VALUE ENGINEERING STUDY

OF

US 421/LEESTOWN ROAD

STATE PROJECT NUMBER: FD52 034 0421 002-004
ITEM NUMBER: 7-223.00 (.01 & .02)

MARCH 24-28, 2008

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 in conjunction with the Kentucky Transportation Cabinet (KYTC). The study was performed during the week of March 24-28, 2008.

The subject of the study was the widening of US 421 to increase capacity on Leestown Road (US 421) from Greendale Road and extending north to Ruffian Way at Masterson Station Park. This project is located north of Lexington, Kentucky in Lafayette County.

PROJECT DESCRIPTION

The purpose of the proposed project is to increase traffic capacity on Leestown Road (US 421) from Greendale Road and extending north to Ruffian Way at Masterson Station Park. Based on traffic studies by the KYTC, predicted traffic volumes for Leestown Road (US 421) for the Design Year (2022) are as high as 34,500 ADT.

The increased capacity will accommodate more motorists with fewer traffic backups and better traffic flow along Leestown Road as well as traffic in and out of adjacent development entrances. In addition to improving the facility for motorists, the project proposes to facilitate the movement of pedestrians and bicyclists from existing and proposed residential developments along the corridor to places of work and to Masterson Station Park in accordance with LFUCG long range pedestrian and bicycle plans.

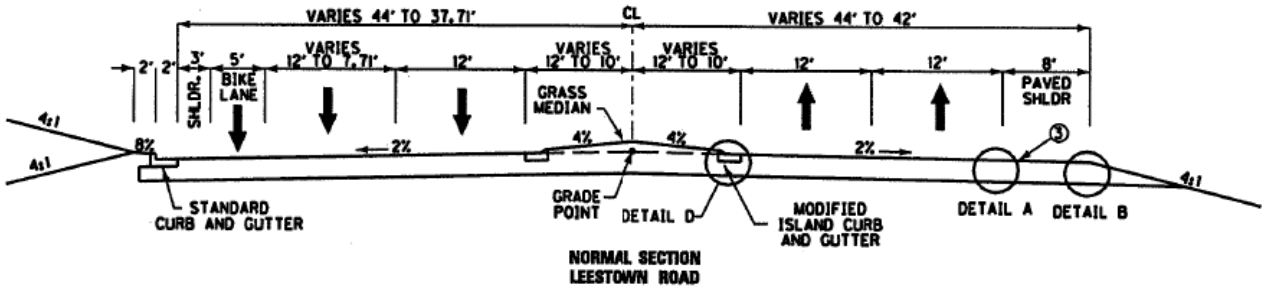
GREENDALE – BEGIN PROJECT

I. EXECUTIVE SUMMARY

PROJECT DESCRIPTION

BRACKTOWN – END PROJECT JUST NORTH OF MASTERSON STATION PARK

The preferred alternative begins at Greendale Road and extends- northward along the existing corridor to 1,570’ north of the Masterson Station Park entrance (Ruffian Way). This alternative has a 45 mph design speed and uses four 12’ lanes with a 24’ mountable median and an 8’ paved bicycle lane with curb & gutter and five foot sidewalks on both sides of the road. From Ruffian Way to the end of the project, a 10’ paved shoulder is used on the right. From Ruffian Way to Bracktown Lane, an 8’ paved shoulder with curb and gutter and 5’ sidewalk is used. From Bracktown Lane to the end of project on the left, a 2’ paved shoulder with 6’ ditch is used.



AS PROPOSED US 421/LEESTOWN ROAD 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:

- Future Maintenance Cost
- Construction Time
- Construction Cost
- Constructability
- Right of Way
- Traffic Operations
- Maintenance Of Traffic

I. EXECUTIVE SUMMARY

RESULTS – AREAS OF FOCUS

The following areas of focus were analyzed by the Value Engineering team and from these areas the following Value Engineering alternatives were developed and are recommended for Implementation:

Recommendation Number 1:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative Reevaluates the Pavement Selection and recommends using JPC Pavement.

If this recommendation can be implemented, there is a possible savings of ***$270,163.***

Recommendation Number 2:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative reduces the Bike Lane to 5' (4' pavement – 1' gutter) and eliminates the 3' Shoulder.

If this recommendation can be implemented, there is a possible savings of ***$427,426.***

Recommendation Number 3:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative constructs 4 – 11' travel lanes.

If this recommendation can be implemented, there is a possible savings of ***$325,452.***

Recommendation Number 4:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative eliminates the median opening at West Leesway Drive and relocates the proposed access to Robinson Way**.**

If this recommendation can be implemented, there is a possible added cost of ***$183,625.***

Recommendation Number 5:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative constructs a 6 – lane facility now.

If this recommendation can be implemented, there is a possible added cost of ***$3,501,797.***

I. EXECUTIVE SUMMARY

RESULTS – AREAS OF FOCUS

Recommendation Number 6:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative reduces the median width to 20'.

If this recommendation can be implemented, there is a possible savings of ***$159,482.***

Recommendation Number 7:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will Cul de sac Alexandria Drive and Construct Citation Blvd west of Leestown Road.

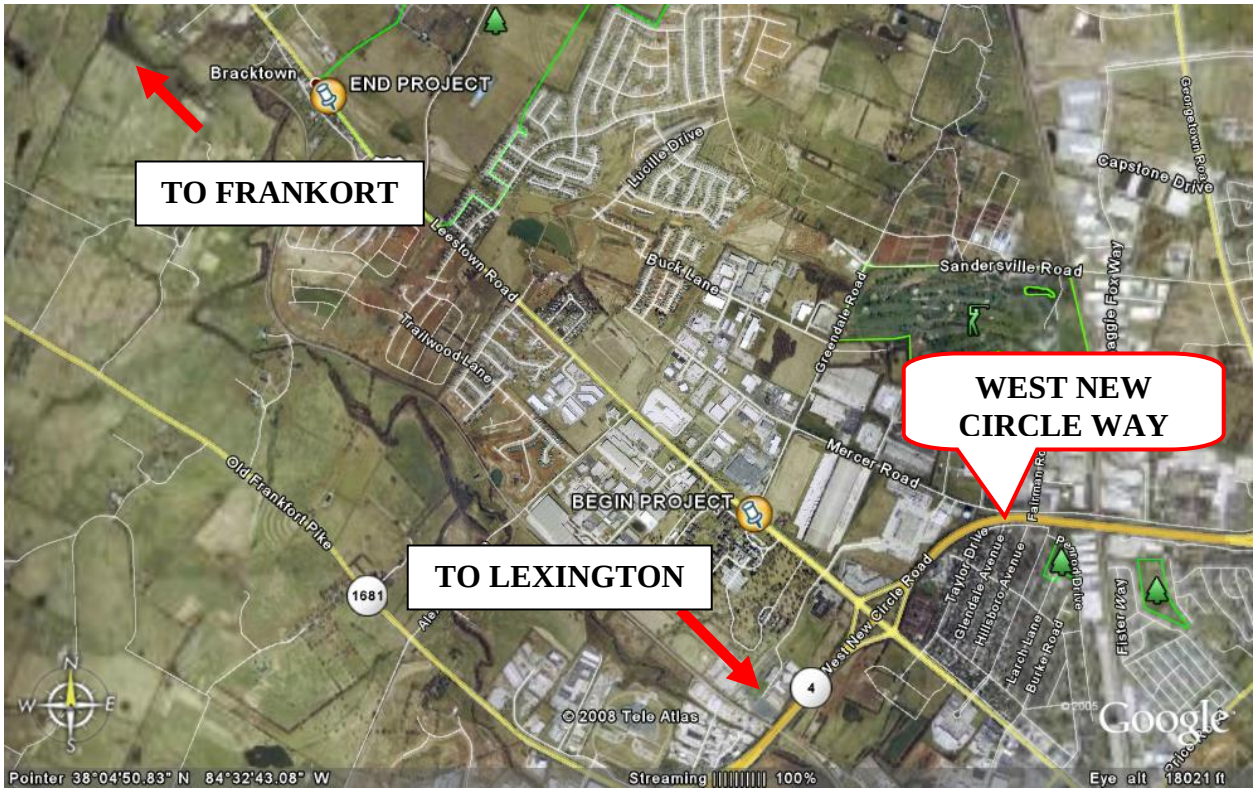
If this recommendation can be implemented, there is a possible savings of ***$27,924.***

Recommendation Number 8:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative constructs the retaining walls with Keystone Blocks (small block wall.

If this recommendation can be implemented, there is a possible savings of ***$92,559.***

II. LOCATION OF PROJECT



PROJECT LOCATION

III. TEAM MEMBERS AND PROJECT DESCRIPTION

TEAMMEMBERS

NAME	AFFILIATION	EXPERTISE	PHONE/ EMAIL
Thomas A. Hartley, P.E., C.V.S.	VE GROUP	Team Leader	850/627-3900 thartley09@aol.com
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Andy Barber, P.E.	KYTC D-7	Construction	859/227-4173 Andy.Barber@ky.gov
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III. TEAM MEMBERS AND PROJECT DESCRIPTION

PROJECT DESCRIPTION

The purpose of the proposed project is to increase capacity on Leestown Road (US 421) from Greendale Road and extending north to Ruffian Way at Masterson Station Park while providing a safe corridor for motorists, cyclists, and pedestrians. Based on traffic studies by the KYTC, predicted traffic volumes for Leestown Road (US 421) for the Design Year (2022) are as high as 34,500 ADT. The increased capacity will accommodate motorists with fewer traffic backups and better traffic flow along Leestown Road as well as in and out of adjacent entrances. In addition to improving the facility for motorists, the project proposes to facilitate the movement of pedestrians and bicyclists from existing and proposed residential developments along the corridor to places of work and to Masterson Station Park in accordance with LFUCG long range pedestrian and bicycle plans.

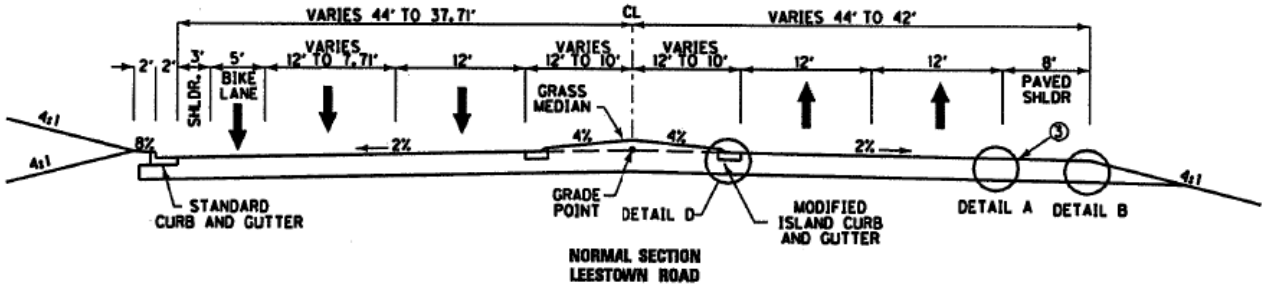
GREENDALE – BEGIN PROJECT

III. TEAM MEMBERS AND PROJECT DESCRIPTION

PROJECT DESCRIPTION

BRACKTOWN – END PROJECT

The preferred alternative begins at Greendale Road and extends- northward along the existing corridor to 1,570’ north of the Masterson Station Park entrance (Ruffian Way). This alternative has a 45 mph design speed and uses four 12’ lanes with a 24’ mountable median and an 8’ paved bicycle lane with curb & gutter and five foot sidewalks on both sides of the road. From Ruffian Way to the end of the project, a 10’ paved shoulder is used on the right. From Ruffian Way to Bracktown Lane, an 8’ paved shoulder with curb and gutter and 5’ sidewalk is used. From Bracktown Lane to the end of project on the left, a 2’ paved shoulder with 6’ ditch is used.



IV. INVESTIGATION PHASE

VALUE ENGINEERING STUDY BRIEFING *421/LEESTOWN ROAD* **March 24-28, 2008**		
NAME	**AFFILIATION**	**PHONE**
Thomas A. Hartley, P.E., C.V.S.	VE GROUP	850/627-3900
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Chris Clifton, P.E.	KYTC D-7	502/564-3210

IV. INVESTIGATION PHASE

FUNCTIONAL ANALYSIS WORKSHEET

US 421/LEESTOWN ROAD, LEXINGTON, KENTUCKY

MARCH 24-28, 2008

ITEM	FUNCT. VERB	FUNCT. NOUN	* TYPE	COST	WORTH	VALUE INDEX
PAVEMENT	**SUPPORT** **INCREASE**	**VEHICLES** **CAPACITY**	**B** **B**	**$6,600,000**	**$6,000,000**	**1.10**
RIGHT OF WAY	**ACQUIRE**	**RIGHTS**	**B**	**$3,000,000**	**$2,800,000**	**1.07**
DRAINAGE	**CONVEY**	**WATER**	**S**	**$1,560,000**	**$1,300,000**	**1.20**
EARTHWORK	**SET**	**GRADE**	**B**	**$700,000**	**$600,000**	**1.17**
DRY STONE MASONARY	MAINTAIN	AESTHETICS	S	$490,000	$490,000	1.00
SIGNALS	ELIMINATE REDUCE	CONFLICT RISK	B B	$450,000	$450,000	1.00
RETAINING WALL	**SUPPRORT**	**EMBANKMENT**	**B**	**$500,000**	**$250,000**	**2.00**
UTILITY RELOCATIONS	MOVE	SERVICES	S	$5,000,000	$5,000,000	1.00

***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. RIGHT OF WAY

C. DRAINAGE

D. EARTHWORK

E. RETAINING WALL

V. SPECULATION PHASE

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

A. PAVEMENT

- **Plain Portland Cement Concrete Pavement**
- **Maximum Aggregate Asphaltic Pavement**
- **Construct 5' bike lane (4' pavement – 1' gutter)**
- **Eliminate 3' shoulder**
- **Construct 11' lanes**

B. RIGHT OF WAY

- **Reduce median width to 20'**
- **11' lanes**

C. DRAINAGE

- **Construct Rural Typical Section**

D. EARTHWORK

- **Balance earthwork**
- **Cul de sac Alexandria Drive**
- **Adjust grades**

E. RETAINING WALL

- **Lower grade**
- **Use fill and 4:1 slopes**
- **Use small block wall (Keystone)**

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:	***Reevaluate Pavement Selection.***
Value Engineering Alternative Number 2:	***Reduce Bike lane to 5' (4' pavement – 1' gutter) and eliminate 3' Shoulder.***
Value Engineering Alternative Number 3:	***Construct 4 – 11' travel lanes.***
Value Engineering Alternative Number 4:	***Eliminate median opening at West Leesway Drive and relocate proposed access to Robinson Way.***
Value Engineering Alternative Number 5:	***Eliminate median opening at the FEDEX Driveway.***
Value Engineering Alternative Number 6:	***Construct 6 – lane facility now.***

B. RIGHT OF WAY

Value Engineering Alternative Number 1:	***Reduce median width to 20'.***
Value Engineering Alternative Number 2:	***Construct 12' flush median.***

C. DRAINAGE

Value Engineering Alternative:	***Construct Rural Typical Section.***

D. EARTHWORK

Value Engineering Alternative Number 1:	***Adjust profile to reduce waste.***
Value Engineering Alternative Number 2:	***Cul de sac Alexandria Drive and Construct Citation Blvd west of Leestown Road.***

VI. EVALUATION PHASE

A. ALTERNATIVES *(continued)*

E. RETAINING WALL

Value Engineering Alternative Number 1:	***Construct retaining walls with Keystone Blocks (small block wall).***
Value Engineering Alternative Number 2:	***Lower profile.***
Value Engineering Alternative Number 3:	***Where possible construct with fill on 4:1 slopes.***

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": **The "As Proposed" Urban Typical Section is:**

- 24' Median
- 4 – 11' Travel Lanes
- 2 - 8' Bike Lanes/Shoulders
- 2 – 2' Curbs & Gutters
- 2 – 2' Utility Strips
- 2 – 5' Sidewalks

The pavement design for the proposed Typical Section is as follows:

- 1.25" Asphalt Surface Course
- 9.75" Asphalt Structural Course
- 4.00" Asphalt Drainage Blanket
- 6.00" DGA

Advantages

- Better construction phasing
- Shorter construction time
- Smooth riding surface
- Easier maintenance

Disadvantages

- Possibly higher LCC
- More frequent maintenance
- May not meet 20 year traffic demand

Conclusion

CARRY FORWARD FOR FURTHER DEVELOPMENT

VI. EVALUATION PHASE

B. ADVANTAGES AND DISADVANTAGES *(continued)*

A. PAVEMENT *(continued)*

Value Engineering Alternative Number 1: Reevaluate Pavement Selection

Advantages

- Update of pavement using more current prices

Disadvantages

- None apparent

Conclusion

CARRY FORWARD FOR FURTHER DEVELOPMENT

Value Engineering Alternative Number 2: Reduce Bike lane to 5' (4' pavement – 1' gutter) and eliminate 3' Shoulder.

Advantages

- Lower Right of Way Cost
- Lower Construction Cost
- Lower Maintenance Cost

Disadvantages

- Loss of vehicle break down area
- Possible higher drainage cost

Conclusion

CARRY FORWARD FOR FURTHER DEVELOPMENT

Value Engineering Alternative Number 3: Construct 4 – 11' travel lanes.

Advantages

- Lower Right of Way Cost
- Lower Construction Cost
- Lower Maintenance Cost
- Traffic calming

Disadvantages

- Negative operational impacts – truck traffic

Conclusion

CARRY FORWARD FOR FURTHER DEVELOPMENT

A. PAVEMENT *(continued)*

Value Engineering Alternative Number 4: ***Eliminate median opening at West Leesway Drive and relocate proposed access to Robinson Way.***

Advantages

- Better operations – less conflicts
- Lower construction cost

Disadvantages

- Circuitous access
- Higher Right of Way Cost

Conclusion

CARRY FORWARD FOR FURTHER DEVELOPMENT

Value Engineering Alternative Number 5: ***Eliminate median opening at the FEDEX Driveway***.

Advantages

- Better operations – less conflicts
- Lower construction cost

Disadvantages

- Poor operations for FEDEX – U-Turning Tractor Trailers
- No alternative access for FEDEX

Conclusion

DROPPED FROM FURTHER DEVELOPMENT

Value Engineering Alternative Number 6: ***Construct 6 – lane facility now.***

Advantages

- Better operation – meets 20 year Traffic Projections

Disadvantages

- Higher Construction Cost
- Higher Right of Way Cost
- Higher Maintenance Cost

Conclusion

CARRY FORWARD FOR FURTHER DEVELOPMENT

B. RIGHT OF WAY

"As Proposed": Acquire a minimum of 112' of Right of Way to contain the "As Proposed" Urban Typical Section:

- 24' Median
- 4 – 11' Travel Lanes
- 2 - 8' Bike Lanes/Shoulders
- 2 – 2' Curbs & Gutters
- 2 – 2' Utility Strips
- 2 – 5' Sidewalks

Advantages

- Allows for off set left turn lanes

Disadvantages

- Higher Construction Cost
- Higher Right of Way Cost
- Higher Maintenance Cost

Conclusion

CARRY FORWARD FOR FURTHER DEVELOPMENT

Value Engineering Alternative Number 1: Reduce median width to 20'.

Advantages

- Lower Construction Cost
- Lower Right of Way Cost
- Lower Maintenance Cost

Disadvantages

- Poor site distance without offset left turns

Conclusion

CARRY FORWARD FOR FURTHER DEVELOPMENT

B. RIGHT OF WAY *(continued)*

Value Engineering Alternative Number 2: Construct 12' flush median.

Advantages

- Better access
- Less Right of Way
- Lower Construction Cost

Disadvantages

- Less access control
- Lower operational capacity

Conclusion

DROPPED FROM FURTHER DEVELOPMENT

C. DRAINAGE

"As Proposed": **Construct Urban Typical with closed drainage System.**

Advantages

- Minimum Right of Way
- Traffic Calming – slower traffic

Disadvantages

- High Construction Cost
- High Maintenance Cost

Conclusion

CARRY FORWARD FOR FURTHER DEVELOPMENT

Value Engineering Alternative: ***Construct Rural Typical Section.***

Advantages

- Lower Construction Cost
- Lower Maintenance Cost
- Less expensive future widening

Disadvantages

- Higher Right of Way Cost

Conclusion

DROPPED FROM FURTHER DEVELOPMENT

D. EARTHWORK

"As Proposed": **Cut 63,000 CY and Fill 18,000 CY.**

Advantages

- No redesign

Disadvantages

- High waste

Conclusion

CARRY FORWARD FOR FURTHER DEVELOPMENT

Value Engineering Alternative Number 1: Adjust profile to reduce waste.

Advantages

- Reduce waste

Disadvantages

- Will have to adjust driveways and side road connections
- Possibly increased Right of Way

Conclusion

DROPPED FROM FURTHER DEVELOPMENT

Value Engineering Alternative Number 2: Cul de sac Alexandria Drive and Construct Citation Blvd west of Leestown Road.

Advantages

- Reduces waste
- Better operation – quicker opening of Citation Blvd
- Better MOT
- No road closure

Disadvantages

- Higher construction cost
- Possible funding considerations with Lexington's Citation Blvd Project

Conclusion

CARRY FORWARD FOR FURTHER DEVELOPMENT

E. RETAINING WALL

"As Proposed": **Construct 7,500 SF of cast in place gravity wall 4' to 9' high.**

Advantages

- Reduced Right of Way

Disadvantages

- Possible high construction

Conclusion

CARRY FORWARD FOR FURTHER DEVELOPMENT

Value Engineering Alternative Number 1: Construct retaining walls with Keystone small block wall.

Advantages

- Possibly less construction cost
- Better aesthetics

Disadvantages

- Possible low acceptance

Conclusion

CARRY FORWARD FOR FURTHER DEVELOPMENT

Value Engineering Alternative Number 2: Lower Profile Grade.

Advantages

- Less retaining wall

Disadvantages

- Will have to adjust driveways and side road connections
- Too close to Citation Blvd

Conclusion

DROPPED FROM FURTHER DEVELOPMENT

E. RETAINING WALL *(continued)*

Value Engineering Alternative Number 3: Where possible construct with fill on 4:1 slopes.

Advantages

- Less retaining wall
- Lower construction cost

Disadvantages

- More Right of Way

Conclusion

CARRY FORWARD FOR FURTHER DEVELOPMENT

VII. DEVELOPMENT PHASE

A. 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
dropped in the evaluation phase
(7) VALUE ENGINEERING ALTERNATIVE NUMBER 6

B. RIGHT OF WAY

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE NUMBER 1
(3) VALUE ENGINEERING ALTERNATIVE NUMBER 2
dropped in the evaluation phase

C. DRAINAGE

dropped in the evaluation phase

D. EARTHWORK

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE NUMBER 1
dropped in the evaluation phase
(3) VALUE ENGINEERING ALTERNATIVE NUMBER 2

E. RETAINING WALL

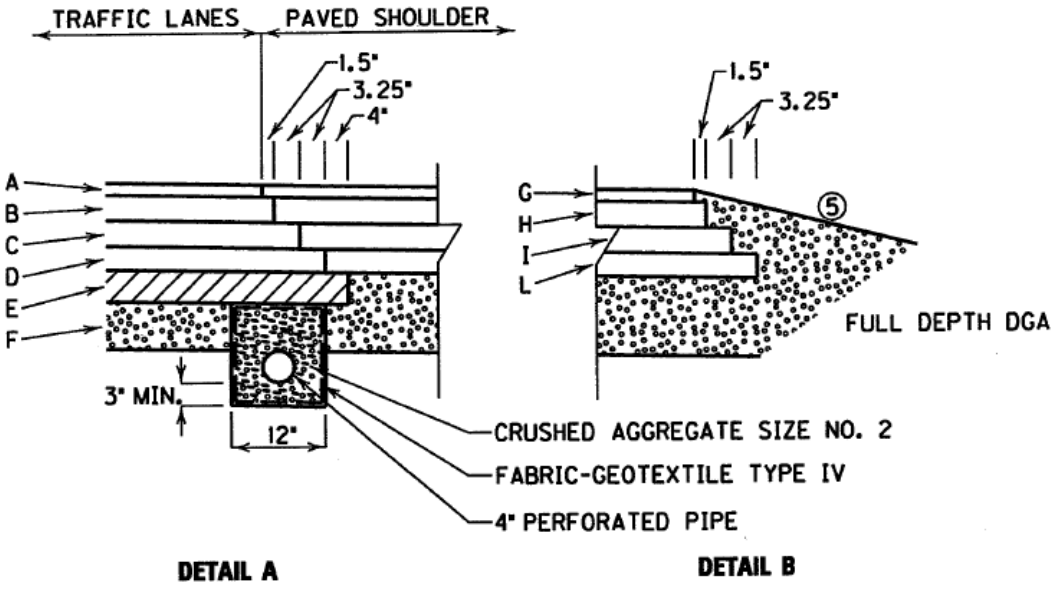
(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE NUMBER 1
(3) VALUE ENGINEERING ALTERNATIVE NUMBER 2
dropped in the evaluation phase
(4) VALUE ENGINEERING ALTERNATIVE NUMBER 3

VII. DEVELOPMENT PHASE

A. PAVEMENT

1. "As Proposed"

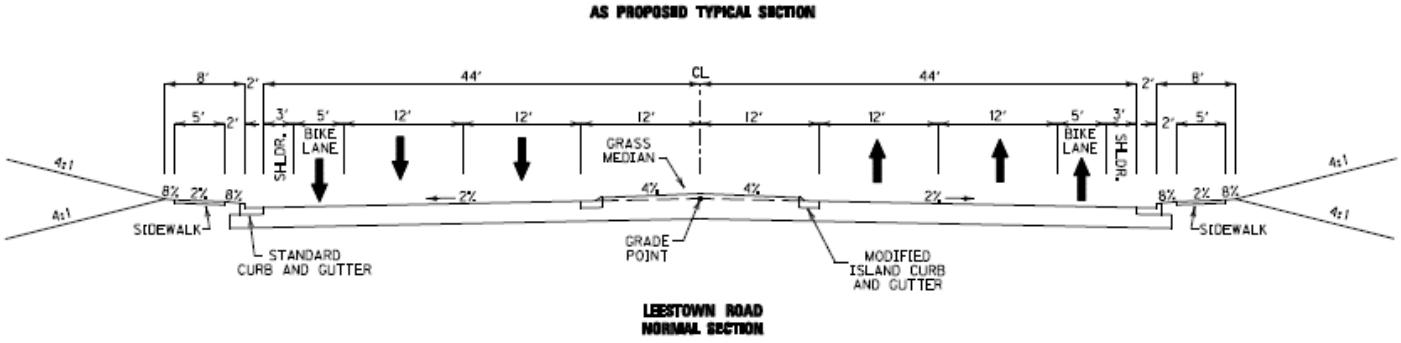
The "As Proposed Pavement Design calls for a "Maximum Asphalt" Design as shown below. This design was developed using ESAL's for a design year on 2022.



A 1.5" CL3 ASPH SURF 0.50A PG76-22
B 3.25" CL3 ASPH BASE 1.00D PG76-22
C 3.25" CL3 ASPH BASE 1.00D PG64-22
D 3" CL3 ASPH BASE 1.00D PG64-22
E 4" DRAINAGE BLANKET TY II - ASPHALT
F 6" DGA BASE

G 1.5" CL2 ASPH SURF 0.50D PG64-22
H 3.25" CL2 ASPH BASE 1.00D PG64-22
I 3.25" CL2 ASPH BASE 1.00D PG64-22
L 3" CL2 ASPH BASE 1.00D PG64-22

AS PROPOSED PAVEMENT DESGIN



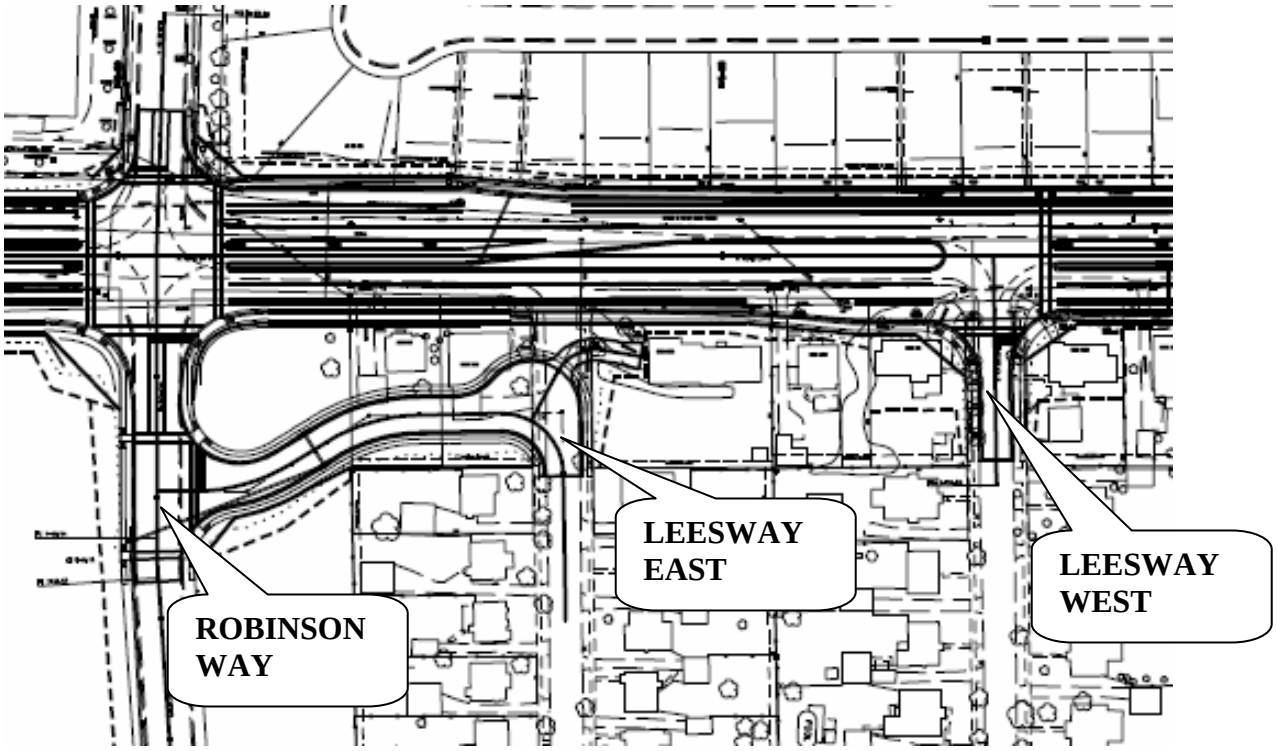
AS PROPOSED TYPICAL SECTION

VII. DEVELOPMENT PHASE

A. PAVEMENT

1. "As Proposed"

Included in the proposed design are several median openings to developments and industrial parks. Of particular interest is the median opening at West Leesway and an access road to allow traffic in and out of East Leesway. However, this access road, which ties to Robinson Way, is very close to the Leestown Road/Robinson Way intersection and this may have negative operational impacts.



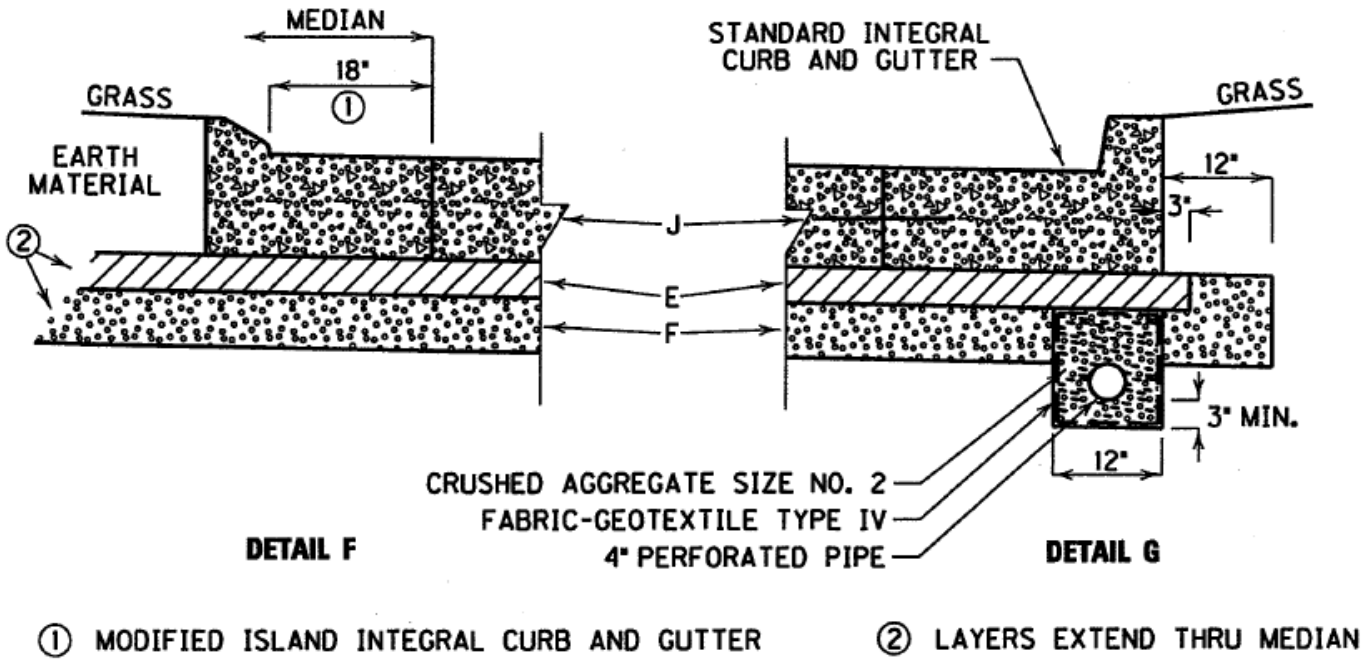
AS PROPOSED
LEESWAY EAST/ROBINSON WAY INTERSECTION AND MEDIAN OPENING ON US 421/LEESTOWN ROAD

VII. DEVELOPMENT PHASE

A. PAVEMENT

2. Value Engineering Alternative Number 1

The Value Engineering Team decided the pavement design is no longer valid because of the difference in what would be the design year if the project were let in 2 years. A 2030 Design year creates higher ESAL's, but it appears the pavement design process has been refined so that the Maximum Asphalt remains the same; but because of changes in prices, it appears the JPC is now the most economical Pavement type.



E 4" DRAINAGE BLANKET TY II - ASPHALT
F 6" DGA BASE
J 9" JPC PAVEMENT

VALUE ENGINEERING ALTERNATIVE NUMBER 1
PAVEMENT DESIGN

PAVEMENT RE-EVALUATION
VALUE ENGINEERING ALTERNATIVE NUMBER 1
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	QTY.	COST	QTY.	PROP'D COST	QTY.	V.E. COST
Re-evaluated Max. Asphalt	LS	$ 4,372,202	1	$ 4,372,202		$ 0		$ 0
Re-evaluated JPC	LS	$ 4,159,726			1.0	$ 4,159,726		$ 0
Re-evaluated Max. Aggregate	LS	$ 4,307,995		$ 0		$ 0	1.0	$ 4,307,995
SUBTOTAL				**$ 4,372,202**		**$ 4,159,726**		**$ 4,307,995**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		6.5%		$ 312,612		$ 297,420		$ 308,022
TRAFFIC CONTROL/MOT		10.0%		$ 437,220		$ 415,973		$ 430,800
CONTINGENCY		10.0%		$ 437,220		$ 415,973		$ 430,800
GRAND TOTAL				**$ 5,559,255**		**$ 5,289,092**		**$ 5,477,616**

JPC POSSIBLE SAVINGS:	**MAX ASPHALT**	**$ 270,163**
	MAX AGGREGATE	**$ 188,524**

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	4,746,245	1.00	4,746,245	1.00	4,746,245	1.00	4,746,245	1.00	4,746,245	1.00	4,746,245	1.00	4,746,245
15	(MILL 1.25" & OVERLAY 1.25")	683,752	1.00	683,752	0.74	508,038	0.56	379,663	0.42	285,306	0.32	215,547	0.24	163,685
20	N/A	0	1.00	0	0.67	0	0.46	0	0.31	0	0.21	0	0.15	0
30	(MILL 1.25" & OVERLAY 3.25")	1,296,510	1.00	1,296,510	0.55	715,766	0.31	399,738	0.17	225,736	0.10	128,844	0.06	74,301
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	6,726,507		6,726,507		5,970,048		5,525,646		5,257,286		5,090,636		4,984,231
	% Cost Difference													
	Maximum Aggregate Design			1.51%		1.70%		1.84%		1.93%		1.99%		2.04%
	JPC Design			30.96%		25.38%		21.43%		18.73%		16.90%		15.65%

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	4,644,774	1.00	4,644,774	1.00	4,644,774	1.00	4,644,774	1.00	4,644,774	1.00	4,644,774	1.00	4,644,774
15	(MILL 1.25" & OVERLAY 1.25")	683,752	1.00	683,752	0.74	508,038	0.56	379,663	0.42	285,306	0.32	215,547	0.24	163,685
20	N/A	0	1.00	0	0.67	0	0.46	0	0.31	0	0.21	0	0.15	0
30	(MILL 1.25" & OVERLAY 3.25")	1,296,510	1.00	1,296,510	0.55	715,766	0.31	399,738	0.17	225,736	0.10	128,844	0.06	74,301
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	6,625,036		6,625,036		5,868,577		5,424,176		5,155,815		4,989,165		4,882,760
	% Cost Difference													
	Maximum Asphalt Design			-1.53%		-1.73%		-1.87%		-1.97%		-2.03%		-2.08%
	JPC Design			29.91%		24.09%		19.96%		17.13%		15.21%		13.89%

JPC Design

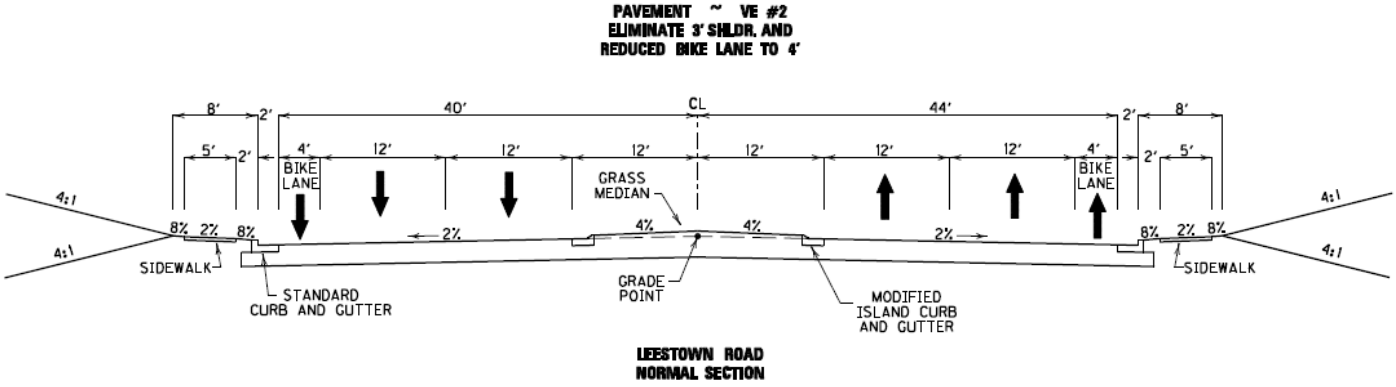
			Discount Rate 0		2		4		6		8		10	
YEAR		COST	P/F	PW	P/F	PW	P/F	PW	P/F	PW	P/F	PW	P/F	PW
0	PW OF CONSTRUCTION	4,159,726	1.00	4,159,726	1.00	4,159,726	1.00	4,159,726	1.00	4,159,726	1.00	4,159,726	1.00	4,159,726
25	JPC REPAIR & DIAMOND GRIND	483,992	1.00	483,992	0.61	295,008	0.38	181,553	0.23	112,769	0.15	70,671	0.09	44,671
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	4,643,718		4,643,718		4,454,734		4,341,280		4,272,496		4,230,398		4,204,397
	% Cost Difference													
	Maximum Asphalt Design			-44.85%		-34.02%		-27.28%		-23.05%		-20.33%		-18.55%
	Maximum Aggregate Design			-42.67%		-31.74%		-24.94%		-20.67%		-17.94%		-16.13%

VII. DEVELOPMENT PHASE

A. PAVEMENT

3. Value Engineering Alternative Number 2

The Value Engineering Team recommends eliminating the 3’ shoulder and reducing the bike lane to 4’ of pavement (plus 2’ to the face of curb) as identified in KYTC Additional Design Topics – Guidelines for Pedestrian & Bicycle Accommodations. This would mean less pavement and less cost. If this recommendation were implemented, the typical would be reduced by 8’ along most of the roadway. This would result in a reduction in pavement area of 5,516 s.y. and a reduction in pavement cost of approximately $ 427,426.



VALUE ENGINEERING ALTERNATIVE NUMBER 2
TYPICAL SECTION WITH 4’ BIKE LANE
(6’ TO FACE OF CURB)

In addition to the accommodating the bicyclist, there is an additional 6’ for stalled vehicles that allows for the 2 – lanes of traffic to shift over a few feet and still make it past a stalled vehicle.

PAVEMENT - 4' BIKE LANE
VALUE ENGINEERING ALTERNATIVE NUMBER 2
COST COMPARISON SHEET

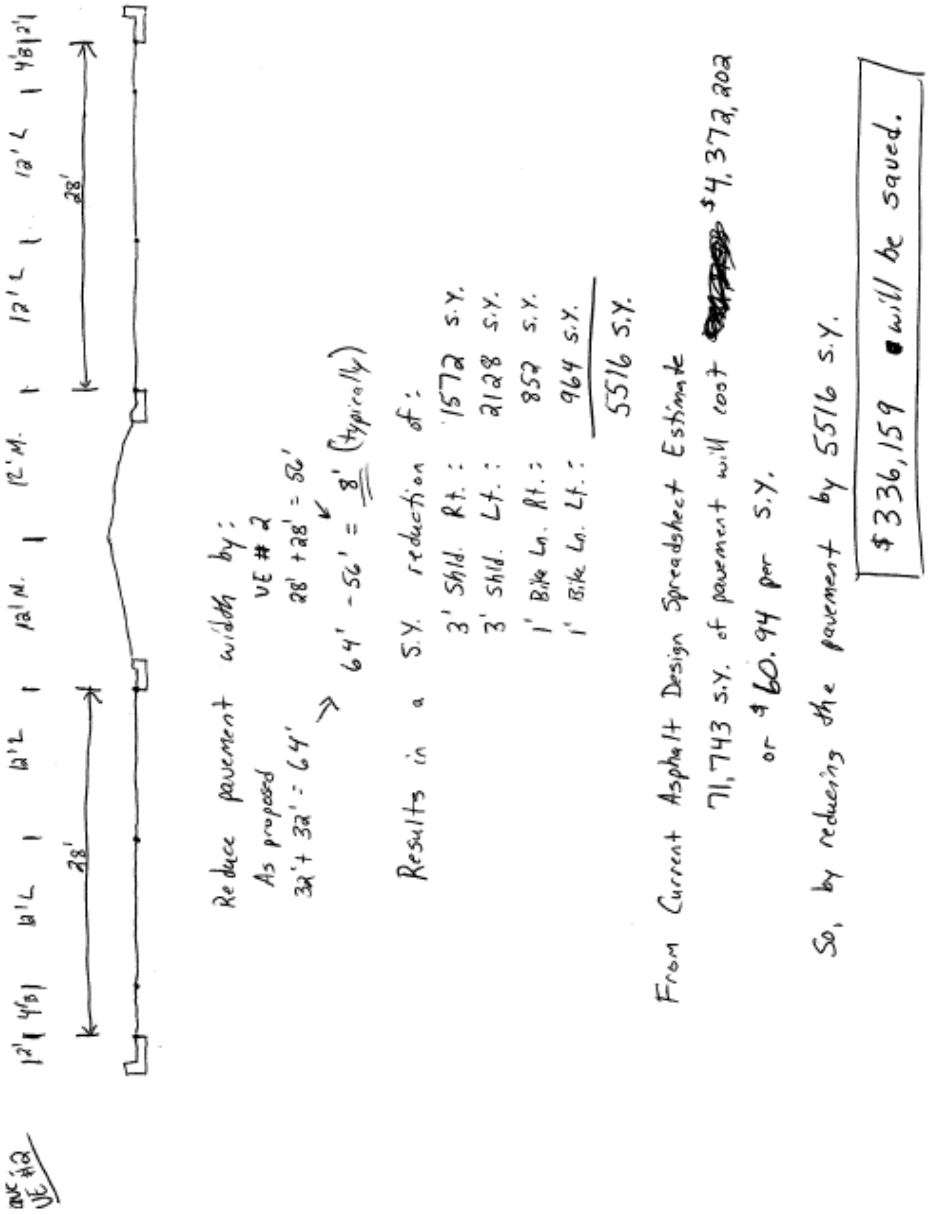
DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
21" Max. Asphalt Design	SY	$ 60.94	71,743.0	$ 4,372,202	66,227.0	$ 4,036,043
SUBTOTAL				**$ 4,372,202**		**$ 4,036,043**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		6.5%		$ 312,612		$ 288,577
TRAFFIC CONTROL/MOT		10.0%		$ 437,220		$ 403,604
CONTINGENCY		10.0%		$ 437,220		$ 403,604
GRAND TOTAL				**$ 5,559,255**		**$ 5,131,828**

POSSIBLE SAVINGS:	**$ 427,426**

VII. DEVELOPMENT PHASE

A. PAVEMENT

COST COMPARISON SHEET BACK UP CALCULATIONS

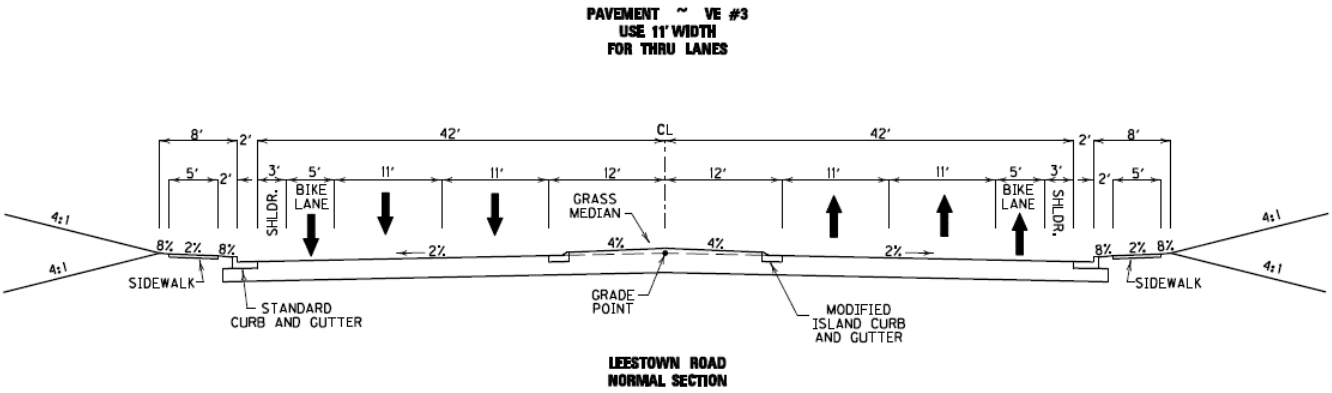


VII. DEVELOPMENT PHASE

A. PAVEMENT

4. Value Engineering Alternative Number 3

The Value Engineering Team recommends constructing 11’ travel lanes; thus reducing pavement width and pavement costs. If this recommendation were implemented, the typical would be reduced by 4’ along most of the roadway. This would mean a reduction in pavement area of 4,200 sy and a reduction in pavement cost of $ 325,452.



VALUE ENGINEERING ALTERNATIVE NUMBER 3
11’ TRAVEL LANES

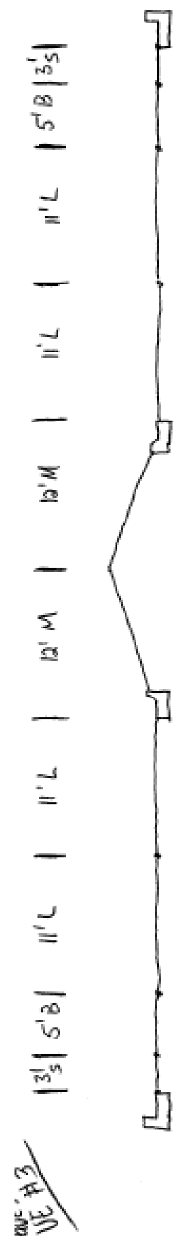
PAVEMENT – 11' TRAVEL LANES
VALUE ENGINEERING ALTERNATIVE NUMBER 3
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
21" Max. Asphalt Design	SY	$ 60.94	71,743.0	$ 4,372,202	67,543.0	$ 4,116,243
SUBTOTAL				**$ 4,372,202**		**$ 4,116,243**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		6.5%		$ 312,612		$ 294,311
TRAFFIC CONTROL/MOT		10.0%		$ 437,220		$ 411,624
CONTINGENCY		10.0%		$ 437,220		$ 411,624
GRAND TOTAL				**$ 5,559,255**		**$ 5,233,803**

POSSIBLE SAVINGS: $ 325,452

VII. DEVELOPMENT PHASE

A. PAVEMENT



Reduce pavement width by:

As proposed 64' → VE #3 60'

⇒ 64' - 60' = 4' (typically)

4' x 9450' = 37800 S.F.

= 4200 S.Y.

From Current Asphalt Design Spreadsheet Estimate pavement will cost $60.94 per S.Y.

So, by reducing the pavement by 4200 S.Y.

$255,948 will be saved.

VII. DEVELOPMENT PHASE

A. PAVEMENT

5. Value Engineering Alternative Number 4

The Value Engineering Team recommends eliminating the West Leesway median opening on US 421/Leestown Road. West Leesway will be a Right In/Right Out intersection. This will improve traffic operations along the corridor. Also, the majority of the traffic from this development will begin using the signalized intersection at Robinson Way to access eastbound Leestown Road. Therefore, this should reduce risk in accessing the Leesway subdivision.

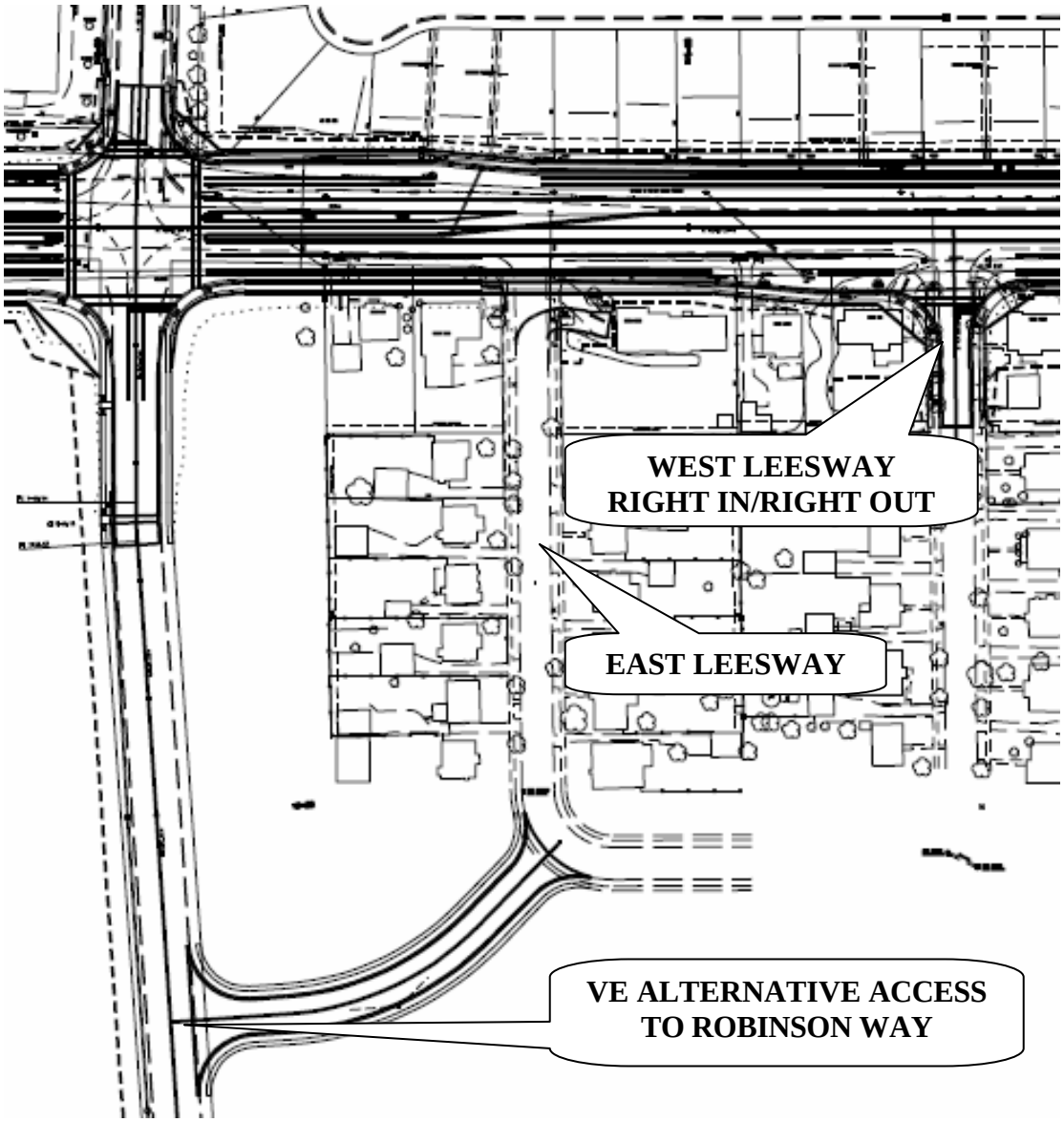
In addition to closing off the West Leesway median opening, the relocation of the proposed East Leesway access to Robinson Way further to the north would improve the operation of the intersection. The Value Engineering Team also recommends acquiring property further down on East Leesway toward the "U" of the road; thus, bringing the entrance/exit further down on Robinson Way, closer to Mercer Road. This will alleviate the potential for bottlenecked traffic near Leestown Road and improve traffic operations.

It is assumed that the construct cost for the as proposed East Leesway connector and the Value Engineering Alternative connector would essentially be the same. The cost difference would be the additional R/W cost for the property near the back of the Leesway subdivision. This additional R/W cost is estimated at $183,625.

VII. DEVELOPMENT PHASE

A. PAVEMENT

5. Value Engineering Alternative Number 4



PAVEMENT
VALUE ENGINEERING ALTERNATIVE NUMBER 4
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
21" Max. Asphalt Design	SY	$ 60.94	71,743.0	$ 4,372,202	71,116.0	$ 4,333,991
Additional Island Curb & Gutter	LF	$ 19.25		$ 0	172.0	$ 3,311
SUBTOTAL				**$ 4,372,202**		**$ 4,337,302**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		6.5%		$ 312,612		$ 310,117
TRAFFIC CONTROL/MOT		10.0%		$ 437,220		$ 433,730
CONTINGENCY		10.0%		$ 437,220		$ 433,730
Additional Right of Way	LS	$ 28,000.00		$ 0	1.0	$ 228,000
GRAND TOTAL				**$ 5,559,255**		**$ 5,742,880**

POSSIBLE COST INCREASE: $183,625

VII. DEVELOPMENT PHASE

A. PAVEMENT

COST COMPARISON SHEET BACK UP CALCULATIONS

Pave.
VE #4

Additional curb & gutter needed: 172 L.F.
At $19.25 per L.F. → $3311

Reduction in pavement area: 5646 S.F.
÷ 9
627 S.Y.

At. $60.94 per S.Y. → $38209

So, [redacted] closing median opening would save:
$38209 - $3311 = $34,898

Assumed property value for a rear lot: $150,000
Building Removal: $14,000
Potential Court Costs: $60,000
Relocation Cost: $4,000
$228,000

Assume that the current [redacted] proposed E. Leesway connector road and the VE [redacted] alternate would have essentially the same construction cost. Therefore, the additional cost would be R/W costs, which is estimated at $228,000.

VII. DEVELOPMENT PHASE

A. PAVEMENT

6. Value Engineering Alternative Number 5

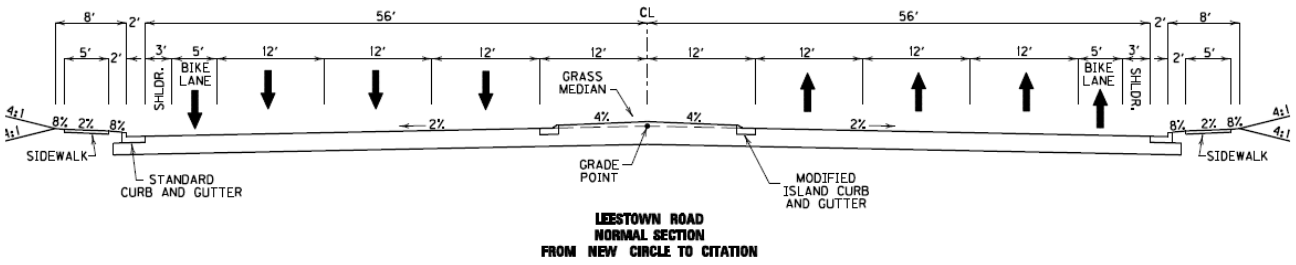
DROPPED IN THE EVALUATION PHASE

VII. DEVELOPMENT PHASE

A. PAVEMENT

7. Value Engineering Alternative Number 6

The Value Engineering Team Recommends constructing a 6-lane road now in anticipation of increased traffic (2030 Traffic) for heavier vehicles (increased truck traffic) from Greendale to the future Citation Way. This will reduce cost by widening this area now in comparison to widening later in 2030+. This alternative will only negatively impact the general public one (1) time rather than two (2) times with major construction activities.



VALUE ENGINEERING ALTERNATIVE NUMBER 6
6 – LANE TYPICAL SECTION

It appears that the traffic projections for this project are outdated and should be updated. The Value Engineering Team used the existing projections and escalated them at a 3.50% increase per year which puts the traffic between Greendale and Citation Way at a volume that will require a 6-lane typical.

PAVEMENT - 6 LANE TYPICAL
VALUE ENGINEERING ALTERNATIVE NUMBER 6
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
4 Lane Roadway Entire Length	Lane-Mile	$ 1,842,000	7.059	$ 13,002,678		$ 0
6 Lane Roadway Greendale to Citation	Lane-Mile	$ 1,842,000		$ 0	8.389	$ 15,452,538
SUBTOTAL				**$ 13,002,678**		**$ 15,452,538**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		6.5%		$ 929,691		$ 1,104,856
TRAFFIC CONTROL/MOT		10.0%		$ 1,300,268		$ 1,545,254
CONTINGENCY		10.0%		$ 1,300,268		$ 1,545,254
Additional Right of Way for 6 Lanes	Acre	$200,000.00		$ 0	1.934	$ 386,800
GRAND TOTAL				**$ 16,532,905**		**$ 20,034,702**

POSSIBLE COST INCREASE: $ 3,501,797

VII. DEVELOPMENT PHASE

A. PAVEMENT

7. Value Engineering Alternative Number 6

LCC:

PROJECT

COMPARISON

4-LANE VS 6-LANE

20 Year Life Cycle Cost Comparison

Enter the Interest Rate = 4%

		AS PROPOSED - 4 LANE		VE ALT - 6 LANE	
Year		**Total**	**Present Worth**	**Total**	**Worth**
0	INITIAL COST	$21,460,000	-$21,460,000	$24,300,000	-$24,300,000
10	REHAB	$700,000	-$472,895	$1,000,000	-$675,564
14	DESIGN	$500,000	-$288,738	$0	$0
15	RIGHT OF WAY	$1,200,000	-$666,317	$0	$0
16	WIDEN/REHAB	$7,000,000	-$3,737,357	$0	$0
25	REHAB	$1,000,000	-$375,117	$0	$0
20	REHAB	$0	$0	$1,000,000	-$456,387
35	REHAB	$1,000,000	-$253,415	$0	$0
40	SALVAGE	-$15,000,000	$3,124,336	-$15,000,000	$3,124,336
			-$24,129,504		**-$22,307,615**

Salvage assumes GAB, drainage items & Right of Way costs and only asphalt value lost.

VII. DEVELOPMENT PHASE

A. PAVEMENT

COST COMPARISON SHEET BACK UP CALCULATIONS

Pave.
UE #5 Cost Calculations

current project has 7.059 lane-miles

If 6 lanes is constructed from start to Citation that would add:

3510 ÷ 5280 = 0.665 miles x 2 lanes

= 1.330 lane-miles

Using current construction estimate of $13 M and current lane-miles of 7.059 the cost per lane mile is $1.842 M.

So, for 1.33 additional lane-miles, an additional 1.33 x $1.842 = $2.45 M would be needed.

The new total construction cost would be

$13 M + $2.45 M = **$15.45 M** Construction

~~Current~~

For R/W, an additional 24' width for the 3510' would be needed, or 24' x 3510' = 84240

= 1.934 acres

At $200,000 per acre that would mean an additional

$200,000 x 1.934 = $386,777

= $0.387 M

The new total R/W cost would be

$3.46M + $0.387M = **$3.847 M** R/W

Utility costs are assumed to be the same.

VII. DEVELOPMENT PHASE

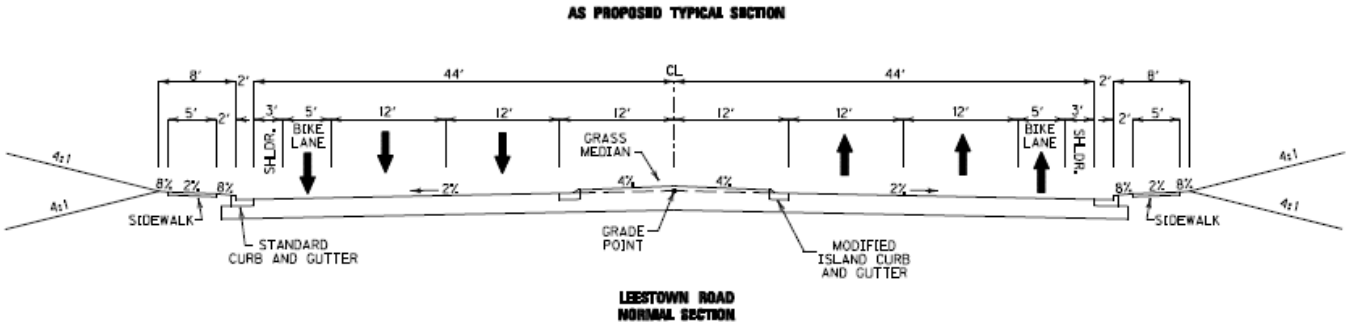
B. RIGHT OF WAY

1. "As Proposed"

The "As Proposed" Typical Section consists of:

- A 24' raised median
- 4 – 12' travel lanes
- 2 – 5' bike lanes
- 2 – 3' shoulders
- 2 – 2' gutters
- 2 – 8' borders

Summing up these items yields a minimum Right of Way width of 108'



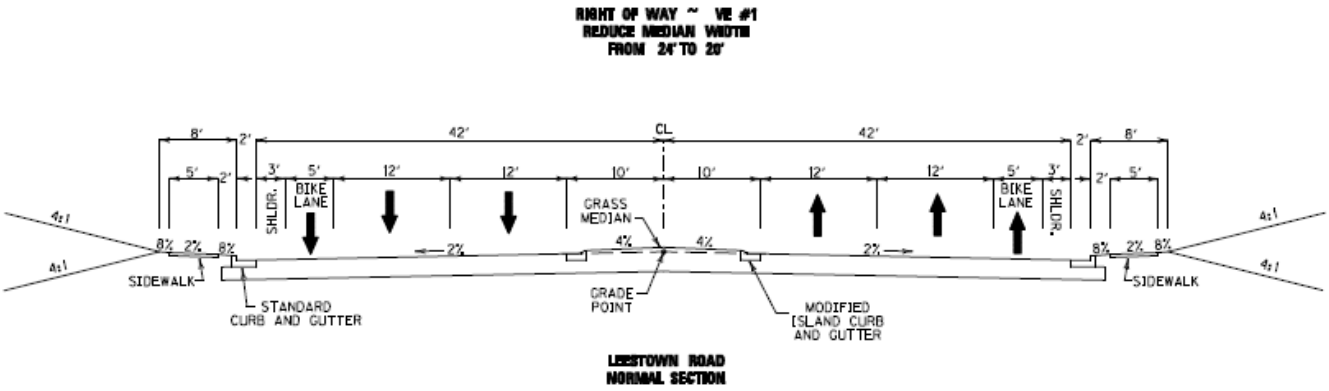
AS PROPOSED TYPICAL SECTION

VII. DEVELOPMENT PHASE

B. RIGHT OF WAY

2. Value Engineering Alternative Number 1

The Value Engineering Team recommends reducing the median width down to 20', thereby reducing the minimum required Right of Way width to 104'



VALUE ENGINEERING ALTERNATIVE NUMBER 1
TYPICAL SECTION

RIGHT OF WAY - 20' MEDIAN
VALUE ENGINEERING ALTERNATIVE NUMBER 1
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
CURB & GUTTER	LF	$ 14.57	17,802	$ 259,375	17,722	$ 258,210
SUBTOTAL				**$ 259,375**		**$ 258,210**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		6.5%		$ 18,545		$ 18,462
TRAFFIC CONTROL/MOT		10.0%		$ 25,938		$ 25,821
CONTINGENCY		10.0%		$ 25,938		$ 25,821
Right of Way	AC	$ 200,000	10.4	$ 2,080,000	9.6	$ 1,922,000
GRAND TOTAL				**$ 2,409,795**		**$ 2,250,313**

POSSIBLE SAVINGS: $ 159,482

VII. DEVELOPMENT PHASE

B. RIGHT OF WAY

3. Value Engineering Alternative Number 2

DROPPED IN THE EVALUATION PHASE

VII. DEVELOPMENT PHASE

C. DRAINAGE

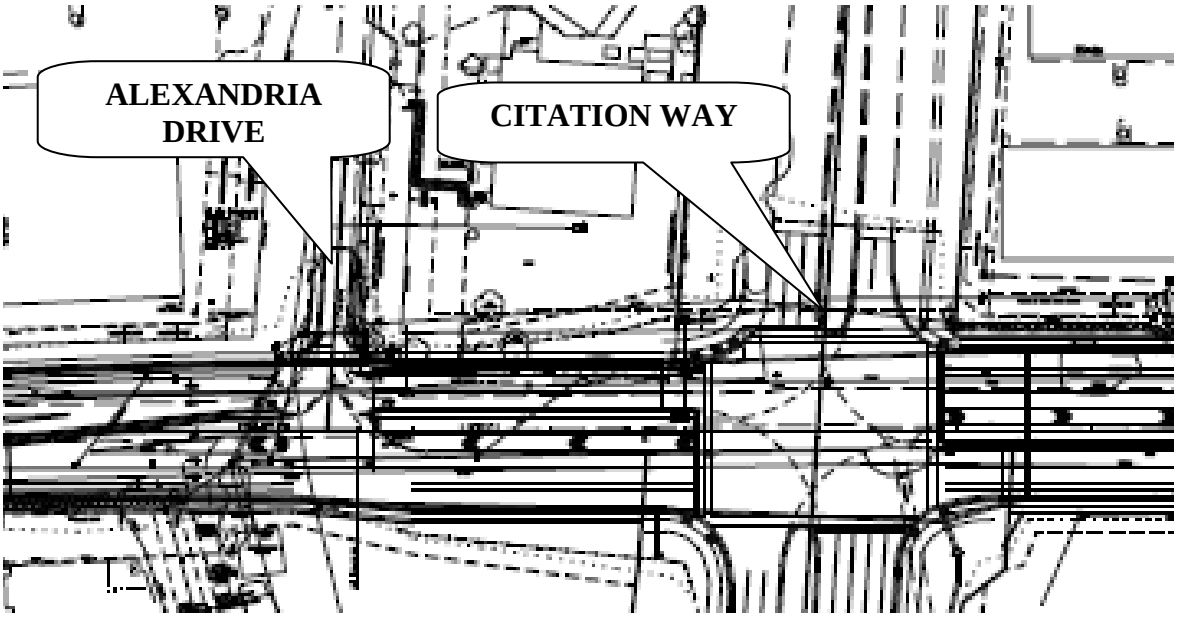
DROPPED IN THE EVALUATION PHASE

VII. DEVELOPMENT PHASE

D. EARTHWORK

1. "As Proposed"

The current plans call for a temporary Alexandria Drive connection to US 421/Leestown Road until Citation Way is completed. Because US 421 will be lowered at this intersection, the Alexandria Drive approach to US 421 will be reconstructed at a lower grade to match US 421. The limits of the reconstruction are shown below.



AS PROPOSED RECONSTRUCTION OF ALEXANDRIA DRIVE

EXISTING ALEXANDRIA DRIVE

VII. DEVELOPMENT PHASE

D. EARTHWORK

2. Value Engineering Alternative Number 1

DROPPED IN THE EVALUATION PHASE

VII. DEVELOPMENT PHASE

D. EARTHWORK

3. Value Engineering Alternative Number 2

The Value Engineering Team recommends incorporating the planned construction of Citation Way south of US 421 into this project. It is the Value Engineering Teams understanding that the Citation Way construction project is funded by KYTC and managed by the City of Lexington. Funding for this Value Engineering Alternative would have to be moved from that project to the US 421 Project.

Alexandria Drive will become a driveway from Trailwood Lane and terminate at the AT&T Facility. Alexandria Drive from the AT&T Driveway to US 421/Leestown Road will be demolished. It appears that the roadway south of US 421 should be named Alexandria Drive and Citation Way should end north of US 421.

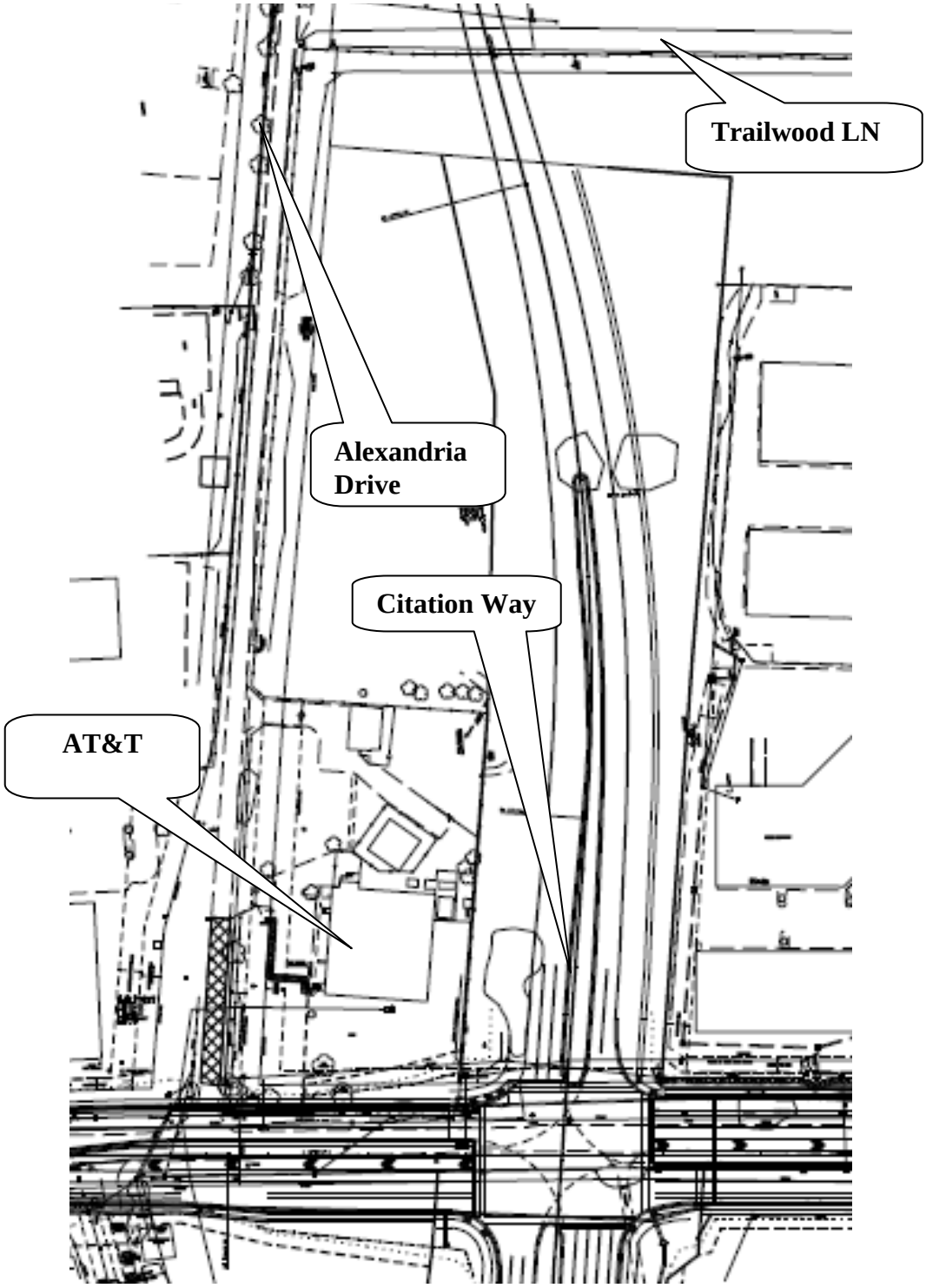
This alternative will have minor savings and improve traffic operations.

VII. DEVELOPMENT PHASE

D. EARTHWORK

3. Value Engineering Alternative Number 2

ALEXANDRIA DRIVE



EARTHWORK - RELOCATE ALEXANDRIA DRIVE
VALUE ENGINEERING ALTERNATIVE NUMBER 2
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
CL 2 SURFACE COURSE	TN	$ 64.96	18.3	$ 1,191	0.0	$ 0
CL 2 BASE COURSE	TN	$ 53.81	99.0	$ 5,327	0.0	$ 0
6" DGA	TN	$ 16.78	107.3	$ 1,801	0.0	$ 0
ROADWAY EXCAVATION	CY	$ 9.56	480.0	$ 4,589	0.0	$ 0
STANDARD CURB & GUTTER	LF	$ 14.57	300.0	$ 4,371	74.0	$ 1,078
DEMOLISH ALEXANDRIA DRIVE (WHEN CITATION WAY OPENS)	CY	$ 60.00	466.7	$ 28,000	377.8	$ 22,667
SOD (POST DEMOLITION EROSION CONTROL)	SY	$ 3.77	566.7	$ 2,136	453.3	$ 1,709
Construction Cost Citation Blvd	LS	$ 1,143,084	1.0	$ 1,143,084	1.0	$ 1,143,084
SUBTOTAL				**$ 1,190,499**		**$ 1,168,538**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		6.5%		$ 85,121		$ 83,550
TRAFFIC CONTROL/MOT		10.0%		$ 119,050		$ 116,854
CONTINGENCY		10.0%		$ 119,050		$ 116,854
GRAND TOTAL				**$ 1,513,720**		**$ 1,485,796**

POSSIBLE SAVINGS **$ 27,924**

VII. DEVELOPMENT PHASE

D. EARTHWORK

COST COMPARISON SHEET BACK UP CALCULATIONS

Earthwork VE 1 — Citation Estimate

1.25" Asph. Surf.

12,000 x 110 x 1.25 ÷ 2000 = 825 TONS

@ ~~$87.09~~ $76.50/ton = ~~$55,349~~ $63,113

9.75" Asph. Base

12,000 x 110 x 9.75 ÷ 2000 = 6435 TONS

@ ~~$48.08~~ $52.85/ton = ~~$309,395~~ $340,090

4" Drainage Blanket

12,000 x 100 x 4 ÷ 2000 = 2400 TONS

@ ~~$44.00~~ $35.85/ton = ~~$98,400~~ $86,040

6" DGA

12,000 x 115 x 6 ÷ 2000 = 4140 TONS

@ ~~$18~~ $17.03/ton = ~~$74,520~~ $70,504

Embankment

Fill = 13,220 c.y.

Cut = 21,162 c.y. x $9.56 = $202,309

$762,056

x 1.5 (cost factor)

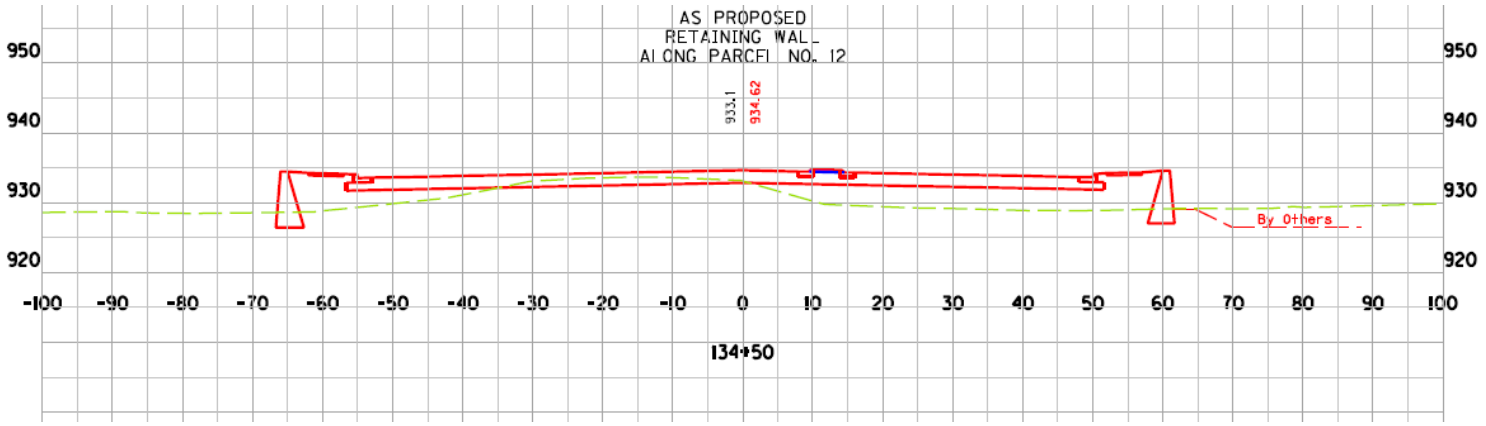
$1,143,084

VII. DEVELOPMENT PHASE

E. RETAINING WALL

1. "As Proposed"

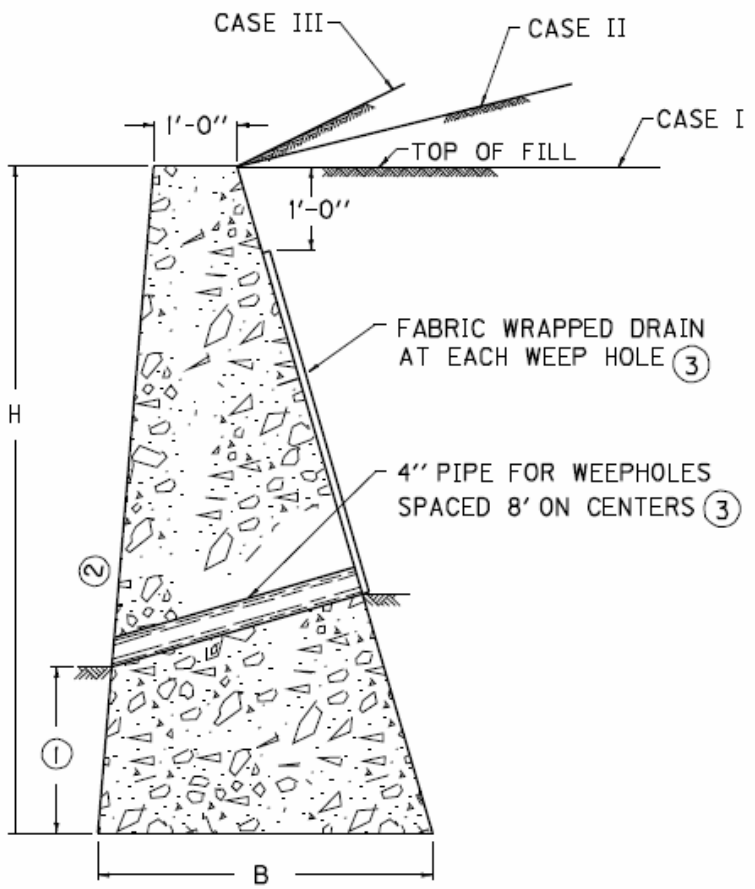
The "As Proposed" design calls for the use of gravity walls to retain fill at several locations along the project. The retaining wall will be 4' to 7.5' high.



VII. DEVELOPMENT PHASE

E. RETAINING WALL

1. "As Proposed"



AS PROPOSED GRAVITY WALL

VII. DEVELOPMENT PHASE

E. RETAINING WALL

1. "As Proposed"

TYPICAL GRAVITY WALL

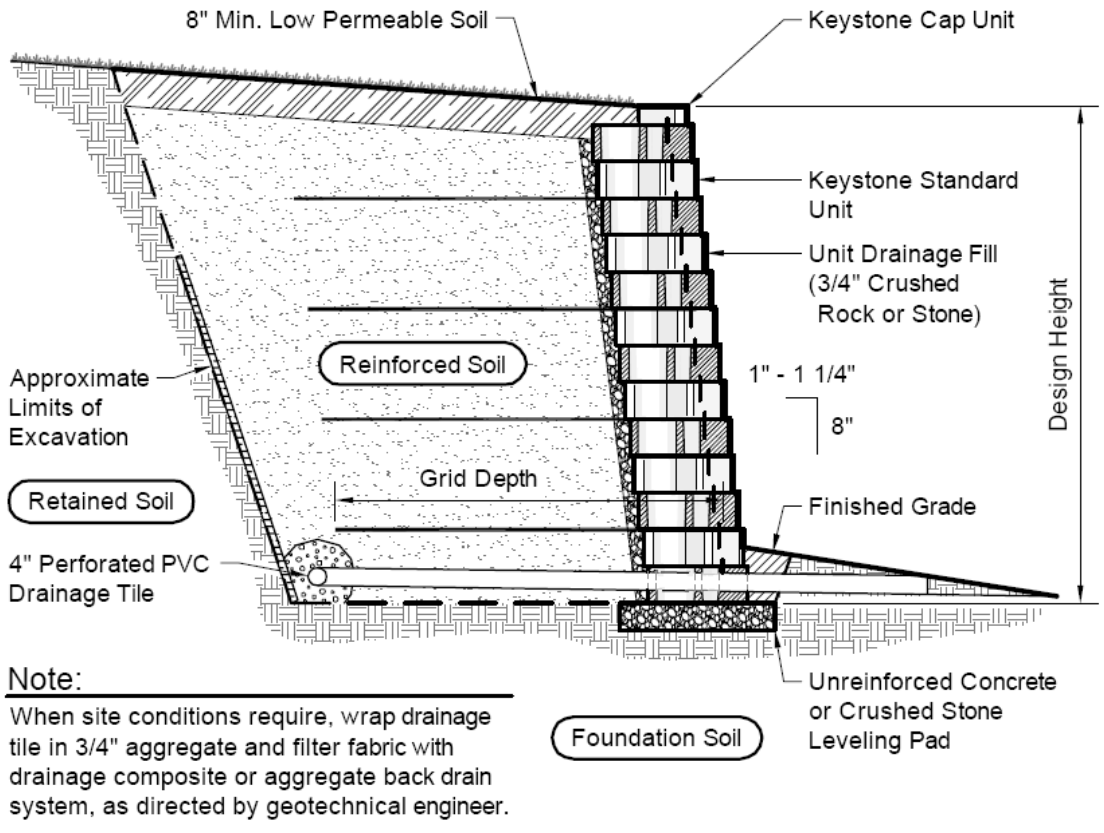
E. RETAINING WALL

2. Value Engineering Alternative Number 1

The Value Engineering Team recommends constructing the retaining walls at Lt. Sta. 131+90 and Rt. Sta. 132+ 50 out of Keystone blocks (small block wall). This reduces the amount of excavation, labor, materials, and cost to build a retaining wall. A Keystone block wall does not require imbedded in the ground as deep as the gravity wall and the trench is not as wide. This reduces the amount of structure excavation for the walls by approximately 80%. The Keystone Walls will also provide a more pleasing look for the adjacent property owners.

The blocks can be moved and stacked by manual labor forces, eliminating the need for most equipment associated with concrete gravity wall construction. The material can be delivered and stored on site to be used when the contractor is ready; unlike concrete which must be scheduled.

A retaining wall at Lt. Sta. 131+90 constructed of Keystone blocks is $34,053.73 less than one constructed of concrete. A retaining wall at Rt. Sta. 132+35 constructed of Keystone blocks is $38,741.01; less than one constructed of concrete.



VALUE ENGINEERING ALTERNATIVE NUMBER 1
RETAINING WALL

E. RETAINING WALL

2. Value Engineering Alternative Number 1

TYPICAL SMALL BLOCK (KEYSTONE) WALL

RETAINING WALL - KEYSTONE WALL
VALUE ENGINEERING ALTERNATIVE NUMBER 1
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Concrete Class B	CY	$ 414.88	616.9	$ 255,923	0.0	$ 0
Structure Excavation	CY	$ 19.23	524.7	$ 10,090	112.5	$ 2,164
Keystone Wall	SF	$ 30.75	0.0	$ 0	6213.2	$ 191,054
SUBTOTAL				**$ 266,013**		**$ 193,219**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		6.5%		$ 19,020		$ 13,815
TRAFFIC CONTROL/MOT		10.0%		$ 26,601		$ 19,322
CONTINGENCY		10.0%		$ 26,601		$ 19,322
GRAND TOTAL				**$ 338,236**		**$ 245,677**

POSSIBLE SAVINGS: $ 92,559

VII. DEVELOPMENT PHASE

E. RETAINING WALL

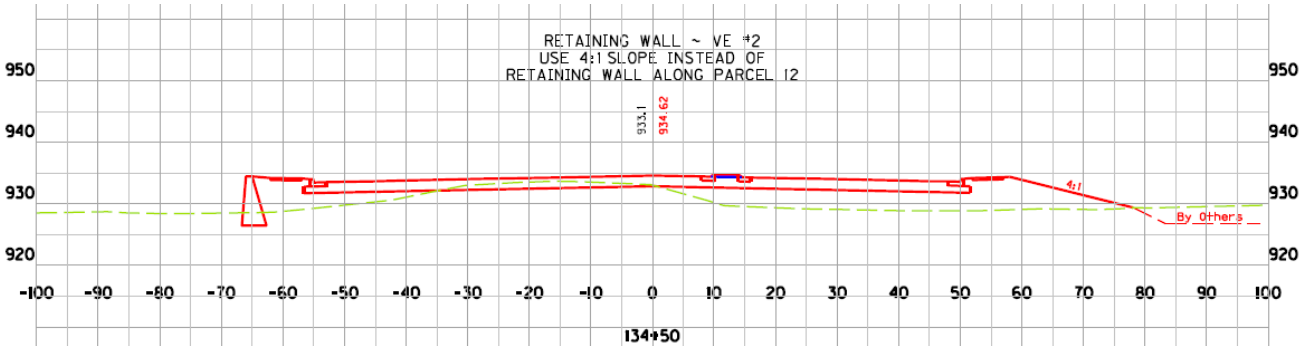
3. Value Engineering Alternative Number 2

DROPPED IN THE EVALUATION PHASE

E. RETAINING WALL

4. Value Engineering Alternative Number 3

The Value Engineering Team also looked at the possibility of eliminating the gravity wall at the vacant land north of US 421 between the proposed Citation Way and Robinson Way. This alternative was developed and appears to be economically unfeasible as long as the Developer keeps his agreement to donate land for the construction of a wall.



VALUE ENGINEERING ALTERNATIVE NUMBER 3
FOR RETAINING WALL

RETAINING WALL - 4:1 SLOPES
VALUE ENGINEERING ALTERNATIVE NUMBER 3
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Concrete Class B	CY	$ 414.88	335.0	$ 138,964	0.0	$ 0
Structure Excavation	CY	$ 19.23	347.2	$ 6,677	0.0	$ 0
Embankment	CY	$ 9.00	0.0	$ 0	762.4	$ 6,862
SUBTOTAL				**$ 145,641**		**$ 6,862**
MOBILIZATION (THIS IS SUB+CONTIN. X % =)		6.5%		$ 10,413		$ 491
TRAFFIC CONTROL/MOT		10.0%		$ 14,564		$ 686
CONTINGENCY		10.0%		$ 14,564		$ 686
Right of Way	AC	$ 200,000		$ 0	1.3	$ 260,000
Easement	AC	$ 40,000		$ 0	0.8	$ 31,600
GRAND TOTAL				**$ 185,183**		**$ 300,325**

POSSIBLE COST INCREASE: $115,142

VII. DEVELOPMENT PHASE

E. RETAINING WALL

COST COMPARISON SHEET BACK UP CALCULATIONS

Cost of Gravity Retaining Wall	Lt Sta. 131+90			
	QTY	unit	UNIT PRICE	TOTAL
Concrete Class B	234.19	CY	$414.88	$97,160.75
Structure Excavation	177.5	CY	$19.23	$3,413.33
				$100,574.07

Cost of Keystone Wall	Lt Sta. 131+90			
	QTY	unit	UNIT PRICE	TOTAL
Keystone Wall	2140.65	SF	$30.75	$65,824.99
Structure Excavation	36.16	CY	$19.23	$695.36
				$66,520.34

Cost of Gravity Retaining Wall	Rt Sta. 132+35			
	QTY	unit	UNIT PRICE	TOTAL
Concrete Class B	382.67	CY	$414.88	$158,762.13
Structure Excavation	347.22	CY	$19.23	$6,677.04
				$165,439.17

Cost of Keystone Wall	Rt Sta. 132+35			
	QTY	unit	UNIT PRICE	TOTAL
Keystone Wall	4072.5	SF	$30.75	$125,229.38
Structure Excavation	76.38	CY	$19.23	$1,468.79
				$126,698.16

VIII. SUMMARY OF RECOMMENDATIONS

It is the recommendation of the Value Engineering Team that the following Value Engineering Alternatives be carried into the Project Development process for further development.

Recommendation Number 1:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative Reevaluates the Pavement Selection and recommends using JPC Pavement.

If this recommendation can be implemented, there is a possible savings of ***$270,163.***

Recommendation Number 2:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative reduces the Bike Lane to 5' (4' pavement – 1' gutter) and eliminates the 3' Shoulder.

If this recommendation can be implemented, there is a possible savings of ***$427,426.***

Recommendation Number 3:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative constructs 4 – 11' travel lanes.

If this recommendation can be implemented, there is a possible savings of ***$325,452.***

Recommendation Number 4:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative eliminates the median opening at West Leesway Drive and relocates the proposed access to Robinson Way**.**

If this recommendation can be implemented, there is a possible added cost of ***$183,625.***

Recommendation Number 5:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative constructs a 6 – lane facility now.

If this recommendation can be implemented, there is a possible added cost of ***$3,501,797.***

VIII. SUMMARY OF RECOMMENDATIONS

Recommendation Number 6:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative reduces the median width to 20'.

If this recommendation can be implemented, there is a possible savings of ***$159,482.***

Recommendation Number 7:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative will Cul de sac Alexandria Drive and Construct Citation Blvd west of Leestown Road.

If this recommendation can be implemented, there is a possible savings of ***$27,924.***

Recommendation Number 8:

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative constructs the retaining walls with Keystone Blocks (small block wall.

If this recommendation can be implemented, there is a possible savings of ***$92,559.***

421/LEESTOWN ROAD
VALUE ENGINEERING STUDY PRESENTATION
MARCH 24-28, 2008

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