

October 18, 2011

SYP Numbers:

R-\$130,000

U-\$50,000

C-\$530,000



DNA: Data Needs Analysis

Leslie County US 421 Land Slide Repair Item Number 11-5010.00

Kentucky Transportation Cabinet

603 Railroad Ave.
Manchester, KY 40962

Phone: 606-598-2145
Fax: 606-598-8269



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I. INTRODUCTION

This study is a Data Needs Analysis (DNA) of a land slide area near Stinnett on US 421 around 15.25 mile point (MP) to about 16.2 MP in Leslie County, Item Number 11-5010.00.

A. Study Purpose

The purpose of the DNA is to address the nine elements of Purpose and Need as defined by NEPA in order to develop a draft Purpose and Need Statement for the project. This study will also provide a more defined project scope, possible alternatives, planning-level cost estimates for the alternatives, an identification of potential environmental impacts, and other information that will be of assistance in the Project Development Phase of this project.

B. Location

This project is located on US 421 north of KY 406 near Stinnett Creek with project limits extending from south of the intersection of KY 406 (MP 15.22) extending north for about a mile along US 421 in Leslie County (See **Figure 1** in **Appendix A**). The project includes an area known for repetitive landslides causing safety issues. A topographic map of the study area, Exhibit 2, can also be viewed in **Appendix A**.

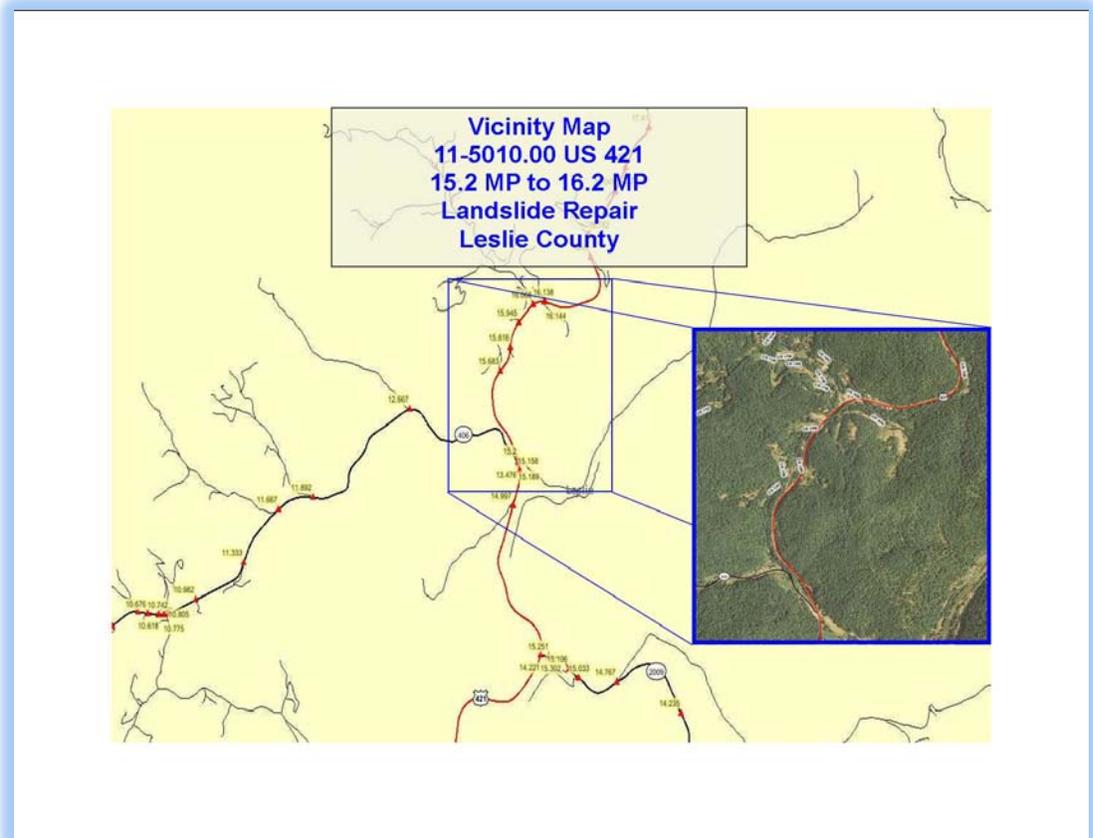


Figure 1: Vicinity Location Map

II. PROJECT PURPOSE AND NEED

A. Legislation

This project was entered into the Six-Year Highway Plan (SYP) in 2008. The design phase funding of \$575,000 (SPP funds) was authorized in September 2011. Additional funds were requested since the SYP funds did not have sufficient funds for the design phase; an additional \$445,000 was requested and authorized. The following is a description of the project as it is listed in the 2010 General Assembly's Enacted Roadway Plan.

- **Item #11-5010.00, Leslie County**

<u>Phase</u>	<u>Fund</u>	<u>Year</u>	<u>Estimate</u>
D:	SPP	2011	\$575,000
R:	SPP	2011	\$130,000
U:	SPP	2011	\$50,000
C:	SPP	2012	\$530,000

LANDSLIDE REPAIR ON US 421 FROM 0.2 MILE SOUTH JCT KY-406 AT STINNETT NORTH 1.0 MILE (2002BOPC) (10CCCR).

B. Project Status

Design funds for this project were authorized in 2011. Preliminary Design Plans are expected to be complete in 2012 for alternatives with the roadway shifting to the cut and fill sides of the existing location. All of the proposed alignments can be viewed in **Appendix A**. Final Design Plans are expected to be completed in 2013 for the chosen alternative. The existing geometry may be utilized as a diversion for each alternate via lane closures. There are currently no studies for this location to aid in the selection of an alternate.

C. System Linkage

The US 421 corridor is a major two-lane connection between US 119 and the Hal Rogers Parkway. KY 406 is a minor collector road that connects several small rural communities.

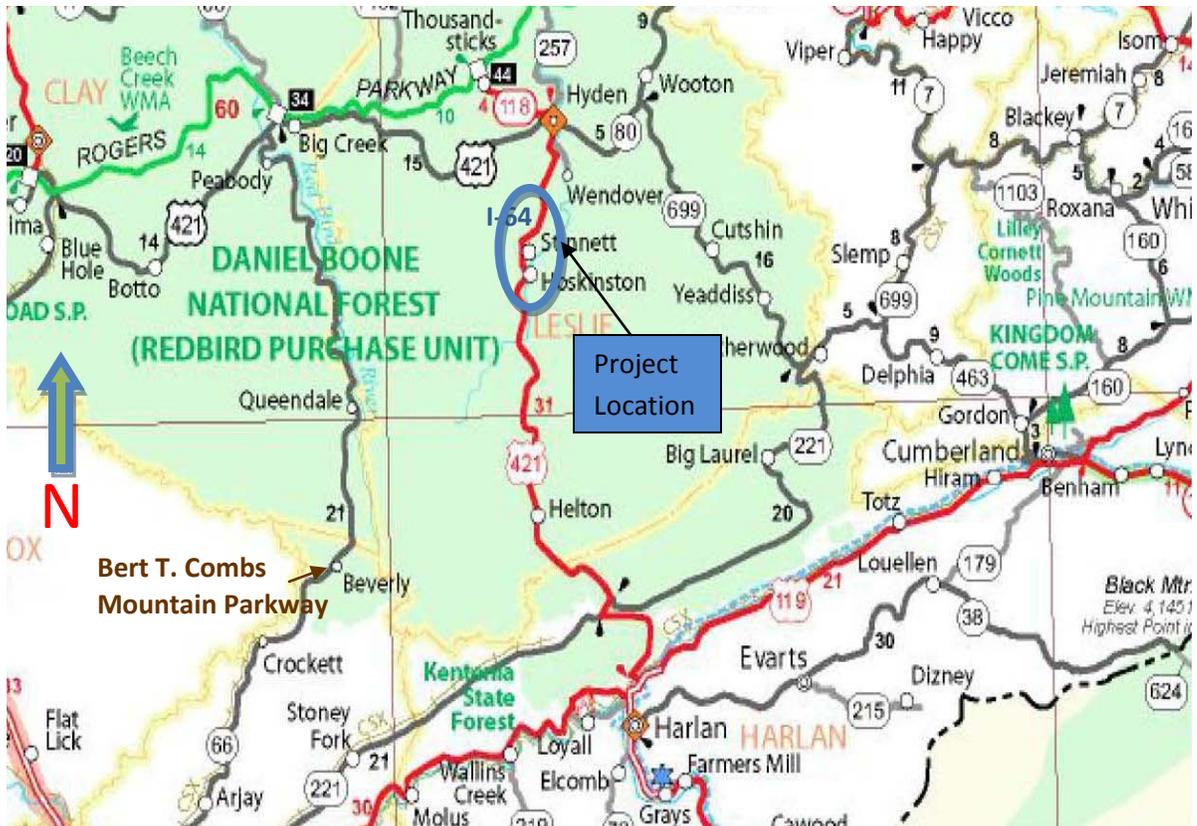


Figure 2: System Linkage Map

This segment of US 421 has the following roadway classifications:

- **Functional Classification** – Rural Minor Arterial
- **State System** – State Primary
- Not on the National Truck Network
- **Truck Weight Classification** – AAA
- Not on the Appalachian Development Highway System
- Not a designated Bike Route
- Limited Access Facility

D. Modal Interrelationships

There is no public transit on this route. The closest active rail line is several miles northeast of the project site in Hazard, KY. US 421 is mostly used for communities travelling in and out of the area with some coal hauled, however, it's not on the National Truck Network.

E. Social Demands & Economic Development

The communities in this area utilize the US 421 corridor as a means to travel to businesses. US 421 connects major developments between the southern and northern areas of Leslie County. It also provides connections to the Hal Rogers Parkway which gives further access to developed areas east or west of this location.

F. Transportation Demand

A traffic forecast was recently completed for this project and can be viewed in detail in **Appendix B. Table 1** summarizes the information provided. The section MP 14.9 is just south of the project location. The growth factor used for determining the forecasted year is 2.0% via the exponential growth analyses performed on the historical data from nearby stations. An annual growth of 1.0% is used to determine the forecasted truck traffic given the area also experiences occasional coal traffic.

Table 1: Traffic Forecast

	MP 14.9
2011 ADT	3,000
2035 ADT	4,800
2035 DHV	600
2011 Truck%	10.0%
2035 Truck%	13.0%
20 YR ESALS	2,000,000

G. Safety

Collision data was obtained from the Kentucky State Police database for a three year period from January 1, 2008 to June 15, 2011. There were no Crash Rate Factor (CRF) issues for this specific area of US 421 in Leslie County. There were 9 reported collisions in the project area during this period. No night/day pattern could be determined. A weather pattern of wet or slick roads was found, likely due to the steep grades in this area. There was 1 fatality that occurred on this segment of US 421 during the three year analysis period near the project location. Site visit concludes the possible reasons were

the steep grades and possible poor sight distance is contributing to some of the collisions. More detailed information on crash data in **Appendix C**.

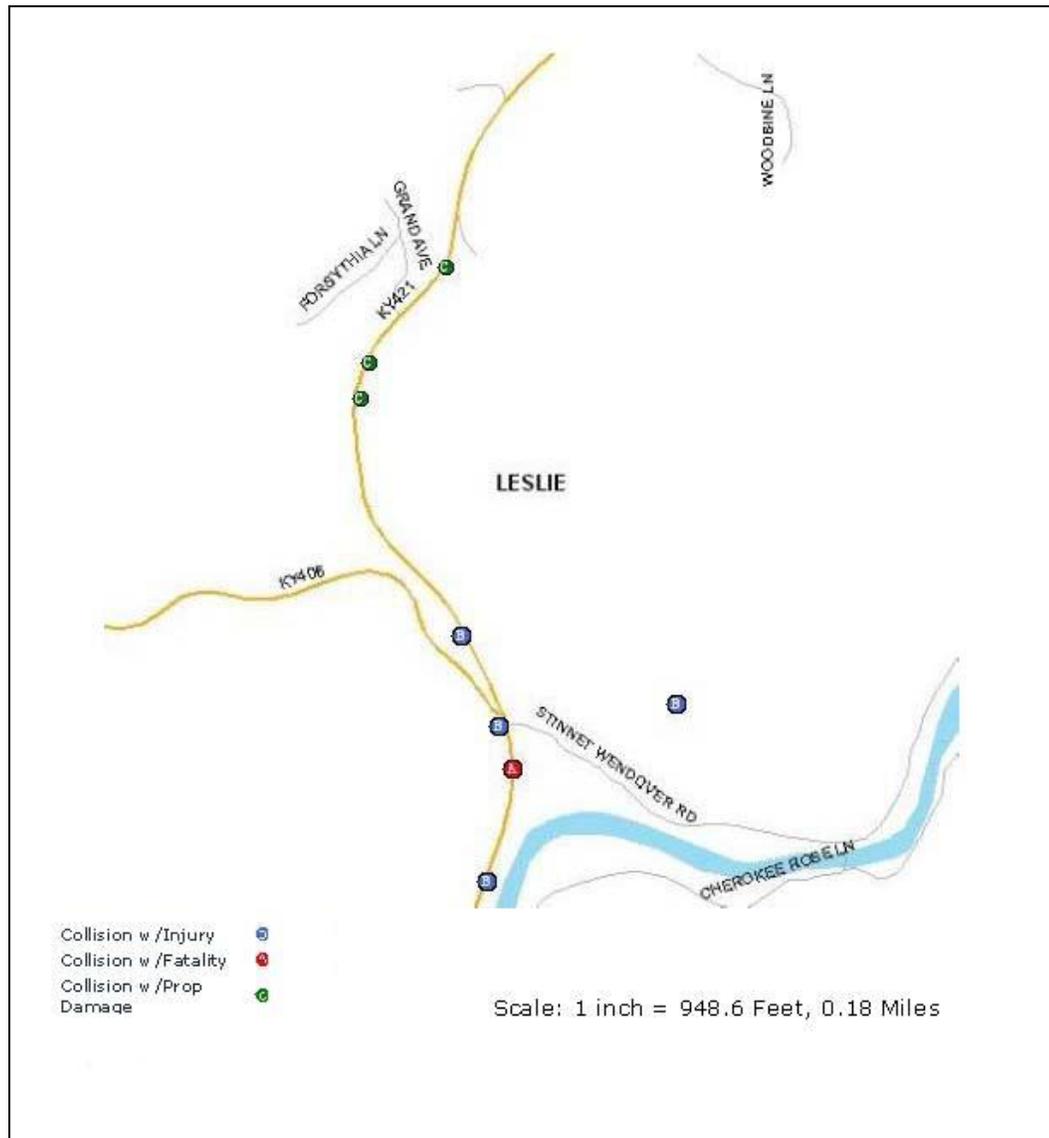


Figure 3: Collision Locations

H. Roadway Deficiencies

a. Mainline Geometrics

The roadway currently has 10-ft lanes, 2-ft shoulders, a maximum grade of 8.4%, a posted speed limit of 55 MPH. KYTC's Common Geometric Practices for Rural Arterials recommends 12-ft lanes and 8-ft shoulders for a 55 MPH Design Speed and a maximum grade of 6% for mountainous terrain (see **Appendix D**). The roadway

currently does not meet these recommendations for the pavement width, shoulder width, nor the maximum grade. The curve at the end of the project has a minimum radius of 954.9 feet which is slightly less than the recommended radius of 1065 feet in the KYTC's Common Geometric Practices for Rural Arterials. Some of these geometric deficiencies will be addressed by an adjacent project (Item Number 11-1078.00) and will not be considered in the alternatives of this report. Existing roadway plans can be viewed in **Appendix E**.



Figure 4: Horizontal and Vertical Curve north going up the hill

b. Bridges/Culverts

There is one culvert located in the project area. The culvert is a 12'x12' double box barrel concrete culvert. The protection above the culvert is currently standard guardrail. The culvert is rated with a Sufficiency Rating (SR) of 31.5 meaning that the structure has been declared structurally deficient. The culvert over Stinnett Creek is not currently wide enough (21.0-ft curb to curb) to accommodate the

recommended 8-ft shoulders. There are also several maintenance issues with debris that collects at the wall separating the barrels of the culvert. Also, scouring was noted at the inlet of the culvert creating a need for additional maintenance. The culvert over Stinnett Creek can be seen in **Figure 5** below. It shall be noted that this structure is part of an adjacent project (Item Number 11-1078.00) even though the project limits of 11-5010.00 encompass the existing structure and that consideration for the design of replacing said structure will not be inclusive to the alternatives in this report.



Figure 5: Culvert over Stinnett Creek

c. Intersections

Due to the crash history on the US 421 intersection with KY 406, the adequacy of the geometrics in this area was analyzed. There is a horizontal curve located at the intersection of KY 406. The stopping sight distance was calculated from roadway plans to be 276 feet which meets a 35 MPH Design Criteria. The road is currently signed at 55 MPH. Below, in **Figure 6 and Figure 7**, are pictures taken near the horizontal curve. However, this intersection is being evaluated by an adjacent project (Item Number 11-1078.00) and will not be addressed in any of the alternatives for evaluation in this report.



Figure 6: KY 406 looking north



Figure 7: US 421 Near Top of Grade

d. Drainage

Flooding does not appear to be a major issue in this area. The Flood Insurance Rate Maps (FIRMs) does indicate a flood zone along the corridor of KY 406, however, this is not in the project area. The drainage issues of the culvert south of the intersection with KY 406 are being addressed by another Six Year Highway Plan (SYP) Project Item Number 11-1078.00. The elevation of the roadway in this area generally stays above the Base Flood Elevation. The FIRM Maps of the project site can be viewed in **Appendix F**.

III. PRELIMINARY ENVIRONMENTAL OVERVIEW

A. Ecological Overview, Threatened and Endangered Species

This project will involve landslide repair along part of Stinnett Creek and an unnamed tributary to Stinnett Creek. Both are upstream to a KDOW listed Special Use Water (Middle Fork Kentucky River) in Leslie County, Kentucky. The USGS Quadrangle is Hoskinston. There are no recognized bat polygons in the area. Caution needs to be taken to ensure all waste generated at the site is placed in a designated site that is not in the floodplain and that Best Management Practice's (BMP's) are developed to adequately control erosion and run-off. There appear to be no ponds impacted. USFWS has identified suitable habitat for threatened and endangered species in the project area. Current species listed for Leslie County are *Myotis sodalis*, Indiana bat. Future study will address the requirements of USFWS and prevent detriment to the protected species. Land use impacts should be temporary and should not significantly change the current use.

B. Socioeconomic/Environmental Justice

With possible relocations, there would appear to be environmental justice issues associated with this project. However, the construction should not pose hardships to a community provided that the road is not closed as part of the project. Similarly, there appears to be no impacts to prime farmland.

C. Cultural/Historic Resources

There appears to be no older structures taken. However, taking into account that the area is at least partially prior disturbed by existing road construction, a phase I archaeological survey will determine cultural significance and if eligible sites are located in the project footprint.

D. Potential UST/HazMat, Air, and Noise

There is no evidence to support UST/Hazmat issues on this project. No asbestos containing materials were discovered during inspection. However, the requirement for an advanced notification prior to demolition and removal of the bridge is necessary due to noise concerns. Noise issues will be temporary and limited to those associated with construction activity. Possible new lanes with no large increase in the traffic patterns will be associated with this project. Air Quality will be controlled with good construction practices. The project area is listed as in attainment for monitored air pollutants.

IV. PRELIMINARY PROJECT INFORMATION

A. Existing Conditions/Roadway Data

A summary of the existing conditions can be seen in **Table 2**. The segment of the roadway within the project limits has 10-ft lanes, 2-ft shoulders, and vertical curves with grades of approximately 6.5% to 8.4%. Other existing roadway information can be viewed in the roadway plans for US 421 in **Appendix E**. Additional pictures of the project site can be viewed in **Appendix G**.

Table 2: Existing Conditions and Data Summary

County:	<u>Leslie</u>	Road Name:	
Route Number(s):	<u>US 421</u>		
Item No.:	<u>11-5010.00</u>		
BMP:	<u>15.1</u>	EMP:	<u>16.2</u>
Project Length:	<u>1.1 miles</u>		
Rdwy. Class.:	<u>Rural Minor Arterial</u>	State Class.:	<u>Primary</u>
Truck Class:	<u>AAA</u>		
ADT (current):	<u>3,000 to 4,400</u>		
Terrain:	<u>Mountainous</u>	Access Control:	<u>Controlled</u>
Posted Speed:	<u>55 MPH</u>	Median Type:	<u>Undivided</u>
Funding Type:	<u>D-SPP, R&U-SPP, C-SPP</u>		

Roadway Data:

	<u>Existing Conditions</u>	<u>Design Criteria*</u>
No. of Lanes	2	2
Lane Width	10 ft	12 ft
Shoulder Width	2 ft	8 ft
Minimum Radius	954.9 ft	1065 ft
Maximum Grade	6.5-8.4%	6%
		<i>* 55 MPH Design Speed</i>
Adequacy Rating %:	30-45	

Bridge Data:

	<u>066B00008N*</u>
Max. Span Length	12.0 ft (2 barrels)
Length	92.0 ft
Width, out to out	36.0 ft
Width, curb to curb	21.0 ft
Sufficiency Rating	31.5

*This bridge shall NOT be considered as part of the design for this project as it will be covered in Item Number 11-1078.00 which is adjacent to the current project location.

B. Utilities

A list of utilities that may be encountered in the project area:

Electric
Telephone
Cable
Water
Gas

This information was obtained from field inspection, existing roadway plans, and a GIS database. The location of utilities as well as the utility contacts will need to be verified as the project survey is completed in Phase I Design.

V. PROJECT PURPOSE AND NEED STATEMENT

A Purpose and Need Statement is the foundation for project decision-making and is needed for projects requiring National Environmental Policy Act (NEPA) documentation. Based upon the information presented in Section II of this report and discussion with the project team, the following Purpose and Need Statement was drafted for this project:

This project is necessary due to the safety issues deriving from the recurring landslides along the US 421 Corridor between MP 15.2 and 16.2 in Leslie County. The current Average Daily Traffic is 3,000 and the geometric deficiencies of two traffic lanes of 10ft in width with the 2ft shoulders make it difficult for vehicles to maneuver along the pavement as it tends to slide. The geometrics of the roadway throughout the project location includes steep grades between 6.5% to 8.4%, as well as horizontal curve, that do not give adequate sight distance, making it difficult to avoid pavement breaks. These landslides also create pavement breaks which cause the vehicles coming down steep grades to have a vertical drop of several inches that is extremely hazardous during inclement weather. Continuing maintenance for this stretch of road could be alleviated from having to repeatedly patch and reinforce the roadside with various means. **This project will improve the safety and geometrics in this community by providing better geometrics for this section of roadway.**

VI. POSSIBLE ALTERNATIVES

The following are several of the alternatives analyzed and discussed during the development of this study. All estimates were completed on a cost per unit bases. The red alignment in each Figure is a preliminary sketch of the alternate being discussed.

A. Alternate #1 - No Build

Alternate #1 will be utilizing the existing alignment and pavement. It will be to increase maintenance activities in this project area to improve the side slopes to reinforce the geotechnical issues causing the landslides, followed by routine maintenance to insure the safety of the roadway.

B. Alternate #2 –Widening through Cut

Alternate #2 will be shifting the roadway into the mountain to widen the current roadway. Because of the steep grades in this area a passing lane may be ideal since there are a number of trucks that travel through the project area. There may be some issues with maintenance of traffic because benching may be required to excavate enough material to widen the road, and a lane closure may be required to accommodate traffic which could be difficult near blasting times. Widening toward the mountain will also aid in the realignment of the intersection of US 421 and KY 406 since the widening will be away from the intersection. There are a few properties that may be affected, and possibly a house or two could be affected as well. This alternate will help alleviate the need for more slope stabilization items. A sketch of this alternative can be viewed in **Figure 8**.

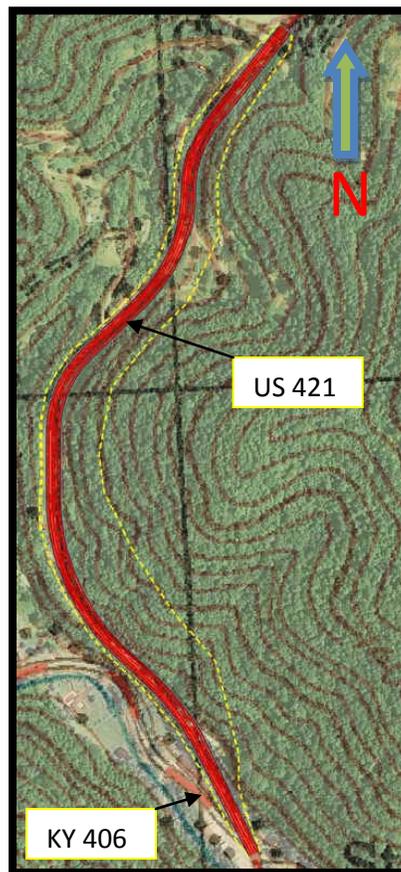


Figure 8: Alternate #2 Preliminary Route

The following is the preliminary cost estimated for Alternate #2:

<u>Phase</u>	<u>Estimate</u>
Right of Way	\$400,000
Utilities	\$200,000
Construction	<u>\$2,500,000</u>
	\$3,100,000

C. Alternate #3 –Widening to Fill

Alternate #3 includes widening to the side where it would require fill. The issue with this alternate is that the slope stabilization will be required unless the problematic material under the roadway is taken out which may require embankment benching. Embankment benching may cause problems with maintenance of traffic due to lane closures. Also, this alternate requires a large amount of fill material to widen the roadway sufficiently. Several houses may be affected by this alternate along the route of KY 406 since they're in close vicinity to the bottom of the slope. Also, if you look at Figure 7 there is a gas station along this route that would be affected as well. This fill will also cause problems with the realignment of the intersection of US 421 and KY 406 since it would increase the grade of the intersection causing more sight distance issues. A sketch of this alternate can be seen in **Figure 9**.

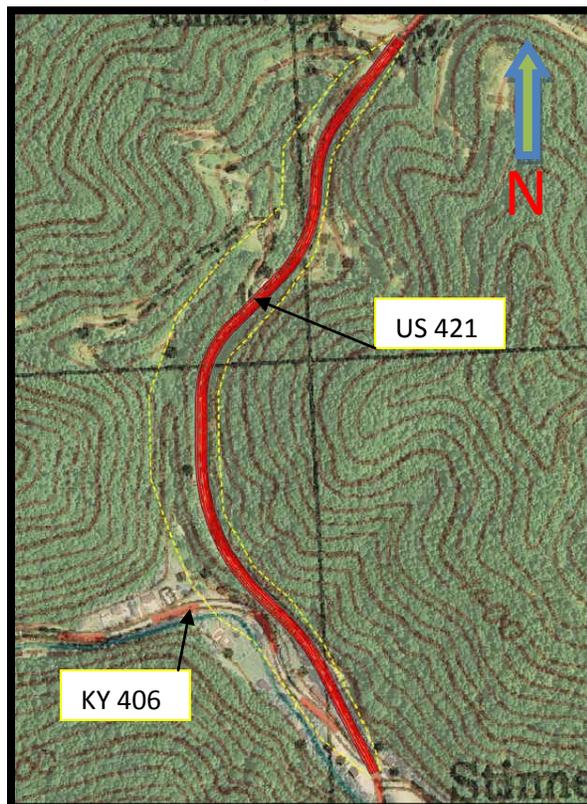


Figure 9: Alternate #3 Preliminary Route

The following is the preliminary cost estimated for Alternate #3:

<u>Phase</u>	<u>Estimate</u>
Right of Way	\$1,000,000
Utilities	\$200,000
Construction	<u>\$2,200,000</u>
	\$3,400,000

D. Alternate #4 – Widening to both sides

Alternate #4 would allow the benefit of getting to use the material from the cut side to use as fill material. This could cut out some costs as the contractor wouldn't have to haul in fill material or haul out so much excavated material. However, like the alternate of widening to the fill side, it could cause major issues with having to acquire ROW as well as the possibility of relocating several home owners. Since it is also being widened to the other side, there are a few more houses that could be affected and would drive up the cost for the ROW phase. Also, there would still be embankment benches required to solve problems with sliver fills and may cause maintenance of traffic problems due to lane closures. The intersection of US 421 and KY 406 would have decreased sight distance since the grade would be steeper. A sketch of this alternate can be seen in **Figure 10**.

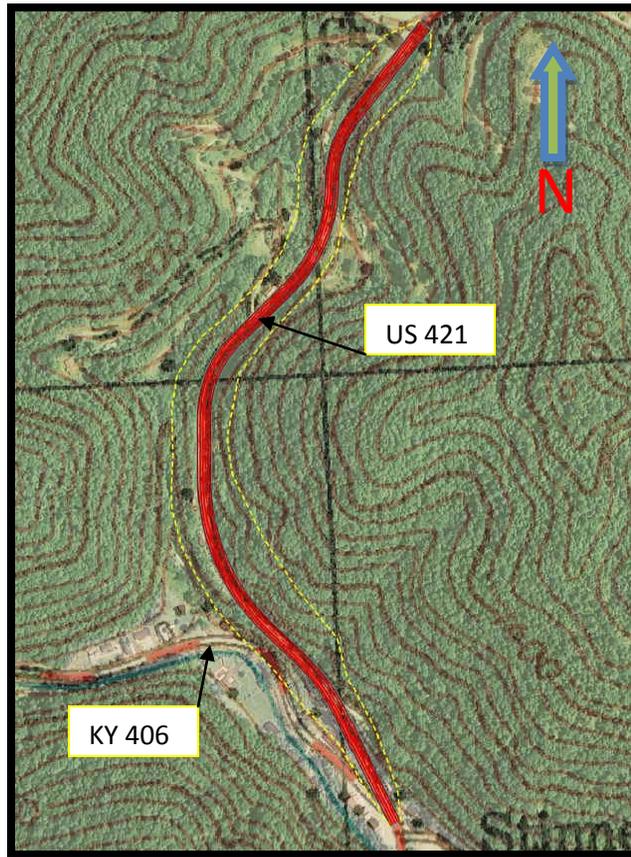


Figure 10: Alternate #4 Preliminary Route

The following is the preliminary cost estimated for Alternate #4:

<u>Phase</u>	<u>Estimate</u>
Right of Way	\$800,000
Utilities	\$200,000
Construction	<u>\$2,200,000</u>
	\$3,300,000

VII. SUMMARY

This study is a Data Needs Analysis (DNA) of a project located on US 421 near Stinnett Creek in Leslie County, Item Number 11-5010.00, from about the intersection of KY 406 extending north a mile. Through analysis of the existing roadway geometrics, crash data, and site visits several needs were identified within the project limits. The following were identified as project needs:

- The amount of ROW acquired and the relocations required need to be as few as possible to reduce the impact to the community.
- With the current grades it makes it difficult for large trucks to build up speed causing traffic to back up down the hill which may indicate the need for widening.
- The roadway is currently sliding off away from the hillside causing maintenance issues as well as traffic hazards as vehicles try to avoid sections of the roadway that are slipping off.

Very steep grades with a large amount of truck traffic creates a hazard as they are slowed significantly going north up the hill. A truck lane could relieve the congestion in this area by allowing faster moving vehicles to maneuver around the trucks. Widening the roadway geometry will increase the sight distance around the horizontal curves through this section of the corridor. This project will improve safety by giving the trucks a climbing lane and allowing traffic to freely flow past them, it will also increase the geometrics of the roadway providing a safer roadway to travel on as it will give the Department the opportunity to reinforce the roadway's base to keep it from sliding.

Included in the alternates were a no build recommendation, three alternates for fixing the landslide problem utilizing both cut and fill options with costs ranging from 3.1 to 3.4 million dollars. All of these alternates are not within the money allocated to this project. More money will need to be requested for the various phases of this project.

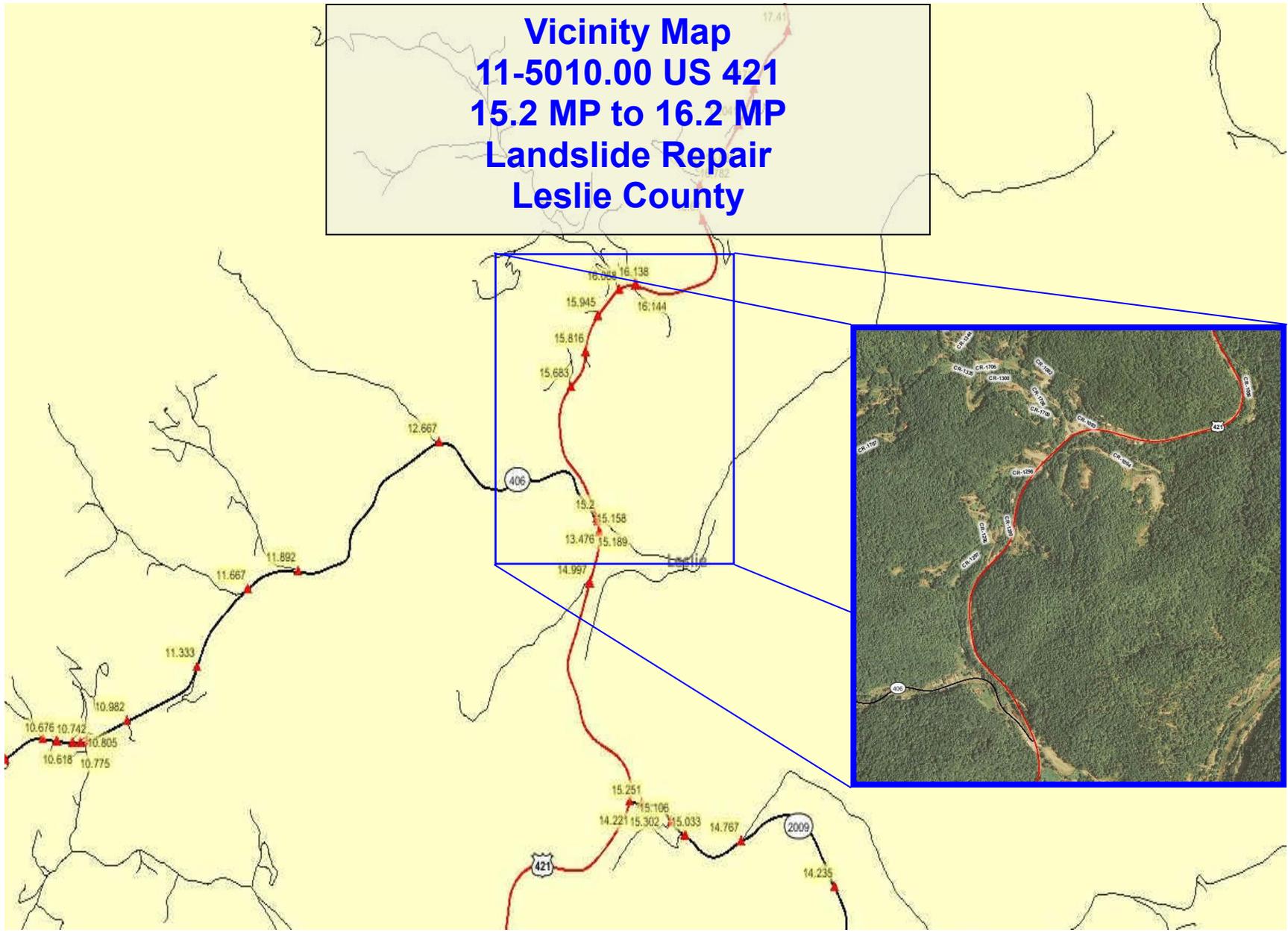
For more information regarding this study please contact:

Erika Smith or Joseph Mosley
Kentucky Transportation Cabinet
Division of Highway Design
603 Railroad Ave.
Manchester, KY 40962
(606) 598-2145

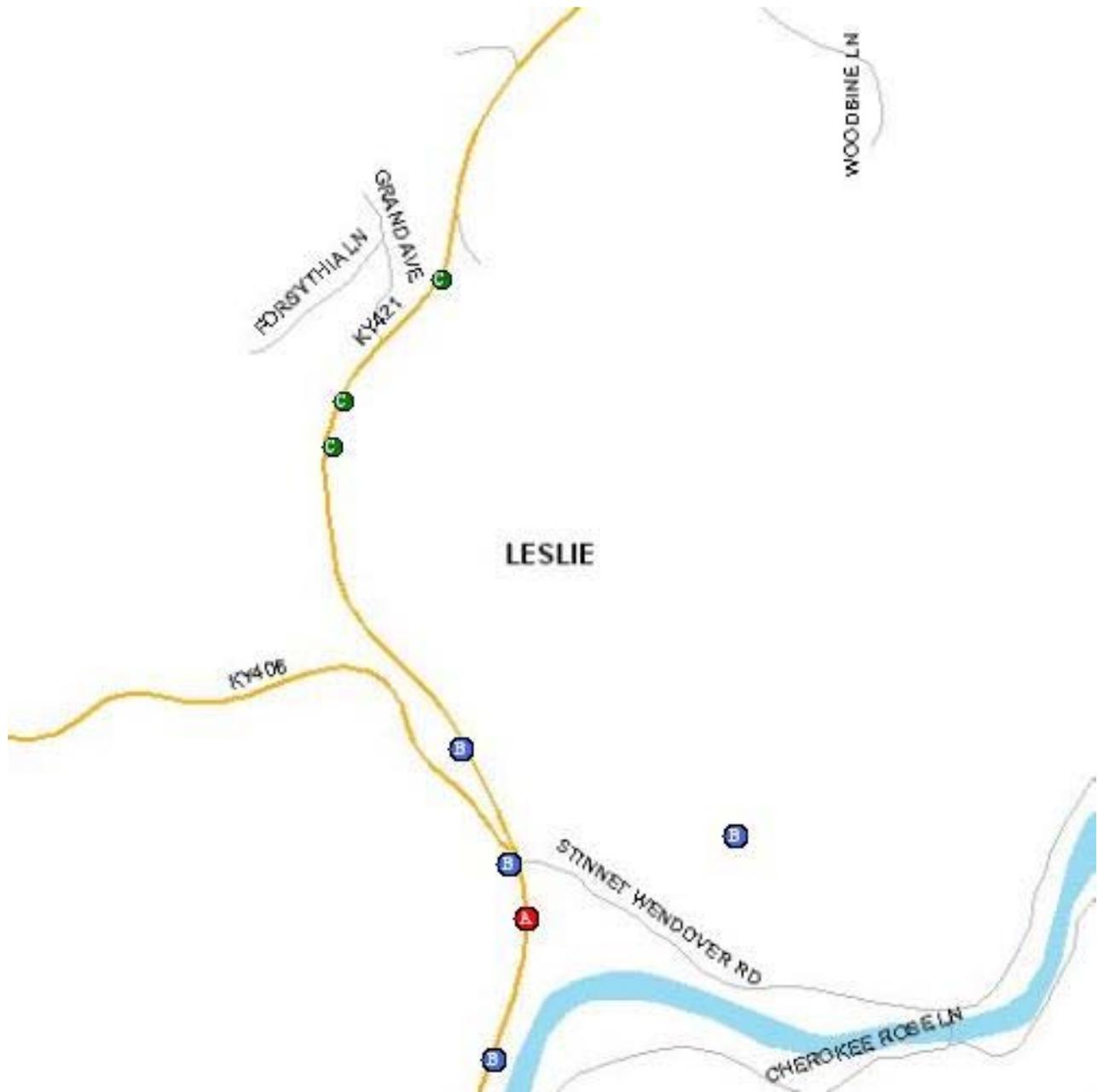
Appendix A

-Exhibits-

Vicinity Map
11-5010.00 US 421
15.2 MP to 16.2 MP
Landslide Repair
Leslie County



Criteria: Collision Date is between 1/1/2007 and 6/15/2011 **And** County Name is one of: LESLIE **And** Roadway Number is US0421



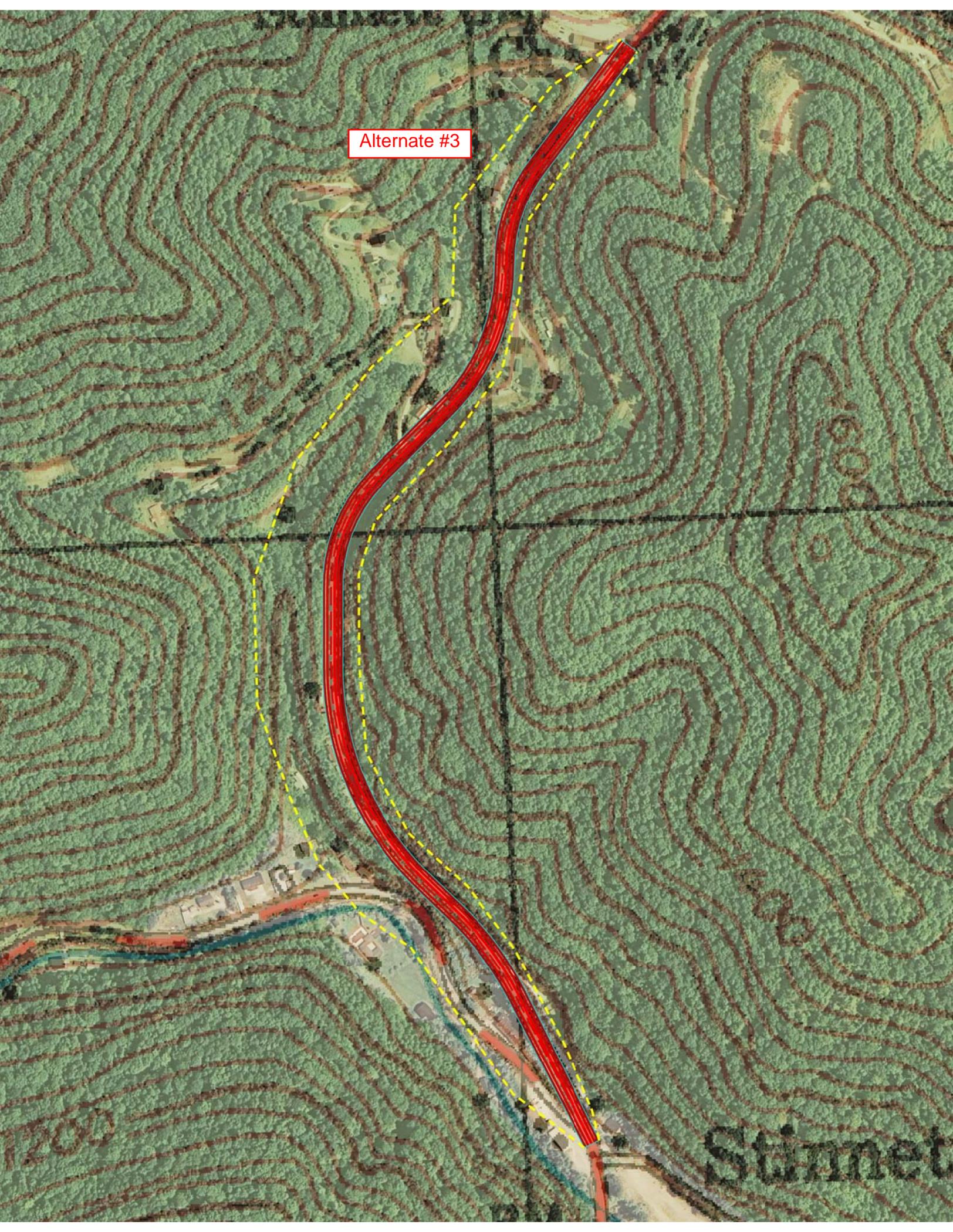
Collision w/Injury	B	80
Collision w/Fatality	A	6
Collision w/Prop Damage	C	88
Total Mapped		174
Total NOT Mapped		0

Scale: 1 inch = 948.6 Feet, 0.18 Miles

Alternate #2



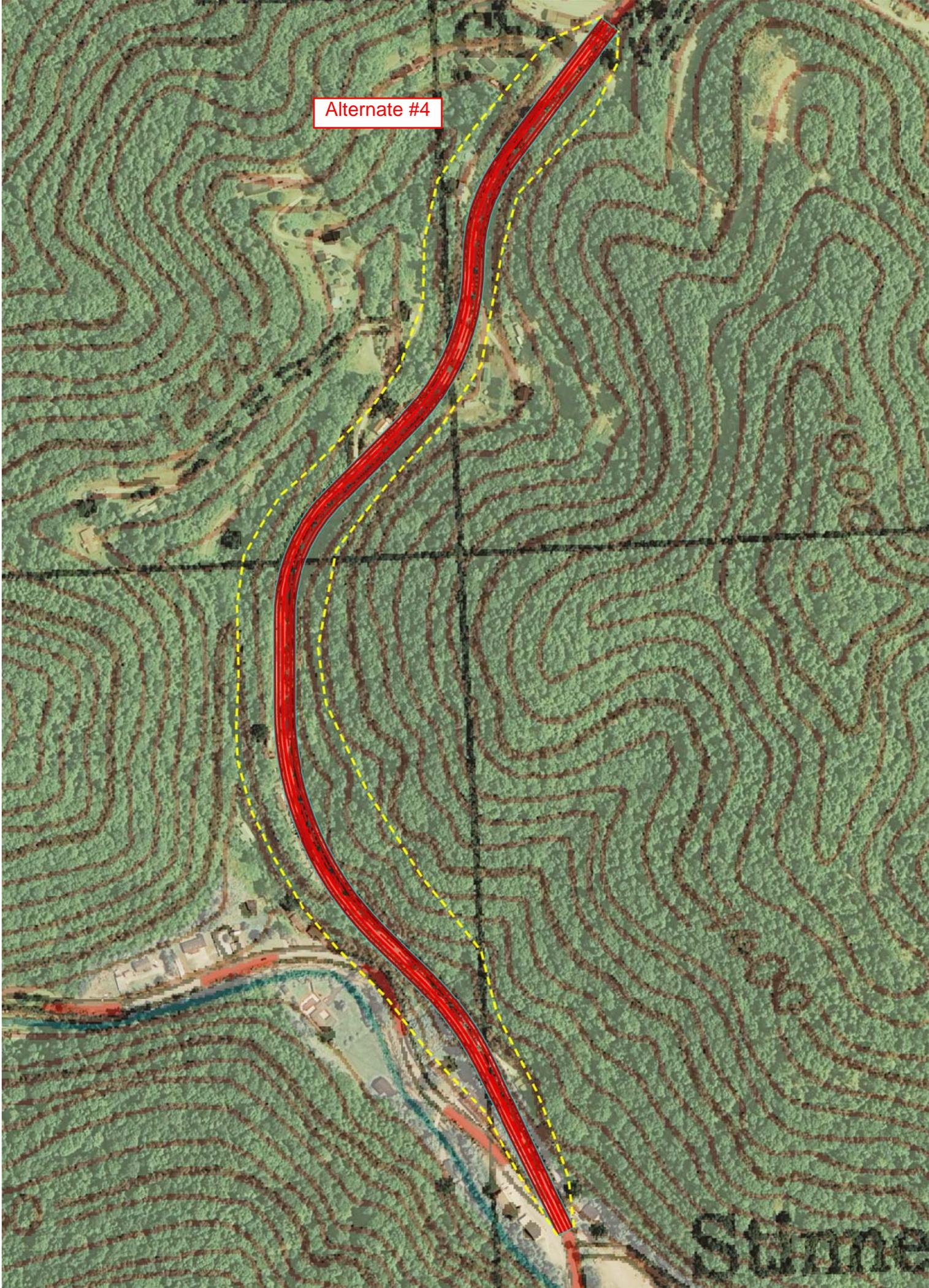
Alternate #3



1200

Stimnet

Alternate #4



Stone

Appendix B

-Traffic Forecast-

Executive Summary

Traffic Forecast Report Leslie County Bridge Replacement On US 421 Over Stinnet Creek Item No. 11-1078.00

Prepared for:



Prepared by:
Jonathan Reynolds, PE
Division of Planning
Kentucky Transportation Cabinet
March 3, 2011

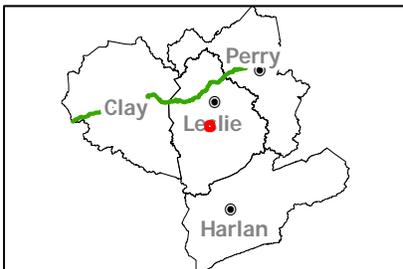
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Commonly Used Abbreviations and their Descriptions

ADT	Average Daily Traffic	Without any adjustment
DHV	Design Hour Volume	30 th highest hour of a <u>year</u>
ESAL	Equivalent Single Axle Load	A measure of traffic's impact on roadway
%T	Truck Percentage	The percentage of trucks to total volume
FC	Functional Class	Refers to a road's importance
GR	Growth Rate	A value normally compounded annually
PHF	Peak Hour Factor	Considers a 15 minute spike in an hourly count
K-Factor	K-30 th hour Factor	DHV divided by ADT (DHV/ADT)
D-Factor	Directional Factor	Percentage of dominant flow to total
MP	Mile Point	Miles increase easterly and northerly
ATR	Automatic Traffic Recorder	A permanent & continuous recording station
KYSTM	Kentucky Statewide Model	A computerized representation of KY roads

Vicinity Map



Bridge Replacement on US 421
at MP 15.2 over Stinnet Creek
Item #11-1078.00



Legend

 Project Location

0 0.03 0.06 0.12
Miles

Traffic Forecast Executive Summary
**Leslie County: Bridge Replacement On US 421 Over Stinnet
Creek**
Item No. 11-1078.00

FORECAST SUMMARY

The project calls for replacing the bridge over Stinnet Creek on US 421 in Leslie County. The purpose of this report is to analyze current and future traffic utilizing US 421 bridge between MP 15.137 and MP 15.177. District 11 requested traffic forecasts for the project road segment.

FORECAST TYPE

The following types of forecasts were developed:

- 2011 and 2035 ADT and DHV values
- 2011 and 2035 Average Daily and Design Hourly Truck Percent Forecasts
- 20-year ESALs

BASE-YEAR VOLUMES

The 2011 ADT volume is based on the most recent 48 hours of count data collected at traffic station 066501 (see page 6). The traffic count data for this station was collected at MP 14.9 on US 421. All figures are subject to rounding.

DESIGN-YEAR/GROWTH FACTORS

The Kentucky State Data Center predicts negative population growth in Leslie County between now and 2035 (see page 5). However, exponential growth analyses performed on historical data from stations 066501 and 066767 reveal traffic volumes on this section of US 421 have been growing 2.0% annually (see page 6). A 2.0% growth rate was used for the purposes of this forecast.

DESIGN HOUR FACTORS

DHVs were estimated by analyzing the most recent hourly volume data collected at station 066501. The peak AM and PM volumes were derived by dividing the highest hourly volumes from these counts by their daily totals. Functional class design hour factors based on the day and month of these counts were then applied. Finally the calculated K-factors were used in combination with the ADT forecast to produce DHVs for 2011 and 2035.

TRUCK PERCENTAGE

A 2009 vehicle classification count conducted on US 421 at station 066508 at MP 8.7 and a 2007 vehicle classification count conducted on US 421 at station 066767 at MP 20.5 provided a historical truck percentage data for US 421. Statewide research indicates a 1.0% annual growth rate for %T may be applied as a component of the overall traffic growth on rural major collector roads. Also the Kentucky Official Coal Haul Highway System 2010 report shows that coal trucks used this segment of road. These components factored into the analysis of the ESAL calculations.

ESALs

Functional class averages from ATR data, traffic counts, and the 2035 ADT projections were used to estimate 20-year ESALs on the project road segment. The 2007 aggregated ESAL report, generated by the Kentucky Transportation Center in collaboration with the Kentucky Transportation Cabinet, were used to grow the important ESAL calculation variables. For more information please see the attached ESAL calculation sheets.

TURN MOVEMENTS

Turn movements were not requested and therefore not included.

Traffic Forecast Technical Report
 Leslie County: Bridge Replacement On US 421 Over Stinnet Creek
 Item No. 11-1078.00

HISTORICAL POPULATION SUMMARY

	1950	1960	1970	1980	1990	2000	50 - 60	60 - 70	70 - 80	80 - 90	90 - 00
	Population	Population	Population	Population	Population	Population	Pct	Change	Pct	Change	Pct
Kentucky	-	3,038,156	3,220,711	3,660,334	3,686,892	4,041,769	-	6.0%	13.6%	0.7%	9.6%
Leslie Co	-	-	11,623	14,882	13,642	12,401	-	-	28.0%	-8.3%	-9.1%

Sources: US Bureau of the Census; Kentucky State Data Center

FUTURE POPULATION PROJECTIONS SUMMARY

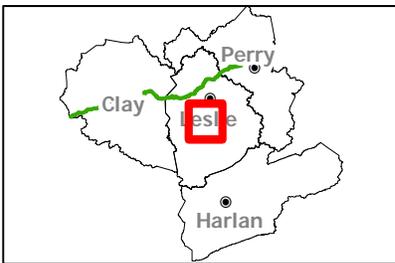
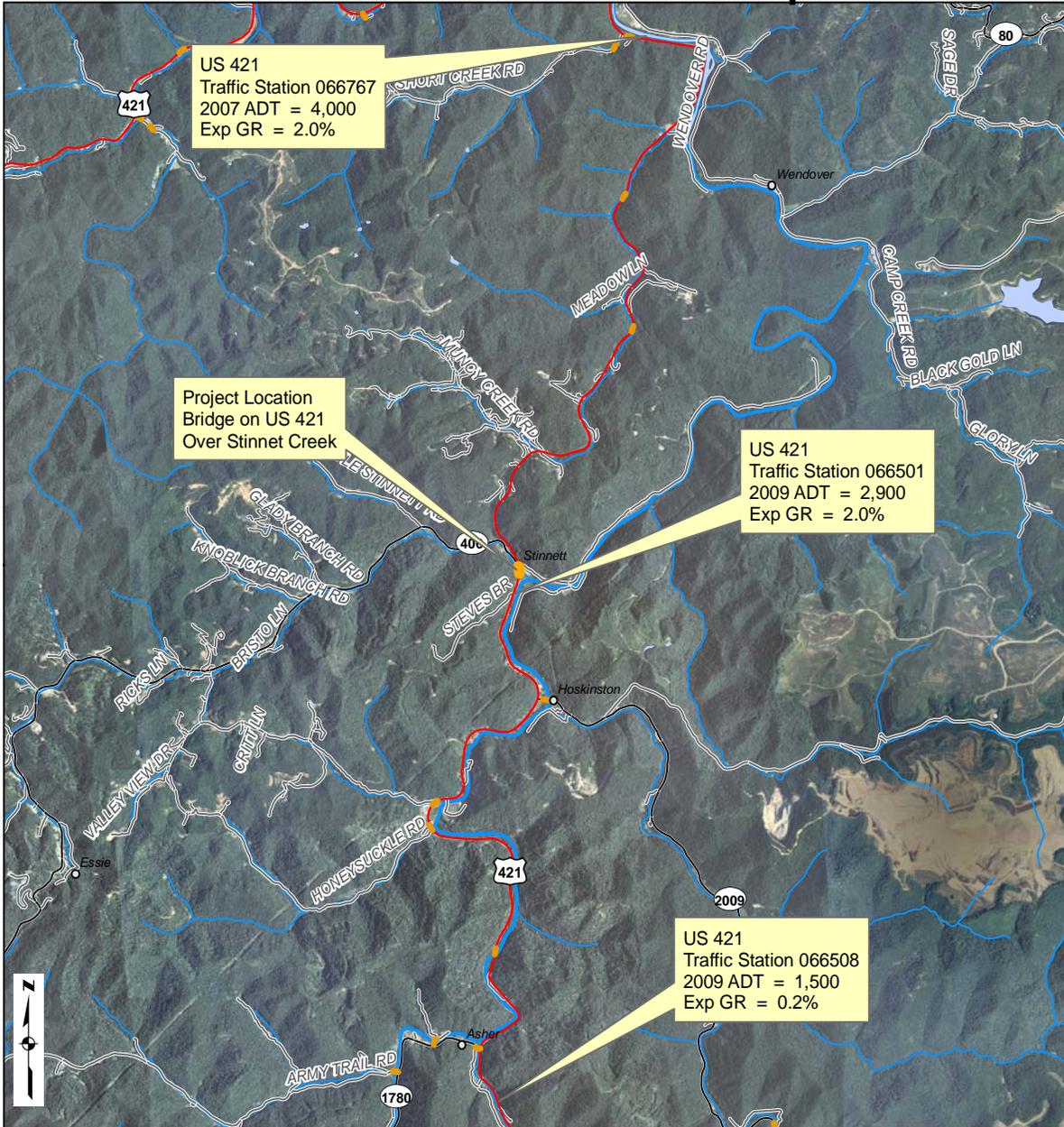
	2005	2010	2015	2020	2025	2030	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30
	Projection	Projection	Projection	Projection	Projection	Projection	Change	Change	Change	Change	Change
Kentucky	4,171,016	4,326,490	4,502,595	4,660,703	4,799,443	4,912,621	3.7%	4.1%	3.5%	3.0%	2.4%
Leslie Co	11,886	11,736	11,478	11,235	10,987	10,735	-1.3%	-2.2%	-2.1%	-2.2%	-2.3%

Sources: US Bureau of the Census; Kentucky State Data Center

ANNUAL POPULATION GROWTH RATES FROM HISTORICAL DATA AND PROJECTIONS

	50 - 60	60 - 70	70 - 80	80 - 90	90 - 00	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	05 - 25
	GR										
Kentucky	-	0.59%	1.29%	0.07%	0.92%	0.73%	0.80%	0.69%	0.59%	0.47%	0.70%
Leslie Co	-	-	2.50%	-0.87%	-0.95%	-0.25%	-0.44%	-0.43%	-0.45%	-0.46%	-0.39%

Traffic Station Map



**Bridge Replacement on US 421
 at MP 15.2 over Stinnet Creek
 Item #11-1078.00**

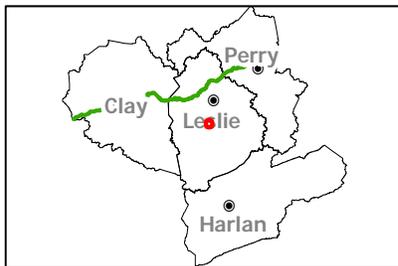
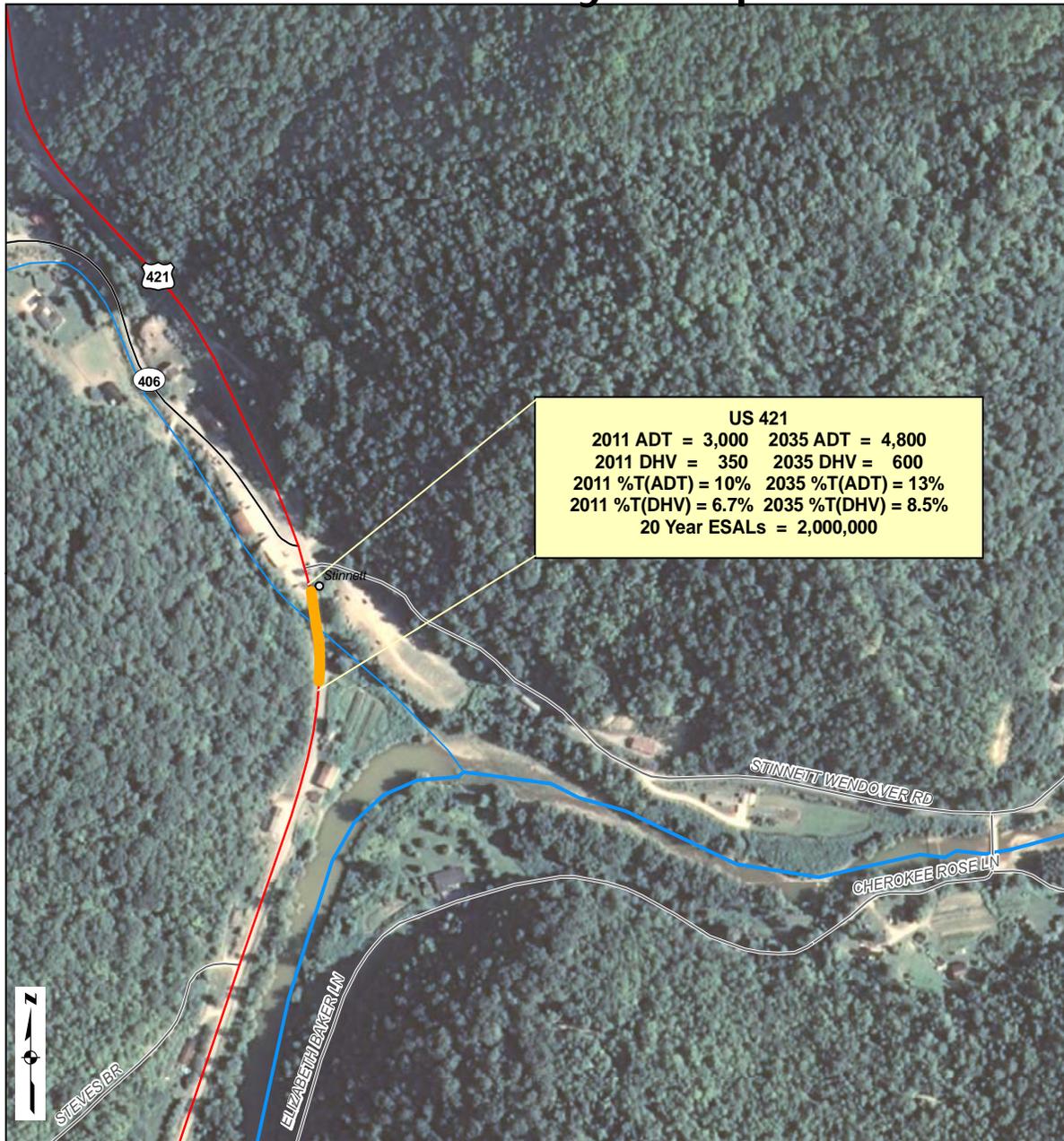


Legend

Project Location

0 0.375 0.75 1.5 Miles

Summary Map



Bridge Replacement on US 421
 at MP 15.2 over Stinnet Creek
 Item #11-1078.00



Legend

Project Location

*Traffic Forecast Technical Report
 Leslie County: Bridge Replacement On US 421 Over Stinnet Creek
 Item No. 11-1078.00*

FORECAST OF EQUIVALENT SINGLE AXLE LOAD ACCUMULATIONS (20-year)

ROUTE ID:

County	Leslie	Date	02/11/11
Road Name	US 421	Forecaster	Jonathan Reynolds, PE
Functional Class	6 - Rural Minor Arterial	MARS No.	8442101D
Project Description	Bridge Replacement US 421 Over Stinnet Creek	Item No.	11-1078.00
Scenario	Build	Route No.	US 421
Segment Description	Bridge Replacement US 421 Over Stinnet Creek	Beg. MP	15.137
		End MP	15.177
		T.F. No.	10.035
		No. of Lanes	2
		1 or 2 way	2

REFERENCES:

Previous Forecasts	0	K- Factor Value	11.7%
Traffic Volume	066501	K-Factor Source	066501
Milepoint	14.9	PHF	0.9
Truck Percent	066501	Full Route Unique Identifier	066-US-0421 -000
Milepoint	14.9		
ESAL Information	2007 Aggregated ESALS		
Growth Rate	2.00%		

TRAFFIC PARAMETERS:

	Present Year	Growth Rate	Construction Year	Median Year	Design Year
	2011		2015	2025	2035
Volume (AADT)	3000	2.00%	3200	4000	4800
Percent Trucks (%T)	10.0%	1.0%	10%	11%	13%
Number of Trucks	300	3.0%	320	440	620
Percent Trucks Hauling Coal (%CT)	0%	-3.0%	0%	0%	0%
<i>Non-Coal Trucks:</i>					
Axles/Truck (A/T)	3.400	0.00%	3.400	3.400	3.400
ESALs/Axle (ESAL/A)	0.260	1.60%	0.277	0.325	0.381
<i>Coal Trucks:</i>					
Axles/Truck (A/CT)	5.123	0.00%	5.123	5.123	5.123
ESALs/Axle (ESAL/CA)	3.3	0.00%	3.300	3.300	3.300

ESAL CALCULATIONS: SEE ATTACHED ESAL CALCULATION SHEET

Design ESALs in Critical Lane 2,000,000

General Comments:

Traffic Forecast Technical Report
 Leslie County: Bridge Replacement On US 421 Over Stinnet Creek
 Item No. 11-1078.00

Year	ADT	Car %	Truck %	Cars	Trucks	CT%	AX/T	ESAL/AX	AX/CT	ESAL/CA	LDF	ESALS
2015	3,247	89.6%	10.4%	2909	338	0.15%	3.40	0.28	5.123	3.3	0.500	62,201
2016	3,312	89.5%	10.5%	2964	348	0.14%	3.40	0.28	5.123	3.3	0.500	64,961
2017	3,378	89.4%	10.6%	3020	359	0.14%	3.40	0.29	5.123	3.3	0.500	67,849
2018	3,446	89.3%	10.7%	3077	369	0.14%	3.40	0.29	5.123	3.3	0.500	70,870
2019	3,515	89.2%	10.8%	3134	381	0.13%	3.40	0.30	5.123	3.3	0.500	74,031
2020	3,585	89.1%	10.9%	3193	392	0.13%	3.40	0.30	5.123	3.3	0.500	77,338
2021	3,657	89.0%	11.0%	3253	404	0.12%	3.40	0.30	5.123	3.3	0.500	80,798
2022	3,730	88.8%	11.2%	3314	416	0.12%	3.40	0.31	5.123	3.3	0.500	84,418
2023	3,805	88.7%	11.3%	3376	429	0.12%	3.40	0.31	5.123	3.3	0.500	88,205
2024	3,881	88.6%	11.4%	3439	442	0.11%	3.40	0.32	5.123	3.3	0.500	92,168
2025	3,958	88.5%	11.5%	3503	455	0.11%	3.40	0.32	5.123	3.3	0.500	96,314
2026	4,038	88.4%	11.6%	3569	469	0.11%	3.40	0.33	5.123	3.3	0.500	100,651
2027	4,118	88.3%	11.7%	3635	483	0.10%	3.40	0.34	5.123	3.3	0.500	105,190
2028	4,201	88.2%	11.8%	3703	497	0.10%	3.40	0.34	5.123	3.3	0.500	109,939
2029	4,285	88.0%	12.0%	3772	513	0.10%	3.40	0.35	5.123	3.3	0.500	114,907
2030	4,370	87.9%	12.1%	3842	528	0.09%	3.40	0.35	5.123	3.3	0.500	120,106
2031	4,458	87.8%	12.2%	3914	544	0.09%	3.40	0.36	5.123	3.3	0.500	125,546
2032	4,547	87.7%	12.3%	3987	560	0.09%	3.40	0.36	5.123	3.3	0.500	131,238
2033	4,638	87.6%	12.4%	4061	577	0.09%	3.40	0.37	5.123	3.3	0.500	137,194
2034	4,731	87.4%	12.6%	4136	595	0.08%	3.40	0.37	5.123	3.3	0.500	143,426
2035	4,825	87.3%	12.7%	4213	613	0.08%	3.40	0.38	5.123	3.3	0.500	149,947

5-yr ESALS
400,000

10-yr ESALS
800,000

15-yr ESALS
1,300,000

20-yr ESALS
2,000,000

Appendix C

-Collision Data-

MASTER FILE NUMBER	ROADWAY #	ROADWAY NAME	MP	DATE	TIME	UNITS	KILLED	INJURED	WEATHER	CONDITION	MANNER OF COLLISION	ROADWAY CHARACTER	LIGHT CONDITION
70599133	US0421	KY421	14.94	01-Aug-08	1030	2	0	2	CLEAR	DRY	ANGLE	STRAIGHT & LEVEL	DAYLIGHT
70802028	US0421	KY421	15.15	30-Dec-09	2225	2	1	0	RAINING	WET	SINGLE VEHICLE	CURVE & LEVEL	DARK-HWY LIGHTED/OFF
70901171	US0421	KY421	15.19	03-Sep-10	1815	2	0	3	CLEAR	DRY	OPPOSING LEFT TURN	STRAIGHT & GRADE	DAYLIGHT
70740143	US0421	KY421	15.3	04-Aug-09	1550	1	0	3	CLOUDY	WET	SINGLE VEHICLE	CURVE & GRADE	DAYLIGHT
70560045	US0421	KY421	15.57	27-Apr-08	1418	2	0	0	RAINING	WET	REAR END	STRAIGHT & HILLCREST	DAYLIGHT
70860555	US0421	KY421	15.6	04-Jun-10	0001	1	0	0	CLOUDY	DRY	SINGLE VEHICLE	CURVE & HILLCREST	DARK-HWY NOT LIGHTED
70757253	US0421	KY421	15.74	25-Sep-09	2215	2	0	0	CLOUDY	WET	HEAD ON	CURVE & GRADE	DARK-HWY NOT LIGHTED
70965779	US0421	KY421	16.73	09-Feb-11	1821	1	0	0	BLOWING SAND/SOIL/DIRT/SNOW	SNOW/SLUSH	SINGLE VEHICLE	CURVE & GRADE	DARK-HWY NOT LIGHTED
70664374	US0421	KY421	16.74	03-Feb-09	1530	1	0	3	SNOWING	ICE	SINGLE VEHICLE	CURVE & LEVEL	DAYLIGHT

Appendix D
-KYTC Common
Geometric Practice
Guidelines-

**COMMON GEOMETRIC PRACTICES
RURAL ARTERIAL ROADS (OTHER THAN FREEWAYS) ④**

		TRAFFIC VOLUME										
		UNDER 400 A.D.T.			400-1500 A.D.T.			1500-2000 A.D.T.			OVER 2000 A.D.T.	
DESIGN SPEED ⑥		40-50 M.P.H.			40-70 M.P.H.			40-70 M.P.H.			40-70 M.P.H.	
PAVEMENT WIDTH (FEET)	40 MPH	22			22			22			24	
	45 MPH											
	50 MPH											
	55 MPH	24			24			24				
	60 MPH											
	65 MPH											
70 MPH												
MINIMUM GRADED SHOULDER WIDTH (FT) ⑤	ALL SPEEDS	4			6			6			8	
MINIMUM CLEAR ROADWAY WIDTH OF NEW AND RECONSTRUCTED BRIDGES	ALL SPEEDS	APPROACH ROADWAY WIDTH ①										
MINIMUM RADIUS (FEET)	DESIGN SPEED	eMAX. 4%			eMAX. 6%			eMAX. 8%				
	30 MPH	300			275			250				
	35 MPH	420			380			350				
	40 MPH	565			510			465				
	45 MPH	730			660			600				
	50 MPH	930			835			760				
	55 MPH	1190			1065			965				
	60 MPH	1505			1340			1205				
	65 MPH	—			1680			1485				
	70 MPH	—			2050			1820				
NORMAL PAVEMENT CROSS SLOPES ③	RATE OF CROSS SLOPE = 2%											
NORMAL SHOULDER CROSS SLOPES	EARTH = 8%						PAVED = 4%					
MAXIMUM GRADE (PERCENT)	M.P.H.	30	35	40	45	50	55	60	65	70	75	80
	LEVEL	-	-	5	-	4	-	-	3	-	-	-
	ROLLING	-	-	6	-	5	-	-	4	-	-	-
MINIMUM STOPPING SIGHT DISTANCE ①	MOUNTAIN	-	-	8	7	6	-	-	5	-	-	-
	(FEET)	200	250	305	360	425	495	570	645	730	820	910
MINIMUM PASSING SIGHT DISTANCE ②	(FEET)	1090	1280	1470	1625	1835	1985	2135	2285	2480	2580	2680

- ① MINIMUM STOPPING SIGHT DISTANCES ARE BASED ON HEIGHT OF EYE OF 3.5 FT AND HEIGHT OF OBJECT OF 2.0FT. BOTH HORIZONTAL AND VERTICAL ALIGNMENTS ARE CONSIDERED.
- ② MINIMUM PASSING SIGHT DISTANCES ARE BASED ON HEIGHT OF EYE 3.5 FT AND HEIGHT OF OBJECT OF 3.5 FT. BOTH HORIZONTAL AND VERTICAL ALIGNMENTS ARE CONSIDERED.
- ③ NORMAL PAVEMENT CROSS SLOPES ON BRIDGES SHALL BE 2%.
- ④ FOR GUIDANCE ON FREEWAYS, REFER TO AASHTO, "A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS", CURRENT EDITION.
- ⑤ WIDEN 3 FT FOR GUARDRAIL.
- ⑥ JUSTIFICATION FOR A DESIGN SPEED LESS THAN THE REGULATORY OR POSTED SPEED MUST BE DOCUMENTED AND AVAILABLE FOR REVIEW IN THE PROJECT FILES.

Appendix E
-Existing Roadway
Plans-

LESLIE

EQUATION OF STATE
1967-73

EQUATION OF STATE
1974-75

EQUATION OF STATE
1976-77

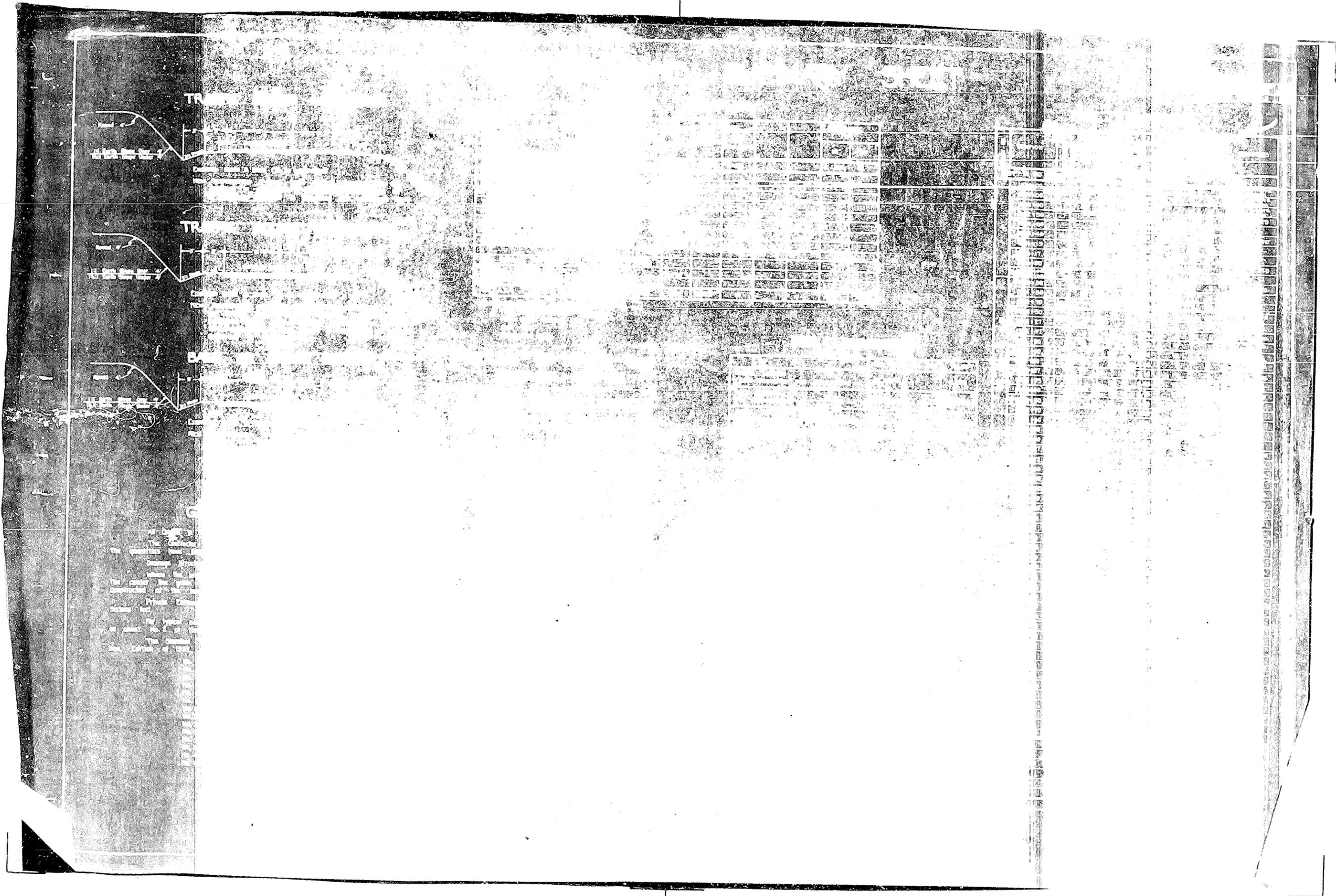
EQUATION OF STATE
1978-79

AS
BUILT

AS BUILT

1. 1967-73
 2. 1974-75
 3. 1976-77
 4. 1978-79

FR 114 B-GS
 LESLIE
 Harlan-Hyden
 G4D-Gravel



SUMMARY OF QUANTITIES

LESLIE CO.-FR 114 B-GS

2A

GENERAL SUMMARY

SHEET NO	STATION TO STATION	CLEARING AND GRUBBING	EXCAVATION UNCLASSIFIED		CONCRETE		FINAL DRESSING	SPRING BOX	PIPE 18" CL.C.M. ENTRANCE	
			ROWAY & DRAINAGE	STRUCT	CLASS A	CLASS B				STA.
UNIT	ACRE	CU YD	CU YD	CU YD	CU YD	CU YD			LIN FT	
4	1270+00 - 1299+30	569	20595							
5	1299+30 - 1326+85	674	27950							
6	1326+85 - 1359+75	676	52617							
7	1359+75 - 1395+00	891	50334							
8	1395+00 - 1421+50	597	31093							
9	1421+50 - 1455+00	707	33154							
10	1455+00 - 1481+55	804	32368							
11	1481+55 - 1500+00	399	13520							
FROM CULVERT SUMMARY			664	603.61						
FROM PIPE SUMMARY			783	198.82						
TOTALS			5317	261431	1447	802.43	225.06	1	248	40
BOOK NUMBER			1						6	6
PAGE NUMBER			43				74	40	78	77

FOR SURFACING

	LIN. FT.	SQ. YDS	MILES
GROSS LENGTH	225060		
DEDUCTED FOR EQUATIONS			
NET LENGTH	225060	450120	4.262
NO DEDUCTIONS			
ADDED FOR CURVE WIDENING		25350	
TOTAL SURFACING		475470	

PIPE SUMMARY

SHEET NO	STATION	PIPE SKEW	PIPE 18" CL. R.C.	CONCRETE CLASS	EXCAV STRUCT UNCL	REMARKS	TYPE	HDWL	BOOK	PAGE	
											LIN FT
	1274+50	39	405	5	1EII-1Std-1Anchor	4			4	1	
	1276+68	39	302	4	2 Std	4			4	2	
	1277+75	48	314	7	1EII-1Std	4			4	3	
	1282+00	33	416	20	1 " 1 "	4			4	4	
	1287+036	36	400	6	2 Std	4			4	5	
4	1289+93	39	400	6	2 "	4			4	7	
	1293+46	27	314	10	1EII-1Std	4			4	8	
	1295+05	30	314	12	1 " 1 "	4			4	10	
	1296+61	75	400	16	2 Std	4			4	11	
	1299+07	90	393	18	2 Std-1Anchor	4			4	12	
	1300+79	30	416	16	1EII-1Std	4			4	13	
	1302+70	30	416	18	1 " 1 "	4			4	15	
	1305+50	36	400	25	2 Std	4			4	16	
	1309+27	33	314	12	1EII-1Std	4			4	19	
5	1312+47	60	400	17	2 Std	4			4	20	
	1315+83	75	400	22	2 "	4			4	21	
	1320+35	54	400	26	2 "	4			4	22	
	1321+50	48	400	13	2 "	4			4	23	
	1339+95	30	470	21	1EII-1Rsd	4			4	29	
	1344+00	33	416	22	1EII-1Std	4			4	30	
6	1347+50	96	349	41	1 " 1 "	4			4	31	
	1353+792	30	416	19	1 " 1 "	4			4	32	
	1360+08	30	314	12	1 " 1 "	4			4	35	
	1362+50	30	416	21	1 " 1 "	4			4	36	
	1375+50	42	261	12	1 " 1 "	4			4	39	
	1375+97	12	045	2	1Spr-Bar-1Anchor	4			4	40	
7	1375+87	45	302	6	2 Std	4			4	43	
	1386+45	30	400	9	2 "	4			4	44	
	1391+50	36	314	11	1EII-1Std	4			4	45	
	1394+50	48	314	15	1 " 1 "	4			4	46	
	1399+00	36	314	18	1 " 1 "	4			4	47	
	1403+00	33	314	13	1 " 1 "	4			4	48	
	1405+70	42	314	11	1 " 1 "	4			4	49	
8	1408+7	30	314	11	1 " 1 "	4			4	50	
	1418+30	36	314	14	1 " 1 "	4			4	53	
	1420+65	30	314	14	1 " 1 "	4			4	54	
	1423+00	30	314	9	1 " 1 "	4			4	55	
	1424+80	63	302	7	2 Std	4			4	56	
	1425+97	48	302	13	2 "	4			4	57	
	1430+12	33	261	13	1EII-1Std	4			4	58	
	1434+50	39	314	10	1 " 1 "	4			4	59	
9	1437+81	30	314	12	1 " 1 "	4			4	60	
	1438+90	42	470	17	1 " 1 Rsd	4			4	61	
	1443+00	48	393	4	2 Std-1Anchor	4			4	62	
	1448+20	30	314	13	1EII-1Std	4			4	65	
	1454+35	42	314	10	1 " 1 "	4			4	66	
	1457+89	30	314	16	1 " 1 "	4			4	67	
	1460+99	54	365	8	1EII-1Std-1Anchor	4			4	68	
10	1464+00	54	344	19	2 Std	4			4	69	
	1467+35	45	353	10	2 " 1 "	4			4	70	
	1480+00	63	533	9	2 " 1 "	5			5	5	
	1483+51	45	314	14	1EII-1Std	5			5	6	
	1485+50	48	314	13	1 " 1 "	5			5	7	
11	1489+50	36	314	3	1 " 1 "	5			5	8	
	1492+00	33	314	16	1 " 1 "	5			5	9	
	1494+98	42	314	8	1 " 1 "	5			5	10	
	1499+30	57	400	24	2 Std	5			5	11	
TOTALS			1476	927	198.82						

BRIDGE SUMMARY

SHEET NO	STATION	SIZE	SKEW	CONCRETE CLASS	STEEL REINFORCEMENT	EXCAV UNCL	ELEVATIONS			DWG NO	STD OR SPCL	BOOK	PAGE	
							GRADE	INLET	OUTLET					
UNIT	CU YD	LB	CU YD											
5	1326+00	100' 12" x 12" x 92'	45°	49170	58030	237	94.59	8913	8906	7132	Spcl	4	24	
9	1445+20	100' 8" x 8" x 88'	45°	25980	28320	198	10079	9905	9871	7155	"	4	63	
STEEL TO REPLACE TEST BARS					331							5	15	
TOTALS				75150	86681	435								

SURFACING QUANTITIES CREEK GRAVEL

UNIT	QUANTITY			
	FOR ROADWAY	FOR ENTRANCE	FOR BRIDGES	
CREEK GRAVEL	TONS	11063.02	405.90	33.06

CULVERT SUMMARY

SHEET NO	STATION	SIZE	SKEW	CONCRETE CLASS	STEEL REINFORCEMENT	EXCAV UNCL	ELEVATIONS			DWG NO	STD OR SPCL	BOOK	PAGE	
							GRADE	INLET	OUTLET					
UNIT	CU YD	LB	CU YD											
4	1291+21	3' x 3' x 50'		2294	2273	34	906.43	898.2	892.9	C 11	Std	4	6	
5	1307+61	4' x 4' x 58'		3806	3054	49	915.70	903.0	897.5	C 20	"	4	17	
6	1335+86	2' x 2' x 31'		1375	1240	62	970.72	967.2	963.0	C 5	"	4	27	
6	1357+74	2' x 2' x 74'		2895	2703	59	1143.76	1135.6	1116.5	7133	Spcl	4	33	
7	1367+45	2' x 2' x 89'		3167	3213	64	1221.44	1202.2	1195.2	C 5	Std	4	37	
7	1378+20	10' x 8' x 129'	45°	31380	34570	214	1225.98	1196.7	1193.6	7134	Spcl	4	41	
8	1413+85	4' x 4' x 109'	30°	7100	7780	62	1146.75	1123.6	1114.0	7133	"	4	51	
10	1472+75	5' x 4' x 66'	30°	5000	4090	64	961.61	950.0	941.5	C 30	Std	5	1	
10	1473+57	2' x 2' x 75'		2744	2171	56	962.74	945.8	941.8	C 5	"	5	3	
STEEL TO REPLACE TEST BARS					222							5	16	
TOTALS				603.61	618.82	664								

EQUATION
1380.516-DMS
305.141.541

Emil Morgan (1902)
Walter
Gordon
M.L.L. (1902)

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PROPOSED LINE
C 6000
F 4000
R 7000
M 8000
A 9000
L 10000
S 11000
D 12000

Emil Morgan

ERIN HAROLD
(M.D.)
MRS. MARVIN SHELL
(M.D.)
TAMMARA WILSON
(M.D.)
MRS. POLLY WILSON
(M.D.)

WALTER J. TURNER
(M.D.)
WALTER J. TURNER
(M.D.)

WALTER J. TURNER
(M.D.)

Sta 1426+00.0
Begin Revision

EQUATION
STA 1429+710.5x
STA 1435+704.7nd
End Revision

12

STA 1500+00 END
FR 114 B-G9

ELINO MOLEY

FM CONSTRUCTION
and in the vicinity of
the proposed
roadway



Table with multiple columns and rows of data, likely a schedule of values or project details. The text is very small and difficult to read.

Appendix F
- FIRM Maps of Study
Area -

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Kentucky State Plane (FIPZONE 1600). The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic

LEGEND



SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A** No Base Flood Elevations determined.
- ZONE AE** Base Flood Elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AR** Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.



FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.



OTHER FLOOD AREAS

- ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.



OTHER AREAS

- ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.
- ZONE D** Areas in which flood hazards are undetermined, but possible.



COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS



OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov/> or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov/>.

Base map Information shown on this FIRM was derived from the U.S.D.A Farm Service Agency National Imagery Program (NAIP) produced at a scale of 1:12,000 from photography dated 2004 or later.

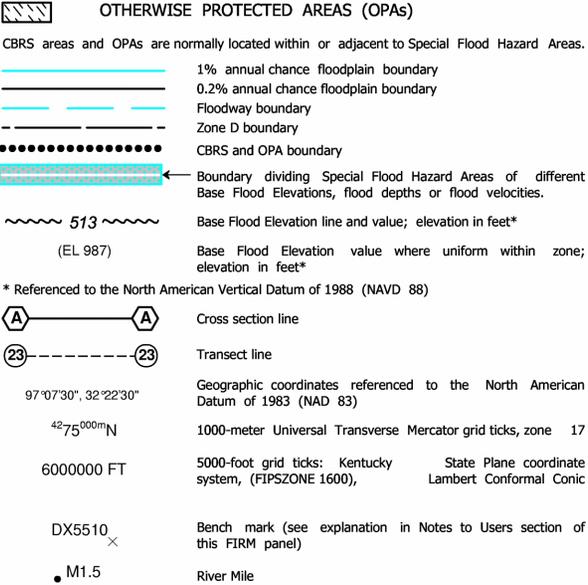
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the *Flood Insurance Study report (which contains authoritative hydraulic data)* may reflect stream channel distances that differ from what is shown on this map.

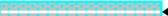
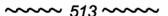
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

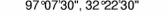
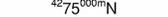
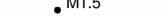
Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a *Flood Insurance Study report*, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at <http://www.msc.fema.gov/>.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov/>.

 **OTHERWISE PROTECTED AREAS (OPAs)**
CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

-  1% annual chance floodplain boundary
-  0.2% annual chance floodplain boundary
-  Floodway boundary
-  Zone D boundary
-  CBRS and OPA boundary
-  Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
-  Base Flood Elevation line and value; elevation in feet*
-  Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

-  Cross section line
-  Transect line
-  Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
-  1000-meter Universal Transverse Mercator grid ticks, zone 17
-  5000-foot grid ticks: Kentucky State Plane coordinate system, (FIPSZONE 1600), Lambert Conformal Conic
-  Bench mark (see explanation in Notes to Users section of this FIRM panel)
-  River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

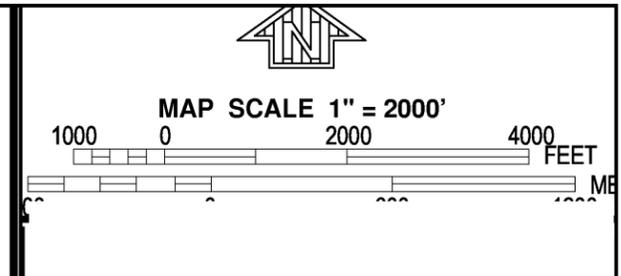
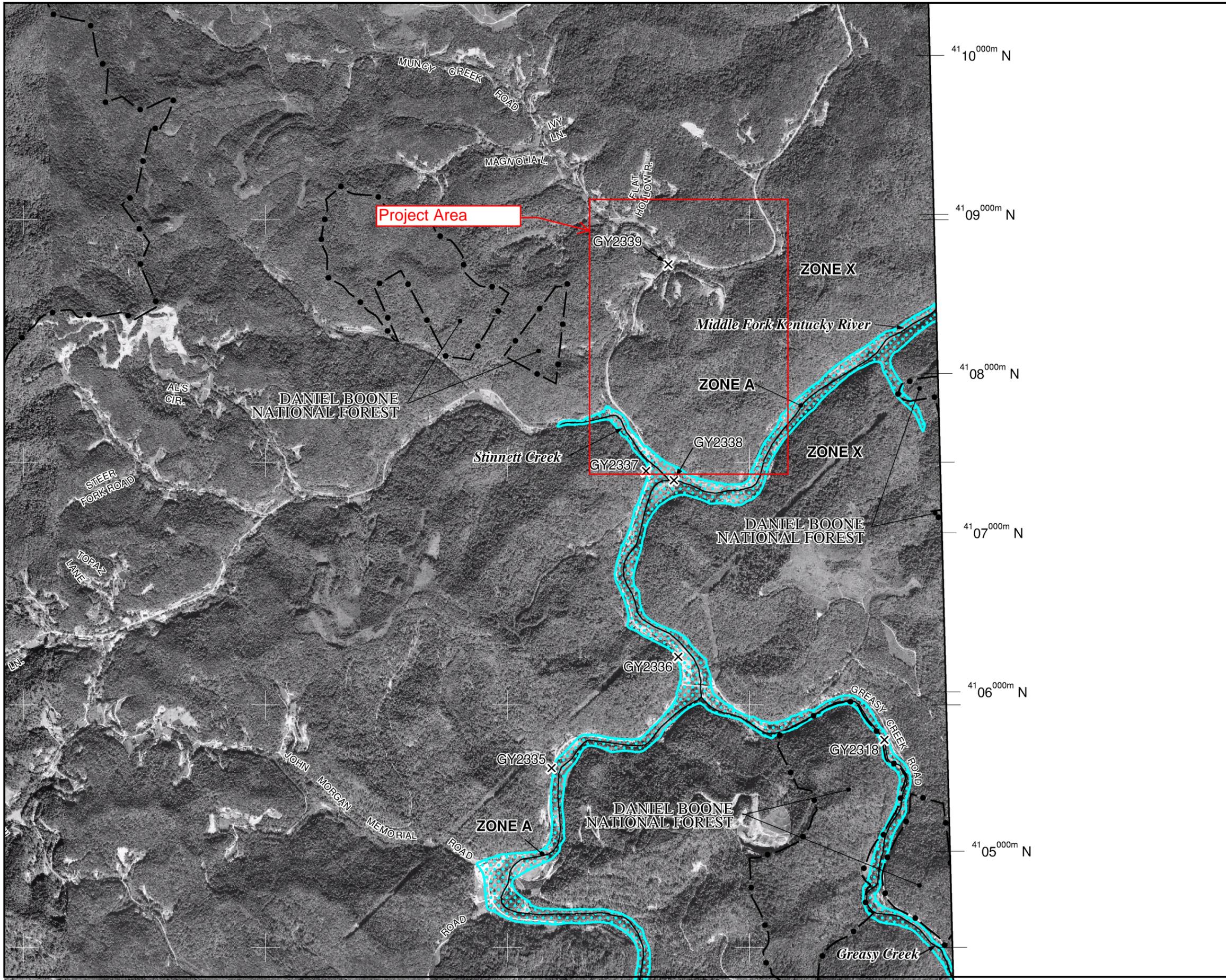
EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
September 28, 2007
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.



This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



NFIP

PANEL 0200D

FIRM
FLOOD INSURANCE RATE MAP
LESLIE COUNTY,
KENTUCKY
AND INCORPORATED AREAS

PANEL 200 OF 350
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LESLIE COUNTY	210324	0200	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
21131C0200D

EFFECTIVE DATE
SEPTEMBER 28, 2007

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Appendix G
-Photographs -

