS/TN = 1,408 TN @ $40.00 = $56,320

DGA:

7040 SY X 74 LBS/SY – IN X 4 "/2000 LBS/TN = 1,042 TN @ $17.00 = $17,715

EXCAVATION:

7040 SY X 2/3 Y X 1.5 = 7040 CY X $5.50 = $38,720

$2,219,706

SAY $2,500,000

VII. DEVELOPMENT PHASE

C. RIGHT OF WAY

3. Value Engineering Alternative Number 2

Change Access Control to Permit.

The Value Engineering Team recommends allowing access to US 641 by permit. With the low volumes of traffic forecast for this section of highway there does not appear to be any negative operational impacts or any negative risk factors with allowing driveways by permit. This would eliminate any additional Right of Way costs for severed damages.

ROW - BY PERMIT
VALUE ENGINEERING ALTERNATIVE NUMBER 2
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
FENCE - WOVEN WIRE TYPE 1	LF	$7.00	57,895	$405,265	-	$0
SUBTOTAL				**$405,265**		**$0**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		5.8%		$25,773		$0
TRAFFIC CONTROL/MOT		0.0%		$0		$0
CONTINGENCY		10.0%		$40,527		$0
ROW DAMAGES COST	ACRE	$560.00	1,538.310	$861,454	-	$0
ROW LAND COST	ACRE	$2,800	257.984	$722,355	257.984	$722,355
GRAND TOTAL				**$2,055,373**		**$722,355**

POSSIBLE SAVINGS: $1,333,018

VII. DEVELOPMENT PHASE

C. RIGHT OF WAY

COST COMPARISON SHEET BACK UP CALCULATIONS

Assume cost of property cost @ $2,800 per acre

Permanent Right of Way	252.81 acre		
Land Locked Property	5.31 acre		
Total	257.94 acre	@ $2,800 per ac	$722,232

Assume damages @ 20% of property cost, or $560 per acre

Severed ROW Left Side	639.28 acre		
Severed ROW Right Side	889.03 acre		
Total	1,528.31 acre	@ $560 per ac	$855,853

Total Estimated Cost of 'As Designed' $1,578,000

VE Right of Way Cost Summary

VE 01 As Design Section with Access Changed to 'By Permit'

Item	As Designed Cost	Factor		Revised Cost	Savings
Right of way Land Cost	$1,578,000	b		$495,508	
Design	$2,485,000	100%		$2,485,000	
Pavmt	$14,156,592	100%		$14,156,592	
Roadway a	$19,081,225	80%	$15,264,980		
exclude r/w fence			-$405,269	$14,859,711	
Drainage a	$1,219,325	80%		$975,460	
Bridge + culverts	$2,528,307	100%		$2,528,307	
Utility	$3,750,000	100%		$3,750,000	
Demob + Mob a	$2,456,260	85%		$2,087,821	
Total	**$47,254,709**			**$41,338,399**	**$5,916,310**

a Assume 20% reduction due to grades being changed to steeper slopes
b No land locked or severed property included, property assumed @ $2800/acre cost

VE 02 Two Lane Super with Partial Control Access

Item	As Designed Cost	Factor	Revised Cost	Savings
Right of way Land Cost	$1,578,000	a	$923,435	
Design	$2,485,000	125%	$3,106,250	
Pavmt	$14,156,592	b	$7,415,358	
Roadway	$19,081,225	60%	$11,448,735	
Drainage	$1,219,325	60%	$731,595	
Bridge + culverts	$2,528,307	c	$1,473,084	
Utility	$3,750,000	90%	$3,375,000	
Demob + Mob	$2,456,260	60%	$1,473,756	
Total	**$47,254,709**		**$29,947,213**	**$17,307,496**

VII. DEVELOPMENT PHASE

C. RIGHT OF WAY

COST COMPARISON SHEET BACK UP CALCULATIONS

a Includes land locked + severed property, property assumed @ $2800/acre cost
(assumes revise plan includes 50% of As Designed severed property)
(assumes 20% damage for severed property)
b See Pavement VE for detail for reduction to two lanes
c See Pavement VE for detail for reduction to two lanes

VE 03 Two Lane Super with Access 'By Permit'

Item	As Designed Cost	Factor		Revised Cost	Savings
Right of way Land Cost	$1,578,000	a		$495,508	
Design	$2,485,000	125%		$3,106,250	
Pavmt	$14,156,592	b		$7,415,358	
Roadway	$19,081,225	60%	$11,448,735		
exclude r/w fence			-$405,269	$11,043,466	
Drainage	$1,219,325	60%		$731,595	
Bridge + culverts	$2,528,307	c		$1,473,084	
Utility	$3,750,000	90%		$3,375,000	
Demob + Mob	$2,456,260	55%		$1,350,943	
Total	**$47,254,709**			**$28,991,204**	**$18,263,505**

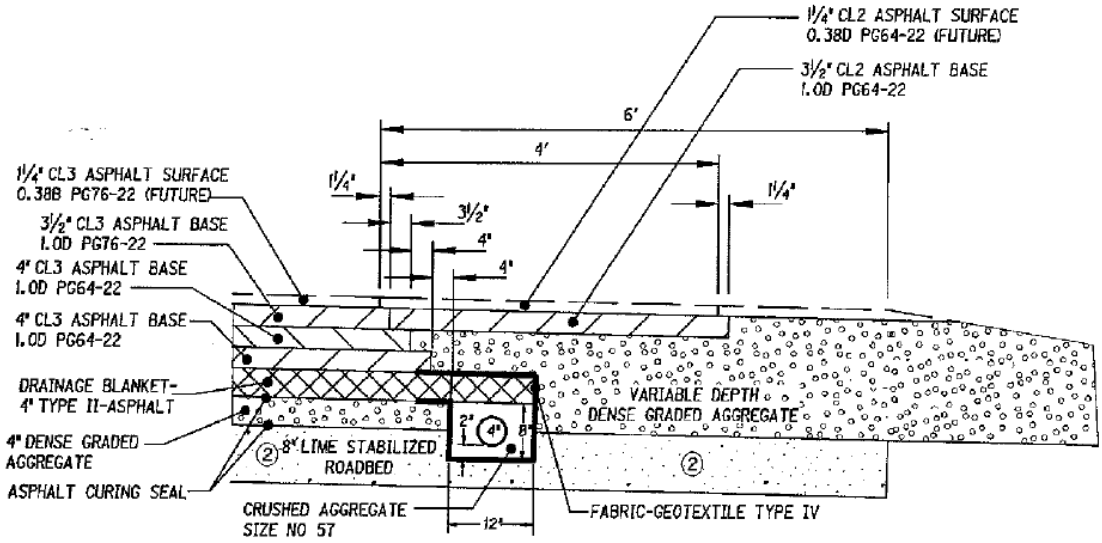
a No land locked or severed property included, property assumed @ $2800/acre cost
b See Pavement VE for detail for reduction to two lanes
c See Pavement VE for detail for reduction to two lanes

VII. DEVELOPMENT PHASE

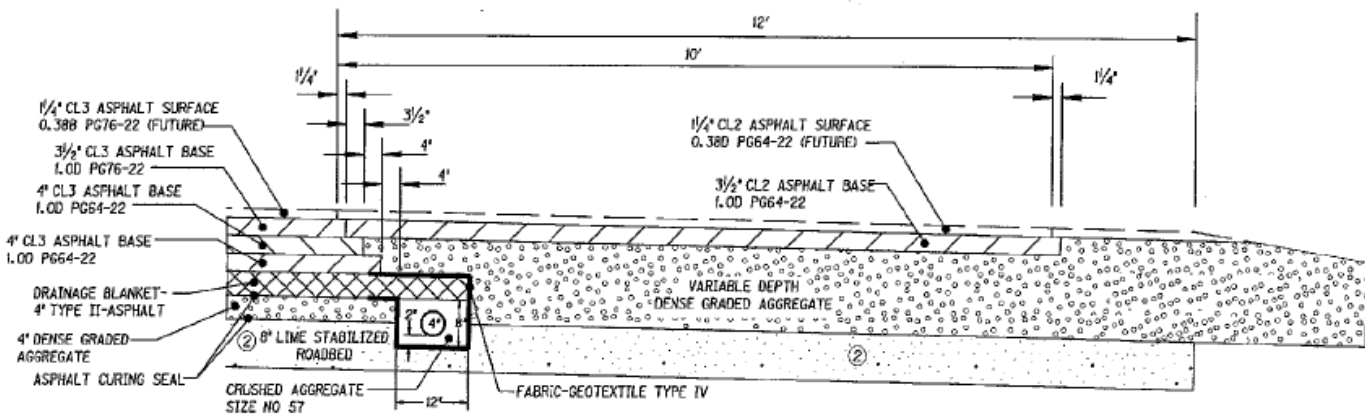
D. PAVEMENT

1. "As Proposed"

Construct 4 – 12' lanes, 12' outside shoulders (10' paved), 6' inside shoulders (4' paved) with the maximum asphalt option – 4" DGA, 4" asphalt drainage blanket, 11 ½" asphalt base, and 1 ¼" surface course for the travel lanes and variable depth DGA, 4" asphalt base, and 1 ¼" surface course for the shoulders.



AS PROPOSED PAVEMENT DESIGN (INSIDE SHOULDER)

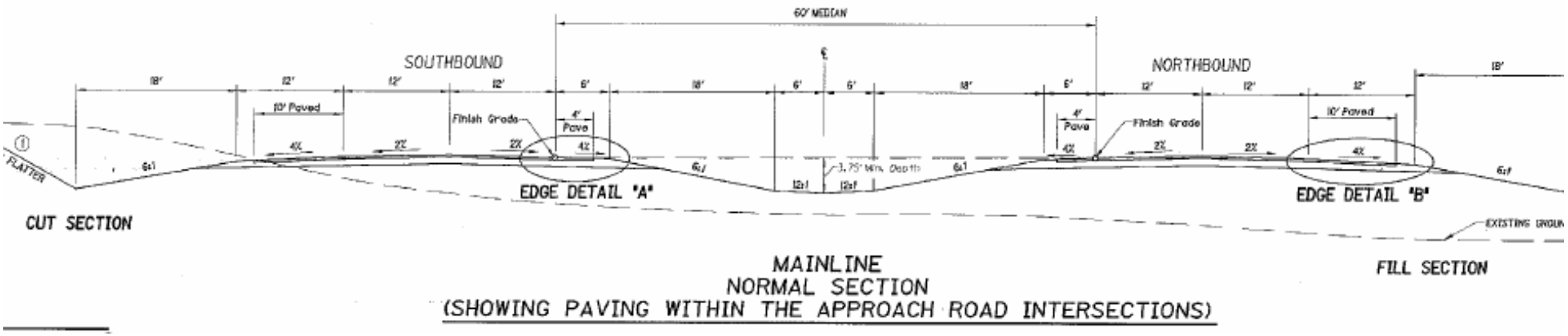


AS PROPOSED PAVEMENT DESIGN (OUTSIDE SHOULDER)

VII. DEVELOPMENT PHASE

D. PAVEMENT

1. "As Proposed"



AS PROPOSED TYPICAL SECTION

D. PAVEMENT

2. Value Engineering Alternative Number 1

Construct 2 – lane roadway within As Proposed Right of Way.

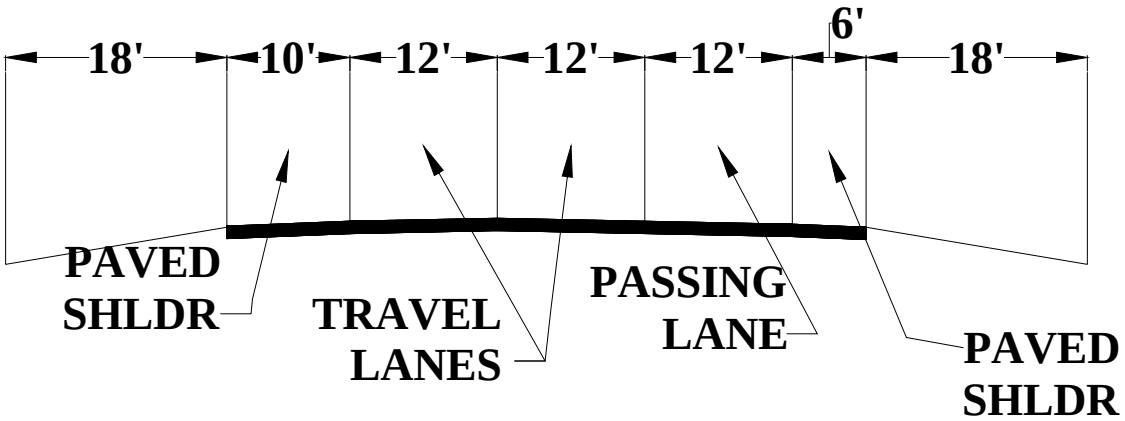
The ADT on existing US 641 is barely 4000 vehicles per day that is well below the operational capacity for a two-lane rural roadway. The VE Team is also very skeptical of the model data that suggests that an additional 10,000 vpd might use the corridor if a 4-lane facility were to be built. Would that mean 15,000 vpd might use the corridor if a 6-lane facility were built? We believe that this data should be evaluated thoroughly before being used as a basis for any design.

The VE Team's opinion is that no reasonable basis for designing the proposed facility with a design speed of 70 mph (interstate standards). The proposed facility should be a partially controlled access facility with several access, egress and crossing points. A 70 mph design speed limits the design team's ability to maximize the practicality of their design, as well as, increasing the risk of severe accidents on the facility.

A limited justification for considering a new facility at this location may be to accommodate truck traffic, as this is a concern on the existing facility. However, we have no data or information which details how or why truck traffic has difficulties using the existing facility. A more thorough analysis may yield alternative measures that could address this aspect of the purpose and need of a new facility.

Based on the information above we the VE Team recommends that a VE Alternative to construct an additional and complementary two-lane facility should be considered. The new two-lane facility could be designated as an "Alternate" or "Truck" Route thereby maintaining the functionality and operational capacity of the existing US 641. We recommend purchasing the right-of-way required for a full-build in the extremely unlikely event that such expansion be ever warranted.

The proposed section would require 12 ft lanes, each having a 10 ft shoulder (8 ft paved).



VALUE ENGINEERING ALTERNATIVE NUMBER 1
TYPICAL SECTION

PAVEMENT-TWO LAVE ROAD
VALUE ENGINEERING ALTERNATIVE NUMBER 1
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
DGA BASE	Ton	$17.00	77,195	$1,312,315	38,598	$656,158
Lime Stabilized Roadbed	Sq Yd	$2.78	75,826	$210,796	37,913	$105,398
Lime	Ton	$115.00	1,407	$161,805	704	$80,903
Drainage Blanket	Ton	$40.00	38,500	$1,540,000	19,250	$770,000
Traffic Bound Base	Ton	$18.00	15,172	$273,096	7,586	$136,548
Asphalt Seal Aggregate	Ton	$155.00	1,132	$175,460	566	$87,730
CL2 1.00D PG64-22	Ton	$55.00	18,917	$1,040,435	9,459	$520,218
CL3 1.00D PG64-22	Ton	$55.00	74,698	$4,108,390	37,349	$2,054,195
CL3 0.75D PG64-22	Ton	$60.00	32,680	$1,960,800	16,340	$980,400
CL2 0.75D PG64-22	Ton	$55.00	12,007	$660,385	6,004	$330,193
Emulsified Asphalt RS-2	Ton	$700.00	136	$95,200	68	$47,600
CL2 0.38D PG64-22	Ton	$60.00	21,146	$1,268,760	10,573	$634,380
Asphalt Curing Seal	Ton	$500.00	268	$134,000	134	$67,000
JPC Pavement 11”	Sq Yd	$75.00	6,596	$494,700	3,298	$247,350
CL3 0.38B PG76-22	Ton	$60.00	11,675	$700,500	5,838	$350,250
Sand For Blotter	Ton	$30.00	665	$19,950	333	$9,975
Bridge at County Line	SF	$62.87	21,826	$1,372,005	10,912	$686,003
10’ c 8’ RCBC	LF	$666.44	310	$206,596	190	$126,623
6’ x 6’ RCBC	LF	$385.32	330	$127,156	200	$77,064
10’ x 8’ RCBC	LF	$678.49	205	$139,090	110	$74,634
DBL 14’ x 10’ RCBC	LF	$1,746.41	290	$506,460	175	$305,622
SUBTOTAL				**$16,507,899**		**$8,348,242**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		5.8%		$1,049,807		$530,900
TRAFFIC CONTROL/MOT		0.0%		$0		$0
CONTINGENCY		10.0%		$1,650,790		$834,824
GRAND TOTAL				**$19,208,496**		**$9,713,966**

POSSIBLE SAVINGS: $ 9,494,530

D. PAVEMENT

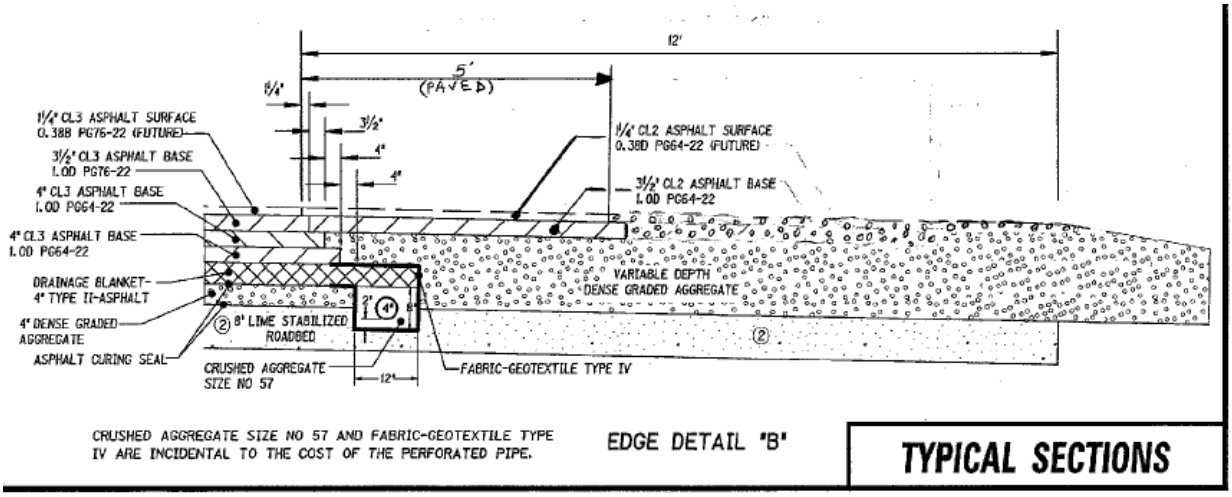
3. Value Engineering Alternative Number 2

Reduce paved shoulders to 5'.

The proposed US 641 typical section specifies 10' paved outside shoulders and 4' paved inside shoulders. The Value Engineering Team investigated the potential cost savings obtained from reducing the paved shoulder widths, both inside and outside. The Value Engineering Alternative typical section calls for an outside paved shoulder width of 5' and an inside paved shoulder width of 2'. The overall width of the template remains unchanged; therefore, right-of-way and other miscellaneous bid items are unaffected relative to the "as proposed" quantities.

The only bid items affected under the Value Engineering Alternative are:

- Asphalt surface CL2 0.38 D PG64-22
- Asphalt Base CL2 1.0D PG64.22
- DGA

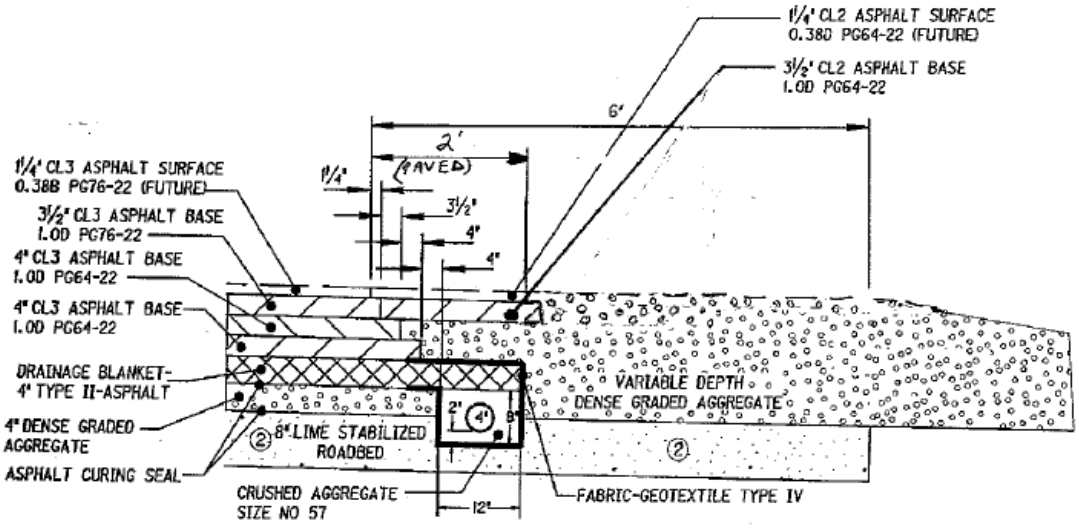


VALUE ENGINEERING ALTERNATIVE NUMBER 2
OUTSIDE SHOULDER

VII. DEVELOPMENT PHASE

D. PAVEMENT

3. Value Engineering Alternative Number 2



EDGE DETAIL "A"

VALUE ENGINEERING ALTERNATIVE NUMBER 2
INSIDE SHOULDER

PAVEMENT - CONSTRUCT 5' OUTSIDE SHLDR/2' INSIDE SHOULDER
VALUE ENGINEERING ALTERNATIVE NUMBER 2
COST COMPARISON SHEET

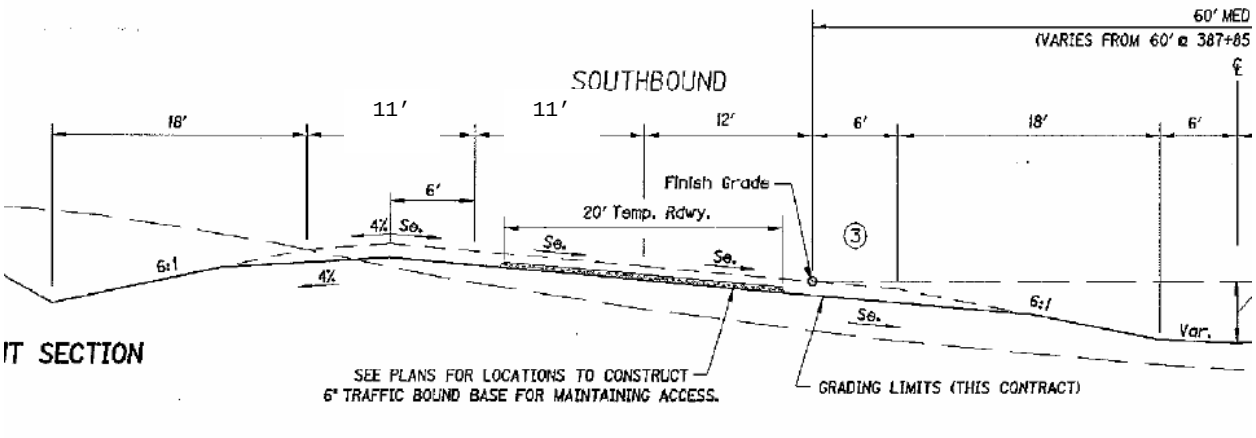
DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
3 1/2' CL2 ASPHALT BASE COURSE	tons	$50.79	17,795.0	$903,808	9,028.0	$458,532
1 1/4' CLS SURFACE COURSE	tons	$58.37	6,262.0	$365,513	3,131.0	$182,756
DGA	tons	$17.51	77,195.0	$1,351,684	89,633.0	$1,569,474
SUBTOTAL				**$2,621,005**		**$2,210,762**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		5.8%		$166,681		$140,592
TRAFFIC CONTROL/MOT		0.0%		$0		$0
CONTINGENCY		10.0%		$262,101		$221,076
GRAND TOTAL				**$3,049,787**		**$2,572,430**

POSSIBLE SAVINGS:	**$477,356**

D. PAVEMENT

4. Value Engineering Alternative Number 3

Construct 11' lanes.



VALUE ENGINEERING ALTERNATIVE NUMBER 3
TYPICAL SECTION WITH 11' LANES

This will be a low volume roadway based on the traffic projects provided to the Value Engineering Team. With that in mind, 11' lanes appear to not have any negative operational impacts.

PAVEMENT - 11' LANES
VALUE ENGINEERING ALTERNATIVE NUMBER 3
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
DGA BASE	tons	$17.51	77,195	$1,351,684	74,308	$1,301,135
Lime Stabilized Roadbed	sqyd	$1.98	75,826	$150,135	62,704	$124,153
Drainage Blanket	tons	$35.77	38,500	$1,377,145	35,613	$1,273,881
CL3 1.00D PG64-22	tons	$48.08	74,698	$3,591,480	68,924	$3,313,877
CL3 0.75D PG64-22	tons	$48.94	32,680	$1,599,359	30,154	$1,475,735
CL3 0.38B PG76-22	tons	$65.36	11,675	$763,078	10,592	$692,320
SUBTOTAL				**$8,832,882**		**$8,181,102**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		5.8%		$561,720		$520,271
TRAFFIC CONTROL/MOT		0.0%		$0		$0
CONTINGENCY		10.0%		$883,288		$818,110
GRAND TOTAL				**$10,277,890**		**$9,519,483**

POSSIBLE SAVINGS: $758,408

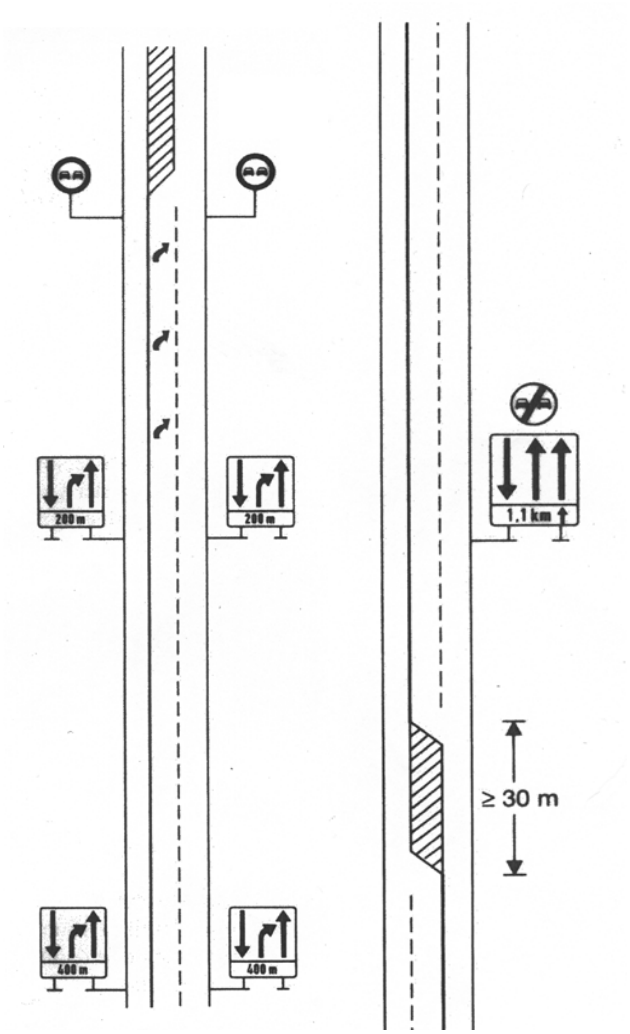
VII. DEVELOPMENT PHASE

D. PAVEMENT

5. Value Engineering Alternative Number 4

Construct 3 – lane roadway.

The Value Engineering Alternative Number 4 under the Pavement category is a 3-lane roadway, also known as a 2+1 roadway. The typical section is composed of 3-12' lanes. The outside shoulders would remain the same as the proposed and the inside shoulders would be eliminated.



VII. DEVELOPMENT PHASE

D. PAVEMENT

5. Value Engineering Alternative Number 4

The 2+1 roadway is a continuous 3-lane cross section with alternating passing lanes. This alternative operates effectively with volumes of 15,000 to 25,000 ADT. The majority of rural roads in the US have only 2 lanes. Some European countries have been able to modify their 2 lane roads utilizing the 2+1 roadway design and driver response has been positive. They have reported accident rates 22-46% lower than for conventional 2 lane roadways. The lanes can be separated by pavement markings and in some cases cable barriers. The US has safety concerns about barrier deflection and tort liability and would like to evaluate these issues before implementing cable barriers with a 2+1 design on US roadways.

This design is recommended for level or gently rolling terrain. It works best with a 60-mph operating speed and it is recommended that the speed limit be lowered to 45 mph at intersections. Partial access control is also recommended.

2+1 ROADWAYS IN OPERATION

Right-of-Way acquisition would be the same as the "As Proposed". This way, when traffic increases, the roadway can be widened to four lanes.

For the 2+1 alternative, the Pavement savings totaled nearly $3 million. But the Earthwork (which includes the Drainage Blanket-Embankment) provided the biggest savings of close to $7 million. This alternative also reduced the costs for clearing and grubbing, pipe culverts, box culverts, the bridge and pavement striping. The overall savings for the 2+1 roadway came to over $14 million.

PAVEMENT - 3-LANE ROADWAY
VALUE ENGINEERING ALTERNATIVE NUMBER 4
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Pavement	SY	$46.24	180,700	$8,355,570	119,470	$5,524,310
Earthwork	CY	$5.50	2,242,484	$12,333,662	1,009,118	$5,550,148
Clearing and Grubbing	AC	$2,500.00	160	$400,000	72	$180,000
Drainage AS PROPOSED	LS	$778,480.00	1	$778,480	-	$0
Drainage AS PROPOSED	LS	$350,316.00	-	$0	1	$350,316
Bridge and Box Culverts AS PROPOSED	LS	$979,302.00	2	$2,306,307	-	$0
Bridge and Box Culverts	LS	$1,435,939.65	-	$0	1	$1,435,940
Pavement Striping	LF	$0.45	177,408	$79,717	118,272	$53,145
SUBTOTAL				**$24,253,736**		**$13,093,858**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		6.5%		$1,734,142		$936,211
TRAFFIC CONTROL/MOT		10.0%		$2,425,374		$1,309,386
CONTINGENCY		10.0%		$2,425,374		$1,309,386
GRAND TOTAL				**$30,838,625**		**$16,648,841**

POSSIBLE SAVINGS: $14,189,785

VII. DEVELOPMENT PHASE

D. PAVEMENT

5. Value Engineering Alternative Number 4

COST COMPARISON SHEET BACK UP CALCULATIONS

	AS PROPOSED			VALUE ENGINEERED		
Culvert Pipe (LF)	**Quantity**	**Unit Price**	**Cost**	**Quantity**	**Unit Price**	**Cost**
18" (462)	2,870	$ 45.00	$ 129,150	1,292	$ 45.00	$ 58,118
24"	1,729	$ 70.00	$ 121,030	778	$ 70.00	$ 54,464
30"	1,095	$ 80.00	$ 87,600	493	$ 80.00	$ 39,420
36"	819	$ 100.00	$ 81,900	369	$ 100.00	$ 36,855
42" (469)	768	$ 110.00	$ 84,480	346	$ 110.00	$ 38,016
48" (470)	948	$ 150.00	$ 142,200	427	$ 150.00	$ 63,990
60" (472)	734	$ 180.00	$ 132,120	330	$ 180.00	$ 59,454
Total			$ 778,480			$ 350,316
Bridge			$ 1,327,005			$ 995,254
Box Culverts			$ 979,302			$ 440,686
Bridge and Box Culverts			$ 2,306,307			$ 1,435,940

PAVEMENT

			DEPTH	RATE/SY	TN	COST/SY
SURFACE	$	65.36	1.25	110	0.069	$ 4.49
BASE 1	$	54.40	3.50	110	0.193	$ 10.47
BASE 2	$	48.94	8.00	110	0.440	$ 21.53
DRAINAGE BLANKET	$	35.77	4.00	100	0.200	$ 7.15
DGA	$	17.51	4.00	74	0.148	$ 2.59
						$ 46.24

D. PAVEMENT

6. Value Engineering Alternative Number 5

Redo Pavement Selection.

The Value Engineering Team recommends completing a Pavement Selection Process with current traffic projections.

We evaluated using the following 3 criteria. The results are included using Life Cycle Cost Analysis for 40 years.

Maximum Asphalt Design:	**$10,421,662.00**
Maximum Aggregate Design:	$11,373,913.00
JPC Design:	$15,776,232.00
As Proposed Cost is:	$14,156,592.00

Therefore, the Value Engineering Team recommends no change in using the Maximum Asphalt Pavement Design.

Maximum Asphalt Design

			Discount Rate											
			0		2		4		6		8		10	
YEAR		COST	P/F	PW	P/F	PW	P/F	PW	P/F	PW	P/F	PW	P/F	PW
0	PW OF CONSTRUCTION	8,610,284	1.00	8,610,284	1.00	8,610,284	1.00	8,610,284	1.00	8,610,284	1.00	8,610,284	1.00	8,610,284
15	(MILL 1.5" & OVERLAY 1.5")	904,750	1.00	904,750	0.74	672,243	0.56	502,376	0.42	377,521	0.32	285,215	0.24	216,590
20	N/A	0	1.00	0	0.67	0	0.46	0	0.31	0	0.21	0	0.15	0
30	(MILL 1.5" & OVERLAY 3.5")	1,676,681	1.00	1,676,681	0.55	925,647	0.31	516,952	0.17	291,927	0.10	166,624	0.06	96,088
40	PW OF SALVAGE	0	1.00	0	0.45	0	0.21	0	0.10	0	0.05	0	0.02	0
	PW Total Cost	11,191,714		11,191,714		10,208,173		9,629,611		9,279,731		9,062,123		8,922,962
	% Cost Difference													
	vs. Maximum Aggregate			-10.39%		-11.39%		-12.07%		-12.53%		-12.83%		-13.03%
	vs. JPC			-54.18%		-60.24%		-64.27%		-66.95%		-68.75%		-70.00%

Maximum Aggregate Design

			Discount Rate											
			0		2		4		6		8		10	
YEAR		COST	P/F	PW	P/F	PW	P/F	PW	P/F	PW	P/F	PW	P/F	PW
0	PW OF CONSTRUCTION	9,772,834	1.00	9,772,834	1.00	9,772,834	1.00	9,772,834	1.00	9,772,834	1.00	9,772,834	1.00	9,772,834
15	(MILL 1.5" & OVERLAY 1.5")	904,750	1.00	904,750	0.74	672,243	0.56	502,376	0.42	377,521	0.32	285,215	0.24	216,590
20	N/A	0	1.00	0	0.67	0	0.46	0	0.31	0	0.21	0	0.15	0
30	(MILL 1.5" & OVERLAY 3.5")	1,676,681	1.00	1,676,681	0.55	925,647	0.31	516,952	0.17	291,927	0.10	166,624	0.06	96,088
40	PW OF SALVAGE	0	1.00	0	0.45	0	0.21	0	0.10	0	0.05	0	0.02	0
	PW Total Cost	12,354,264		12,354,264		11,370,723		10,792,161		10,442,281		10,224,673		10,085,512
	% Cost Difference													
	vs. Maximum Asphalt			9.41%		10.22%		10.77%		11.13%		11.37%		11.53%
	vs. JPC			-39.67%		-43.86%		-46.58%		-48.36%		-49.57%		-50.41%

JPC Design

			Discount Rate											
			0		2		4		6		8		10	
YEAR		COST	P/F	PW	P/F	PW	P/F	PW	P/F	PW	P/F	PW	P/F	PW
0	PW OF CONSTRUCTION	14,957,051	1.00	14,957,051	1.00	14,957,051	1.00	14,957,051	1.00	14,957,051	1.00	14,957,051	1.00	14,957,051
25	JPC REPAIR & DIAMOND GRIND	2,297,872	1.00	2,297,872	0.61	1,400,624	0.38	861,970	0.23	535,401	0.15	335,530	0.09	212,084
30	N/A	0	1.00	0	0.55	0	0.31	0	0.17	0	0.10	0	0.06	0
40	PW OF SALVAGE	0	1.00	0	0.45	0	0.21	0	0.10	0	0.05		0.02	0
	PW Total Cost	17,254,923		17,254,923		16,357,675		15,819,021		15,492,452		15,292,581		15,169,135
	% Cost Difference													
	vs. Maximum Asphalt			35.14%		37.59%		39.13%		40.10%		40.74%		41.18%
	vs. Maximum Aggregate			28.40%		30.49%		31.78%		32.60%		33.14%		33.51%

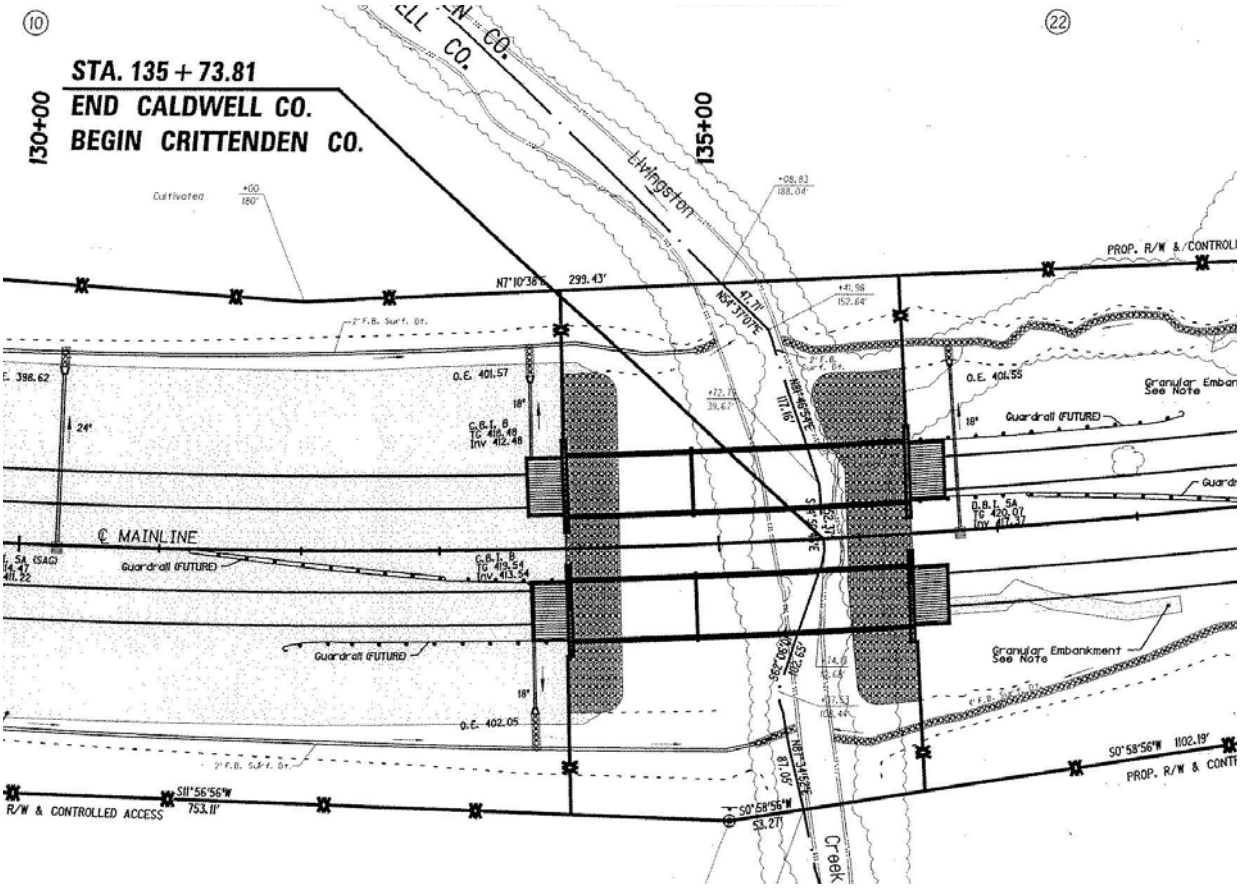
VII. DEVELOPMENT PHASE
D. PAVEMENT
6. VALUE ENGINEERING ALTERNATIVE NUMBER 5

VII. DEVELOPMENT PHASE

E. BRIDGE

1. "As Proposed"

New twin bridges over Livingston Creek will be constructed to carry US 641 over the creek. Each bridge will be a 2-span (80' +/-, 168' +/-) bridge with PCIB Type IV girders and spill through abutments. The horizontal alignment has a 6,000' curve.

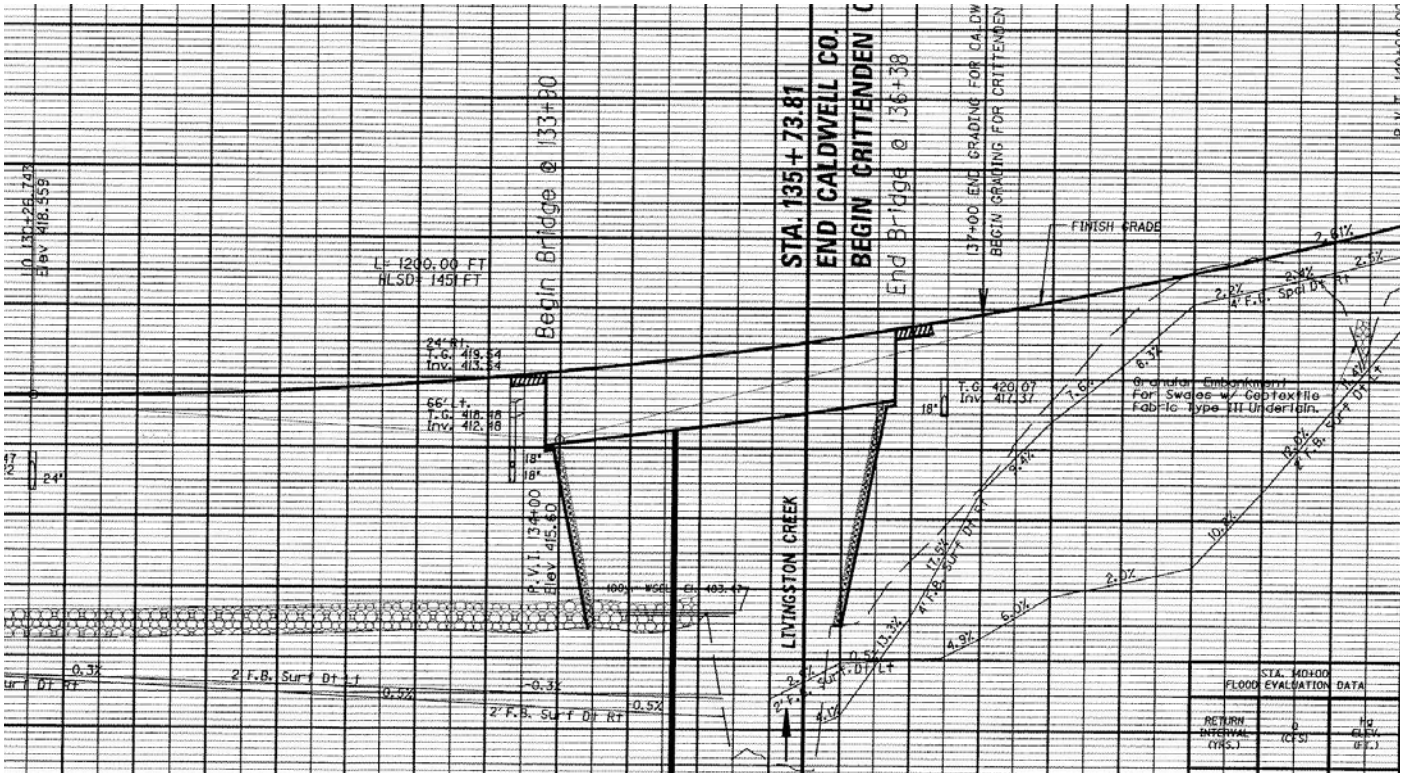


AS PROPOSED LIVINGSTON CREEK BRIDGES

VII. DEVELOPMENT PHASE

E. BRIDGE

1. "As Proposed"



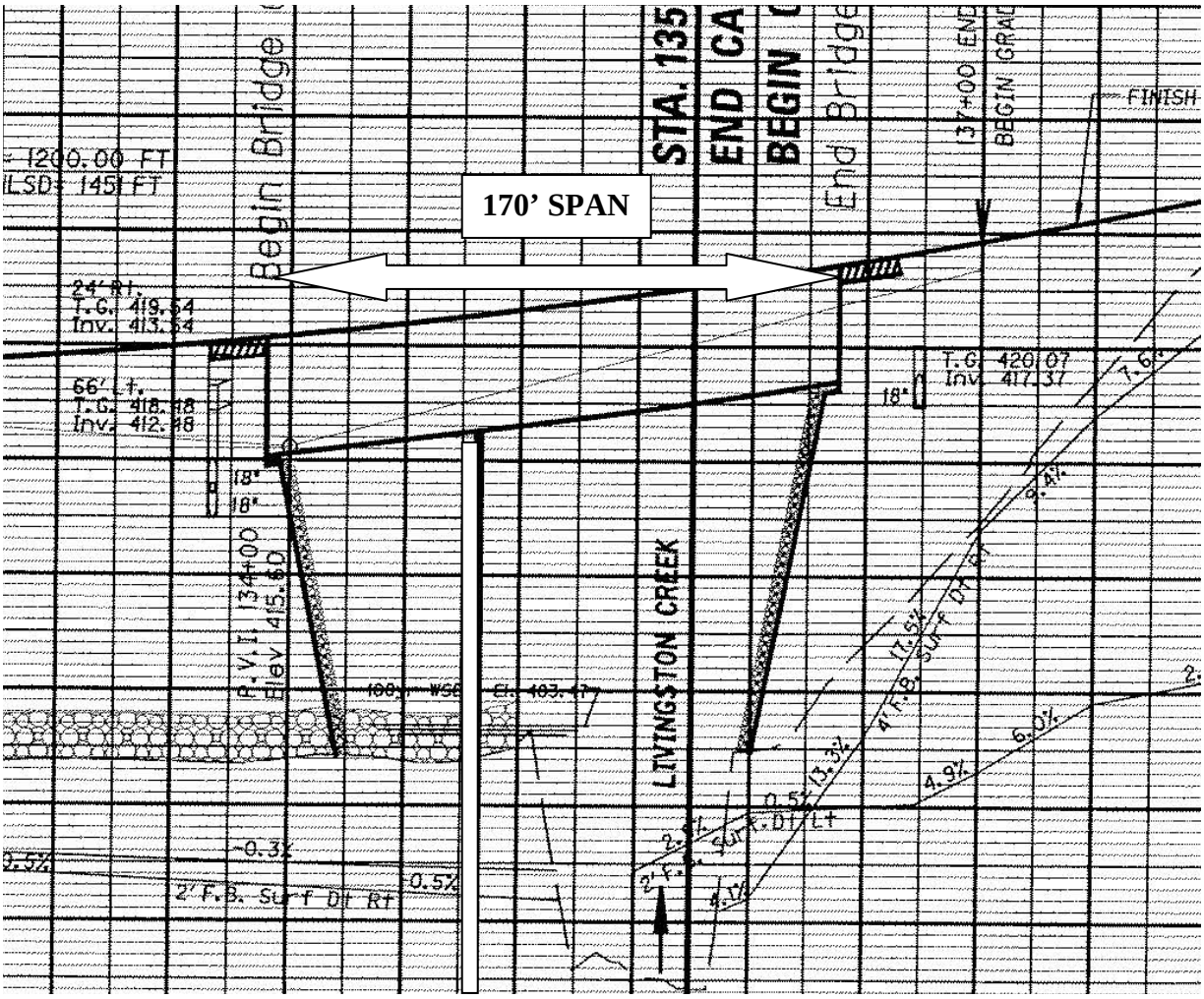
AS PROPOSED BRIDGE ELEVATION

VII. DEVELOPMENT PHASE

E. BRIDGE

2. Value Engineering Alternative Number 1

The Value Engineering Alternative is single span 170’ bridges constructed with steel plate girdgers.



BRIDGE - SHORTEN BRIDGE
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	SF	$65.25	20,336	$1,327,005	14,596	$952,447
ROADWAY EXCAVATION	CY	$5.50	1,634,777	$8,991,274	1,645,796	$9,051,875
PAVEMENT TRAVEL LANE	SY	$49.10	0.0	$0	186.7	$9,166
SHOULDER	SY	$20.59	0.0	$0	108.9	$2,242
SUBTOTAL				**$10,318,279**		**$10,015,730**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		5.8%		$656,183		$636,942
TRAFFIC CONTROL/MOT		0.0%		$0		$0
CONTINGENCY		10.0%		$1,031,828		$1,001,573
GRAND TOTAL				**$12,006,289**		**$11,654,245**

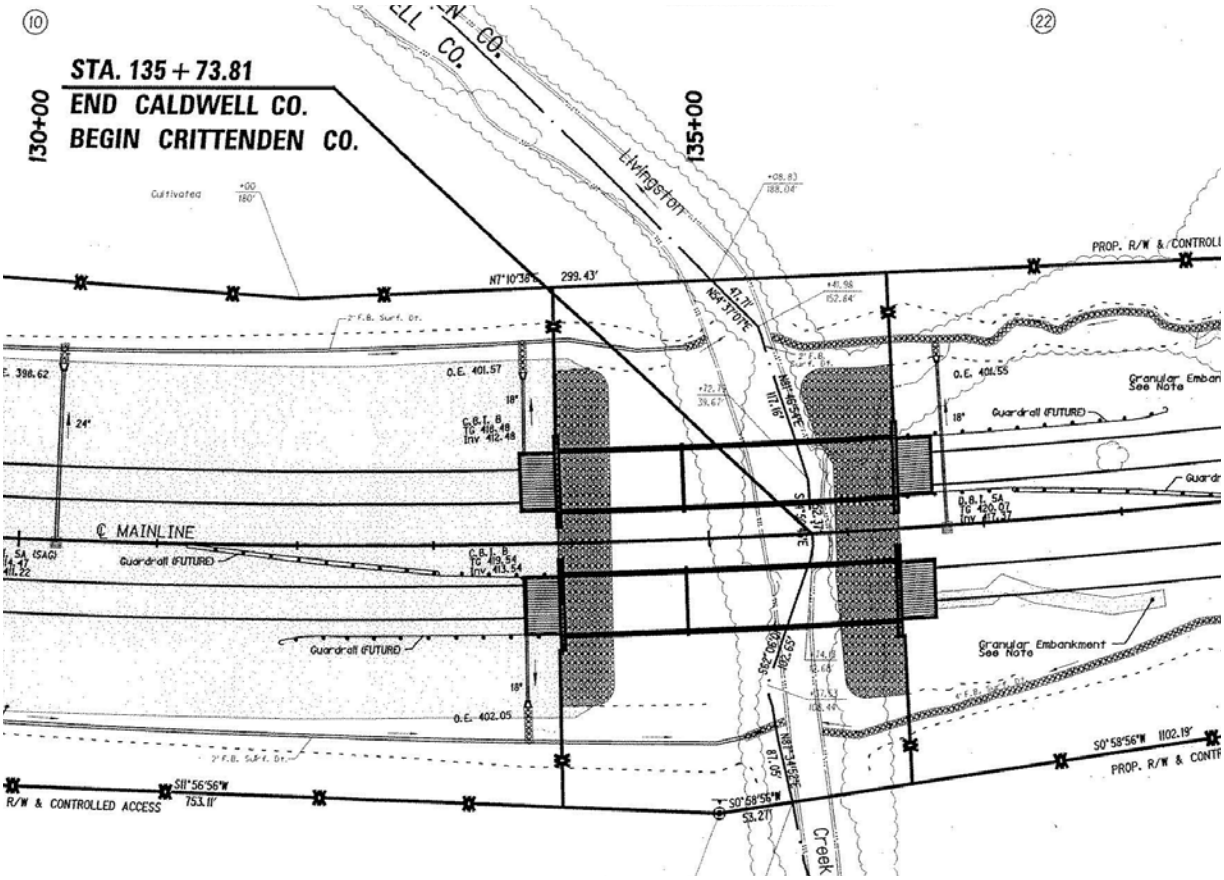
POSSIBLE SAVINGS: $352,044

VII. DEVELOPMENT PHASE

E. BRIDGE

3. Value Engineering Alternative Number 2

Make the bridge a tangent horizontal alignment. The will reduce the complexity of the design as well as the construction methods and is estimated to reduce the unit price by 10%.



BRIDGE - TANGENT ALIGNMENT
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 6,000 ' CURVE	SF	$65.25	20,336	$1,327,005	-	$0
BRIDGE TANGENT	SF	$58.73	-	$0	20,336	$1,194,305
SUBTOTAL				**$1,327,005**		**$1,194,305**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		5.8%		$84,390		$75,951
TRAFFIC CONTROL/MOT		0.0%		$0		$0
CONTINGENCY		10.0%		$132,701		$119,430
GRAND TOTAL				**$1,544,095**		**$1,389,686**

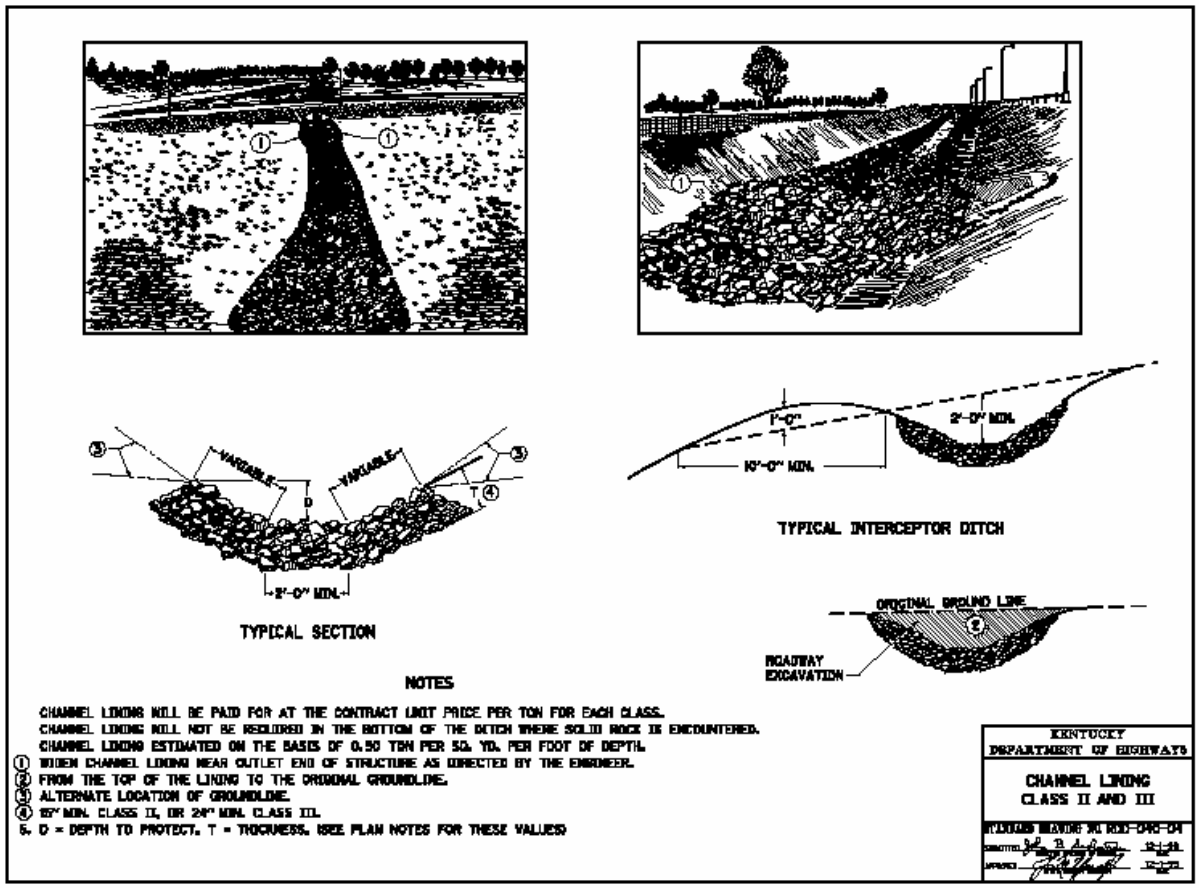
POSSIBLE SAVINGS: $154,410

VII. DEVELOPMENT PHASE

F. DRAINAGE

1. "As Proposed"

The original proposal calls for KYTC Class II & Class III Channel Lining for stabilization of special ditches throughout the project.



AS PROPOSED CHANNEL LINING

VII. DEVELOPMENT PHASE

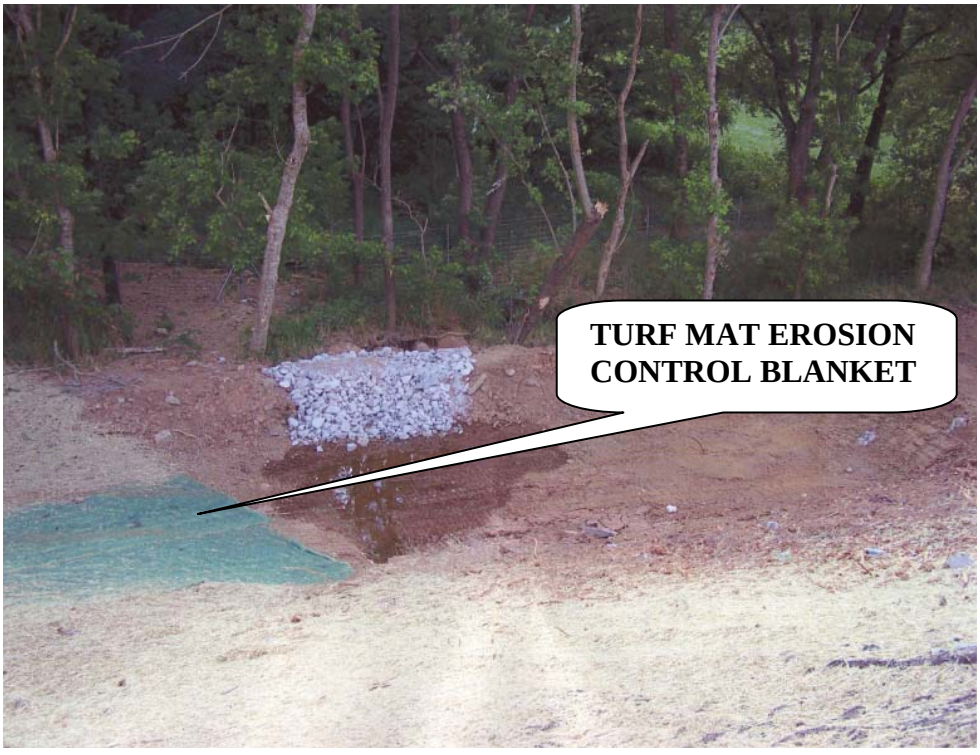
F. DRAINAGE

2. Value Engineering Alternative Number 1

The Value Engineering Team recommends that alternate ditch stabilization techniques, such as grass lined ditches using erosion control blankets be used throughout the project where design ditch velocities do not exceed 10' per second.

Using KYTC average unit bid prices from 2005 through 2007, Team one used $1.30 per square yard for permanent seeding using Erosion Control Blanket (ECB). In an attempt to quantify the impact of this change, a 500' long channel 2'flat bottom ditch with 2' side slopes was designed and compared to the cost for using channel lining versus ECB. This ditch would require 333 tons of Class II or III Channel Lining costing $8,325. The same ditch would require 333.3 square yards of ECB costing only $433.30. This is an approximately 95% savings for the same ditch. Team one assumed that 90% of the ditches on the project may allow the use of ECB in lieu of channel lining therefore we estimate a potential savings of over $500,000.

As an alternate to standard erosion control blanket, reinforced turf mats may be used at all locations with very high channel velocities or steep slopes. The KYTC Average Bid Prices for 2006 and 2007 equals $5.50 per square yard. For the 500 foot ditch proposed above, the cost would equal $1833.15. This is a 78% savings over the cost of rock lined ditches for the same theoretical ditch. If used for all ditches on the project, potential savings could equal $450,000.



DRAINAGE - ALTERNATIVE DITCH STABILIZATION
VALUE ENGINEERING ALTERNATIVE NUMBER 1
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
CHANNEL LINING CLASS II	TN	$25.00	18,873	$471,825	1,887	$47,183
CHANNEL LINING CLASS III	TN	$25.00	4,128	$103,200	413	$10,320
TURF MAT	SY	$1.30	-	$0	20,720	$26,935
SUBTOTAL				**$575,025**		**$84,438**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		5.8%		$36,568		$5,370
TRAFFIC CONTROL/MOT		0.0%		$0		$0
CONTINGENCY		10.0%		$57,503		$8,444
GRAND TOTAL				**$669,096**		**$98,251**

POSSIBLE SAVINGS: $570,844

VII. DEVELOPMENT PHASE

G. WOVEN WIRE FENCE

1. "As Proposed"

The proposed plans call for 57,895' of control access right of way fence at $7 per linear foot for a total cost of $405,265 for the length of the project. The purposes of control access fences are to deter encroachments by landowners, wild life, and live stock as well as to have a visible right of way location marker.

AS PROPOSED WOVEN WIRE FENCE – CONTROL ACCESS FENCE

AS PROPOSED WOVEN WIRE FENCE – CONTROL ACCESS FENCE

G. WIRE WOVEN FENCE

2. Value Engineering Alternative Number 1

Value Engineering Alternative Number 1 is to not install the control access fence.

The KYTC Design Manual allows for the installation of the control access fence to be determined on a project-by-project basis. The purpose of this project is to promote commercial and industrial development as well as allow for safer and an increased level of service roadway. In cases of development, many times the control access fence is removed by the adjoining landowner for aesthetics. There will be many breaks in the fence due to landowner access therefore wild life can still encroach upon the highway.

Concerning livestock, it is not the responsibility of the Cabinet to provide fencing for agriculture uses but the landowner's.

As development increases in the area, many landowners will remove the fence in order to improve aesthetics and additional access points.

WIRE WOVEN FENCE - ELIMINATE
VALUE ENGINEERING ALTERNATIVE NUMBER 1
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
WIRE WOVEN FENCE	LF	$7.00	57,895	$405,265	-	$0
SUBTOTAL				**$405,265**		**$0**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		5.8%		$25,773		$0
TRAFFIC CONTROL/MOT		0.0%		$0		$0
CONTINGENCY		10.0%		$40,527		$0
GRAND TOTAL				**$471,564**		**$0**

POSSIBLE SAVINGS: $471,564

G. WIRE WOVEN FENCE

3. Value Engineering Alternative Number 2

Value Engineering Alternative Number 2 is to only install a limited amount of fence at the five major intersections, the bridge structure, and at the grade cut at station 261+00. By installing 250’ at the corners of the intersections and the bridges, a total of 7,600 linear feet can be installed at a total of $53,200 cost.

This would allow the visible delineation of the right of way at the intersections.

WIRE WOVEN FENCE - SELECTED LOCATIONS
VALUE ENGINEERING ALTERNATIVE NUMBER 2
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
WIRE WOVEN FENCE	LF	$7.00	57,895	$405,265	7,600	$53,200
SUBTOTAL				**$405,265**		**$53,200**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		5.8%		$25,773		$3,383
TRAFFIC CONTROL/MOT		0.0%		$0		$0
CONTINGENCY		10.0%		$40,527		$5,320
GRAND TOTAL				**$471,564**		**$61,903**

POSSIBLE SAVINGS: $409,661

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 Number1:

The Value Engineering Team recommends that Value Engineering Alternative be implemented. This alternative proposes to not build the project.

If this recommendation can be implemented, there is a possible savings of ***$67,123,076.***

Recommendation Number 2:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will adjust the profile grades.

If this recommendation can be implemented, there is a possible savings of ***$1,599,942.***

Recommendation Number 3:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct a 36' median.

If this recommendation can be implemented, there is a possible savings of ***$888,065.***

Recommendation Number 4:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct a 2' Drainage Blanket***.***

If this recommendation can be implemented, there is a possible savings of ***$839,419.***

Recommendation Number 5:

The Value Engineering Team recommends that Value Engineering Alternative be implemented. This alternative will utilize existing US 64 and add passing lanes along with other minor improvements.

If this recommendation can be implemented, there is a possible savings of ***$28,821,483.***

Recommendation Number 6:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will change Access Control to By Permit.

If this recommendation can be implemented, there is a possible savings of ***$1,333,018.***

VIII. SUMMARY OF RECOMMENDATIONS

Recommendation Number 7:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct a 2 – lane roadway.

If this recommendation can be implemented, there is a possible savings of ***$9,494,530.***

Recommendation Number 8:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will reduce the paved shoulders to 5'.

If this recommendation can be implemented, there is a possible savings of ***$477,356.***

Recommendation Number 9:

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

If this recommendation can be implemented, there is a possible savings of ***$758,408.***

Recommendation Number 10:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct a 3 – lane roadway.

If this recommendation can be implemented, there is a possible savings of ***$14,189,785.***

Recommendation Number 11:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct a Maximum Asphalt Pavement.

If this recommendation can be implemented, there is a possible savings of ***$6,189,410.***

Recommendation Number 12:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct single span steel plate girder to shorten bridge.

If this recommendation can be implemented, there is a possible savings of ***$352,044.***

VIII. SUMMARY OF RECOMMENDATIONS

Recommendation Number 13:

The Value Engineering Team recommends that Value Engineering Alternative be implemented. This alternative proposes will construct Tangent Bridge.

If this recommendation can be implemented, there is a possible savings of ***$154,410.***

Recommendation Number 14:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct ditches with alternative ditch stabilization.

If this recommendation can be implemented, there is a possible savings of ***$570,844.***

Recommendation Number 15:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will not install fence.

If this recommendation can be implemented, there is a possible savings of ***$471,564.***

Recommendation Number 16:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will install fence only where required.

If this recommendation can be implemented, there is a possible savings of ***$409,661.***

US 641
VALUE ENGINEERING STUDY PRESENTATION
APRIL 11, 2008

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