VALUE ENGINEERING STUDY

OF

I-64 MAJOR WIDENING AND RECONSTRUCTION

Item Number: 5-65.00 &5-65.1

Frankfort, Kentucky

June 26-30, 2006

Prepared by:
VE GROUP, L.L.C.

In Association With:

KENTUCKY TRANSPORTATION CABINET

VALUE ENGINEERING STUDY
TEAM LEADER

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DATE

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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 June 26-30, 2006.

The subject of the study was 17.5 +/- miles of Interstate 64 just west of the I-265 Interchange in Louisville, Kentucky to just east of the KY 53 Interchange. This project will widen the roadway from 4-lanes with a 60 ft. median to 6-lanes with a 30 ft. 8 in. median including a barrier wall.

PROJECT DESCRIPTION

The I-64 widening project is from just west of the Gene Snyder Interchange and extends to just east of the KY 53 Interchange. The existing 4-lane divided Interstate will be widened to the inside and a median barrier constructed. The project will also reconfigure 3-interchanges: KY 1848, KY 55 and KY 53.

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
- 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:

A. PAVEMENT

Recommendation Number 1:

The Value Engineering Team recommends that Value Engineering Alternative Number 2 be implemented. This alternative constructs the ultimate 8-lane typical section from Gene Snyder interchange using the outside lane as a 12 ft. full depth paved shoulder. This typical also includes the median barrier, 10 ft. inside full depth paved shoulder, 6 – 12 ft. lanes and the 12 ft. full depth paved shoulder.

If this recommendation can be implemented, there is a possible savings of ***$3,431,387.***

B. MAINTENANCE OF TRAFFIC

Recommendation Number 2:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will use temporary concrete barrier on both sides of the median for half the length of the project during phase 1. The temporary barrier will be advanced as work is completed. The other phases will use barrels to delineate the work zones.

If this recommendation can be implemented, there is a possible savings of ***$3,387,236.***

C. ENGLISH STATION ROAD OVERPASS

Recommendation Number 3:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct the English Station overpass replacement bridge with 2 – 100 ft. +/- spans with vertical abutments.

If this recommendation can be implemented, there is a possible savings of ***$95,552.***

D. BECKLEY STATION ROAD UNDERPASS

Recommendation Number 4:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct the Beckley Station Road underpass bridge with a single 52 ft. span with vertical abutments.

If this recommendation can be implemented, there is a possible savings of ***$3,297,088.***

I. EXECUTIVE SUMMARY

RESULTS – AREAS OF FOCUS *(continued)*

E. GILLILAND ROAD OVERPASS

Recommendation Number 5:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will leave existing Gilliland Road Overpass Bridge in place.

If this recommendation can be implemented, there is a possible savings of ***$1,013,232.***

F. KY 1531 (EASTWOOD/FISHERSVILLE ROAD) UNDERPASS

Recommendation Number 6:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct KY 1531 (Eastwood / Fishersville Road) Underpass Bridge with a single 52 ft. span with vertical abutments.

If this recommendation can be implemented, there is a possible savings of ***$1,108,318.***

G. CLARK STATION ROAD OVERPASS

Recommendation Number 7:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct the Clark Station Road Overpass Bridge with two 84 ft. spans and vertical abutments.

If this recommendation can be implemented, there is a possible savings of ***$109,330.***

H. CONNER STATION ROAD UNDERPASS

Recommendation Number 8:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct the Conner Station Road Underpass Bridge with a single 52 ft. span and vertical abutments.

If this recommendation can be implemented, there is a possible savings of ***$79,722.***

I. JOYES STATION ROAD OVERPASS

Recommendation Number 9:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will remove the Joyes Station Road Overpass Bridge and does not replace it.

If this recommendation can be implemented, there is a possible savings of ***$930,632.***

I. EXECUTIVE SUMMARY

RESULTS – AREAS OF FOCUS *(continued)*

J. KY 1848 OVER I 64 INTERCHANGE

Recommendation Number 10:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct a Modern Day Roundabouts at the KY 1848 Interchange Ramp Termini.

If this recommendation can be implemented, there is a possible savings of ***$473,081.***

K. KY 55 BRIDGE OVER I 64

Recommendation Number 11:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct the KY 55 Interchange Overpass Bridge with two 84 ft. spans and vertical abutments.

If this recommendation can be implemented, there is a possible savings of ***$221,382.***

L. KY 2861 (OLD TAYLORSVILLE/ZARIM ROAD) OVERPASS

Recommendation Number 12:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct the KY 2861 (Old Taylorsville/Zaring Mill Road) Overpass Bridge with two 84 ft. spans and vertical abutments.

If this recommendation can be implemented, there is a possible savings of ***$52,391.***

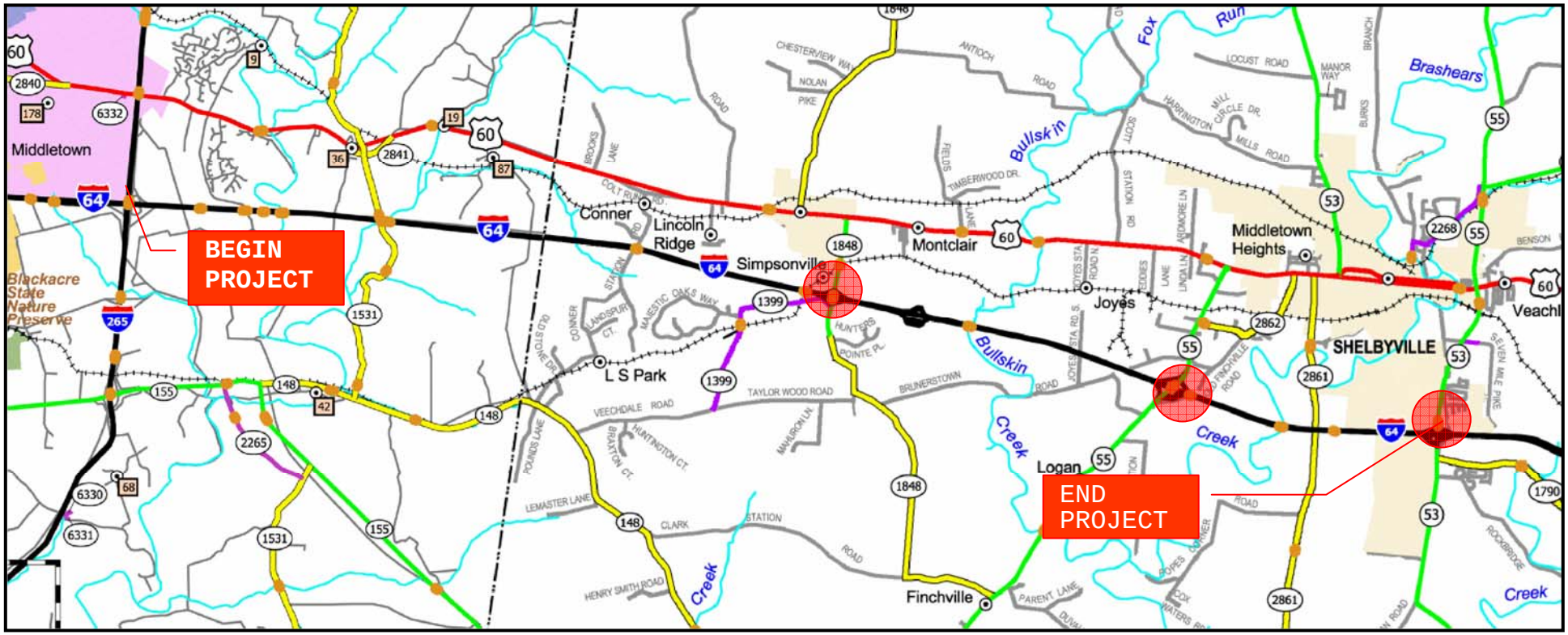
M. KY 53 INTERCHANGE BRIDGE

Recommendation Number 13:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct the KY 53 Interchange Overpass Bridge with two 84 ft. spans and vertical abutments.

If this recommendation can be implemented, there is a possible savings of ***$79,069.***

II. LOCATION OF PROJECT



III. TEAM MEMBERS AND PROJECT DESCRIPTION

TEAM MEMBERS

NAME	AFFILIATION	EXPERTISE	PHONE
Tom Hartley, P.E., C.V.S.	VE Group	Team Leader	850/627-3900
Shane Ramey	KYTC	Maintenance	606/845-2551
Scott Pedito	KYTC	Traffic	270/746-7898
Brian Gillum	KYTC	Construction	606/784-8388
Eric Scott	KYTC	Geotechnical	502/564-2374
Kevin Martin	KYTC	Roadway Design	502/564-3280

III. TEAM MEMBERS AND PROJECT DESCRIPTION

PROJECT DESCRIPTION

The project is from just west of the Gene Snyder Interchange and extends to just east of the KY 53 Interchange. Major discussion items are listed as follows:

1. Design Criteria
    a. A summary of the Traffic Forecasts and Capacity Analysis was presented.
    b. The Draft Design Executive Summary was presented with no current comments.

2. Mainline Design
    a. The six-lane typical section (30 ft.-8 in. median, 6-12 ft. lanes with 12 ft. outside shoulders) was presented and accepted.
    b. Current criteria requires a 3 ft. widening for guardrail. For this typical section a sliver fill is created using this criteria. The Project Team decided to use 2 ft. widening with specified two-foot longer guardrail posts (6 ft. post to 8 ft. post). Central Office will provide the standard drawing of the longer guardrail posts.
    c. Three deficient mainline vertical curves (1 K value and 2 SSD) were presented. A design exception would be required. The Consultant Team was asked to present the costs associated with correcting the 2 crest curves and any accident data that may justify this (criteria can be based on either of the last 2 editions of the AASHTO Green Book). The Project Team determined that the deficient sag vertical did not need to be corrected.

3. Mainline Rock Cuts
    a. The Line and Grade Plans were developed matching the existing backslopes in rock cut sections. Geotechnical investigations will recommend the proposed slopes. The consultant will incorporate the recommended backslopes into the final plans and present the impacts to the Project Team.
    b. The Line and Grade Plans show the backslopes would accommodate a future 8-Lane section. This avoided sliver cuts for the initial widening to meet current clear zone criteria. The Geotechnical Branch should make recommendations for this case also.

4. Mainline Guardrail Elimination Study
    a. The Line and Grade Plans were developed using the criteria that guardrail would only be eliminated if construction was within the existing right-of-way. The costs were presented for guardrail elimination by design section. The Project Team determined that Phase 2 plans would reflect using the 6-Lane Safety Slope Design from the project beginning to the KY 1848 (Simpsonville) exit. Right-of-way plans will be developed based on acquiring right-of-way for the safety slope design through this section.

III. TEAM MEMBERS AND PROJECT DESCRIPTION

PROJECT DESCRIPTION *(continued)*

5. Mainline Utilities

    a. If necessary, use a retaining wall to stay out of Transmission Tower at Sta. 1582+03 Rt.

    b. The utility companies will need a copy of the plans and a joint meeting will need to be held soon to determine locations of existing utilities and any impacts this project may have on them and any future plans they might have.

6. Mainline Maintenance of Traffic Scheme

    a. 3-Phase Maintenance of Traffic scheme was presented and accepted. Final Traffic Control Plan should include appropriate and ample signage.

    b. Temporary lighting will be used at the splits.

7. Mainline Bridges

    a. General Comments

        - If approach road closure is needed, plans will specify closure to be in the summer season. If multiple closures are needed for a contract section, construction shall be staggered. A typical closure period is 60 days.
        - When presenting adverse travel, figure the worst case scenario for the detour due to road closure.
        - Revise the line and grade report to include a 5 ft. Bike Lane (in Jefferson County).
        - Where required, design structures to accommodate a 5 ft. sidewalk (in Jefferson County).
        - At all cross roads, the structure should be designed for the ultimate typical section; however, the approach road improvements will not be part of this project.

    b. English Station Road – overpass structure will be coordinated with adjacent I-265 Interchange project.

    c. Beckley Station Road – underpass structure will be coordinated with adjacent I-265 Interchange project.

    Note: Letters from KYTC to Louisville Metro regarding closure due to construction on the above I-64 cross roads have been sent with no response to date.

III. TEAM MEMBERS AND PROJECT DESCRIPTION

PROJECT DESCRIPTION *(continued)*

d. Floyd's Fork – Louisville Metro Parks Department may want the bridge to be longer to accommodate a proposed Greenway. Consultant will coordinate and report to KYTC. The use of form liners for aesthetic purposes should be considered. Rob Harris of KYTC will provide a note to put on the plans at wet structures regarding permitting.

e. Gilliland Road – overpass structure presented with an offset alignment in order to maintain traffic on the existing bridge while the new structure is constructed. Look at part width construction at all overpass bridges in order to minimize impacts on the existing properties (Clark Station, Joyes Station).

f. KY 1531 – existing Wagon Box underpass to be replaced with a bridge. The opening will allow for the future typical section; however, there will only be minimal improvements to KY 1531 for this project.

g. Long Run Creek – no comments on structure scheme presented.

h. Clark Station Road – look at part width construction per Note "e" above.

i. Conner Station Road – existing underpass (Wagon Box) to be replaced with a bridge. Consultant to look at single-span vs. three-span bridge (costs).

j. Bridge over Norfolk Southern RR – look at other options (3-span, box beams, raising mainline grade). Subsequent to the inspection, it is noted that the proposed span arrangement is a 41-48-72-41. Type III PCIB bridge that meets current horizontal clearance criteria. The longer middle span will require a deeper beam resulting in raising the bridge deck and roadway approach to accommodate the vertical clearance criteria for railroads. Box Beams or Tee Beams will not be adequate for the longer span needed for horizontal clearance. A consultant for the US 60 Water District has already let Debbie Harris know that they have a water main crossing I-64 at the Railroad Bridge that may require relocation if there is any work in this area. The line will be shown on the plans.

k. Joyes Station Road – The recommendation was approved as presented. Research the cost of the property on the north side of the Interstate and report to Central Office and District for discussion.

l. Existing Western Farm Connector Wagon Box – even though the crossing appears to not be in use presently, the Project Team decided to leave the existing Wagon Box in place (i.e. do not safe load). Leave the existing 2:1 slopes in place and construct new guardrail.

m. Bullskin Creek – the recommendation for the Mainline Bridge over was approved as submitted. A COE 404 permit will be required for this structure.

n. Existing Eastern Farm Connector Wagon Box – leave in place and construct new guardrail.

PROJECT DESCRIPTION *(continued)*

o. Bridge over Clear Creek – investigate further the access road along Clear Creek for any existing ownership easements. If no easement is on record, then the bridge over Clear Creek will not be designed to accommodate an access road.

p. Existing Wagon Box @ Sta. 2285+00 – leave in place and construct new guardrail.

q. KY 2861(Old Taylorsville/Zaring Mill Road) – overpass Bridge- Presented 3 Alternates. Choose to close road and replace in place due to potential Historic Farm District.

8. KY 1848 Interchange

a. Selected Expanded Diamond design.

b. Look at using existing ramps and just building acceleration/deceleration tapers.

c. Realign the frontage road (KY 1399) at the BP Station as discussed in the meeting to eliminate property damage and use more of existing KY 1399.

d. Use raised median barrier from the ends of the ramps on KY 1848 to the first access point.

e. Right-of-way negotiation note: Remove the Pilot Station's proposed right in/right out option, add SB deceleration lane and tighten up radius to avoid right-of-way impact.

9. KY 55 Interchange

a. Consultant will evaluate moving the ramps on the south side of KY55 I/C farther south to provide more left turn storage along KY 55. If this is not possible, then KY 55 Bridge will be constructed with six lanes.

b. Use raised median barrier from the end of the ramps to the Control of Access points.

c. Move entrance to frontage road on south side (if ramps are moved south and relocation is necessary for access control).

d. Consultant will evaluate the possibility of using 4:1 fill slopes (instead of replacing existing guardrail and using 2:1) at the double R.C.B.C.

10. KY 53 Interchange

a. Use raised median barrier from the end of the ramps to the Control of Access points.

b. Move proposed shared entrance at BP station closer to road to minimize right-of-way impacts.

c. Consultant will use a six-lane bridge to accommodate left turn storage between the ramp termini with KY 53.

IV. INVESTIGATION PHASE

VALUE ENGINEERING STUDY BRIEFING

I-64 MAJOR WIDENING AND RECONSTRUCTION *June 26-30, 2006*		
NAME	**AFFILIATION**	**PHONE**
Tom Hartley, P.E., C.V.S.	VE Group	850/627-3900
Shane Ramey	KYTC	606/845-2551
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Doug Sheffer	ACE	502/213-7535
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John Bargo	FHWA	502/223-6763
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Robert Semones	KYTC	502/564-4555
Dexter Newman	KYTC	502/564-4555
Kevin Martin	KYTC	502/564-3280
Albert Zimmerman	QK4	502/992-2942

IV. INVESTIGATION PHASE

FUNCTIONAL ANALYSIS WORKSHEET

I-64 MAJOR WIDENING AND RECONSTRUCTION

June 26-30, 2006

ITEM	FUNCT. VERB	FUNCT. NOUN	* TYPE	COST	WORTH	VALUE INDEX
Drainage	convey	runoff	B	$1,450,000	$1,450,000	1.00
Embankment	set	grades	B	$6,040,000	$6,040,000	1.00
Pavement	**support** **increase**	**vehicles** **capacity**	**B** **B**	**$37,650,000**	**$25,000,000**	**1.50**
MAINTENANCE OF TRAFFIC	**protect** **move**	**workers** **traffic**	**S** **S**	**$6,720,000**	**$5,000,000**	**1.34**
Median Barrier	redirect separate	vehicle traffic	S S	$6,230,000	$6,230,000	1.00
English Station Rd Bridge	**separate**	**conflicts**	**B**	**$615,000**	**$400,000**	**1.54**
Beckley Station Rd Bridge	**separate**	**conflicts**	**B**	**$999,000**	**$500,000**	**2.0**
Floyd's Fork Creek	separate	conflicts	B	$1,982,000	$1,982,000	1.00
Gilliland Road	**separate**	**conflicts**	**B**	**$77,000**	**0**	**∞**
KY 1531	**separate**	**conflicts**	**B**	**$999,000**	**$500,000**	**2.0**

***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

FUNCTIONAL ANALYSIS WORKSHEET *(continued)*

I-64 MAJOR WIDENING AND RECONSTRUCTION (continued)

June 26-30, 2006

ITEM	FUNCT. VERB	FUNCT. NOUN	* TYPE	COST	WORTH	VALUE INDEX
Long Run Creek	separate	conflicts	B	$2,000,000	$2,000,000	1.00
Clark Station Rd	**separate**	**conflicts**	**B**	**$755,000**	**$400,000**	**1.89**
Conner Road	**separate**	**conflicts**	**B**	**$1,690,000**	**$850,000**	**1.99**
Wagon Box	separate	conflicts	B	$70,000	$70,000	1.00
Bullskin Creek	separate	conflicts	B	$2,100,000	$2,100,000	1.00
Norfolk Southern RR	separate	conflicts	B	$1,720,000	$1,720,000	1.00
Joyes Station Rd	**separate**	**conflicts**	**B**	**$52,000**	**$0**	**∞**
KY 1848 Interchange	**separate**	**conflicts**	**B**	**$1,400,000**	**$1,200,000**	**1.67**
Clear Creek	separate	conflicts	B	$3,050,000	$3,050,000	1
KY 55 Interchange	**separate**	**conflicts**	**B**	**$2,810,000**	**$2,000,000**	**1.40**
KY 53 Interchange	**separate**	**conflicts**	**B**	**$2,610,000**	**$2,000,000**	**1.30**
Zarim Mill Rd	**separate**	**conflicts**	**B**	**$1,400,000**	**$1,000,000**	**1.40**

***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

B. MAINTENANCE OF TRAFFIC

C. ENGLISH STATION OVERPASS BRIDGE

D. BECKLEY STATION ROAD UNDERPASS

E. GILLILAND ROAD OVERPASS

F. KY 1531 (EASTWOOD/FISHERVILLE ROAD) UNDERPASS

G. CLARK STATION OVERPASS

H. CONNER STATION ROAD UNDERPASS

I. JOYES STATION ROAD OVERPASS

J. KY 1848 INTERCHANGE BRIDGE

K. KY 55 INTERCHANGE BRIDGE

L. KY 2861 (OLD TAYLORSVILLE/ZARING MILL ROAD) OVERPASS

M. KY 53 INTERCHANGE BRIDGE

V. SPECULATION PHASE

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

A. PAVEMENT

- Stage pavement construction.
- Eliminate vertical curve correction.
- Construct 8 – lane typical without outside shoulder.

B. MAINTENANCE OF TRAFFIC

- Use a maximum of 3 miles of temporary concrete barrier.

C. ENGLISH STATION OVERPASS BRIDGE

- Construct bridge with 2 – 82 ft. spans with vertical abutments.

D. BECKLEY STATION ROAD UNDERPASS

- Construct bridge with a single 110 ft. span with vertical abutments.

E. GILLILAND ROAD OVERPASS

- Leave bridge as is.

F. KY 1531 (EASTWOOD/FISHERVILLE ROAD) UNDERPASS

- Construct bridge with a single 62 ft. span with vertical abutments.

G. CLARK STATION OVERPASS

- Construct bridge with two 110 ft. spans with vertical abutments.

H. CONNER STATION ROAD UNDERPASS

- Construct bridge with a single 62 ft. span with vertical abutments.

I. JOYES STATION ROAD OVERPASS

- Remove existing bridge and do not replace.

J. KY 1848 INTERCHANGE BRIDGE

- Construct a single point urban interchange.
- Construct round about at ramp termini.
- Construct bridge with a two 110 ft. spans with vertical abutments.

V. SPECULATION PHASE *(continued)*

K. KY 55 INTERCHANGE BRIDGE

- Construct bridge with two 110 ft. spans with vertical abutments.

L. KY 2861 (OLD TAYLORSVILLE/ZARING MILL ROAD) OVERPASS

- Construct bridge with two 110 ft. spans with vertical abutments.

M. KY 53 INTERCHANGE BRIDGE

- Construct bridge with two 110 ft. spans with vertical abutments.

VI. EVALUATION PHASE

A. ALTERNATIVES

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

A. PAVEMENT

Value Engineering Alternative Number 1: *Stage pavement construction.*

Value Engineering Alternative Number 2: *Eliminate vertical curve correction.*

Value Engineering Alternative Number 3: *Construct 8 – lane typical without outside shoulder.*

B. MAINTENANCE OF TRAFFIC

Value Engineering Alternative: *Use a maximum of 3 miles of temporary concrete barrier.*

C. ENGLISH STATION OVERPASS BRIDGE

Value Engineering Alternative: *Construct bridge with 2 – 100 ft. spans with vertical abutments.*

D. BECKLEY STATION ROAD UNDERPASS

Value Engineering Alternative: *Construct bridge with a single 52 ft. span with vertical abutments.*

E. GILLILAND ROAD OVERPASS

Value Engineering Alternative: *Leave bridge as is.*

F. KY 1531 (EASTWOOD/FISHERVILLE ROAD) UNDERPASS

Value Engineering Alternative: *Construct bridge with a single 52 ft. span with vertical abutments.*

G. CLARK STATION OVERPASS

Value Engineering Alternative: *Construct bridge with two 94 ft. spans with vertical abutments.*

H. CONNER STATION ROAD UNDERPASS

Value Engineering Alternative: *Construct bridge with a single 52 ft. span with vertical abutments.*

VI. EVALUATION PHASE

A. ALTERNATIVES *(continued)*

I. JOYES STATION ROAD OVERPASS

Value Engineering Alternative: *Remove existing bridge and do not replace.*

J. KY 1848 INTERCHANGE BRIDGE

Value Engineering Alternative Number 1: *Construct a single point urban interchange.*

Value Engineering Alternative Number 2: *Construct round about at ramp termini.*

K. KY 55 INTERCHANGE BRIDGE

Value Engineering Alternative: *Construct bridge with two 94 ft. spans with vertical abutments.*

L. KY 2861 (OLD TAYLORSVILLE/ZARING MILL ROAD) BRIDGE

Value Engineering Alternative: *Construct bridge with two 82 ft. spans with vertical abutments.*

M. KY 53 INTERCHANGE BRIDGE

Value Engineering Alternative: *Construct bridge with two 82 ft. spans with vertical abutments.*

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

"As Proposed": Construct 6 – lane typical section with 12 ft. – travel lanes, median barrier, 15 ft. 4 in. full depth paved inside shoulder and 12 ft. outside shoulder (10 ft. paved). The existing lanes and inside shoulder will be over laid with 7.5 in. of asphalt and the widened pavement will consist of 17.75 in. asphalt, 4 in. Drainage Blanket and 4 in. of DGA.

Advantages

- Standard maximum asphalt pavement.

Disadvantages

- Shoulder width exceeds standards.
- High construction cost.
- Does not appear to be a 20 year design.
- Will require full depth widening to add a future lane, when warranted.

Conclusion

Carry forward for further evaluation.

Value Engineering Alternative Number 1: *Construct a 10 yr. pavement design and, at year 10, construct the remaining depth of asphalt for the 20 yr. design.*

Advantages

- Lower initial cost.
- Reduced construction time.
- 20-year pavement design.

Disadvantages

- May not meet actual traffic counts – i.e. traffic increases quicker than expected.

Conclusion

Carry forward for further evaluation.

A. PAVEMENT *(continued)*

Value Engineering Alternative Number 2: *Eliminate vertical curve corrections at STA 1868+00 (Crest), STA 1980+00 (Crest) and STA 2087+50 (Sag).*

Advantages

- Lower initial cost.
- Reduced construction time.

Disadvantages

- Each of these vertical curves is in the vicinity of a mainline bridge replacement and within a higher than average crash area.

Conclusion

DROPPED FROM FURTHER CONSIDERATION.

Value Engineering Alternative Number 3: *Construct the ultimate 8 – lane typical section from Gene Snyder interchange using the outside lane as a 12 ft. full depth paved shoulder. This typical also includes the median barrier, 10 ft. inside full depth paved shoulder, 6 – 12 ft. lanes and the 12 ft. full depth paved shoulder.*

Advantages

- If traffic warranted an 8 – lane section quicker than anticipated it could easily be converted to the 8 – lanes by just adding a shoulder.
- Long term construction cost savings.
- Less future construction impacts.
- Less Maintenance of Traffic.
- Reduced drainage requirements for less impervious (10 ft. shoulder vs. 15 ft. 4 in. shoulder).

Disadvantages

- Initial higher construction cost.
- Determining the location of the crown and associated overbuild requirements to meet cross section requirements.

Conclusion

Carry forward for further evaluation.

VI. EVALUATION PHASE

B. ADVANTAGES AND DISADVANTAGES *(continued)*

B. MAINTENANCE OF TRAFFIC

"As Proposed": Use temporary concrete barrier on both sides of the median the entire length of the project in all three phases of construction.

Advantages

- More work area.
- Quicker construction.

Disadvantages

- Increased Maintenance of Traffic costs.
- Traffic confusion in phase 2 and 3.
- More crash cushion/impact attenuators.

Conclusion

Carry forward for further evaluation.

Value Engineering Alternative: *Use temporary concrete barrier on both sides of the median for half the length of the project during phase 1. The temporary barrier will be advanced as work is completed. The other phases will use barrels to delineate the work zones.*

Advantages

- Lower Maintenance of Traffic costs.
- Less traffic confusion.
- Less disposal costs.
- Less barrier relocations.

Disadvantages

- May increase construction time.

Conclusion

Carry forward for further evaluation.

C. ENGLISH STATION OVERPASS

"As Proposed": Replace bridge with a bridge with 2 – 130 ft. +/- spans.

Advantages

- Open appearance.

Disadvantages

- Higher bridge cost.
- Higher maintenance cost.

Conclusion

Carry forward for further evaluation.

Value Engineering Alternative: *Construct the English Station overpass replacement bridge with 2 – 100 ft. +/- spans with vertical abutments.*

Advantages

- Lower construction costs.
- Lower maintenance costs.

Disadvantages

- Closed appearance.

Conclusion

Carry forward for further evaluation.

VI. EVALUATION PHASE

B. ADVANTAGES AND DISADVANTAGES *(continued)*

D. BECKLEY STATION ROAD UNDERPASS

"As Proposed": Replace the existing structure with a single 3-span (90 ft., 110 ft., 85 ft.) bridge.

Advantages

- Open appearance.

Disadvantages

- Higher bridge cost.
- Higher maintenance cost.

Conclusion

Carry forward for further evaluation.

Value Engineering Alternative: *Construct the Beckley Station Road underpass bridge with a single 52 ft. span with vertical abutments.*

Advantages

- Lower construction costs.
- Lower maintenance costs.

Disadvantages

- Closed appearance.

Conclusion

Carry forward for further evaluation.

VI. EVALUATION PHASE

B. ADVANTAGES AND DISADVANTAGES *(continued)*

E. GILLILAND ROAD OVERPASS

"As Proposed": Replace the existing structure with a new one using part-width construction to minimize impacts to adjacent properties. The proposed structure will be a 2-span (130 ft., 130 ft.) replacement structure designed to accommodate the proposed approach road typical section of 2-12 ft. driving lanes, 2-3 ft. bike lanes and an 8 ft. sidewalk on each side.

Advantages

- Upgrades bridge to city standards.
- New structure.
- No future construction impacts.

Disadvantages

- Higher bridge cost.
- Higher maintenance cost.
- Loss of service life of structure.

Conclusion

Carry forward for further evaluation.

Value Engineering Alternative: Leave existing Gilliland Road Overpass Bridge in place.

Advantages

- No construction costs.
- Retains service life of the structure.
- Meets "Purpose and Needs" of I-64 Project – capacity improvement.

Disadvantages

- Loss of good will with city.
- Will require replacement in future.

Conclusion

Carry forward for further evaluation.

F. KY 1531 (EASTWOOD/FISHERVILLE ROAD) UNDERPASS

"As Proposed": Replace the existing structure with a single 3-span (36 ft., 62 ft., 36 ft.) structure designed to accommodate the mainline proposed typical section and the proposed approach road typical section of 2-12 ft. driving lanes, 2-3 ft. bike lanes and an 8 ft. sidewalk on each side.

Advantages

- Open appearance.

Disadvantages

- Higher bridge cost.
- Higher maintenance cost.

Conclusion

Carry forward for further evaluation.

Value Engineering Alternative: *Construct KY 1531 (Eastwood/ Fisherville Road) underpass bridge with a single 52 ft. span with vertical abutments.*

Advantages

- Lower construction costs.
- Lower maintenance costs.

Disadvantages

- Closed appearance.

Conclusion

Carry forward for further evaluation.

G. CLARK STATION ROAD OVERPASS

"As Proposed": Replace the existing structure in place due to insufficient vertical clearance using the part-width construction method. The proposed profile grade will have to be raised and can be tied down quickly to avoid any entrances or right-of-way impacts. The proposed structure will be a 2-span (130 ft., 130 ft.) replacement structure designed to accommodate the proposed typical section of 2-12 ft. driving lanes, 2-3 ft. bike lanes and an 8 ft. sidewalk on each side.

Advantages

- Open appearance.

Disadvantages

- Higher bridge cost.
- Higher maintenance cost.

Conclusion

Carry forward for further evaluation.

Value Engineering Alternative: *Construct the Clark Station Road Overpass Bridge with two 84 ft. spans and vertical abutments.*

Advantages

- Lower construction costs.
- Lower maintenance costs.

Disadvantages

- Closed appearance.

Conclusion

Carry forward for further evaluation.

VI. EVALUATION PHASE

B. ADVANTAGES AND DISADVANTAGES *(continued)*

H. CONNER STATION ROAD – UNDERPASS

"As Proposed": Replace the existing structure with a single 3-span (36 ft., 62 ft., 36 ft.) structure designed to accommodate the mainline proposed typical section and the proposed approach road typical section of 2-12 ft. driving lanes, 2-3 ft. bike lanes and an 8 ft. sidewalk on each side.

Advantages

- Open appearance.

Disadvantages

- Higher bridge cost.
- Higher maintenance cost.

Conclusion

Carry forward for further evaluation.

Value Engineering Alternative: *Construct the Conner Station Road Underpass Bridge with a single 52 ft. span and vertical abutments.*

Advantages

- Lower construction costs.
- Lower maintenance costs.

Disadvantages

- Closed appearance.

Conclusion

Carry forward for further evaluation.

VI. EVALUATION PHASE

B. ADVANTAGES AND DISADVANTAGES *(continued)*

I. JOYES STATION ROAD – OVERPASS

"As Proposed": Shift the horizontal alignment to the east in order to maintain traffic on the existing bridge while constructing a new structure. This alternate will require approximately 750 ft. of approach relocation on each side of the bridge and additional right-of-way. Utility relocation may also be required to construct the approaches. The replacement structure will be a 4-span bridge designed to accommodate the proposed typical section. The grade of Joyes Station Road will be raised approximately 2 ft. to accommodate the deeper beams.

Advantages

- Continues existing traffic patterns.

Disadvantages

- High bridge cost.
- High maintenance cost.

Conclusion

Carry forward for further evaluation.

Value Engineering Alternative: *Remove the Joyes Station Road Overpass Bridge and do not replace.*

Advantages

- No construction costs.
- No maintenance costs.

Disadvantages

- Local access issues.

Conclusion

Carry forward for further evaluation.

J. KY 1848 INTERCHANGE

"As Proposed": Reconstruct ramps with a shifted horizontal alignment while maintaining traffic on existing ramps. Accel./decel. lanes extended and dual left turns on eastbound exit ramp added with signal at intersection. KY 1848 will be expanded in a northerly direction to US 60 with another KYTC project (urban section with curb and gutter and sidewalks). Strip takings of right-of-way for the ramps impacts the ingress and egress of the Tobacco Road (BP Station) in the southwest quadrant. The right-of-way and utility impacts may be reduced substantially by using 2:1 fill slopes on the ramps and replacing the guardrail.

Advantages

- Minimal construction impacts on ramps.
- Low construction cost.
- Low maintenance cost.
- Simple structure design.

Disadvantages

- Poor to fair operational characteristics.
- Large volume of truck traffic.
- Signalization spacing too close.
- Ramp termini too close to Pilot Truck Stop.
- County road access issues.

Conclusion

Carry forward for further evaluation.

VI. EVALUATION PHASE

B. ADVANTAGES AND DISADVANTAGES *(continued)*

J. KY 1848 INTERCHANGE *(continued)*

Value Engineering Alternative Number 1: Construct a Single Point Urban Interchange.

Advantages

- Better operational characteristics.
- Reduced signal spacing conflicts.
- Fewer utility conflicts.

Disadvantages

- Higher construction cost.

Conclusion

Carry forward for further evaluation.

Value Engineering Alternative Number 2: Construct a Modern Day Roundabout at the KY 1848 Interchange Ramp Termini.

Advantages

- Better operational characteristics.
- No Signalization.
- Fewer utility conflicts.
- Low construction cost.

Disadvantages

- Non-Standard design.

Conclusion

Carry forward for further evaluation.

VI. EVALUATION PHASE

B. ADVANTAGES AND DISADVANTAGES *(continued)*

K. KY 55 INTERCHANGE – OVERPASS

"As Proposed": Remove and replace the existing structure with a single 4-span structure that will accommodate 2-12 ft. driving lanes in each direction, 2-12 ft. center turn lanes and 12 ft. shoulders on KY 55. The proposed interchange will be reconstructed as a standard Diamond Interchange.

Advantages

- Open appearance.

Disadvantages

- Higher bridge cost.
- Higher maintenance cost.

Conclusion

Carry forward for further evaluation.

Value Engineering Alternative: *Construct the KY 55 Interchange Overpass Bridge with two 84 ft. spans and vertical abutments.*

Advantages

- Lower construction costs.
- Lower maintenance costs.

Disadvantages

- Closed appearance.

Conclusion

Carry forward for further evaluation.

VI. EVALUATION PHASE

B. ADVANTAGES AND DISADVANTAGES *(continued)*

L. KY 2861 (OLD TAYLORSVILLE/ZARING MILL ROAD) – OVERPASS

"As Proposed": Close KY 2861 and replace the existing structure due to insufficient vertical clearance. The proposed bridge and the proposed approach road typical section will have 2-12 ft. driving lanes, with 8 ft. shoulders.

Advantages

- Open appearance.

Disadvantages

- Higher bridge cost.
- Higher maintenance cost.

Conclusion

Carry forward for further evaluation.

Value Engineering Alternative: *Construct the KY 2861 (Old Taylorsville/Zaring Mill Road) Overpass Bridge with two 84 ft. spans and vertical abutments.*

Advantages

- Lower construction costs.
- Lower maintenance costs.

Disadvantages

- Closed appearance.

Conclusion

Carry forward for further evaluation.

M. KY 53 INTERCHANGE – OVERPASS

"As Proposed": Remove and replace the existing structure with a single 4-span structure that will accommodate 2-12 ft. driving lanes in each direction, 2-12 ft. center turn lanes and 12 ft. shoulders on KY 53. The proposed interchange will be reconstructed as a standard Diamond Interchange.

Advantages

- Open appearance.

Disadvantages

- Higher bridge cost.
- Higher maintenance cost.

Conclusion

Carry forward for further evaluation.

Value Engineering Alternative: *Construct the KY 53 Interchange Overpass Bridge with two 84 ft. spans and vertical abutments.*

Advantages

- Lower construction costs.
- Lower maintenance costs.

Disadvantages

- Closed appearance.

Conclusion

Carry forward for further evaluation.

VII. DEVELOPMENT PHASE

A. PAVEMENT

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

B. MAINTENANCE OF TRAFFIC

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

C. ENGLISH STATION ROAD OVERPASS BRIDGE

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

D. BECKLEY STATION ROAD

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

E. GILLILAND ROAD

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

F. KY 1531

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

G. CLARK STATION ROAD OVERPASS

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

VII. DEVELOPMENT PHASE

H. CONNER STATION ROAD

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

I. JOYES STATION ROAD

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

J. KY 1848 INTERCHANGE

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

K. KY 55 INTERCHANGE

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

L. KY 2861 (OLD TAYLORSVILLE/ZARING MILL ROAD)

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

M. KY 53 INTERCHANGE

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

VII. DEVELOPMENT PHASE

A. PAVEMENT

"As Proposed"

The assumed "As Proposed" pavement design calls for 7.5 in. overlay of the existing pavement. Computing the Structural Number (SN) from this yields a required SN of 8.56. With a SN of 8.56, the following pavement design was developed.
Proposed:

Required Structural Number (SN) of 8.56

Overlay of Existing Pavement:

- 1.5 in. Surface SN = 0.66
- 6 in. Base SN = 2.40
- Existing Pavement SN = 5.50
- Total SN = 8.56

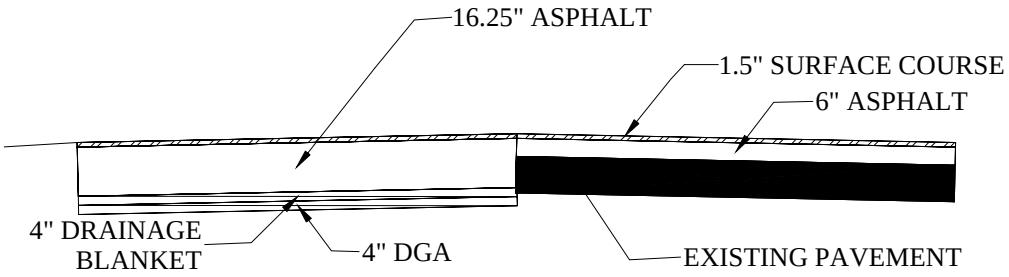
Widening:

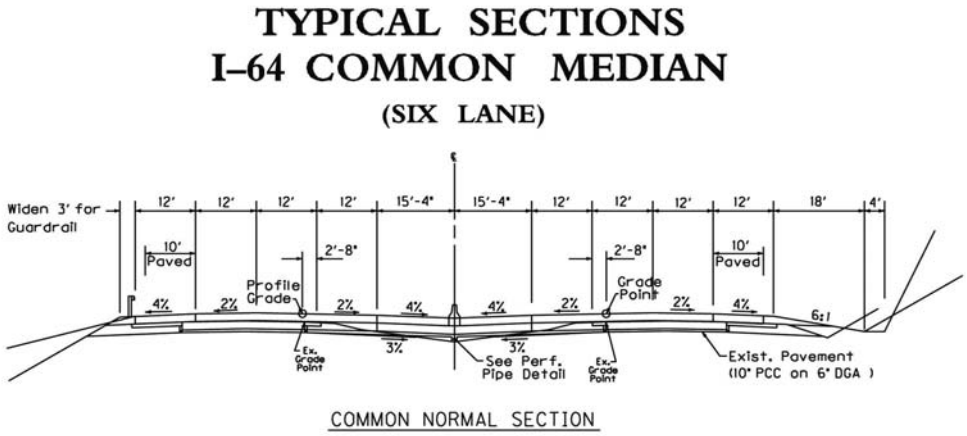
- 1.5 in. Surface SN = 0.66
- 16.25 in. Base SN = 6.50
- 4 in. Drainage Blanket SN = 0.84
- 4 in. DGA SN = 0.56
- Total SN = 8.56

VII. DEVELOPMENT PHASE

A. PAVEMENT

"As Proposed" *(continued)*





VII. DEVELOPMENT PHASE

A. PAVEMENT

Value Engineering Alternative Number 1

Background Data:

20 Year ESAL design values are approximately 50 million on mainline.

10 Year ESAL design values may be estimated at 40 percent of 20 years, resulting in 20 million ESAL's.

The KYTC Pavement Design Spread Sheet will only compute pavement designs for up to 20 million ESAL's. Using the 20 million ESAL's yields the following pavement design (10 – year design):

Required Structural Number (SN) of 8.56

Overlay of Existing Pavement:

- 1.5 in. Surface SN = 0.66
- 6 in. Base SN = 2.40
- Existing Pavement SN = 5.50
- Total SN = 8.56

Widening:

- 1.5 in. Surface SN = 0.66
- 16.25 in. Base SN = 6.50
- 4 in. Drainage Blanket SN = 0.84
- 4 in. DGA SN = 0.56
- Total SN = 8.56

This is the same assumed design provided to the Value Engineering Team. Therefore the Value Engineering Team recommends a staged construction of the pavement. Use the above pavement design for initial construction and, at 10 years, resurface with another 10 year pavement design, which would appear to be another 7.5 in. overlay.

PAVEMENT
VALUE ENGINEERING ALTERNATIVE NUMBER 1
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
RE-SURFACE 10 YEARS	TONS	$39.00	0.0	$0	309,210	$12,059,190
SUBTOTAL				**$0**		**$12,059,190**
CONTINGENCY			22.0%	$0	22.0%	$2,653,022
GRAND TOTAL				**$0**		**$14,712,212**

POSSIBLE COST INCREASE: **$14,712,212**

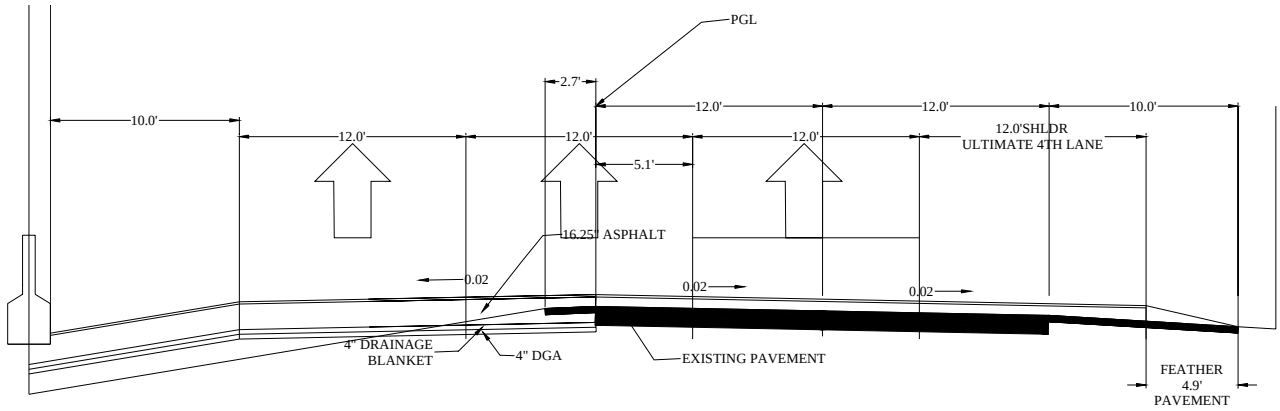
VII. DEVELOPMENT PHASE

A. PAVEMENT

Value Engineering Alternative Number 2

Construct the ultimate 8 – lane typical section from Gene Snyder interchange using the outside lane as a 12 ft. full depth paved shoulder. This typical also includes the median barrier, 10 ft. inside full depth paved shoulder, 6 – 12 ft. lanes and the 12 ft. full depth paved shoulder.

Keep Crown Point in Same Place, Crown Point is in 6 ft. 9 in. into right lane from centerline



VALUE ENGINEERING ALTERNATIVE TYPICAL

The median pavement is essentially the same with the exception of some minor grade changes caused by the location of the profile grade. The initial construction savings comes from not overlaying the entire existing shoulder with 7.5 in. of asphalt. The long term savings comes from having a full depth paved shoulder that can easily be converted to the 4th lane in the future and just adding a paved 10 ft. shoulder when traffic warrants the 4th lane.

PAVEMENT
(10 ft. 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
WIDENED ASPHALT	TONS	$39.00	232,529.7	$9,068,660	232,529.7	$9,068,660
DRAINAGE BLANKET	TONS	$31.00	54,208.0	$1,680,448	54,208.0	$1,680,448
DGA	TONS	$17.00	56,672.0	$963,424	56,672.0	$963,424
OVERLAY 7.5	TONS	$39.00	115,192.0	$4,492,488	98,590.8	$3,845,041
SUBTOTAL				**$16,205,020**		**$12,059,190**
ENGINEERING & CONTINGENCY			10.0%	$1,620,502	10.0%	$1,555,757
CONTINGENCY			22.0%	$3,565,104	22.0%	$845,909
GRAND TOTAL				**$21,390,626**		**$17,959,239**

POSSIBLE SAVINGS: $3,431,387

PAVEMENT
(FUTURE WIDENING TO 8 LANES)
VALUE ENGINEERING ALTERNATIVE NUMBER 2
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
ASPHALT	TONS	$39.00	96,219.2	$3,752,549	0.0	$0
DRAINAGE BLANKET	TONS	$31.00	21,683.2	$672,179	0.0	$0
DGA	TONS	$17.00	21,683.2	$368,614	0.0	$0
SHOULDER PAVEMENT	TONS	$39.00	18,069.3	$704,704	18,069.3	$704,704
SHOULDER DGA	TONS	$17.00	27,104.0	$460,768	18,069.3	$307,179
OVERLAY 7.5	TONS	$39.00	173,906.0	$6,782,336	196,504.0	$7,663,656
SUBTOTAL				**$12,741,150**		**$8,675,539**
ENGINEERING & CONTINGENCY			10.0%	$1,274,115	10.0%	$867,554
CONTINGENCY			22.0%	$2,803,318	22.0%	$1,908,619
GRAND TOTAL				**$16,818,318**		**$11,451,711**

POSSIBLE SAVINGS: $5,366,607

VII. DEVELOPMENT PHASE

A. PAVEMENT

Value Engineering Alternative Number 2

LCC ANALYSIS
CONSTRUCT 10' SHOULDER

COMPARISON

10 Year Life Cycle Cost Comparison

Enter the Interest Rate = 4%

		AS PROPOSED		ALT 1	
Year		**Total**	**Present Worth**	**Total**	**Worth**
0	INITIAL COST	$21,390,626	-$21,390,626	$17,959,230	-$17,959,230
10	widening/overlay	$16,818,318	-$11,361,853	$11,451,711	-$7,736,366
10	SALVAGE	$0	$0	$0	$0
			-$32,752,479		**-$25,695,596**

LIFE CYCLE COST SAVINGS **$7,056,883**

VII. DEVELOPMENT PHASE

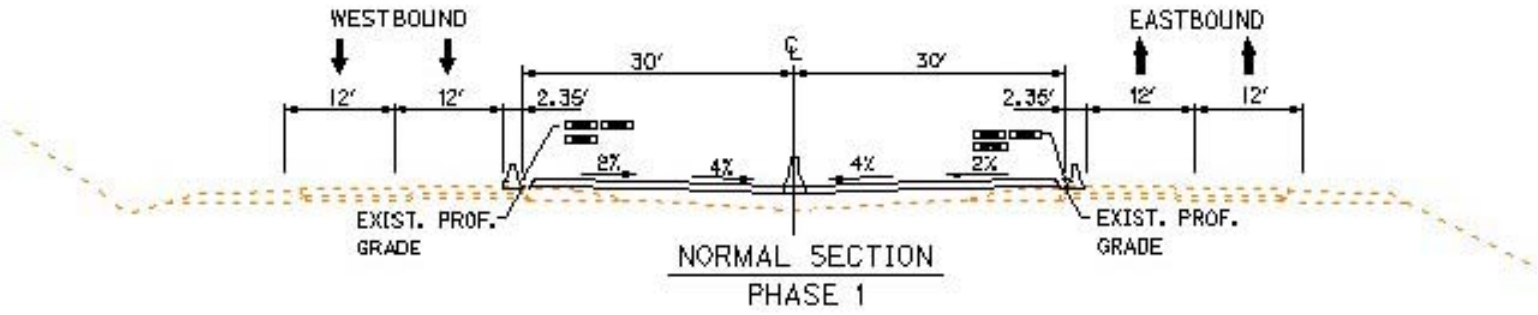
B. MAINTENANCE OF TRAFFIC

"As Proposed"

Three phase construction.

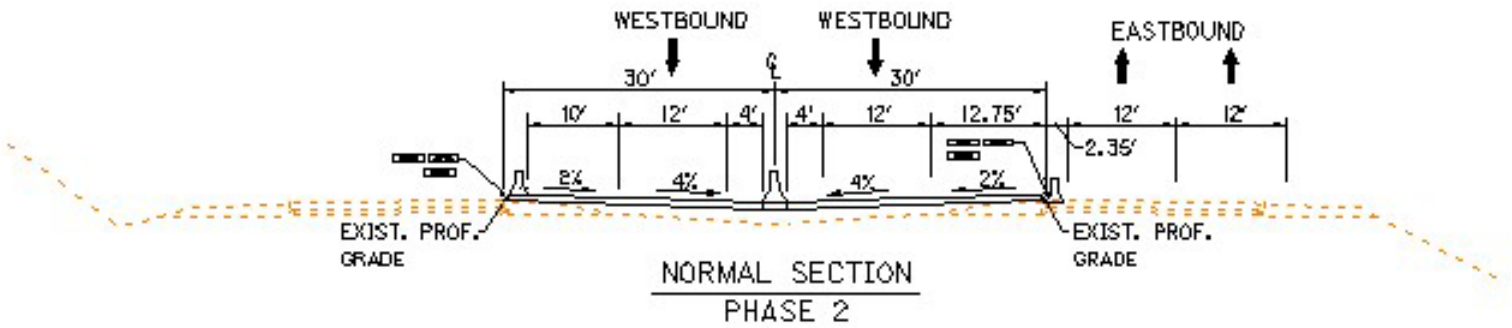
PHASE 1

- Place TCBW on edge of EB and WB pavement.
- Maintain traffic on existing lanes while constructing median pavement up through base courses, and construct middle phase of bridges



PHASE 2

- Relocate the WB TCBW to the WB outside edge of the median constructed in Phase 1.
- Move the WB traffic to the middle portion of the widening constructed in Phase 1.
- Construct the WB overlay on the existing traffic lanes and shoulders along with the WB phase of the mainline bridges



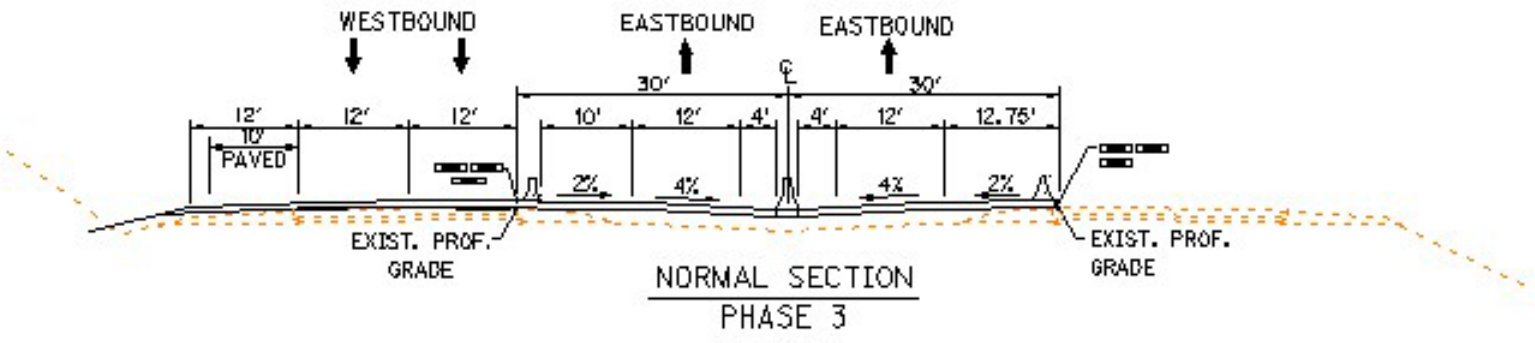
VII. DEVELOPMENT PHASE

B. MAINTENANCE OF TRAFFIC

"As Proposed" *(continued)*

PHASE 3

- Relocate the EB TCBW to the EB outside edge of median constructed in Phase 1.
- Remove the WB TCBW relocated in Phase 2.
- Move the WB traffic back to the existing WB lanes and structures completed in Phase 2.
- Move the EB traffic to the middle portion of the widening constructed in Phase 1.
- Construct the EB overlay on the existing traffic lanes and shoulders along with the EB phase of the mainline bridges.
- Remove the EB TCBW and construct asphalt surface under traffic.



VII. DEVELOPMENT PHASE

B. MAINTENANCE OF TRAFFIC

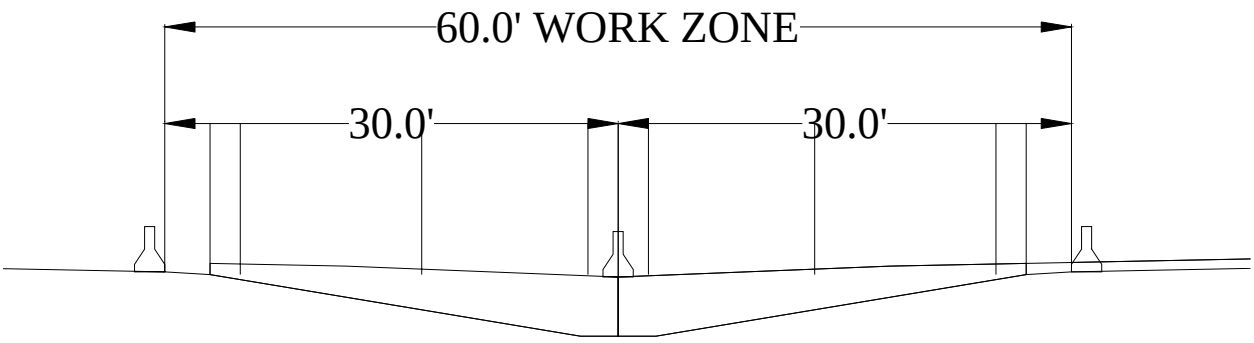
Value Engineering Alternative

Use temporary concrete barrier on both sides of the median for half the length of the project during phase 1. The temporary barrier will be advanced as work is completed. The other phases will use barrels to delineate the work zones.

Construct the project in short sections of 3-6 mile lengths to reduce length of traffic disruption.

PHASE I

- While maintaining traffic on the existing EB and WB lanes, install Temporary Concrete Barrier Wall (TCBW) on the inside edge of pavement of both the EB and WB lanes through one-half of the construction length.
- Construct the median and inside lane of the roadway through the final asphalt base course and the middle phase of the mainline bridges in this work zone.
- Relocate TCBW on the inside edge of pavement of both the EB and WB lanes to the remaining one-half of the construction length.
- Construct the median and inside lane of the roadway through the final asphalt base course and the middle phase of the mainline bridges in this work zone.



VALUE ENGINEERING ALTERNATIVE PHASE 1 MAINTENANCE OF TRAFFIC

VII. DEVELOPMENT PHASE

B. MAINTENANCE OF TRAFFIC

Value Engineering Alternative *(continued)*

PHASE II

- While maintaining EB and WB traffic on the newly constructed median shoulder and inside lane, construct the overlay on the existing EB and WB lanes and outside shoulder work.
- Install barrels on the outside of the newly constructed median only at bridge locations.
- Wedge drop-offs as required throughout project.

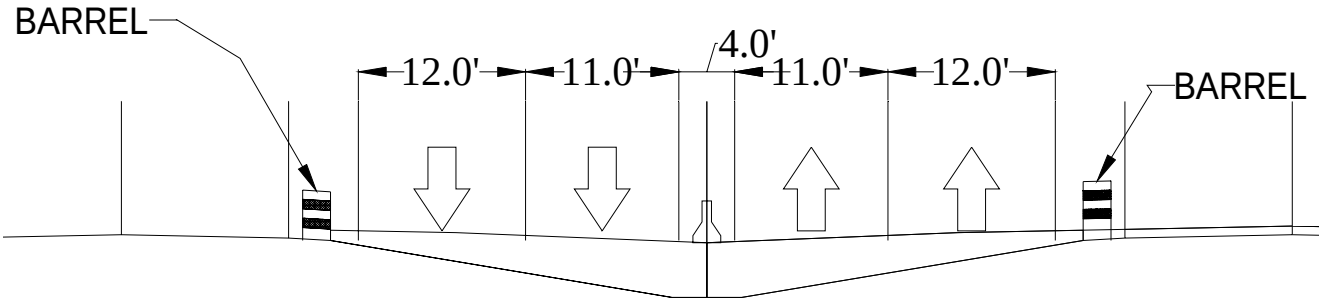
Value Engineering Alternative for Maintenance of Traffic

Advantages

- Reduces the required length of TCBW by approximately one-half.
- Reduces the required relocation of TCBW by approximately one-half.
- Results in savings of $2.5 million dollars.
- Improves access to exits during Phase 2.

Disadvantages

- Does not provide positive separation of traffic and work zone during Phase 2 of construction.
- Phase 2 Maintenance of Traffic has narrow shoulders.
- Requires wedging of pavement edge drop-offs.



MAINTENANCE OF TRAFFIC
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
TMCB	LF	$22.00	18,292.0	$4,032,424	91,646.0	$2,016,212
RELOCATE TMCB	LF	$6.00	$183,292.0	$1,099,752	91,646.0	$549,876
SUBTOTAL				**$5,132,176**		**$2,566,088**
ENGINEERING & CONTINGENCY			10.0%	$513,218	10.0%	$256,609
CONTINGENCY			22.0%	$1,129,079	22.0%	$564,539
GRAND TOTAL				**$6,774,472**		**$3,387,236**

POSSIBLE SAVINGS: $3,387,236

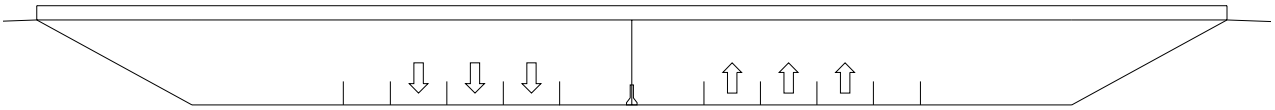
VII. DEVELOPMENT PHASE

C. ENGLISH STATION ROAD OVERPASS

"As Proposed"

The existing English Station Road Overpass Bridge configuration is a 4 span (50 ft., 75 ft., 75 ft., 50 ft.) structure with a 20° skew. The as-proposed design will replace the existing structure due to insufficient horizontal and vertical clearance. The HNTB interchange design tapers will affect the geometry of the replacement structure. An exact replacement bridge was not provided, so the Value Engineering Team assumed a 2 – span bridge (130 ft., 130 ft.) with 2 – 24 ft. lanes and 8 ft. shoulders. The cost estimate provided to the Value Engineering Team priced this bridge at $614,579, which yields a cost of $59.10/SF.

EXISTING ENGLISH STATION OVERPASS



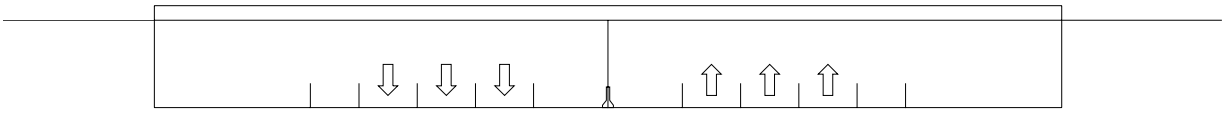
AS PROPOSED 2 SPAN BRIDGE (130 ft., 130 ft.)

VII. DEVELOPMENT PHASE

C. ENGLISH STATION ROAD OVERPASS

Value Engineering Alternative

The Value Engineering Team recommends constructing a two span (100 ft., 100 ft.) overpass bridge with vertical end abutments that will reduce the overall length of the bridge by 60 ft.. The end abutments will have to be cast in place walls because it is in a cut section. This typical includes the future widening to 8 – lanes.



VALUE ENGINEERING ALTERNATIVE 2 – SPAN OVERPASS (100 ft., 100 ft.)

ENGLISH STATION ROAD OVERPASS
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
BRIDGE	SF	$65.00	12,480.0	$811,200	9,600	$624,000
RETAINING WALL	SF	$35.00	0.0	$0	2,541	$88,935
EXTRA EMBANKMENT (behind abutments)	CY	$8.00	0.0	$0	1,411.7	$11,293
Steel H-Piles	LF	$45.00	0.0	$0	280	$12,600
Pavement	SY	$24.80	0.0	$0	80	$1,984
SUBTOTAL				**$811,200**		**$738,812**
ENGINEERING & CONTINGENCY			10.0%	$81,120	10.0%	$73,881
CONTINGENCY			22.0%	$178,464	22.0%	$162,539
GRAND TOTAL				**$1,070,784**		**$975,232**

POSSIBLE SAVINGS: $95,552

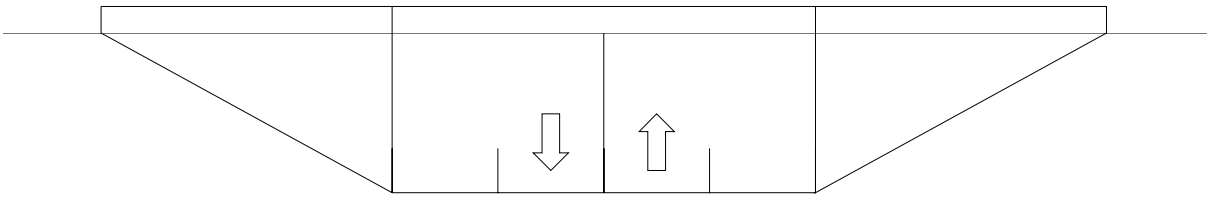
VII. DEVELOPMENT PHASE

D. BECKLEY STATION ROAD UNDERPASS

"As Proposed"

Remove and replace the existing 24 ft. x 14 ft. Single Barrel Concrete Wagon box with a single 3-span (90 ft., 110 ft., 85 ft.) structure designed to accommodate the proposed mainline typical section. The HNTB interchange design tapers will affect the geometry of the replacement structure.

EXISTING STRUCTURE



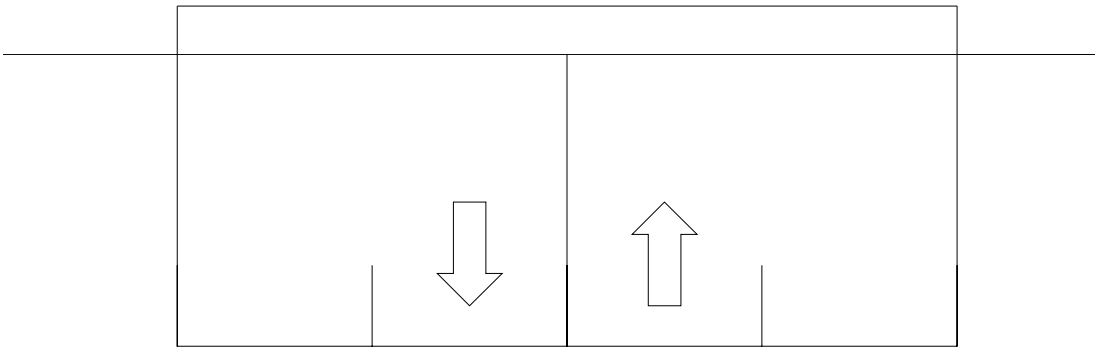
AS PROPOSED 3 – SPAN UNDERPASS BRIDGE (90 ft., 110 ft., 85 ft.)

VII. DEVELOPMENT PHASE

D. BECKLEY STATION ROAD UNDERPASS

Value Engineering Alternative

The Value Engineering Team recommends constructing the underpass bridge with an 80 ft. single span bridge vertical end abutments that will reduce the overall length of the bridge by 205 ft..



VALUE ENGINEERING ALTERNATIVE SINGLE 52 ft. SPAN UNDERPASS BRIDGE

BECKLEY STATION ROAD UNDERPASS
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
BRIDGE	SF	$65.00	53,209.5	$3,458,618	9,708.4	$631,046
MSE WALL	SF	$35.00	0.0	$0	7,250.1	$253,754
EXTRA EMBANKMENT (behind abutments)	CY	$8.00	0.0	$0	268.5	$2,148
Steel H-Piles	LF	$45.00	0.0	$0	280.0	$12,600
Pavement	SY	$49.31	0.0	$0	1,242.7	$61,276
SUBTOTAL				**$3,458,618**		**$960,824**
ENGINEERING & CONTINGENCY			10.0%	$345,862	10.0%	$96,082
CONTINGENCY			22.0%	$760,896	22.0%	$211,381
GRAND TOTAL				**$4,565,375**		**$1,268,287**

POSSIBLE SAVINGS: $3,297,088

VII. DEVELOPMENT PHASE

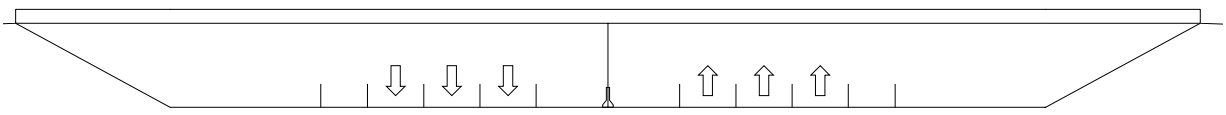
E. GILLILAND ROAD OVERPASS

"As Proposed"

Replace the existing 4-span (50 ft., 75 ft., 75 ft., 50 ft.) structure with a new one using part-width construction to minimize impacts to adjacent properties. The proposed structure will be a 2-span (130 ft., 130 ft.) replacement structure designed to accommodate the proposed approach road typical section of 2-12 ft. driving lanes, 2-3 ft. bike lanes and an 8 ft. sidewalk on each side.

EXISTING GILLILAND OVERPASS

With the as proposed construction there would be an upgrade to the City of Louisville's future recommendations on typical sections and would obtain a new structure at this location with no future construction impacts.



AS PROPOSED 2 – SPAN BRIDGE (130 ft., 130 ft.)

VII. DEVELOPMENT PHASE

E. GILLILAND ROAD OVERPASS

Value Engineering Alternative

After reviewing the project and looking at the proposed Six Year Plan write up about the proposed new future interchange at this location the scope of the I-64 Rehabilitation project is to widen the existing structure to 6 – lanes to better accommodate the existing traffic flows. This is why, with sticking to the scope of the existing project and reviewing the existing structure, the Value Engineering Team recommends not replacing the existing bridge at this time.

The vertical clearance on the bridge will be sufficient to accommodate the new typical section and the horizontal will be acceptable to the median. However, the outside 30 ft. clear zone is not met. Steel W-Beam guardrail will be used to shield obstacles.

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VALUE ENGINEERING ALTERNATIVE TO LEAVE EXISTING BRIDGE

GILLILAND ROAD OVERPASS
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
BRIDGE	SF	$65.00	11,040.0	$717,600	0.0	$0
BRIDER REMOVAL	LS	$50,000.00	1.0	$50,000	0.0	$0
SUBTOTAL				**$767,600**		**$0**
ENGINEERING & CONTINGENCY			10.0%	$76,760	10.0%	$0
CONTINGENCY			22.0%	$168,872	22.0%	$0
GRAND TOTAL				**$1,013,232**		**$0**

POSSIBLE SAVINGS: $1,013,232

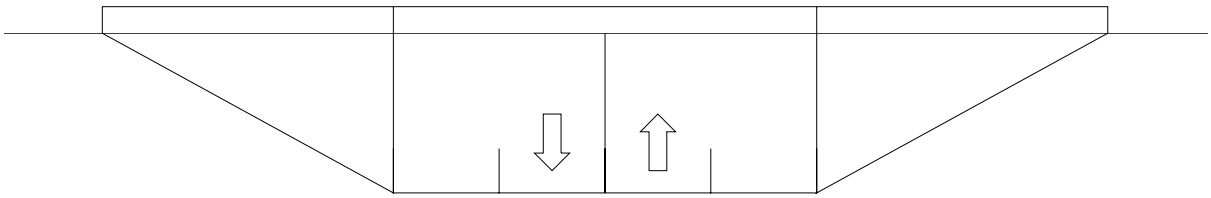
VII. DEVELOPMENT PHASE

F. KY 1531 (EASTWOOD/FISHERVILLE ROAD) UNDERPASS

"As Proposed"

Remove and replace the existing 24 ft. x 14 ft. Single Barrel Concrete Wagon box with a single 3-span (36 ft., 62 ft., 36 ft.) structure designed to accommodate the mainline proposed typical section and the proposed approach road typical section of 2-12 ft. driving lanes, 2-3 ft. bike lanes and an 8 ft. sidewalk on each side. Close road during construction.

EXISTING KY 1531 WAGON BOX



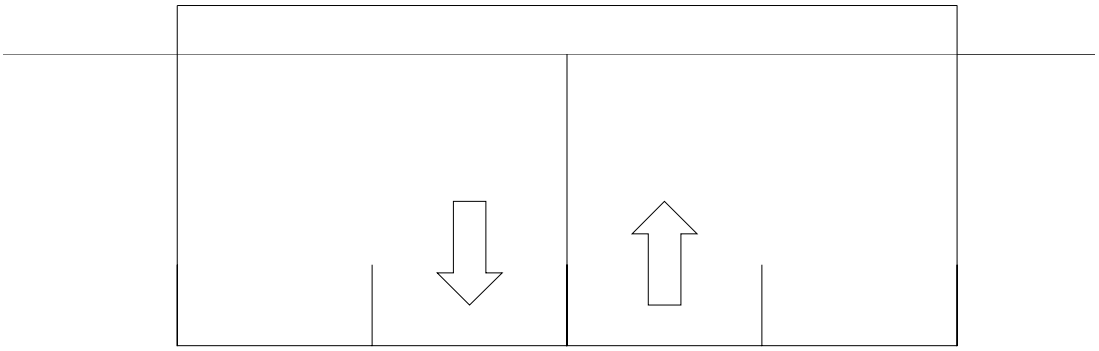
AS PROPOSED 3 – SPAN UNDERPASS BRIDGE (36 ft., 62 ft., 36 ft.)

VII. DEVELOPMENT PHASE

F. KY 1531 (EASTWOOD/FISHERVILLE ROAD) UNDERPASS

Value Engineering Alternative

The Value Engineering Team recommends constructing the underpass bridge with a 65 ft. single span bridge vertical end abutments that will reduce the overall length of the bridge by 69 ft..



VALUE ENGINEERING ALTERNATIVE SINGLE 52 ft. SPAN UNDERPASS BRIDGE

KY 1531 (EASTWOOD/FISHERVILLE ROAD) UNDERPASS
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
BRIDGE	SF	$65.00	25,017.8	$1,626,157	9,708.4	$631,046
MSE WALL	SF	$35.00	1.0	$0	2,673.0	$93,555
EXTRA EMBANKMENT (behind abutments)	CY	$8.00	0.0	$0	1,782.0	$14,256
STEEL H-PILES	LF	$45.00	0.0	$0	580.0	$26,100
PAVEMENT	SY	$49.31	0.0	$0	437.3	$21,565
SUBTOTAL				**$1,626,157**		**$786,522**
ENGINEERING & CONTINGENCY			10.0%	$162,616	10.0%	$78,652
CONTINGENCY			22.0%	$357,755	22.0%	$173,035
GRAND TOTAL				**$2,146,527**		**$1,038,209**

POSSIBLE SAVINGS: $1,108,319

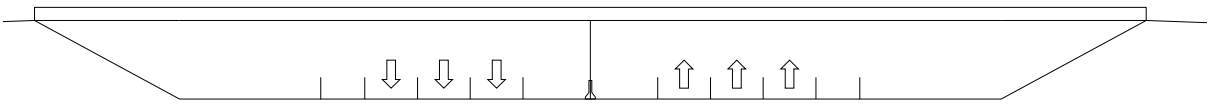
II. DEVELOPMENT PHASE

G. CLARK STATION ROAD OVERPASS

"As Proposed"

Shift the alignment to the west in order to maintain traffic on the existing bridge. On the north end, this would result in a substandard profile tie-in grade greater than 8%. The proposed structure will be a 2-span (130 ft., 130 ft.) replacement structure designed to accommodate the proposed approach road typical section of 2-12 ft. driving lanes, 2-3 ft. bike lanes and an 8 ft. sidewalk on each side.

EXISTING CLARK STATION ROAD OVERPASS



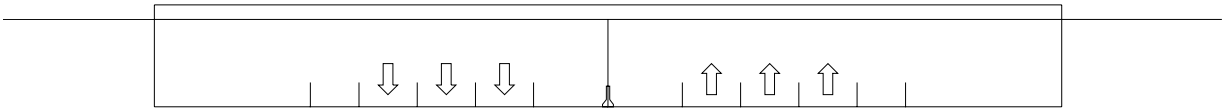
AS PROPOSED 2 SPAN BRIDGE (130 ft., 130 ft.)

VII. DEVELOPMENT PHASE

G. CLARK STATION ROAD OVERPASS

Value Engineering Alternative

The Value Engineering Team recommends constructing the underpass bridge with a two-span (94 ft., 94 ft.) bridge with vertical end abutments that will reduce the overall length of the bridge by 72 ft..



VALUE ENGINEERING ALTERNATIVE 2 – SPAN OVERPASS (94 ft., 94 ft.)

CLARK STATION ROAD OVERPASS
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
BRIDGE	SF	$65.00	12,480.0	$811,200	9,024.0	$586,560
MSE WALL	SF	$35.00	0.0	$0	2,673.0	$93,555
EXTRA EMBANKMENT (behind abutments)	CY	$8.00	0.0	$0	3,267.0	$26,136
STEEL H-PILES	LF	$45.00	0.0	$0	280.0	$12,600
PAVEMENT	SY	$24.80	0.0	$0	384.0	$9,523
SUBTOTAL				**$811,200**		**$728,374**
ENGINEERING & CONTINGENCY			10.0%	$81,120	10.0%	$72,837
CONTINGENCY			22.0%	$178,464	22.0%	$160,242
GRAND TOTAL				**$1,070,784**		**$961,454**

POSSIBLE SAVINGS: $109,330

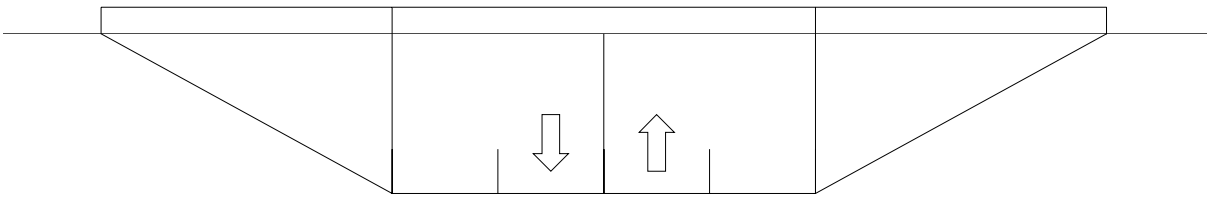
VII. DEVELOPMENT PHASE

H. CONNER STATION ROAD UNDERPASS

"As Proposed"

Remove and replace the existing 20 ft. x 14 ft. Single Barrel Concrete Wagon box with a single 3-span structure designed to accommodate the proposed typical section. Conner Station Road typical is assumed to be 2 – 12 ft. lanes with a 30 ft. border/clear zone. The replacement structure is assumed to be a 3 – span bridge (35 ft., 52 ft., 35 ft.).

EXISTING CONNER ROAD WAGON BOX



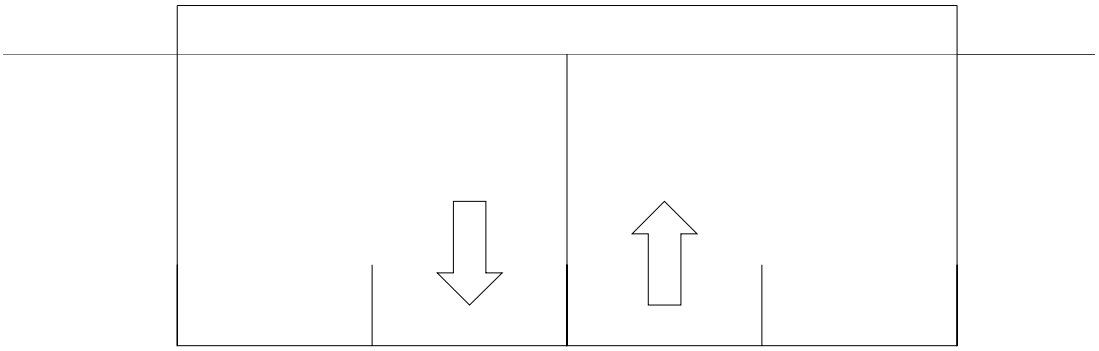
AS PROPOSED 3 – SPAN BRIDGE (36 ft., 52 ft., 36 ft.)

VII. DEVELOPMENT PHASE

H. CONNER STATION ROAD UNDERPASS

Value Engineering Alternative

The Value Engineering Team recommends constructing the underpass bridge with a 52 ft. single span bridge vertical end abutments that will reduce the overall length of the bridge by 72 ft..



VALUE ENGINEERING ALTERNATIVE SINGLE 52 ft. SPAN UNDERPASS BRIDGE

CONNER STATION ROAD UNDERPASS
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
BRIDGE	SF	$65.00	25,017.8	$1,626,157	9,755.2	$634,088
MSE WALL	SF	$35.00	0.0	$0	7,279.8	$254,793
EXTRA EMBANKMENT (behind abutments)	CY	$8.00	0.0	$0	62,822.0	$502,579
STEEL H-PILES	LF	$45.00	0.0	$0	280.0	$12,600
PAVEMENT	SY	$49.31	0.0	$0	3,279.3	$161,705
SUBTOTAL				**$1,626,157**		**$1,565,761**
ENGINEERING & CONTINGENCY			10.0%	$162,616	10.0%	$156,576
CONTINGENCY			22.0%	$357,755	22.0%	$344,467
GRAND TOTAL				**$2,146,527**		**$2,066,805**

POSSIBLE SAVINGS: $79,722

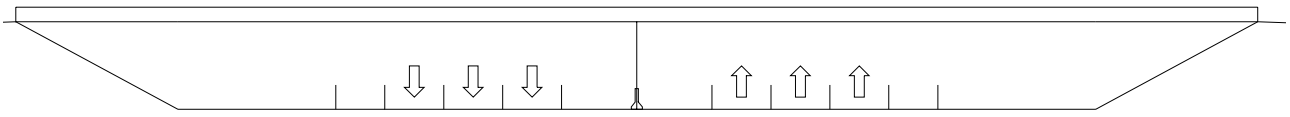
VII. DEVELOPMENT PHASE

I. JOYES STATION ROAD OVERPASS

"As Proposed"

Shift the horizontal alignment to the east in order to maintain traffic on the existing 4 span (50 ft., 75 ft., 75 ft., 50 ft.) bridge while constructing a new structure. This alternate will require approximately 750 ft. of approach relocation on each side of the bridge and additional right-of-way. Utility relocation may also be required to construct the approaches. The replacement structure will be a 4-span bridge designed to accommodate the proposed typical section. The grade of Joyes Station Road will be raised approximately 2 ft. to accommodate the deeper beams.

EXISTING JOYES ROAD OVERPASS



AS PROPOSED 2 – SPAN BRIDGE (130 ft., 130 ft.)

VII. DEVELOPMENT PHASE

I. JOYES STATION ROAD OVERPASS

Value Engineering Alternative

After a site visit to each side of the interstate, this bridge only provides access to one family residence. Norfolk Southern RR has installed a locked gate at the termination of Joyes Road.

This gate is approximately .25 mile north of the residence and, if opened, would provide access for the residence. The road north of the locked gate leads out through the industrial park and to KY 55. There are no other gates or signs preventing access to this area.

VII. DEVELOPMENT PHASE

I. JOYES STATION ROAD OVERPASS

Value Engineering Alternative

LOOKING NORTH TOWARD NORFOLK SOUTHNER ACCESS ROAD

It appears that this property is residential/farm land with an older 2-story wooden frame house located on approximately 65 acres. Norfolk Southern RR has already purchased the property to the west side of Joyes Road that had the same type of land usage with a single story brick house on it. It appears as though instead of building a new bridge over I-64, which would basically be a driveway for the 2-story wooden frame house, the Cabinet should pursue acquiring some type of easement from Norfolk Southern RR to allow ingress and egress to the 2-story house. As shown above, there would be access by opening a gate that appears to be locked. Failing to negotiate with Norfolk Southern, the Cabinet could make a fair market offer to the property owner for the property and relocation costs.

Purchasing the land adds the disadvantage of acquiring "surplus Right-of-Way", which should be disposed of. Two options of disposal of this property may be selling to Norfolk Southern, or using it as environmental mitigation.

The Value Engineering Team Recommends demolishing the existing bridge without replacement and obtain an easement from Norfolk Southern to allow ingress and egress for the residence north of I-64 on Joyes Station Road.

VII. DEVELOPMENT PHASE

I. JOYES STATION ROAD OVERPASS

Value Engineering Alternative

VALUE ENGINEERING ALTERNATIVE FOR JOYES ROAD BRIDGE

JOYES STATION ROAD OVERPASS
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
BRIDGE	SF	$65.00	11,040.0	$717,600	0.0	$0
CUL DE SAC	EA	$2,500.00	0.0	$0	2.0	$5,000
SUBTOTAL				**$717,600**		**$5,000**
ENGINEERING & CONTINGENCY			10.0%	$71,760	10.0%	$500
EASEMENT WITH NORFOLK SOUTHERN	LS	$10,000.00	0.0	$0	1.0	$10,000
CONTINGENCY			22.0%	$157,872	22.0%	$1,100
GRAND TOTAL				**$947,232**		**$16,600**

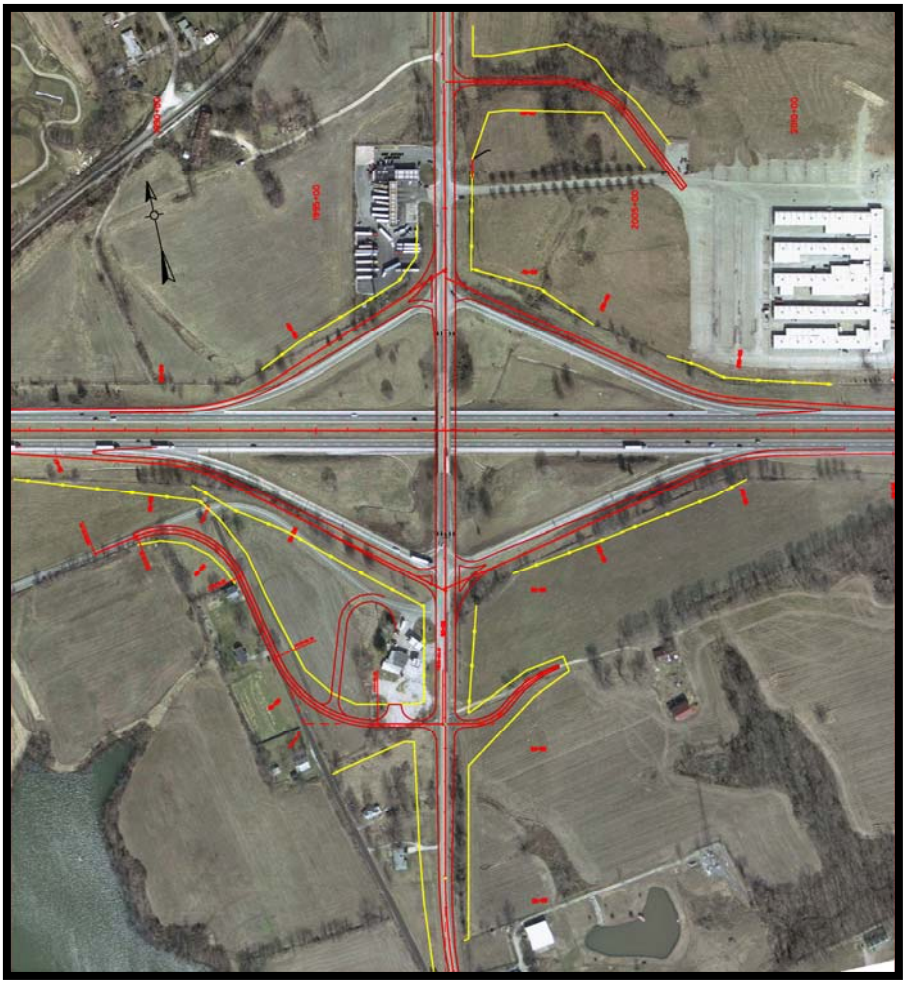
POSSIBLE SAVINGS: $930,632

VII. DEVELOPMENT PHASE

J. KY 1848 INTERCHANGE BRIDGE

"As Proposed"

The I-64 interchange with KY 1848 is proposed to be a diamond interchange with two signalized intersections at the ramp termini on KY 1848. The proposed template for KY 1848 consists of 2-12 ft. lanes in each direction, a 12 ft. center turn lane and 2-10 ft. shoulders. The existing bridge over I-64 will be reconstructed and the proposed ramps will be located just to the outside of the existing ramps. The eastbound exit ramp will have dual left turn lanes. The proposed bridge over I-64 will be a 4-span configuration with lengths of 48 ft., 86 ft., 86 ft., 52 ft..



AS PROPOSED KY 1848 INTERCHANGE

VII. DEVELOPMENT PHASE

J. KY 1848 INTERCHANGE BRIDGE

***Value Engineering Alternative** Number 1*

Value Engineering Alternative Number 1 consists of reconfiguring the proposed diamond interchange to a single-point urban interchange. This configuration requires only one traffic signal to control all four ramps. Right-of-way impacts are lessened with this type of interchange due to its smaller footprint. Furthermore, because of the aforementioned footprint, utility impacts will also be reduced. The KY 1848 bridge over I-64 would require splayed girders to accommodate the turning radii of the ramps as they approach KY 1848. The bridge will be shortened to 2 spans with lengths of 90 ft.-90 ft. and utilize vertical MSE wall end-bents with end-bearing piles. Due to the compact nature of a single point diamond, additional retaining walls will be required to constrain the embankment where necessary.

Advantages:

- Improved traffic flow.
- Less impacts to right of way and utilities.
- Shorter structure (remove 92 ft. of structure length).

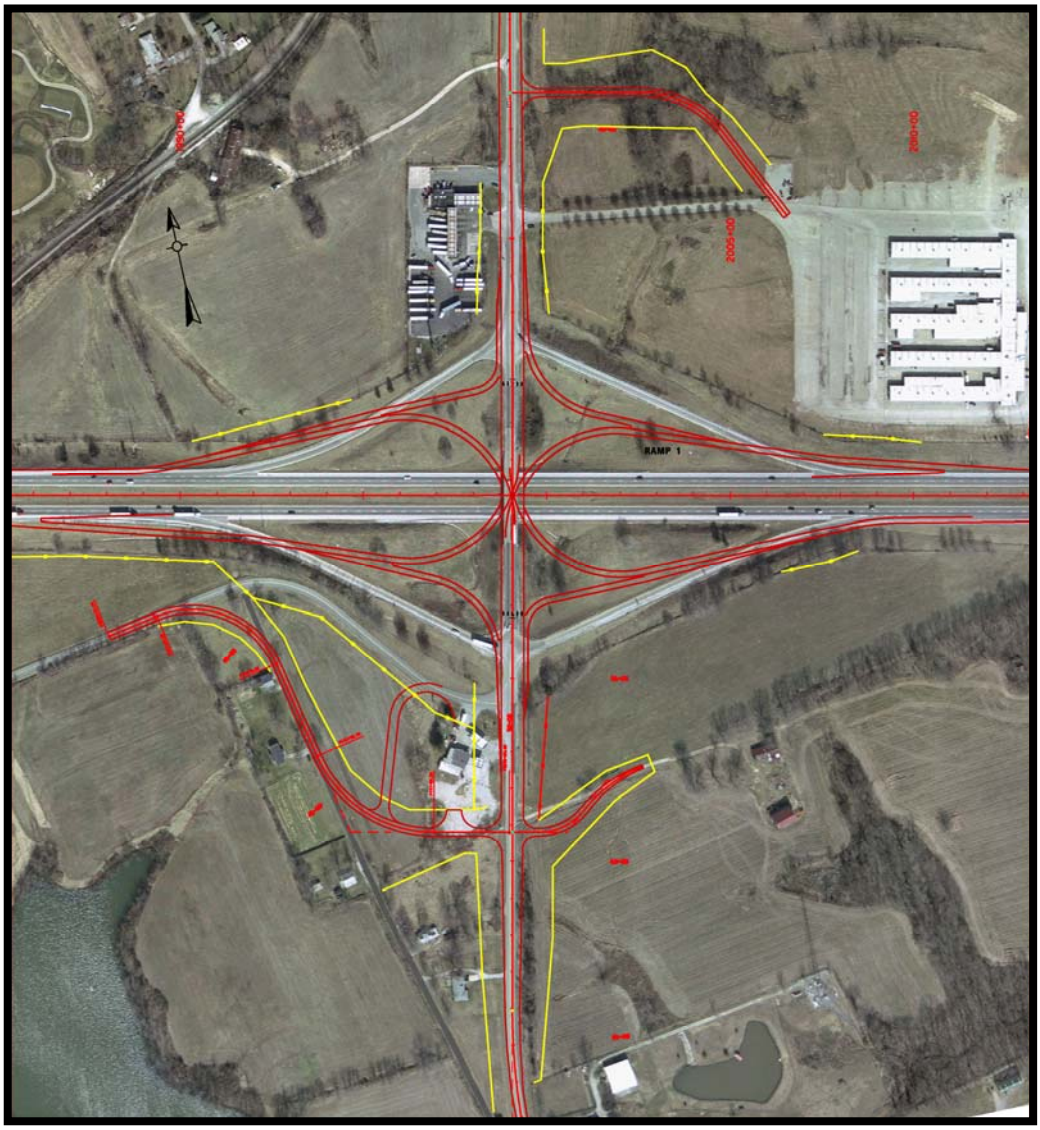
Disadvantages:

- Additional retaining walls.
- Additional pavement.
- Requires splayed girders.
- Higher cost.

VII. DEVELOPMENT PHASE

J. KY 1848 INTERCHANGE BRIDGE

***Value Engineering Alternative** Number 1*



VALUE ENGINEERING ALTERNATIVE NUMBER 1
SINGLE POINT INTERCHANGE

KY 1848 INTERCHANGE BRIDGE
(ROUNDABOUTS)
VALUE ENGINEERING ALTERNATIVE NUMBER 1
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
DIAMOND INTERCHANGE	LS	$4,617,000	1.0	$4,617,000	0.0	$0
SINGLE POINT INTERCHANGE	LS	$6,138,000	0.0	$0	1.0	$6,138,000
SUBTOTAL				**$4,617,000**		**$6,138,000**
ENGINEERING & CONTINGENCY			10.0%	$461,700	10.0%	$613,800
CONTINGENCY			22.0%	$1,015,740	22.0%	$1,350,360
GRAND TOTAL				**$6,094,440**		**$8,102,160**

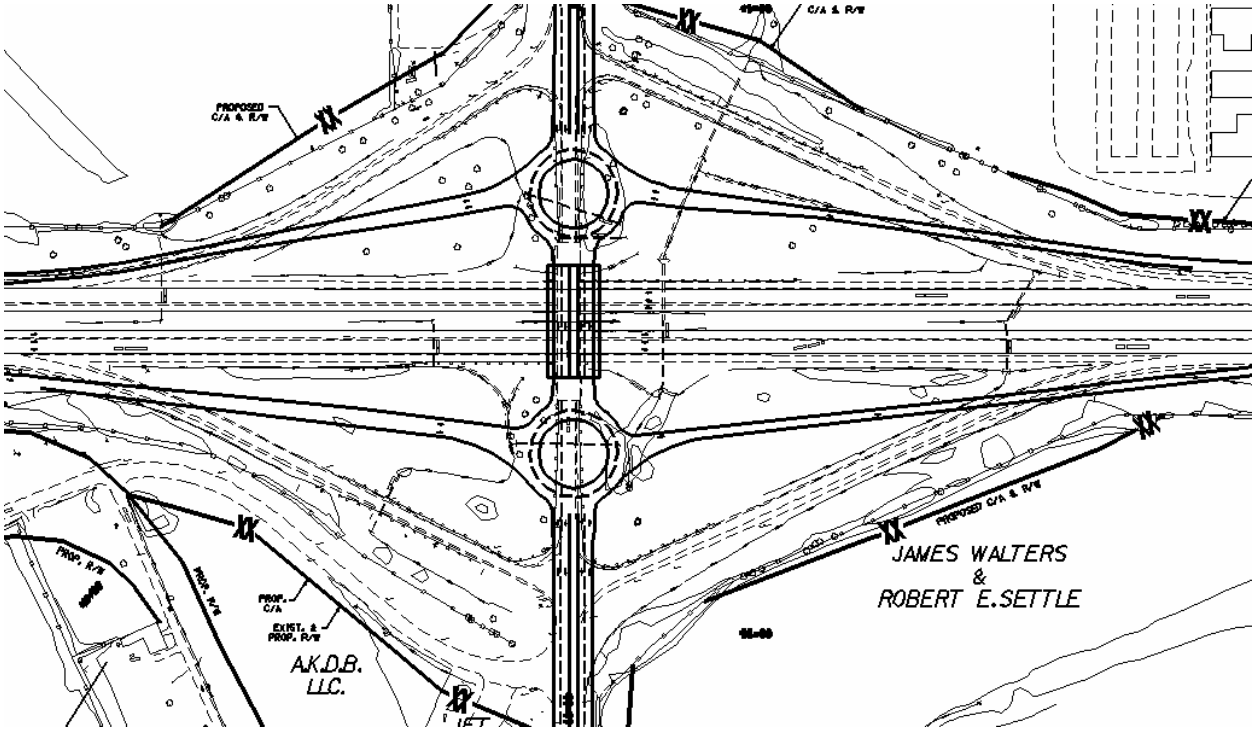
POSSIBLE COST INCREASE: **$2,007,720**

VII. DEVELOPMENT PHASE

J. KY 1848 INTERCHANGE BRIDGE

Value Engineering Alternative Number 2

Value Engineering Alternative Number 2 consists of a dual 2-lane roundabout system at the ramp termini on KY 1848 and a compacted urban diamond ramp configuration. This configuration would have similar impacts to Value Engineering Alternative Number 1, lessened impacts to utilities and right-of-way and improved traffic flow on KY 1848. However, this alternate will also eliminate a second traffic signal through the utilization of roundabouts, one at the ramp termini on each side of I-64. The roundabouts would consist of 2-15 ft. lanes and an inscribed diameter of 170 ft.. The bridge over I-64 would also be shortened to a 2-span structure of lengths of 90 ft.-90 ft. and utilize vertical MSE wall end-bents with end-bearing piles, like Value Engineering Alternative Number 1.



VALUE ENGINEERING ALTERNATIVE NUMBER 2
ROUNDABOUT INTERCHANGE

VII. DEVELOPMENT PHASE

J. KY 1848 INTERCHANGE BRIDGE

Value Engineering Alternative *Number 2*

Advantages:

- Improved traffic flow.
- Less impacts to right-of-way and utilities.
- Shorter structure (remove 92 ft. of structure length).
- Splayed girders not necessary.
- Lower cost.

Disadvantages:

- Additional retaining walls.
- Additional pavement.
- Non-standard Interchange configuration.

A traffic analysis was conducted using *Roundabouts: An Informational Guide,* FHWA Publication Number FHWA-RD-00-067. The 2030 AM/PM traffic projection for the interchange was adjusted to account for the changed roadway configuration. The operational capacity of a roundabout is dependent on the acceptance gap of the driver entering the roundabout. Therefore it is a function of how many vehicles are approaching the entry point as well as the number of vehicles wanting to enter the roundabout. The graph provided in *Roundabouts: An Informational Guide* was used to determine if these ramp termini roundabouts operate satisfactorily.

A two lane roundabout was chosen because of the high truck traffic that will be generated by the Pilot Truck Stop.

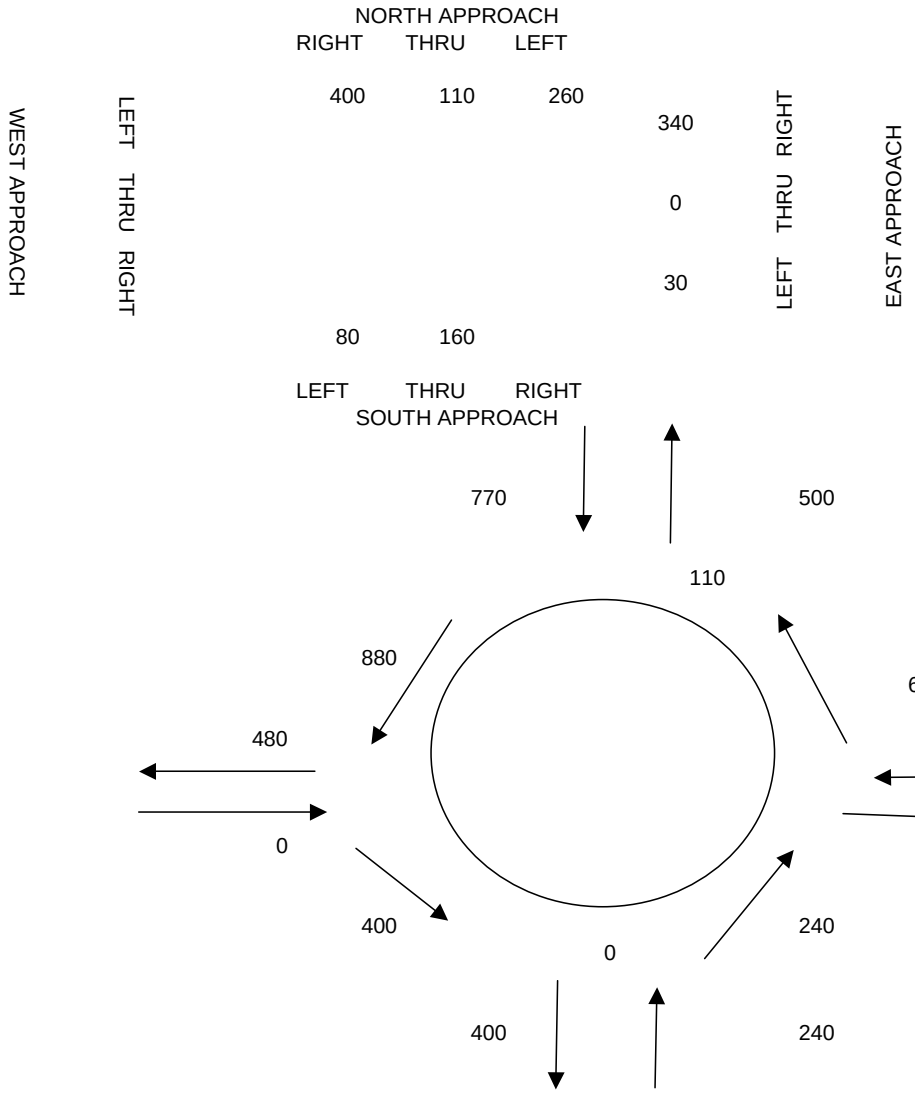
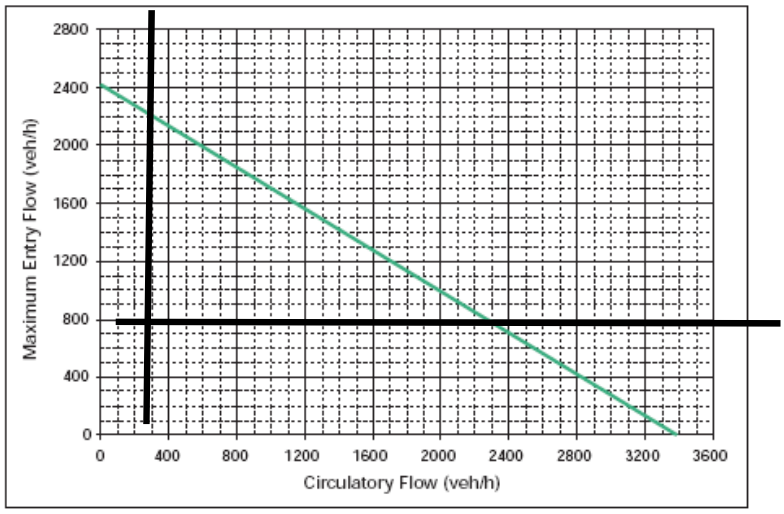


Exhibit 4-4. Approach capacity of a double-lane roundabout.



WEST BOUND OFF/ON RAMP AM PEAK

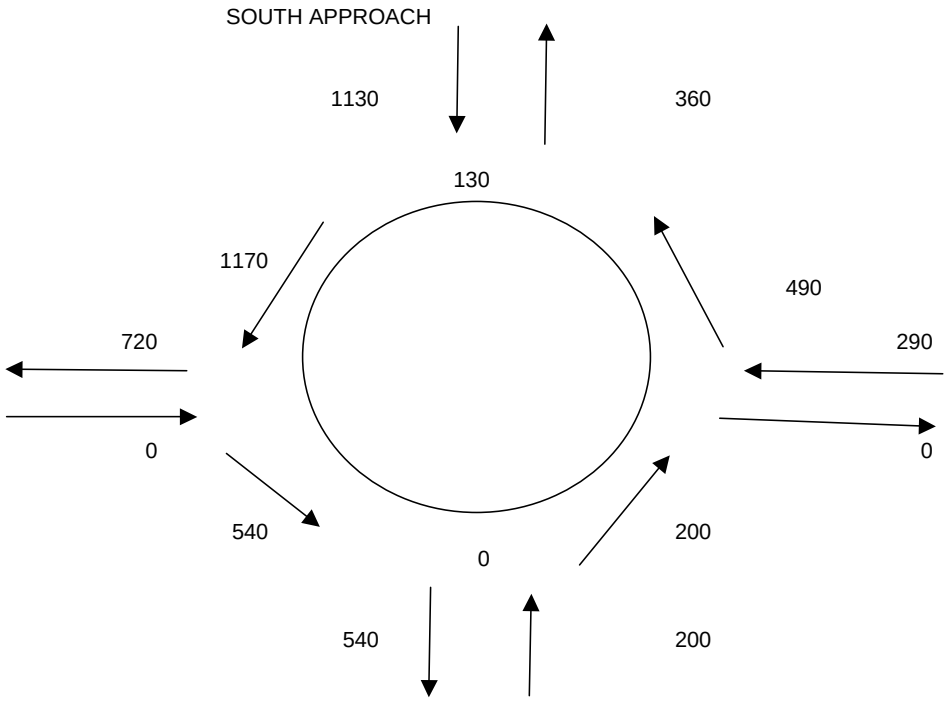
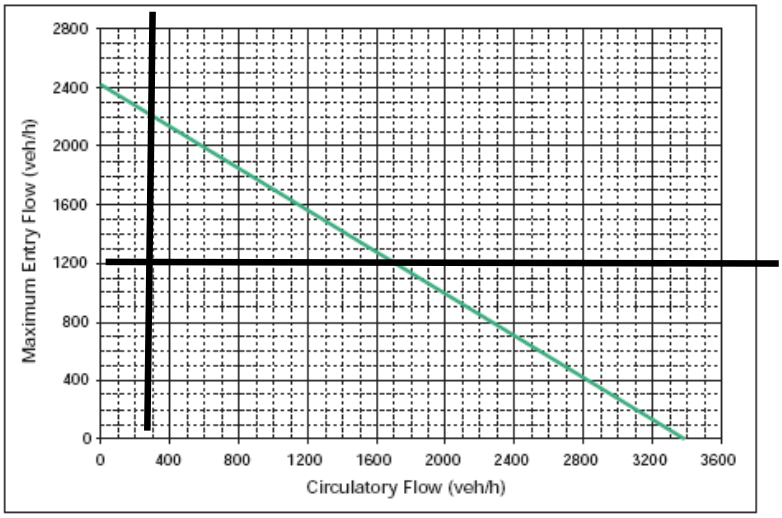


Exhibit 4-4. Approach capacity of a double-lane roundabout.



WEST BOUND ON/OFF RAMP PM PEAK

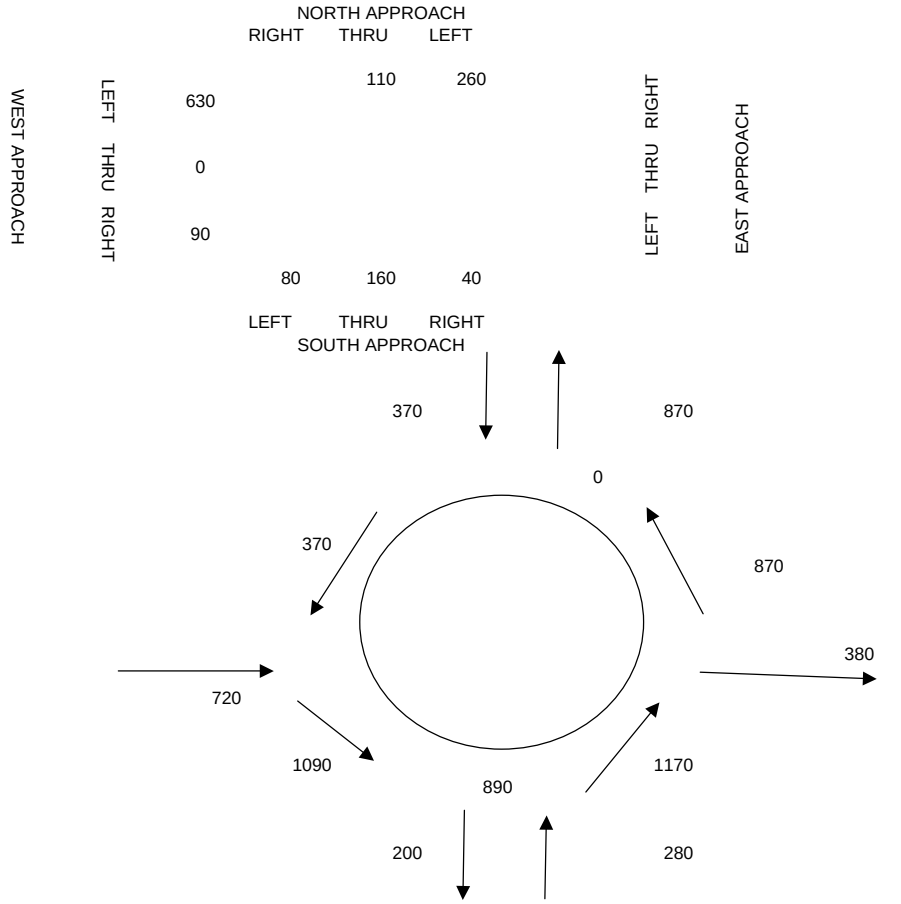
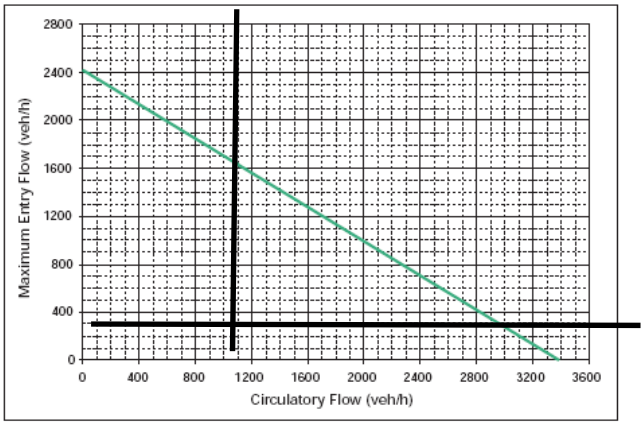


Exhibit 4-4. Approach capacity of a double-lane roundabout.



EASTBOUND ON/OFF RAMP AM PEAK

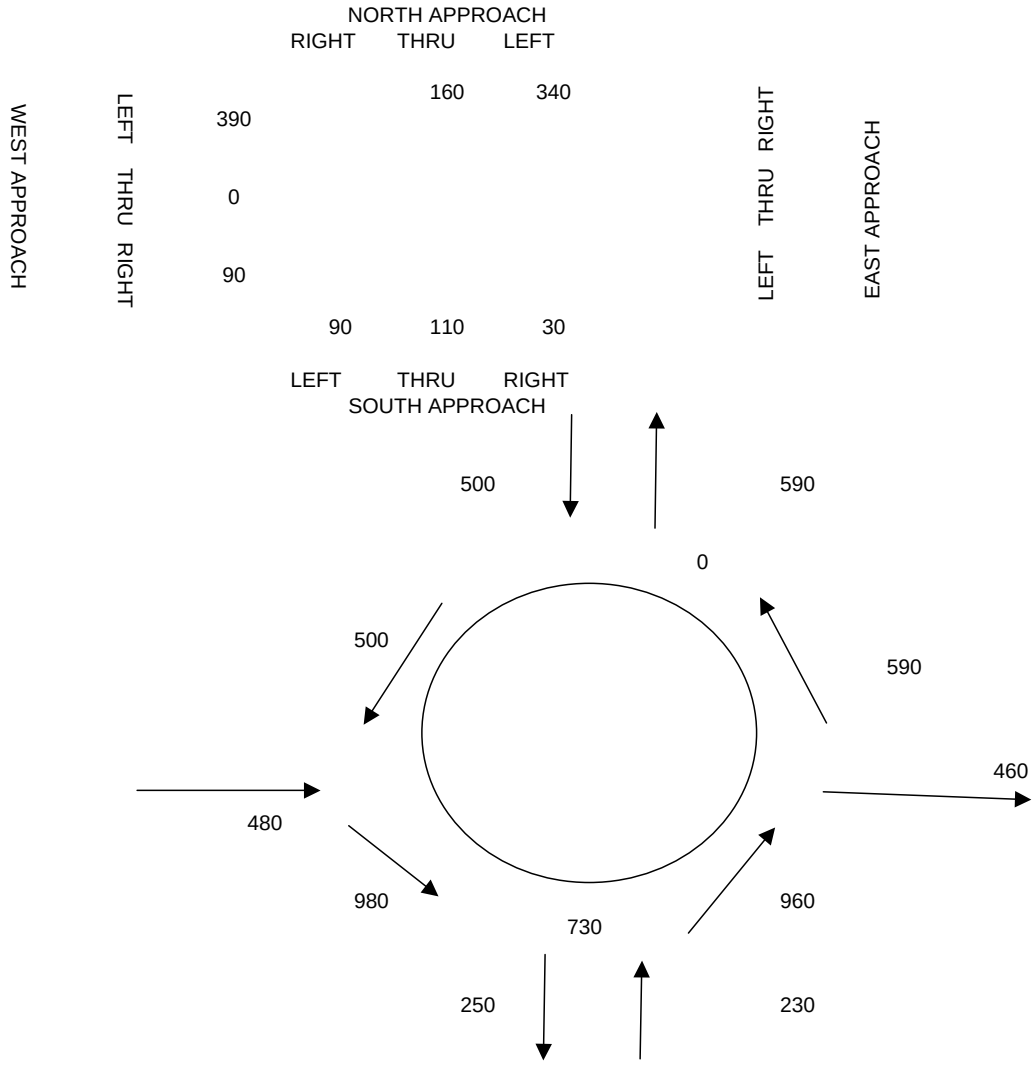
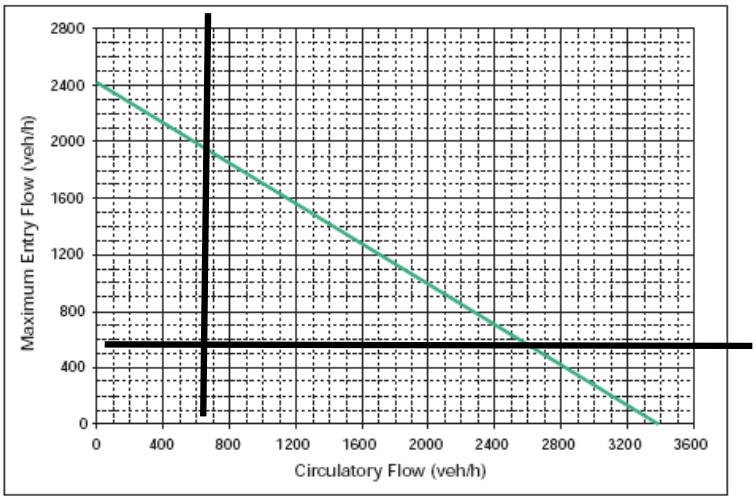


Exhibit 4-4. Approach capacity of a double-lane roundabout.



EAST BOUND ON/OFF RAMP PM PEAK

KY 1848 INTERCHANGE ROUNDABOUTS
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	S.F.	$62.71	22,325.0	$1,400,001	14,763.0	$925,788
MSE Wall	S.F.	$35.00	0.0	$0	3,932.0	$137,620
Extra Embankment (behind abutments)	C.Y.	$8.00	0.0	$0	17,089.0	$136,712
Steel H-Piles	L.F.	$45.00	0.0	$0	280.0	$12,600
Pavement	TONS	$35.40	0.0	$0	816.0	$28,886
Signals	EACH	$100,000.00	2.0	$200,000	0.0	$0
SUBTOTAL				**$1,600,001**		**$1,241,606**
Engineering & Contingency			10.0%	$160,000	10.0%	$124,161
CONTINGENCY			22.0%	$352,000	22.0%	$273,153
GRAND TOTAL				**$2,112,001**		**$1,638,920**

POSSIBLE SAVINGS: $473,081

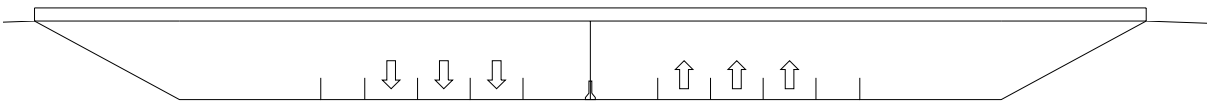
VII. DEVELOPMENT PHASE

K. KY 55 INTERCHANGE OVERPASS

"As Proposed"

Remove and replace the existing 4 span (55 ft., 90 ft., 90 ft., 55 ft.) structure with a single 4-span structure that will accommodate 2-12 ft. driving lanes in each direction, 2-12 ft. center turn lanes and 12 ft. shoulders on KY 55. The proposed structure span configuration is assumed to be (55 ft., 94 ft., 94 ft., 55 ft.). The proposed interchange will be reconstructed as a standard Diamond Interchange.

EXISTING KY 55 INTERCHANGE OVERPASS



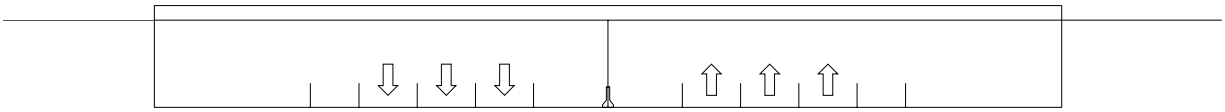
AS PROPOSED 2 SPAN BRIDGE (130 ft., 130 ft.)

VII. DEVELOPMENT PHASE

K. KY 55 INTERCHANGE OVERPASS

Value Engineering Alternative

The Value Engineering Team recommends constructing the underpass bridge with a two-span (94 ft., 94 ft.) bridge with vertical end abutments that will reduce the overall length of the bridge by 110 ft..



VALUE ENGINEERING ALTERNATIVE 2 – SPAN OVERPASS (94 ft., 94 ft.)

KY 55 INTERCHANGE OVERPASS
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Bridge	S.F.	$65.00	19,008.0	$1,235,520	13,536.0	$879,840
MSE Wall	S.F.	$35.00	0.0	$0	3,465.0	$121,275
Extra Embankment (behind abutments)	C.Y.	$8.00	0.0	$0	4,876.7	$39,013
Steel H-Piles	L.F.	$45.00	0.0	$0	280.0	$12,600
Pavement	TONS	$24.80	0.0	$0	608.0	$15,078
SUBTOTAL				**$1,235,520**		**$1,067,807**
ENGINEERING & CONTINGENCY			10.0%	$123,552	10.0%	$106,781
CONTINGENCY			22.0%	$271,814	22.0%	$234,917
GRAND TOTAL				**$1,630,886**		**$1,409,505**

POSSIBLE SAVINGS: $221,382

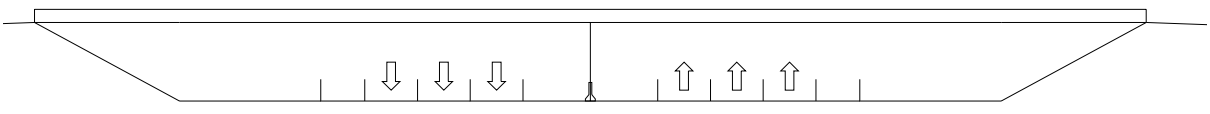
VII. DEVELOPMENT PHASE

L. KY 53 INTERCHANGE OVERPASS

"As Proposed"

Remove and replace the existing structure with a single 4-span (55 ft., 80 ft., 80 ft., 55 ft.) structure that will accommodate 2-12 ft. driving lanes in each direction, 2-12 ft. center turn lanes and 12 ft. shoulders on KY 53. The proposed structure span configuration is assumed to be (55 ft., 84 ft., 84 ft., 55 ft.). The proposed interchange will be reconstructed as a standard Diamond Interchange.

EXISTING KY 53 INTERCHANGE OVERPASS



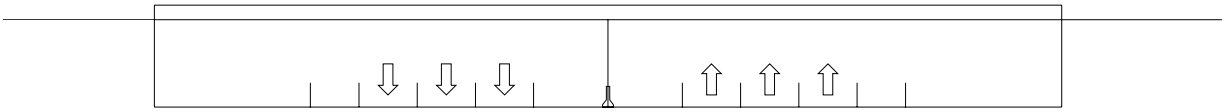
AS PROPOSED 2 SPAN BRIDGE (130 ft., 130 ft.)

VII. DEVELOPMENT PHASE

L. KY 53 INTERCHANGE OVERPASS

Value Engineering Alternative

The Value Engineering Team recommends constructing the underpass bridge with a two-span (84 ft., 84 ft.) bridge with vertical end abutments that will reduce the overall length of the bridge by 110 ft..



VALUE ENGINEERING ALTERNATIVE 2 – SPAN OVERPASS (84 ft., 84 ft.)

KY 53 INTERCHANGE OVERPASS
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Bridge	S.F.	$65.00	11,040.0	$717,600	7,872.0	$511,680
MSE Wall	S.F.	$35.00	0.0	$0	2,673.0	$93,555
Extra Embankment (behind abutments)	C.Y.	$8.00	0.0	$0	3,267.0	$26,136
Steel H-Piles	L.F.	$45.00	0.0	$0	280.0	$12,600
Pavement	TONS	$39.00	0.0	$0	352.0	$13,728
SUBTOTAL				**$717,600**		**$657,699**
ENGINEERING & CONTINGENCY			10.0%	$71,760	10.0%	$65,770
CONTINGENCY			22.0%	$157,872	22.0%	$144,694
GRAND TOTAL				**$1,630,886**		**$868,163**

POSSIBLE SAVINGS: $79,069

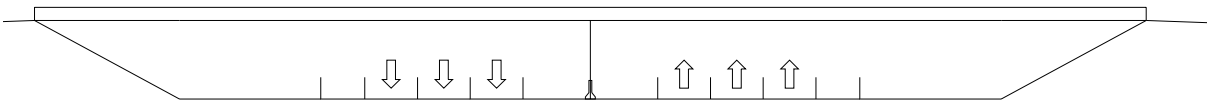
VII. DEVELOPMENT PHASE

M. KY 2861 (OLD TAYLORSVILLE/ZARING MILL ROAD) OVERPASS BRIDGE

"As Proposed"

Close KY 2861 and replace the existing 4-span (50 ft., 75 ft., 75 ft., 50 ft.) structure in place due to insufficient vertical clearance. The proposed structure span configuration is assumed to be (50 ft., 84 ft., 84 ft., 50 ft.). The proposed bridge and the proposed approach road typical section will have 2-12 ft. driving lanes with 8 ft. shoulders.

EXISTING KY 2861 (OLD TAYLORSVILLE/ZARING MILL ROAD) OVERPASS BRIDGE



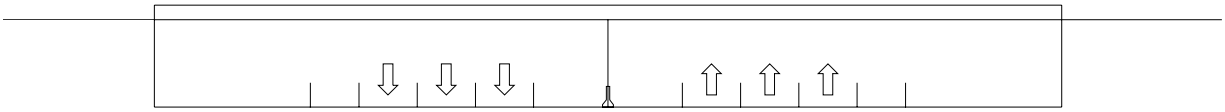
AS PROPOSED 2 SPAN BRIDGE (130 ft., 130 ft.)

VII. DEVELOPMENT PHASE

M. KY 2861 (OLD TAYLORSVILLE/ZARING MILL ROAD) OVERPASS BRIDGE

Value Engineering Alternative

The Value Engineering Team recommends constructing the underpass bridge with a two-span (84 ft., 84 ft.) bridge with vertical end abutments that will reduce the overall length of the bridge by 100 ft..



VALUE ENGINEERING ALTERNATIVE 2 – SPAN OVERPASS (84 ft., 84 ft.)

KY 2861 (OLD TAYLORSVILLE/ZARING MILL ROAD)
OVERPASS BRIDGE
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Bridge	S.F.	$65.00	9,200.0	$598,000	6,560.0	$426,400
MSE Wall	S.F.	$35.00	0.0	$0	2,409.0	$84,315
Extra Embankment (behind abutments)	C.Y.	$8.00	0.0	$0	2,944.3	$23,555
Steel H-Piles	L.F.	$45.00	0.0	$0	280.0	$12,600
Pavement	TONS	$39.00	0.0	$0	293.3	$11,440
SUBTOTAL				**$598,000**		**$558,310**
ENGINEERING & CONTINGENCY			10.0%	$59,800	10.0%	$55,831
CONTINGENCY			22.0%	$131,560	22.0%	$122,828
GRAND TOTAL				**$789,360**		**$736,969**

POSSIBLE SAVINGS: $52,391

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.

A. PAVEMENT

Recommendation Number 1:

The Value Engineering Team recommends that the Value Engineering Alternative Number 2 be implemented. This alternative construct the ultimate 8-lane typical section from Gene Snyder interchange using the outside lane as a 12 ft. full depth paved shoulder. This typical also includes the median barrier, 10 ft. inside full depth paved shoulder, 6 – 12 ft. lanes and the 12 ft. full depth paved shoulder.

If this recommendation can be implemented, there is a possible savings of ***$3,431,387.***

B. MAINTENANCE OF TRAFFIC

Recommendation Number 2:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will use temporary concrete barrier on both sides of the median for half the length of the project during phase 1. The temporary barrier will be advanced as work is completed. The other phases will use barrels to delineate the work zones.

If this recommendation can be implemented, there is a possible savings of ***$3,387,236.***

C. ENGLISH STATION ROAD OVERPASS

Recommendation Number 3:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct the English Station overpass replacement bridge with 2 – 100 ft. +/- spans with vertical abutments.

If this recommendation can be implemented, there is a possible savings of ***$95,552.***

D. BECKLEY STATION ROAD UNDERPASS

Recommendation Number 4:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct the Beckley Station Road underpass bridge with a single 52 ft. span with vertical abutments.

If this recommendation can be implemented, there is a possible savings of ***$3,297,088.***

E. GILLILAND ROAD OVERPASS

Recommendation Number 5:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will leave existing Gilliland Road Overpass Bridge in place.

If this recommendation can be implemented, there is a possible savings of ***$1,013,232.***

F. KY 1531 (EASTWOOD/FISHERSVILLE ROAD) UNDERPASS

Recommendation Number 6:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct KY 1531 (Eastwood / Fishersville Road) Underpass Bridge with a single 52 ft. span with vertical abutments.

If this recommendation can be implemented, there is a possible savings of ***$1,108,318.***

G. CLARK STATION ROAD OVERPASS

Recommendation Number 7:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct the Clark Station Road Overpass Bridge with two 84 ft. spans and vertical abutments.

If this recommendation can be implemented, there is a possible savings of ***$109,330.***

H. CONNER STATION ROAD UNDERPASS

Recommendation Number 8:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct the Conner Station Road Underpass Bridge with single 52 ft. span and vertical abutments.

If this recommendation can be implemented, there is a possible savings of ***$79,722.***

I. JOYES STATION ROAD OVERPASS

Recommendation Number 9:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will remove the Joyes Station Road Overpass Bridge and does not replace it.

If this recommendation can be implemented, there is a possible savings of ***$930,632.***

J. KY 1848 OVER I 64 INTERCHANGE

Recommendation Number 10:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct a Modern Day Roundabouts at the KY 1848 Interchange Ramp Termini.

If this recommendation can be implemented, there is a possible savings of ***$473,081.***

K. KY 55 BRIDGE OVER I 64

Recommendation Number 11:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct the KY 55 Interchange Overpass Bridge with two 84 ft. spans and vertical abutments.

If this recommendation can be implemented, there is a possible savings of ***$221,382.***

L. KY 2861 (OLD TAYLORSVILLE/ZARIM ROAD) OVERPASS

Recommendation Number 12:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct the KY 2861 (Old Taylorsville/Zaring Mill Road) Overpass Bridge with two 84 ft. spans and vertical abutments.

If this recommendation can be implemented, there is a possible savings of ***$52,391.***

M. KY 53 INTERCHANGE BRIDGE

Recommendation Number 13:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will construct the KY 53 Interchange Overpass Bridge with two 84 ft. spans and vertical abutments.

If this recommendation can be implemented, there is a possible savings of ***$79,069.***

I-64 MAJOR WIDENING AND RECONSTRUCTION

VALUE ENGINEERING STUDY PRESENTATION

June 30, 2006

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