

April 13, 2011



DNA: Data Needs Analysis

Leslie County US 421 over Stinnett Creek Item Number 11-1078.00



Kentucky Transportation Cabinet

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I. INTRODUCTION

This study is a Data Needs Analysis (DNA) of a bridge replacement project on the double barrel box culvert near Stinnett Creek on US 421 around 15.158 MP in Leslie County, Item Number 11-1078.00.

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 south of KY 406 near Stinnett Creek with project limits extending from south of the culvert over Stinnett Creek (MP 15.1) to the intersection of KY 406 (MP 15.22) in Leslie County (See **Figure 1** and Exhibit 1 in **Appendix A**). The project includes a double 12'x12' barrel box concrete culvert, and an intersection with KY 406. A topographic map of the study area, Exhibit 2, can also be viewed in **Appendix A**.

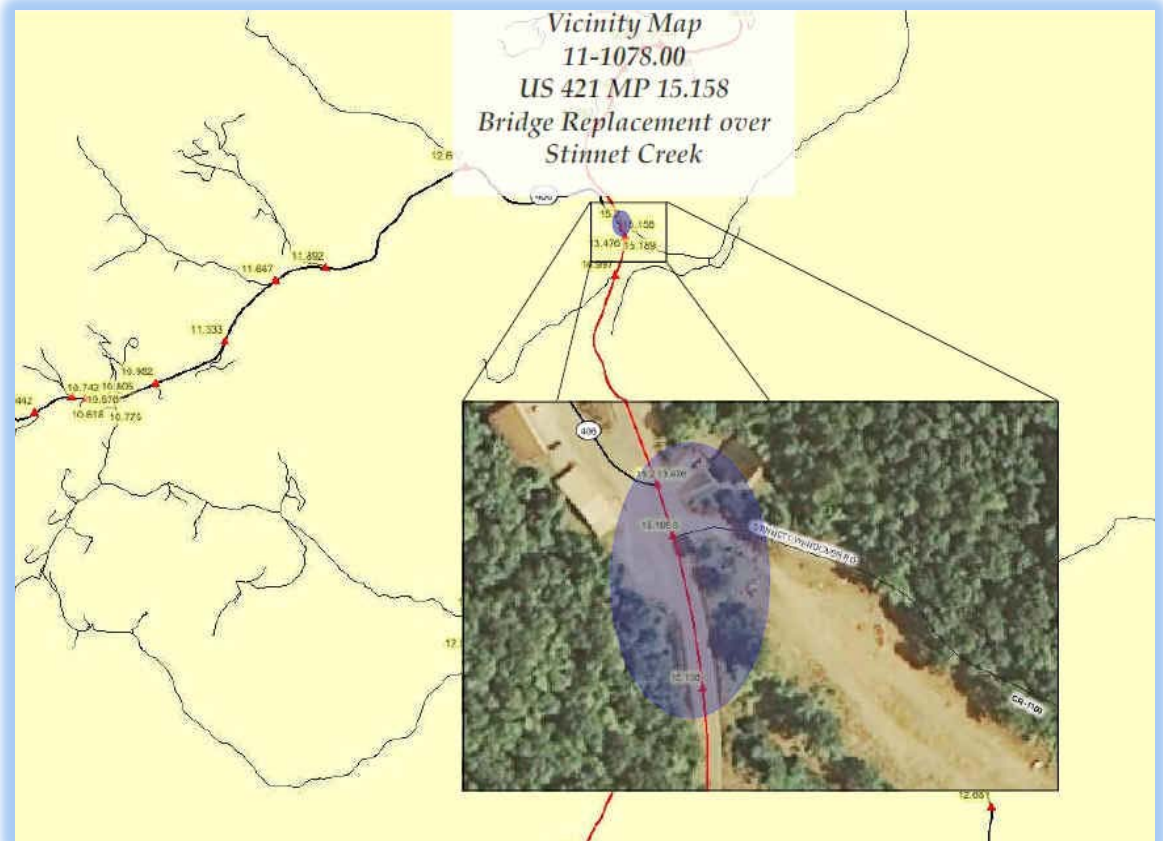


Figure 1: Vicinity Location Map

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 \$400,000 (BRO funds) was authorized in September 2010. The following is a description of the project as it is listed in the 2012 General Assembly's Enacted Roadway Plan.

- **Item #11-1078.00, Leslie County**

<u>Phase</u>	<u>Fund</u>	<u>Year</u>	<u>Estimate</u>
R:		2011	\$250,000
U:		2011	\$180,000
C:		2012	\$920,000

REPLACE BRIDGE AND APPROACHES ON US-421 OVER STINNETT CREEK (B08)
0.028 MILE SOUTH OF KY-406 NEAR STINNETT. (SR=26.0) (10CCR).

B. Project Status

Preliminary Design Plans are expected to be complete in 2011 for an alternative with the culvert shifting to the east of the existing location. Preliminary Design Plans are expected to be completed in 2011 for an alternative that moves the culvert to the west of the existing location. The existing geometry shall be utilized as a diversion for each alternate. There are currently no studies for this location to aid in the selection of an alternate. All of these proposed alignments can be viewed in Exhibit 3 in **Appendix A**. Design funds for this project were authorized in 2010.

C. System Linkage

The US 421 corridor is a major two-lane connection between US 119 and the Daniel Boone Parkway. KY 406 is a minor collector road that connects several small rural communities. (See **Figure 2** and Exhibit 4 in **Appendix A**).

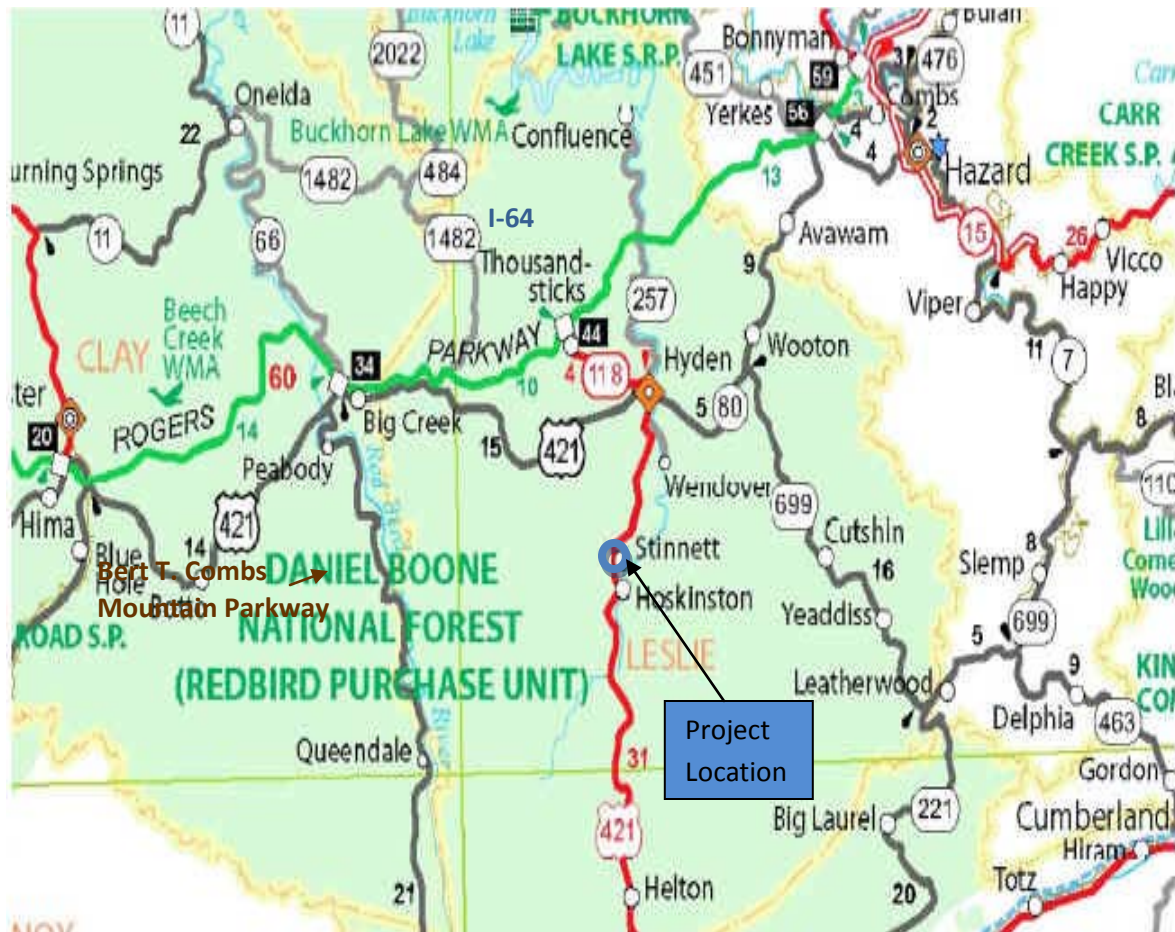


Figure 2: System Linkage Map

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 business places. US 421 connects major developments throughout the Southeastern Kentucky area, as well as provide connections to the Daniel Boone Parkway which provides further access to developed areas that are further east or west.

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 existing structure which is at MP 15.158. 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 ten year period from January 1, 2006 to December 31, 2010. There were 20 reported collisions in the project area during this five year period. Several of the collisions were located at the intersection with KY 406 and were collisions with property damage. No night/day or weather pattern could be determined. There was 1 fatality that occurred on this

segment of US 421 during the ten year analysis period near the project location. More detailed information on crash data in **Appendix D** if required.

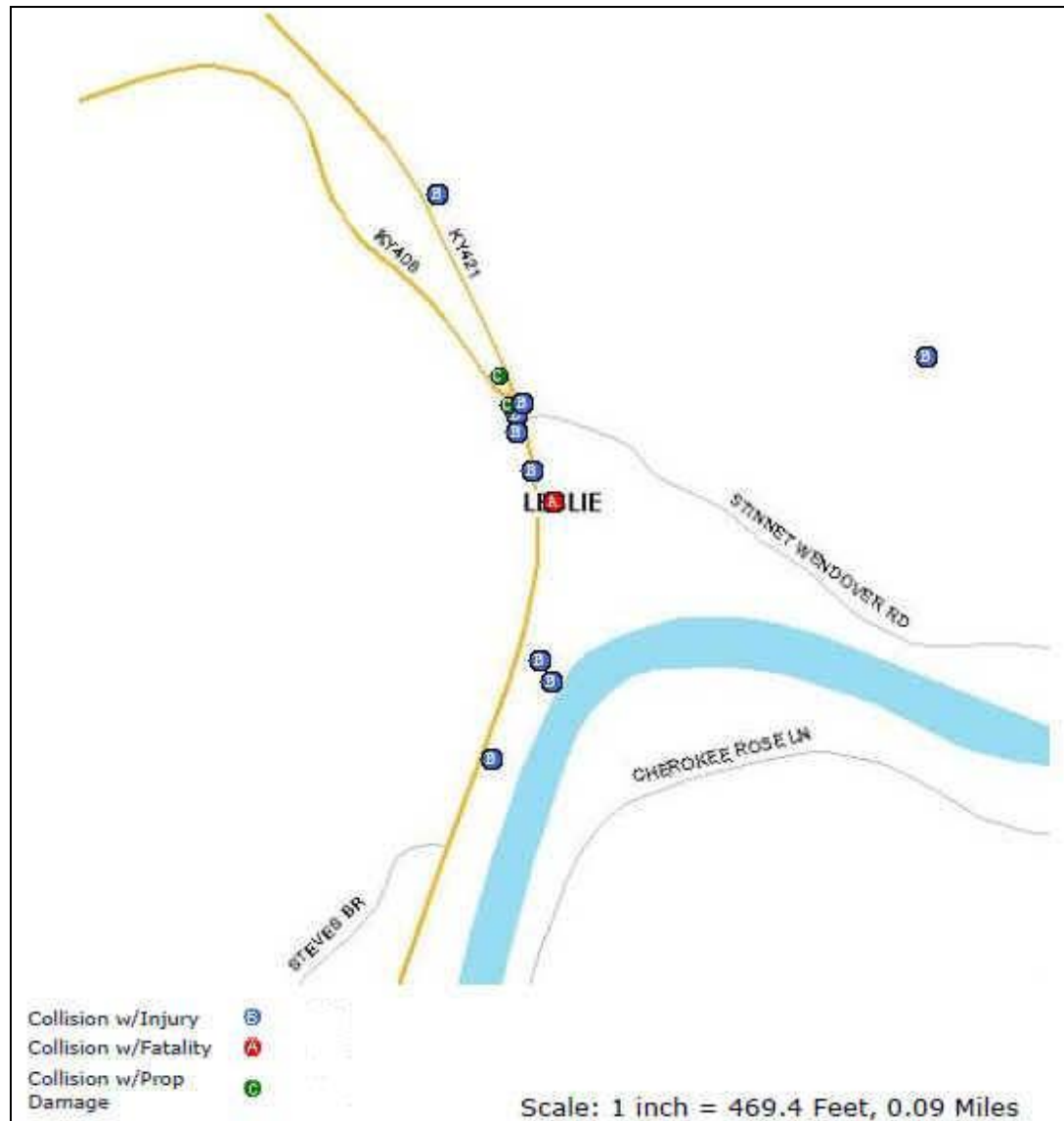


Figure 3: Collision Locations

H. Roadway Deficiencies

a. Mainline Geometrics

The roadway currently has 10-ft lanes, 2-ft shoulders, a maximum grade of 5.5%, 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 E**). The roadway

currently meets these recommendations except for the pavement width and shoulder width. 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. Existing roadway plans can be viewed in **Appendix F**).



Figure 4: Horizontal Curve south of KY 406

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 SR of 31.5 meaning that the structure has been declared structurally deficient. The Structure Inventory and Appraisal Sheets for each bridge can be viewed in **Appendix G**. The culvert over Stinnett Creek is not wide enough (21.0-ft curb to curb) to accommodate the recommended 8-ft shoulders. Currently there are several maintenance issues with the debris that collects at the wall separating the barrels of the culvert. Also noted was scouring at the inlet of the culvert creating a need for additional maintenance. The culvert over Stinnett Creek can be seen in **Figure 5** and **Figure 6** below.



Figure 5: Culvert over Stinnett Creek



Figure 6: 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 7**, is a picture taken near the horizontal curve.



Figure 7: KY 406 Site Distance



Figure 8: KY 406 Intersection

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 near the area of the outlet of the culvert. 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 H**.

III. PRELIMINARY ENVIRONMENTAL OVERVIEW

A. Air Quality

No new lanes or increased traffic will be associated with Air Quality will be controlled with good construction practices. The project area is listed as attainment for monitored air pollutants for this project.

B. Threatened and Endangered Species

This project will involve a bridge over Stinnett Creek in Leslie County Kentucky. The USGS Quadrangle is Hoskinston. The ecological impacts will occur 0.1 mile upstream to Middle Fork of the Kentucky River, listed as outstanding state resource water (OSRW) by Kentucky Division of Water. Small to medium sized trees are in the area. The stream bed is gravel and rock infused. 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 or wetlands impacted. USFWS has identified suitable habitat for threatened and endangered species in the project area. The current species listed for Leslie County is *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.

C. Hazardous Materials

There is no evidence to support UST/Hazmat issues on this project. No asbestos containing materials were discovered during inspection.

D. Historic Resources

Few structures were noted along the project corridor. Any structures at least 50 years of age meet the first screening requirement for the National Register of Historic Places. Possible cultural resource impacts will need to be explored further.

E. Noise

Be aware of advanced notification prior to demolition and removal of the bridge. Noise issues will be temporary and limited to those associated with construction activity.

F. Socioeconomic

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

G. Section 4(f) Resources

If residences or structures located nearby are ruled as eligible for the National Register of Historic Places, they could be afforded protection under Section 4(f). KYTC has options to mitigate and avoid impacts to section 4(f) resources including a programmatic agreement for mitigating historic bridges, or using 'de minimus' guidance for properties with minor strip takings.

H. Section 6(f) Resources

No apparent impacts.

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 5.5%. Other existing roadway information can be viewed in the roadway plans for US 421 in **Appendix F**. Additional pictures of the project site can be viewed in **Appendix I**.

Table 2: Existing Conditions and Data Summary

County:	<u>Leslie</u>	Road Name:	
Route Number(s):	<u>US 421</u>		
Item No.:	<u>11-1078.00</u>		
BMP:	<u>15.1</u>	EMP:	<u>15.22</u>
Project Length:	<u>0.12 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-BRO, R&U-SPB, C-SB2</u>		

Roadway Data:

	<u>Existing Conditions</u>	<u>Design Criteria*</u>
No. of Lanes	2	2
Lane Width	10 ft	24 ft
Shoulder Width	2 ft	8 ft
Minimum Radius	954.9 ft	1065 ft
Maximum Grade	5.50%	6%
		<i>* 55 MPH Design Speed</i>
Adequacy Rating %:	56.19	

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

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 NEPA documentation. Based upon the information presented in Section II of this report and discussion of the project team, the following Purpose and Need Statement was drafted for this project:

This project is necessary because of the structural deficiency of the existing culvert and the maintenance problems due to this culvert. In the project area the Average Daily Traffic is 2,920 and the existing culvert has a sufficiency rating of 31.5. Currently over Stinnett Creek is a 12'x12' concrete double barrel box culvert with considerable damage. Currently maintenance issues, aside from the damage, derive from the scour that has undermined the channel protection. Replacing this structure will not only improve the safety of the project area, it will alleviate maintenance of the structure. The intersection of US 421 and KY 406 has experienced a high number of collisions in this area as the sight distance is very short given the current geometry of the intersection. **This project will improve the safety and geometrics in this community by providing sufficient sight distance and a geometrically sufficient structure.**

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 yellow alignment in each Figure is a preliminary sketch of the alternate being discussed.

A. Alternate #1 - No Build

Increase maintenance activities in this project area to improve the structure to a structurally sufficient culvert, followed by routine maintenance to insure the safety of the structure.

B. Alternate #2 – Replacing the Culvert

The culvert will be replaced in the exact same location as the existing culvert as well as the same type and size of the existing culvert. This would minimize the acquisition of any additional Right Of Way required to replace the culvert to the recommended width. Widening this section of roadway will also increase the sight distance for the intersection of KY 406. This alternate will utilize the existing geometry of the horizontal curve to minimize the project length. The approach to KY 406 will be shifted to the north slightly to increase the sight distance; however, an additional property owner may be affected as the alignment may require the taking of a building. If this alternate is chosen, the existing maintenance issues could still be an issue unless extra measures are taken to prevent undercutting. A sketch of this alternative can be viewed in **Figure 10**.

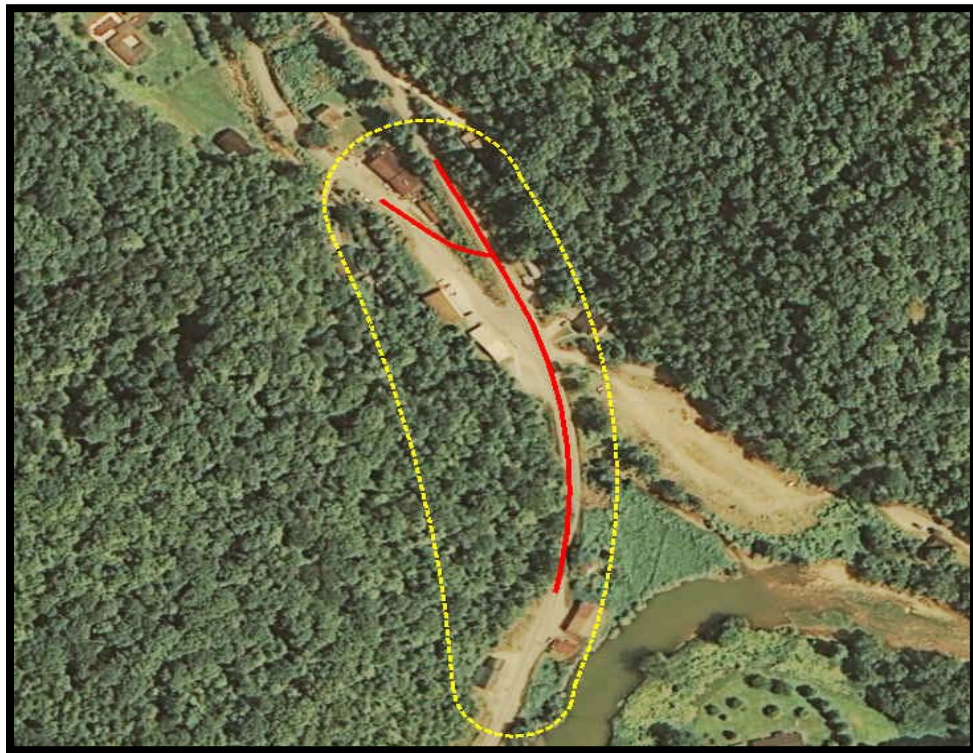


Figure 8: Alternate #2

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

<u>Phase</u>	<u>Estimate</u>
Right of Way	\$150,000
Utilities	\$180,000
Construction	<u>\$750,000</u>
	\$1,080,000

C. Alternate #3 – Replace Structure with a Bridge to the East

This alternate shifts the horizontal curve to the east. Since there isn't much development on the east side of the corridor, it makes it an ideal location to shift the alignment. The alignment should also be moved far enough to allow for the new roadway to act as a diversion as the existing structure is taken down. Also, the tangent section can be extended to allow the KY 406 intersection to be moved creating better sight distance. Replacing the existing structure with a bridge will increase the hydraulic conveyance as it would remove a pier-like structure which catches debris. Even though measures will be taken to minimize impacts this may cause issues with Right Of Way since additional property owners further to the south may be affected. It is possible that with the realignment of the intersection a building may need to be taken. Also, depending on the radius of the horizontal curve the building on the southern end of the project may be affected. A sketch of this alternate can be seen in **Figure 11**.

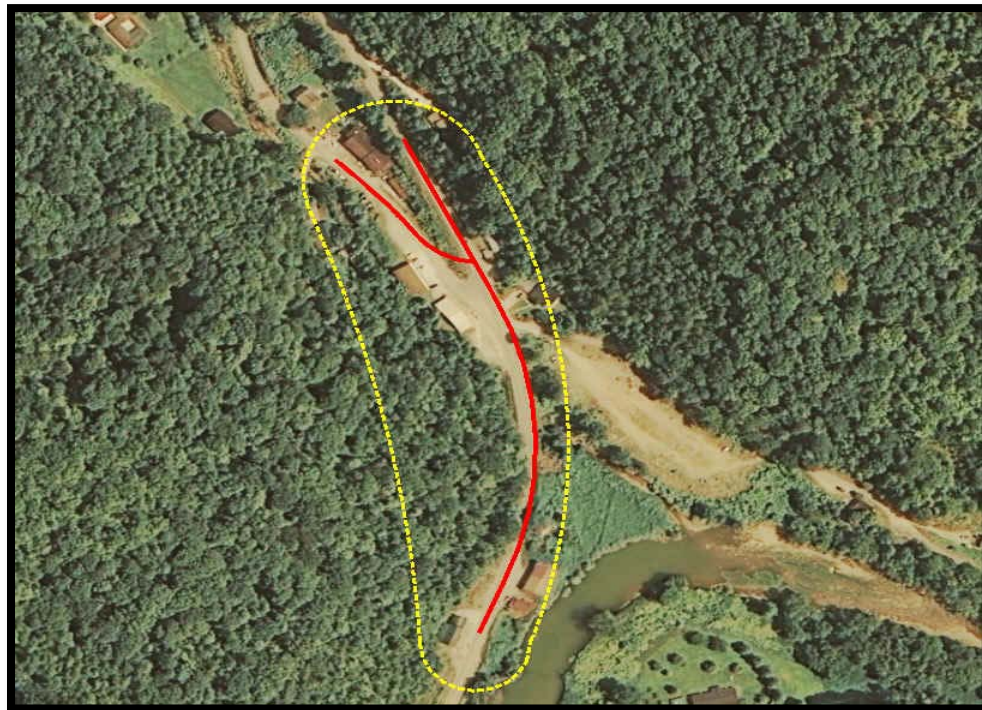


Figure 9: Alternate #3

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

<u>Phase</u>	<u>Estimate</u>
Right of Way	\$250,000
Utilities	\$180,000
Construction	<u>\$860,000</u>
	\$1,290,000

D. Alternate #4 – Replace Structure with a Bridge to the West

The topography to the west of the existing structure could be an issue as it would require additional work to cut the material back far enough to provide room for construction. However, if this alternate is chosen the geometry should be such that the existing corridor could be utilized as a diversion. With this new alignment the intersection should be moved to provide increased sight distance and better geometry for maneuvers. With the realignment of the intersection an additional property owner may be affected which may cause Right Of Way issues. A sketch of this alternate can be seen in **Figure 12**.

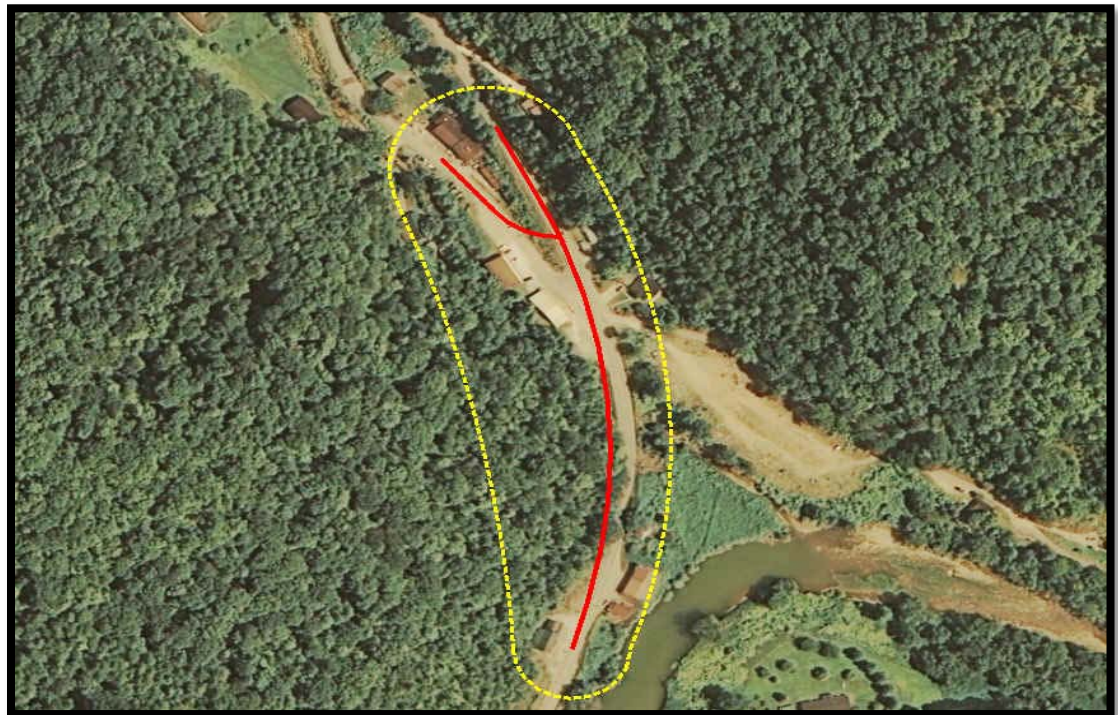


Figure 10: Alternate #4

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

<u>Phase</u>	<u>Estimate</u>
Right of Way	\$150,000
Utilities	\$180,000
Construction	<u>\$830,000</u>
	\$1,160,000

VII. SUMMARY

This study is a Data Needs Analysis (DNA) of a project located on US 421 over Stinnett Creek near the intersection of KY 406 in Leslie County, Item Number 11-1078.00, from a couple thousand feet south of the existing culvert over Stinnett Creek to north of the intersection of US 421 and KY 406. 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 horizontal curvature does not provide adequate sight distance for the geometry of the intersection of KY 406.
- The intersection of US 421 and KY 406 has a long history of multiple crashes dealing with property damage.
- The existing culvert has a SR of 31.5 which recommends the structure be replaced. There also are maintenance issues with undercutting of the culvert which could cause failure of the structure. Additional maintenance must also be performed to remove the large amount of debris that collects at the dividing wall of the culvert.

A double barrel culvert with a compromised structural integrity along with geometric deficiencies just north of a horizontal curve with short sight distance with an intersection nearby poses as a hazard to the traveling public. This project will improve the safety and geometrics in this community by providing sufficient sight distance and a geometrically sufficient structure.

Included in the alternates were a no build recommendation, three alternates for replacing the existing structure and realigning the intersection of US 421 and KY 406 with costs ranging from \$1.08M to \$1.29 million. All of these alternates are well within the money allocated to this project.

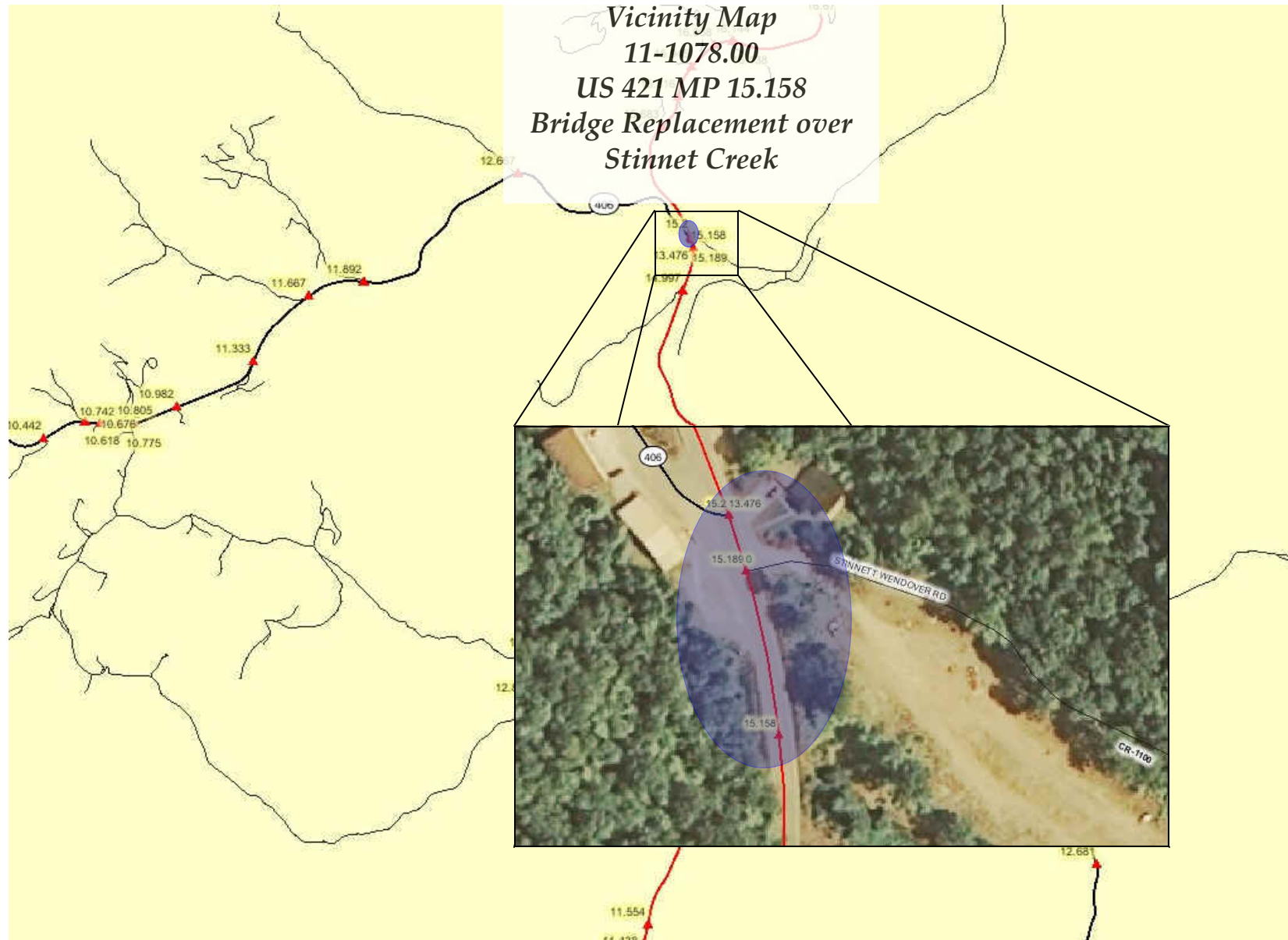
For more information regarding this study please contact:

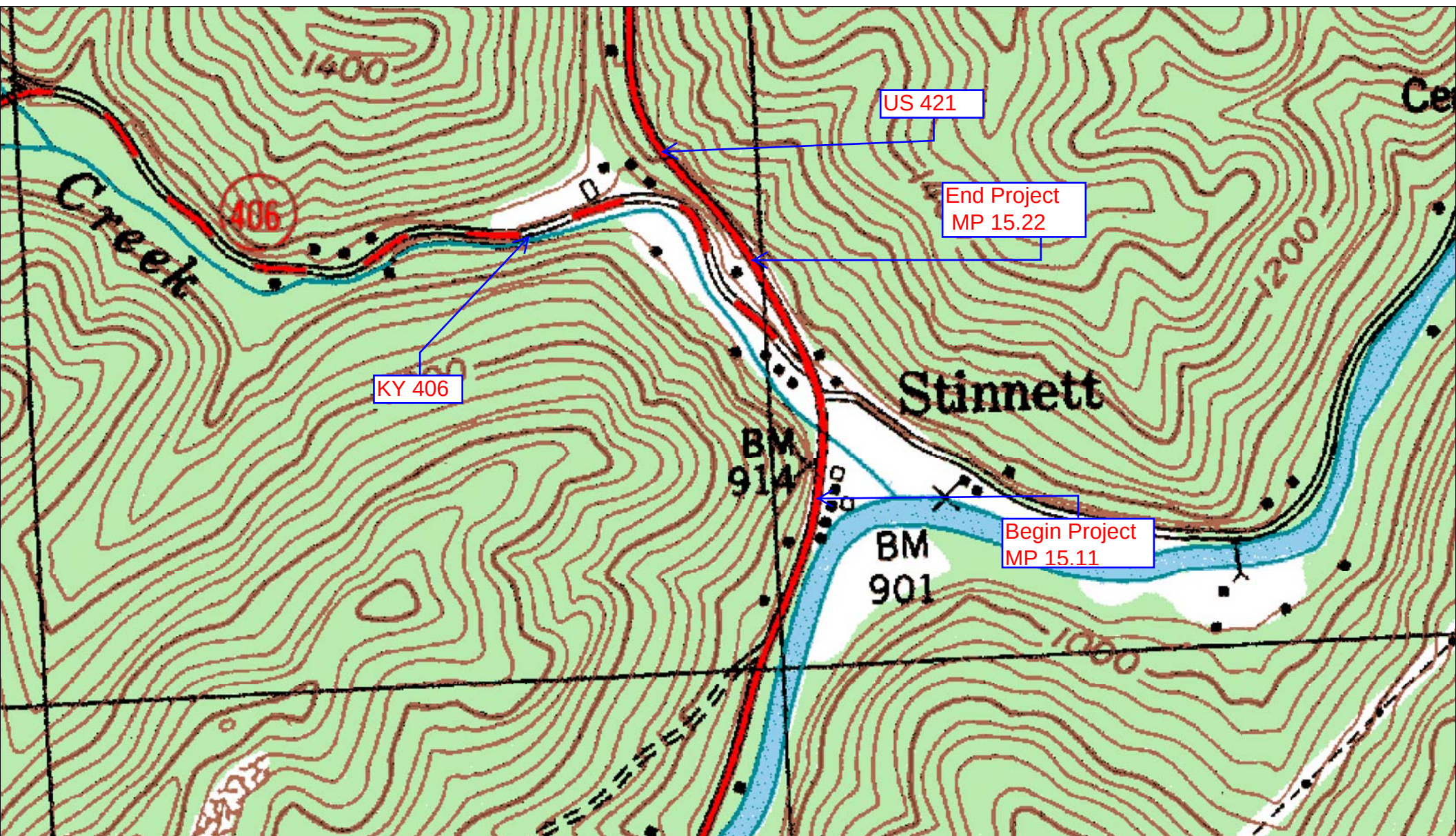
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Appendix A

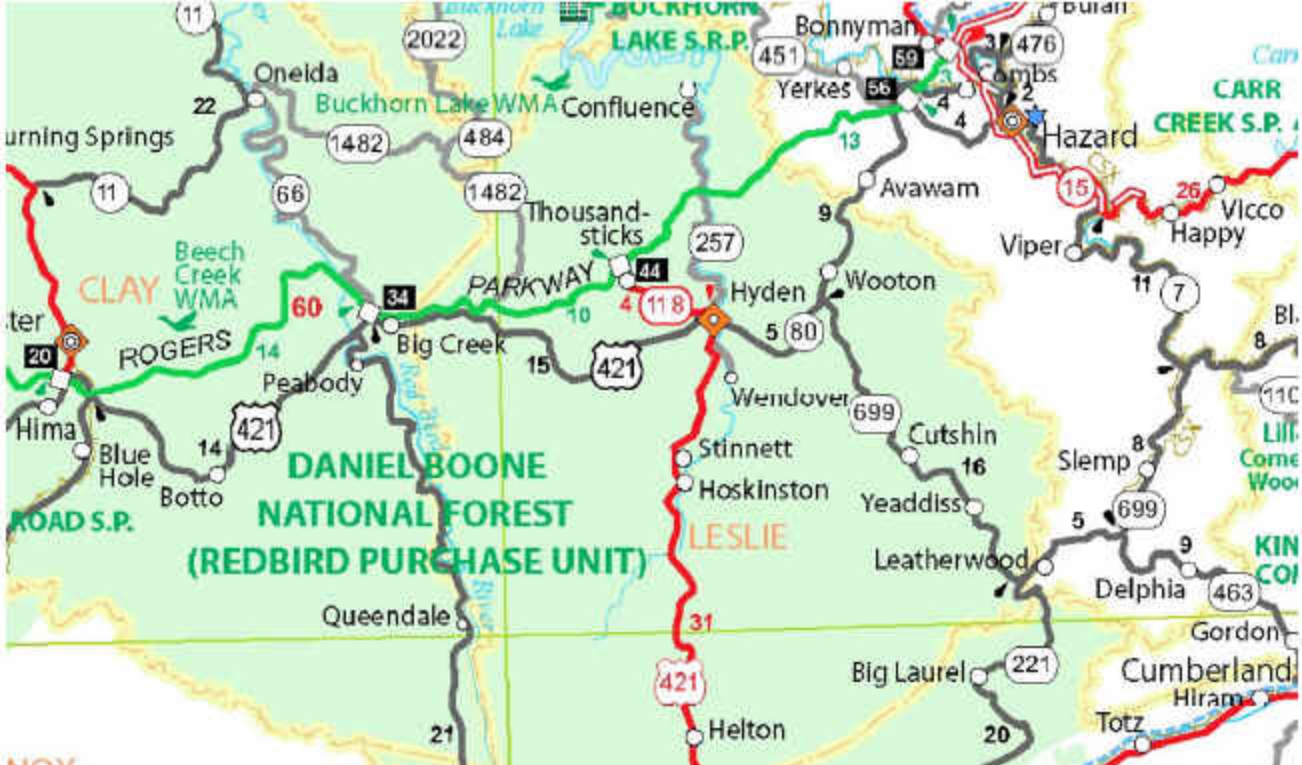
-Exhibits-

Vicinity Map
11-1078.00
US 421 MP 15.158
Bridge Replacement over
Stinnet Creek









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

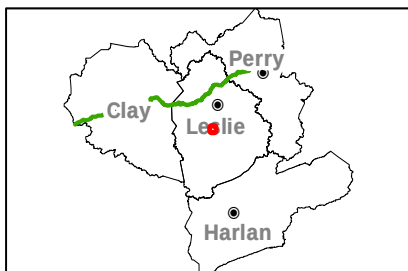
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Commonly Used Abbreviations and their Descriptions

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

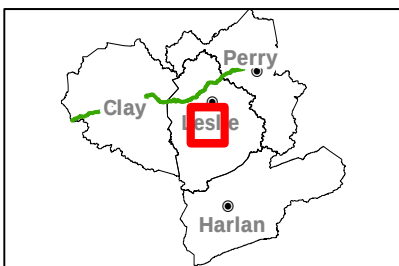
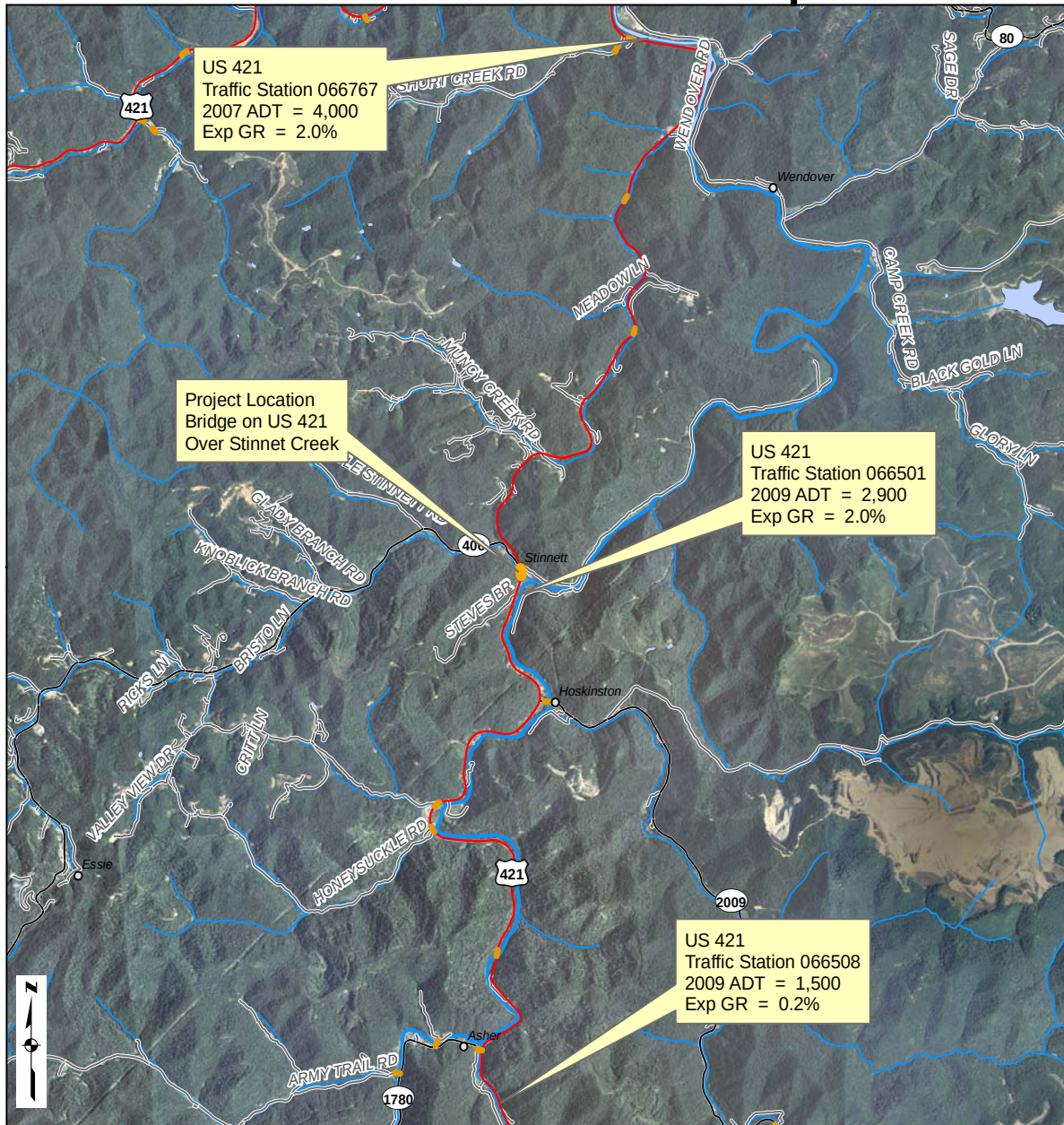
	2005	2010	2015	2020	2025	2030	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30
	Projection	Projection	Projection	Projection	Projection	Projection	Change	Change	Change	Change	Change
Kentucky	4,171,016	4,326,490	4,502,595	4,660,703	4,799,443	4,912,621	3.7%	4.1%	3.5%	3.0%	2.4%
Leslie Co	11,886	11,736	11,478	11,235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

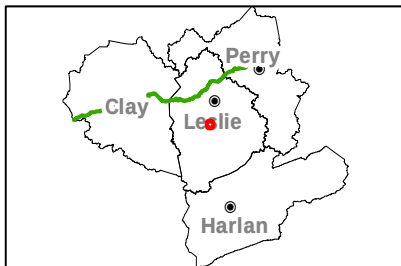


Legend

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

0 0.03 0.06 0.12 Miles

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	
Milepoint	14.9		066-US-0421 -000
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

Bridge Replacement US 421 Over Stinnet Creek (Build)

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	88.9%	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	ROADWAY	GPS LATITUDE DECIMAL	GPS LONGITUDE DECIMAL	MP	DATE	TIME	INTERSECTION	# Units	KILLED	INJURED	WEATHER	RD CONDITION	MANNER OF COLLISION	ROADWAY CHARACTER	LIGHT
01026857	US0421	37.0904	-84.22926667		29-Mar-06	0850		2	0	1	CLEAR	DRY	ANGLE		DAYLIGHT
01717501	US0421	37.07895	-83.37378333		01-Apr-06	0445	US0421	1	0	1	CLEAR	DRY	HEAD ON	CURVE & LEVEL	DARK-HWY LIGHTED/ON
01863703	US0421				30-Mar-06	1126	WENDOVER ROAD	2	0	0	CLEAR	DRY	REAR END	STRAIGHT & LEVEL	DAYLIGHT
01026918	US0421	37.08883333	-83.39556667		03-Mar-06			1	0	3	CLEAR	DRY	SINGLE VEHICLE	STRAIGHT & LEVEL	DARK-HWY NOT LIGHTED
70889093	US0421	37.074388	-83.3970976	13.8	17-Aug-10	1750		1	0	0	RAINING	WET	SINGLE VEHICLE	CURVE & GRADE	DAYLIGHT
70917392	US0421	37.0748177	-83.3962279	13.85	26-Oct-10	1632		2	0	0	CLOUDY	DRY	SIDESWIPE-OPPOSITE DIRECTION	CURVE & LEVEL	DAYLIGHT
70925522	US0421	37.07574	-83.3950542	13.94	04-Nov-10	1130		2	0	1	CLOUDY	WET	SINGLE VEHICLE	CURVE & LEVEL	DAYLIGHT
70887133	US0421	37.076236	-83.3945491	13.99	10-Aug-10	1545		2	0	2	CLEAR	DRY	ANGLE	CURVE & LEVEL	DAYLIGHT
70740588	US0421	37.0784238	-83.3936871	14.29	11-Aug-09	1320		1	0	0	CLEAR	DRY	SINGLE VEHICLE	CURVE & GRADE	DAYLIGHT
70471609	US0421	37.09081667	-83.39226667	14.83	20-Aug-07	0840		1	0	1	CLEAR	DRY	SINGLE VEHICLE	STRAIGHT & GRADE	DAYLIGHT
70471610	US0421	37.07136667	-83.3926	14.87	18-Aug-07	1423		1	0	2	CLEAR	DRY	SINGLE VEHICLE	CURVE & LEVEL	DAYLIGHT
70463538	US0421	37.0843	-83.39201667	14.89	28-Jul-07	1720		1	0	1	RAINING	WET	SINGLE VEHICLE	STRAIGHT & HILLCREST	DAYLIGHT
70599133	US0421	37.0882023	-83.3959769	14.94	01-Aug-08	1030		2	0	2	CLEAR	DRY	ANGLE	STRAIGHT & LEVEL	DAYLIGHT
70386243	US0421	37.08766667	-83.39083333	15.1	02-Dec-06	1725	KY0406	2	0	0	CLEAR	DRY	ANGLE	STRAIGHT & LEVEL	DUSK
70802028	US0421	37.0898673	-83.3954597	15.15	30-Dec-09	2225		2	1	0	RAINING	WET	SINGLE VEHICLE	CURVE & LEVEL	DARK-HWY LIGHTED/OFF
70901171	US0421	37.0905093	-83.3957231	15.19	03-Sep-10	1815		2	0	3	CLEAR	DRY	OPPOSING LEFT TURN	STRAIGHT & GRADE	DAYLIGHT
70740143	US0421	37.0918536	-83.396452	15.3	04-Aug-09	1550		1	0	3	CLOUDY	WET	SINGLE VEHICLE	CURVE & GRADE	DAYLIGHT
70560045	US0421	37.0953802	-83.3984402	15.57	27-Apr-08	1418		2	0	0	RAINING	WET	REAR END	STRAIGHT & HILLCREST	DAYLIGHT
70860555	US0421	37.0959035	-83.3982478	15.6	04-Jun-10	0001		1	0	0	CLOUDY	DRY	SINGLE VEHICLE	CURVE & HILLCREST	DARK-HWY NOT LIGHTED
70757253	US0421	37.0973308	-83.3967576	15.74	25-Sep-09	2215		2	0	0	CLOUDY	WET	HEAD ON	CURVE & GRADE	DARK-HWY NOT LIGHTED

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	24				
	45 MPH												
	50 MPH												
	55 MPH			24	24								
	60 MPH												
	65 MPH												
70 MPH			4		6		6		8				
MINIMUM GRADED SHOULDER WIDTH (FT) ⑤		ALL SPEEDS											
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	-	-	
	MOUNTAIN	-	-	8	7	-	6	-	-	5	-	-	
MINIMUM STOPPING SIGHT DISTANCE ①		(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 2.0 FT. 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: $MA(1366788) =$
 $311,196,778,1000$

Equation 1978-15-15

L.A. 100-86103-175

2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047 2048 2049 2050 2051 2052 2053 2054 2055 2056 2057 2058 2059 2060 2061 2062 2063 2064 2065 2066 2067 2068 2069 2070 2071 2072 2073 2074 2075 2076 2077 2078 2079 2080 2081 2082 2083 2084 2085 2086 2087 2088 2089 2090 2091 2092 2093 2094 2095 2096 2097 2098 2099 2100 2101 2102 2103 2104 2105 2106 2107 2108 2109 2110 2111 2112 2113 2114 2115 2116 2117 2118 2119 2120 2121 2122 2123 2124 2125 2126 2127 2128 2129 2130 2131 2132 2133 2134 2135 2136 2137 2138 2139 2140 2141 2142 2143 2144 2145 2146 2147 2148 2149 2150 2151 2152 2153 2154 2155 2156 2157 2158 2159 2160 2161 2162 2163 2164 2165 2166 2167 2168 2169 2170 2171 2172 2173 2174 2175 2176 2177 2178 2179 2180 2181 2182 2183 2184 2185 2186 2187 2188 2189 2190 2191 2192 2193 2194 2195 2196 2197 2198 2199 2200 2201 2202 2203 2204 2205 2206 2207 2208 2209 2210 2211 2212 2213 2214 2215 2216 2217 2218 2219 2220 2221 2222 2223 2224 2225 2226 2227 2228 2229 2230 2231 2232 2233 2234 2235 2236 2237 2238 2239 2240 2241 2242 2243 2244 2245 2246 2247 2248 2249 2250 2251 2252 2253 2254 2255 2256 2257 2258 2259 2260 2261 2262 2263 2264 2265 2266 2267 2268 2269 2270 2271 2272 2273 2274 2275 2276 2277 2278 2279 2280 2281 2282 2283 2284 2285 2286 2287 2288 2289 2290 2291 2292 2293 2294 2295 2296 2297 2298 2299 2300 2301 2302 2303 2304 2305 2306 2307 2308 2309 2310 2311 2312 2313 2314 2315 2316 2317 2318 2319 2320 2321 2322 2323 2324 2325 2326 2327 2328 2329 2330 2331 2332 2333 2334 2335 2336 2337 2338 2339 2340 2341 2342 2343 2344 2345 2346 2347 2348 2349 2350 2351 2352 2353 2354 2355 2356 2357 2358 2359 2360 2361 2362 2363 2364 2365 2366 2367 2368 2369 2370 2371 2372 2373 2374 2375 2376 2377 2378 2379 2380 2381 2382 2383 2384 2385 2386 2387 2388 2389 2390 2391 2392 2393 2394 2395 2396 2397 2398 2399 2400 2401 2402 2403 2404 2405 2406 2407 2408 2409 2410 2411 2412 2413 2414 2415 2416 2417 2418 2419 2420 2421 2422 2423 2424 2425 2426 2427 2428 2429 2430 2431 2432 2433 2434 2435 2436 2437 2438 2439 2440 2441 2442 2443 2444 2445 2446 2447 2448 2449 2450 2451 2452 2453 2454 2455 2456 2457 2458 2459 2460 2461 2462 2463 2464 2465 2466 2467 2468 2469 2470 2471 2472 2473 2474 2475 2476 2477 2478 2479 2480 2481 2482 2483 2484 2485 2486 2487 2488 2489 2490 2491 2492 2493 2494 2495 2496 2497 2498 2499 2500 2501 2502 2503 2504 2505 2506 2507 2508 2509 2510 2511 2512 2513 2514 2515 2516 2517 2518 2519 2520 2521 2522 2523 2524 2525 2526 2527 2528 2529 2530 2531 2532 2533 2534 2535 2536 2537 2538 2539 2540 2541 2542 2543 2544 2545 2546 2547 2548 2549 2550 2551 2552 2553 2554 2555 2556 2557 2558 2559 2560 2561 2562 2563 2564 2565 2566 2567 2568 2569 2570 2571 2572 2573 2574 2575 2576 2577 2578 2579 2580 2581 2582 2583 2584 2585 2586 2587 2588 2589 2590 2591 2592 2593 2594 2595 2596 2597 2598 2599 2600 2601 2602 2603 2604 2605 2606 2607 2608 2609 2610 2611 2612 2613 2614 2615 2616 2617 2618 2619 2620 2621 2622 2623 2624 2625 2626 2627 2628 2629 2630 2631 2632 2633 2634 2635 2636 2637 2638 2639 2640 2641 2642 2643 2644 2645 2646 2647 2648 2649 2650 2651 2652 2653 2654 2655 2656 2657 2658 2659 2660 2661 2662 2663 2664 2665 2666 2667 2668 2669 2670 2671 2672 2673 2674 2675 2676 2677 2678 2679 2680 2681 2682 2683 2684 2685 2686 2687 2688 2689 2690 2691 2692 2693 2694 2695 2696 2697 2698 2699 2700 2701 2702 2703 2704 2705 2706 2707 2708 2709 2710 2711 2712 2713 2714 2715 2716 2717 2718 2719 2720 2721 2722 2723 2724 2725 2726 2727 2728 2729 2730 2731 2732 2733 2734 2735 2736 2737 2738 2739 2740 2741 2742 2743 2744 2745 2746 2747 2748 2749 2750 2751 2752 2753 2754 2755 2756 2757 2758 2759 2760 2761 2762 2763 2764 2765 2766 2767 2768 2769 2770 2771 2772 2773 2774 2775 2776 2777 2778 2779 2780 2781 2782 2783 2784 2785 2786 2787 2788 2789 2790 2791 2792 2793 2794 2795 2796 2797 2798 2799 2800 2801 2802 2803 2804 2805 2806 2807 2808 2809 2810 2811 2812 2813 2814 2815 2816 2817 2818

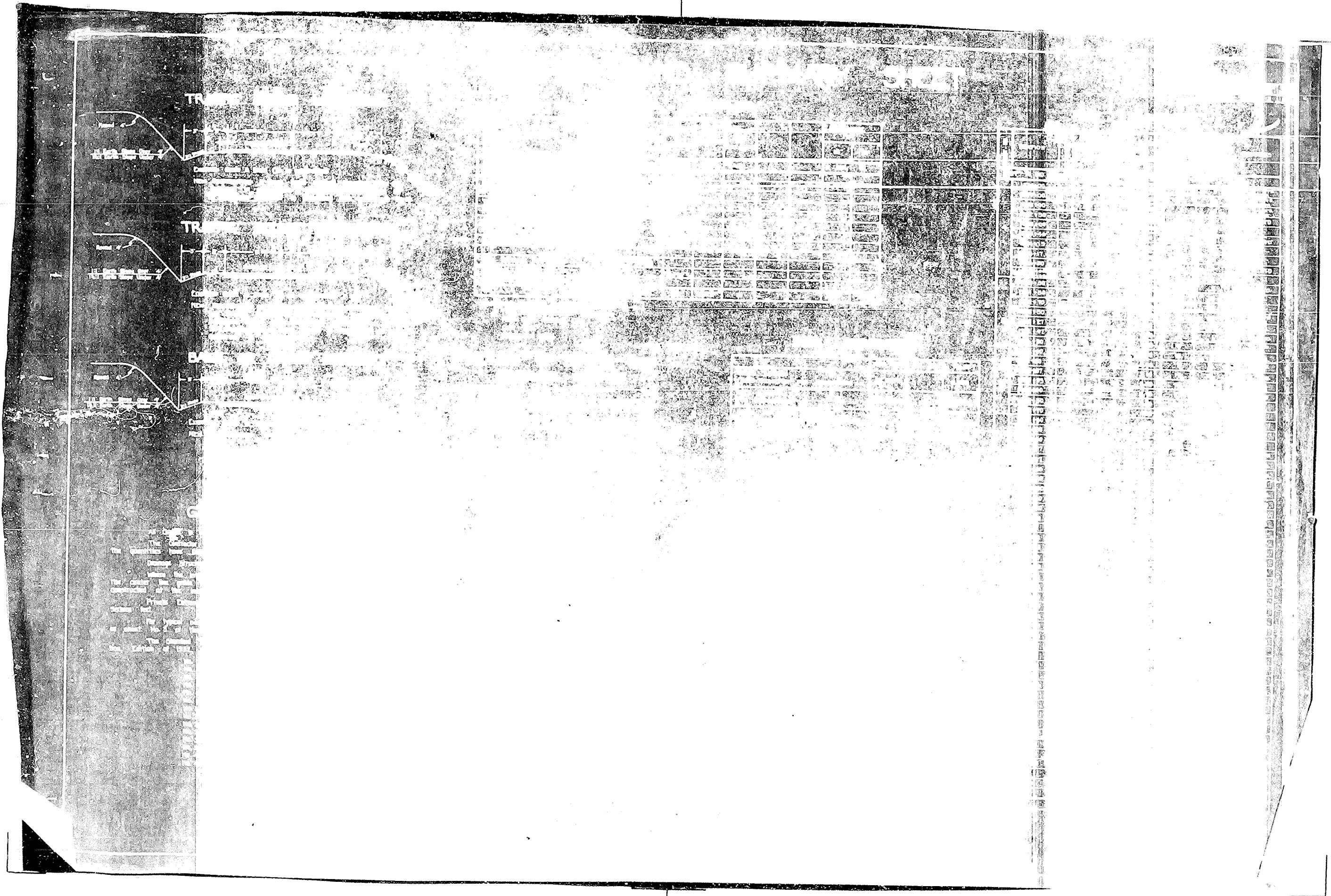
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
WASHINGTON, D.C. 20246

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[illegible]

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



SUMMARY OF QUANTITIES

LESLIE CO.-FR 114 B-GS

Sheet No. 2A of 18

2A

GENERAL SUMMARY

SHEET NO.	STATION TO STATION	CLEARING AND GRUBBING	EXCAVATION UNCLASSIFIED		CONCRETE		FINAL DRESSING	SPRING BOX	PIPE 18" CL.C.M. ENTRANCE 15" 24"
			ROWY & DRAINAGE	STRUCT	CLASS A	CLASS B			
	UNIT	ACRE	CU YD	CU YD	CU YD	CU YD	STA.	EACH	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				1	4	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	

SURFACING QUANTITIES CREEK GRAVEL

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

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°	491.70	58030	237	94.59	8913	8906	7132	Spec	4 24
9	1445+20	100' 8" x 8" x 88'	45°	25980	28320	198	10079	9905	9871	7135		4 63
STEEL TO REPLACE TEST BARS					331						5	15
TOTALS				75150	86681	435						

CULVERT SUMMARY

SHEET NO.	STATION	SIZE	SKEW	CONCRETE CLASS	STEEL REINFORCEMENT	EXCAV. UNCL	ELEVATIONS		DWG NO	STD OR SPCL	BOOK	PAGE
							GRADE	INLET/OUTLET				
				CU YD	LB							
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	961.2	963.0	C 5		4 27
6	1357+74	2' x 2' x 74'		2895	2703	59	1143.76	1135.6	1116.5	7133	Spec	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	31570	214	12398	1196.7	1193.6	7134	Spec	4 41
8	1413+85	4' x 4' x 109'	30°	7700	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	2771	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						

PIPE SUMMARY

SHEET NO.	STATION	PIPE	CONCRETE	EXCAV	REMARKS	BOOK	PAGE	
		18" CL. R.C.	CLASS	STRUCT				
		18" 24"	A	UNCL	TYPE HDWL			
	UNIT	LIN. FT.	CU YD	CU YD				
4	1274+50	39'	405	5	1 Ell 1 Sid 1 Anchor	4	1	
	1276+68	39'	302	4	2 Sid	4	2	
	1277+75	48'	314	7	1 Ell 1 Sid	4	3	
	1282+00	33'	416	20	1 " 1 "	4	4	
	1287+036	36'	400	6	2 Sid	4	5	
	1289+93	39'	402	6	2 "	4	7	
	1293+46	27'	314	10	1 Ell 1 Sid	4	8	
	1295+05	30'	314	12	1 " 1 "	4	10	
	1296+61	75'	400	16	2 Sid	4	11	
	1299+07	90'	393	18	2 Sid 1 Anchor	4	12	
	1300+79	30'	416	16	1 Ell 1 Sid	4	13	
	1302+70	30'	416	18	1 " 1 "	4	15	
5	1305+50	36'	400	25	2 Sid	4	16	
	1309+27	33'	314	12	1 Ell 1 Sid	4	19	
	1312+47	60'	400	17	2 Sid	4	20	
	1315+83	75'	400	22	2 "	4	21	
	1320+35	54'	400	26	2 "	4	22	
	1321+50	48'	400	13	2 "	4	23	
	1339+95	30'	470	21	1 Ell 1 Rsd	4	29	
	1344+00	33'	416	22	1 Ell 1 Sid	4	30	
	1347+50	96'	349	41	1 " 1 "	4	31	
	1353+792	30'	416	19	1 " 1 "	4	32	
	1360+08	30'	314	12	1 " 1 "	4	35	
	1362+50	30'	416	21	1 " 1 "	4	36	
7	1375+50	42'	261	12	1 " 1 "	4	39	
	1375+97	12'	045	2	1 Spr Bar 1 Anchor	4	40	
	1375+87	45'	302	6	2 Sid	4	43	
	1386+45	30'	400	9	2 "	4	44	
	1391+50	36'	314	11	1 Ell 1 Sid	4	45	
	1394+50	48'	314	15	1 " 1 "	4	46	
	1399+00	36'	314	18	1 " 1 "	4	47	
	1403+00	33'	314	13	1 " 1 "	4	48	
	1405+70	42'	314	11	1 " 1 "	4	49	
	1408+7	30'	314	11	1 " 1 "	4	50	
	1418+30	36'	314	14	1 " 1 "	4	53	
	1420+65	30'	314	14	1 " 1 "	4	54	
9	1423+00	30'	314	9	1 " 1 "	4	55	
	1424+80	63'	302	7	2 Sid	4	56	
	1425+97	48'	302	13	2 "	4	57	
	1430+12	33'	261	13	1 Ell 1 Sid	4	58	
	1434+50	39'	314	10	1 " 1 "	4	59	
	1437+81	30'	314	12	1 " 1 "	4	60	
	1438+90	45'	470	17	1 " 1 Rsd	4	61	
	1443+00	48'	393	4	2 Sid 1 Anchor	4	62	
	1448+20	30'	314	13	1 Ell 1 Sid	4	65	
	1454+35	42'	314	10	1 " 1 "	4	66	
	1457+89	30'	314	16	1 " 1 "	4	67	
	1460+99	54'	365	8	1 Ell 1 Sid 1 Anchor	4	68	
10	1464+00	54'	344	19	2 Sid 1 "	4	69	
	1467+35	45'	353	10	2 " 1 "	4	70	
	1480+00		533	9	2 " 1 "	5	5	
	1483+51	45'	314	14	1 Ell 1 Sid	5	6	
	1485+50	48'	314	13	1 " 1 "	5	7	
	1489+50	36'	314	13	1 " 1 "	5	8	
	1492+00	33'	314	16	1 " 1 "	5	9	
	1494+98	42'	314	8	1 " 1 "	5	10	
	1499+30	57'	400	24	2 Sid	5	11	
	TOTALS		1476	927	198.82			

STANDARD CONCRETE HEADWALL 21



THE MASONRY HEADWALL

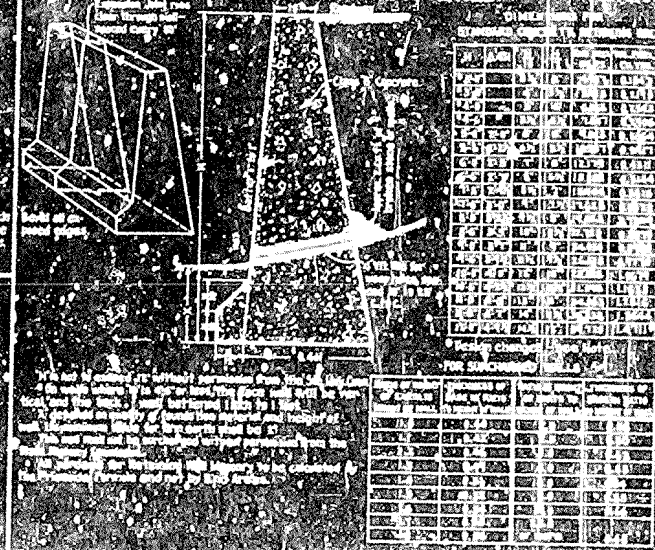


CONCRETE FULL HEADWALL



STANDARD DRAWINGS

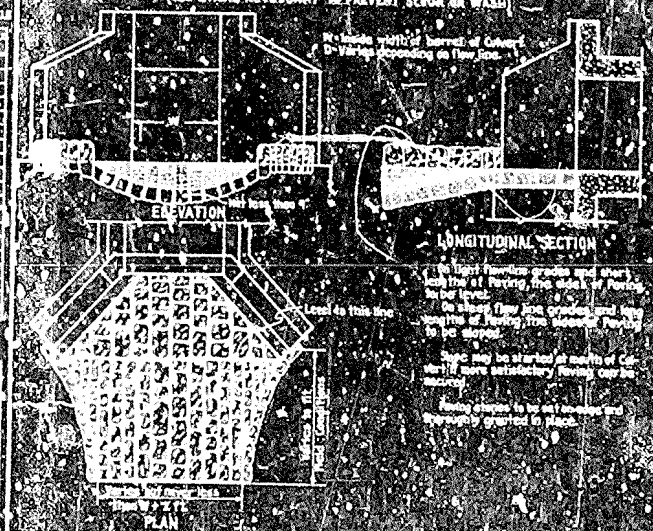
CONCRETE RETAINING WALL



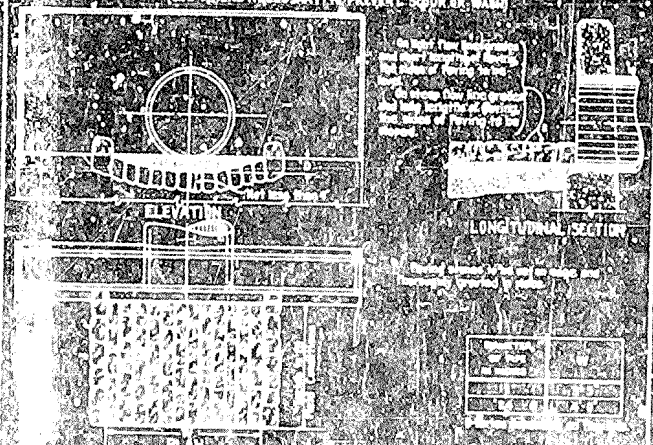
STONE MASONRY RETAINING WALL



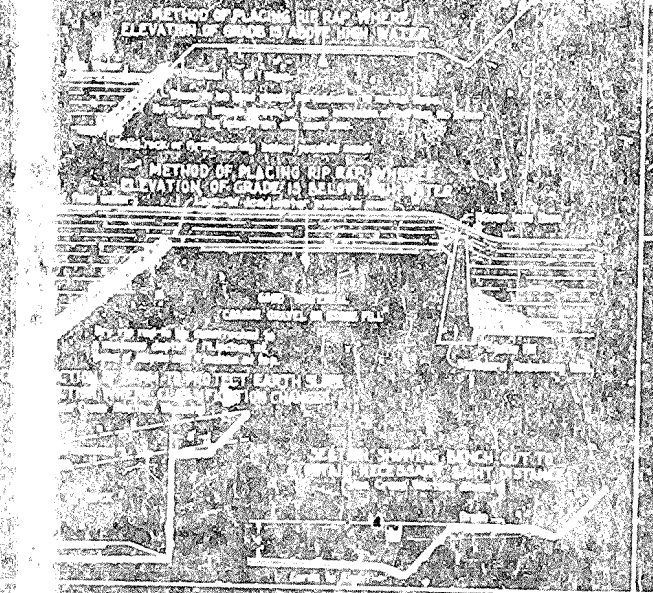
STONE PAVING FOR BOX CULVERT OUTLETS



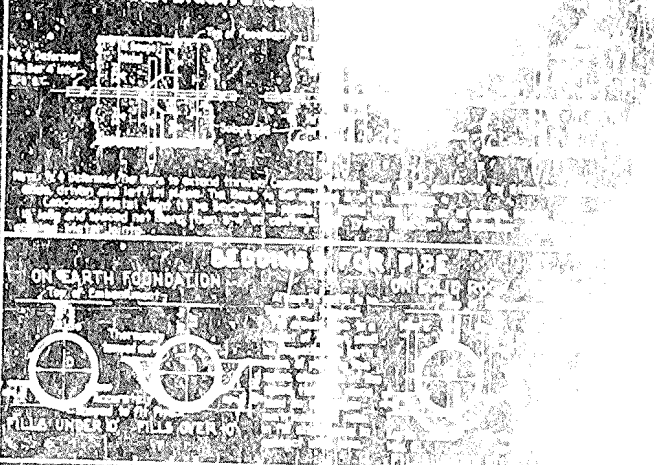
STONE PAVING FOR PIPE COLVERT OUTLETS



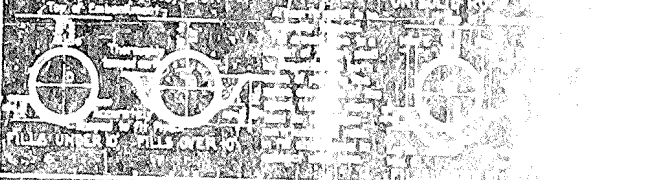
RIP RAP



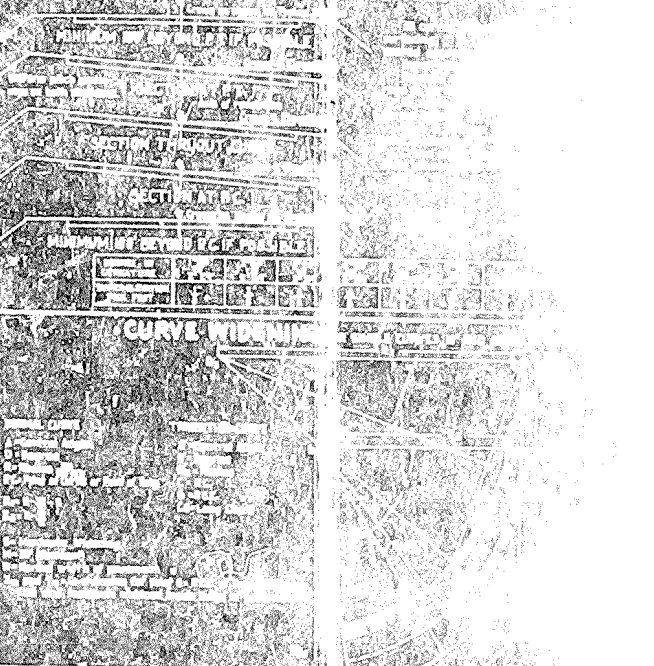
ALTERNATE CO



ON EARTH FOUNDATION



SUPER-ELEVATION





EQUATION
1308-536 BM
1308-444 SW

Earl Morgan
Viola - (Wife)
Gordon - (Singer)
Hallie Hoskins

A 450.4
C 100
T 150
L 300.0
R 389.7
S 30.5

PROJECTED
Δ 41.00 U
C 5.00
T 406.7
L 764.9
R 951.3
E 83.0

Δ 41.00 U
C 5.00
T 406.7
L 762.7
R 1145.9
E 82.8

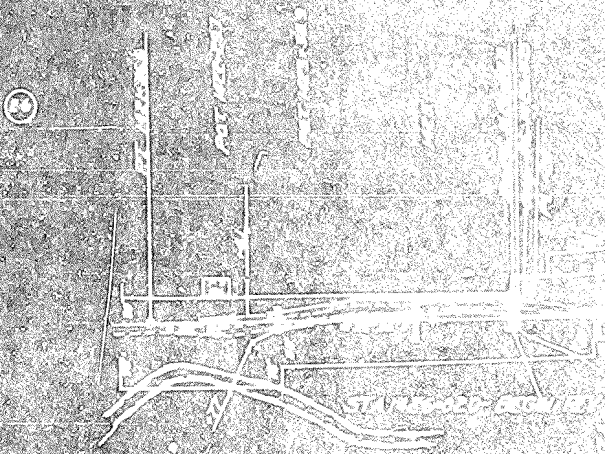
The image shows a document page with a dense, repetitive layout, characteristic of a ledger or index. The text is arranged in columns and rows, with many small, illegible markings and characters. The page is oriented vertically, and the content appears to be a structured list or table of entries. The overall appearance is that of a high-resolution scan of a physical document, where the text is too small to be read accurately, but the layout suggests a structured data table.

1337-10.1 Box
1337-10.2 Box

This is a detailed black and white map of the Fort Belknap Reservation in Montana. The map shows the Fort Belknap River flowing through the center, with several towns and settlements marked, including Fort Belknap, Browns, and Browns. The map also shows the surrounding landscape, including mountains and valleys. A scale bar is located in the bottom right corner, and a north arrow is in the bottom left corner. The map is titled "Fort Belknap Reservation, Montana" at the top.

S F 631

LOW HANGING





12

ELINO MOSLE

Full Construction
 100% of the cost of the
 building, including the
 cost of the land.

SP 531

Appendix F

-Structure Inventory and Appraisal Sheets-

Structure Inventory and Appraisal Sheet (English Units)

Bridge Key: 8318 Agency ID: 066B00008N SR: 31.5 SD/FO: SD

IDENTIFICATION

State 1: 21 Kentucky Struc Num 8: 066B00008N
 Facility Carried 7: US-421 Location 9: .10 MI SOU. OF JCT KY 406
 Rte.(On/Under)5A: Route On Structure Rte. Signing Prefix 5B: 2 U.S. Numbered Hwy
 Level of Service 5C: 1 Mainline Rte. Number 5D: 00421
 Directional Suffix 5E: 0 N/A (NBI) % Responsibility: Unknown
 SHD District 2: District 11 County Code 3: Leslie (066)
 Place Code 4: FIPS 0000 Mile Post 11: 15.158 mi
 Feature Intersected 6: STINNETT CREEK
 Latitude 16: 37d 05' 24" Longitude 17: 083d 23' 44"
 Border Bridge Code 98: Unknown (P)
 Border Bridge Number 99:

INSPECTION

Frequency 91: 24 months Inspection Date 90: 11/23/2010 Next Inspection: 11/23/2012
 FC Frequency 92A: NA FC Inspection Date 93A: NA Next FC Inspection: NA
 UW Frequency 92B: NA UW Inspection Date 93B: NA Next UW Inspection: NA
 SI Frequency 92C: NA SI Date 93C: NA Next SI: NA
 Element Frequency: 24 months Element Inspection Date: 11/23/2010 Next Elem. Insp. Due: 11/23/2012

CLASSIFICATION

Defense Highway 100: 0 Not a STRAHNET hwy Parallel Structure 101: No || bridge exists
 Direction of Traffic 102: 2 2-way traffic Temporary Structure 103: Not Applicable (P)
 Highway System 104: 0 Not on NHS NBIS Length 112: Long Enough
 Toll Facility 20: 3 On free road Functional Class 26: 06 Rural Minor Arterial
 Defense Hwy 110: 0 Historical Significance 37: 5 Not eligible for NRHP
 Owner 22: 01 State Highway Agency
 Custodian 21: 01 State Highway Agency

STRUCTURE TYPE AND MATERIALS

Number of Approach Spans 46: 0 Number of Spans Main Unit 45: 2
 Main Span Material/Design 43A/B:
 1 Concrete 19 Culvert

Deck Type 107: N/A (NBI)
 Wearing Surface 108A: N/A (no deck (NBI))
 Membrane 108B: N/A (no deck (NBI))
 Deck Protection 108C: N/A (no deck (NBI))

CONDITION

Deck 58: N/A (NBI) Super 59: N/A (NBI) Sub 60: N/A (NBI)
 Culvert 62: 4 Considerable Damage Channel/Channel Protection 61: 4 Protection Undermined

LOAD RATING AND POSTING

Inventory Rating Method 65: 1 LF Load Factor Operating Rating Method 63: 1 LF Load Factor
 Inventory Rating 66: HS8.3 Operating Rating 64: HS13.9
 Design Load 31: 2 M 13.5 (H 15) Posting 70: 1 30.0-39.9%below
 Posting status 41: A Open, no restriction

AGE AND SERVICE

Year Built 27: 1938 Year Reconstructed 106: Unknown
 Type of Service on 42A: 1 Highway
 Type of Service under 42B: 5 Waterway
 Lanes on 28A: 2 Lanes Under 28B: 0 Detour Length 19: 72.1 mi
 ADT 29: 2,930 Truck ADT 109: 8 % Year of ADT 30: 2009

APPRAISAL

Bridge Rail 36A: 1 Meets Standards Approach Rail 36C: 1 Meets Standards
 Transition 36B: 1 Meets Standards Approach Rail Ends 36D: 1 Meets Standards
 Str. Evaluation 67: 4 Deck Geometry 68: N Not applicable (NBI)
 Underclearance, Vertical and Horizontal 69: N Not applicable (NBI)
 Waterway Adequacy 71: 9 Above Desirable Approach Alignment 72: 8 Equal Min Criteria
 Scour Critical 113: 4 Stable, needs action

GEOMETRIC DATA

Length Max Span 48: 12.0 ft Structure Length 49: 36.0 ft
 Curb/Sdwk Width L 50A: 0.0 ft Curb/Sidewalk Width R 50B: 0.0 ft
 Width Curb to Curb 51: 0.0 ft Width Out to Out 52: 0.0 ft
 Approach Roadway Width 32: 21.0 ft Median 33: 0 No median (w/ shoulders)
 Deck Area: . sq. ft
 Skew 34: 45.00 ° Structure Flared 35: 0 No flare
 Vertical Clearance 10: 99.99 ft Horiz. Clearance 47: 20.00 ft
 Minimum Vertical Clearance Over Bridge 53: 328.1 ft
 Minimum Vertical Underclearance Reference 54A: N Feature not hwy or RR
 Minimum Vertical Underclearance 54B: 0.0 ft
 Minimum Lateral Underclearance Reference R 55A: N Feature not hwy or RR
 Minimum Lateral Underclearance R 55: 0.0 ft
 Minimum Lateral Underclearance L 56: 0.0 ft

PROPOSED IMPROVEMENTS

Bridge Cost 94: \$ 117,000 Type of Work 75: 31 Repl-Load Capacity
 Roadway Cost 95: \$ 0 Length of Improvement 76: 3.9 ft
 Total Cost 96: \$ 117,000 Future ADT 114: 4,365
 Year of Cost Estimate 97: 1994 Year of Future ADT 115: 2029

NAVIGATION DATA

Navigation Control 38: 0 0
 Vertical Clearance 39: 0.0 ft Horizontal Clearance 40: 0.0 ft
 Pier Protection 111: Not Applicable (P) Lift Bridge Vertical Clearance 116:

ELEMENT CONDITION STATE DATA

Str Unit	Elm/Env	Description	Units	Total Qty	% in 1	Qty. St. 1	% in 2	Qty. St. 2	% in 3	Qty. St. 3	% in 4	Qty. St. 4	% in 5	Qty. St. 5
1	241/2	Concrete Culvert	(LF)	184	0 %	0	76 %	140	22 %	40	2 %	4	0 %	0
1	361/2	Scour Smart Flag	(EA)	1	0 %	0	100 %	1	0 %	0	0 %	0	0 %	0
1	500/2	RC Culv Wing	(LF)	56	30 %	17	70 %	39	0 %	0	0 %	0	0 %	0
1	501/2	RC Culv Head	(LF)	64	78 %	50	22 %	14	0 %	0	0 %	0	0 %	0
1	811/1	Embankment Erosion	(EA)	1	0 %	0	0 %	0	100 %	1	0 %	0	0 %	0
1	812/1	Chan Align	(EA)	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %	0

Structure Inventory and Appraisal Sheet (English Units)

Str Unit	Elm/Env	Description	Element Notes
1	241/2	Reinforced Concrete Culvert	STREAMWEAR HAS CAUSED CENTER WALL TO BE UNDERCUT @ N. END VAR. LOC. S. BARREL LARGE CRKS. BAD @ CTR OF S. BARREL & @ S. BARREL @ OUTLET. LEACHING, CRACKS IN TOPS OF BARRELS THRUOUT. STEEL EXP. IN TOPS & SIDES SOME LOCATIONS
1	361/2	Scour	DUE TO CENTER WALL BEING UNDERCUT
1	500/2	Reinforced Concrete Culvert Wings	STREAMWEAR @ OUTLET & SW WINGS. BAD VERT. CRKS @ OUTLET S. WING.
1	501/2	Reinforced Concrete Culvert Head	SCALING
1	511/1	Embankment Erosion	EROSION UPSTREAM, DOWNSTREAM, OUTLET, SW WINGS
1	512/1	Channel Alignment	

BRIDGE NOTES

HAS W-RAIL SUBSTANDARD.

PAST INSPECTION

Inspection Date: 11/23/2010

Type: 2 Standard (24 months)

Inspector: TBALL

Pontis User Key: TBALL - Tim Ball

Scope:

NBI: ☒Other: ☐Element: ☒Underwater: ☐Fracture Critical: ☐

INSPECTION NOTES

Structure Inventory and Appraisal Sheet (English Units)**PAST INSPECTION**

Inspection Date: 12/31/2008

Type: 2 Standard (24 months)

Inspector: TFARMER

Pontis User Key: TFARMER - Terry

Scope:

NBI: ☒Other: ☐Element: ☒Underwater: ☐Fracture Critical: ☐**INSPECTION NOTES****PAST INSPECTION**

Inspection Date: 03/19/2007

Type: 2 Standard (24 months)

Inspector: TBALL

Pontis User Key: TBALL - Tim Ball

Scope:

NBI: ☒Other: ☐Element: ☒Underwater: ☐Fracture Critical: ☐**INSPECTION NOTES**

Structure Inventory and Appraisal Sheet (English Units)**PAST INSPECTION**

Inspection Date: 02/01/2005

Type: 2 Standard (24 months)

Inspector: TBALL

Pontis User Key: TBALL - Tim Ball

Scope:

NBI: ☒Other: ☐Element: ☐Underwater: ☒Fracture Critical: ☐**INSPECTION NOTES****INSPECTOR WORK CANDIDATES**

Work Candidate ID	Action	Object	Agency Status	Agency Priority	Assigned to a Project	Rec. Date
A-KYTC-0F4305BF-0000006D	Repl Elem	Scour Smart Flag	Under review	low	No	3/19/2007
A-KYTC-0F4305BF-0000006F	Repl Elem	Chan Drift	Approved	low	No	3/19/2007
A-KYTC-10F78528-0000000F	Rehab Elem	Chan Drift	Under review	High	No	12/31/2008
A-KYTC-10F78528-00000011	Pr Maint	Embankment Erosion	Under review	High	No	12/31/2008
A-KYTC-10F78528-00000013	Rehab Elem	Chan Algn	Under review	High	No	12/31/2008
A-KYTC-0F4305BF-0000006B	Repl Elem	Concrete Culvert	Under review	Medium	No	3/19/2007

Appendix G

-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 (FIPSZONE 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.

513
(EL 987)

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

97°07'30", 32°22'30"

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)

42°75'00"N

1000-meter Universal Transverse Mercator grid ticks, zone 17

6000000 FT

5000-foot grid ticks: Kentucky State Plane coordinate system, (FIPSZONE 1600), Lambert Conformal Conic

DX5510

Bench mark (see explanation in Notes to Users section of this FIRM panel)

• M1.5

River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

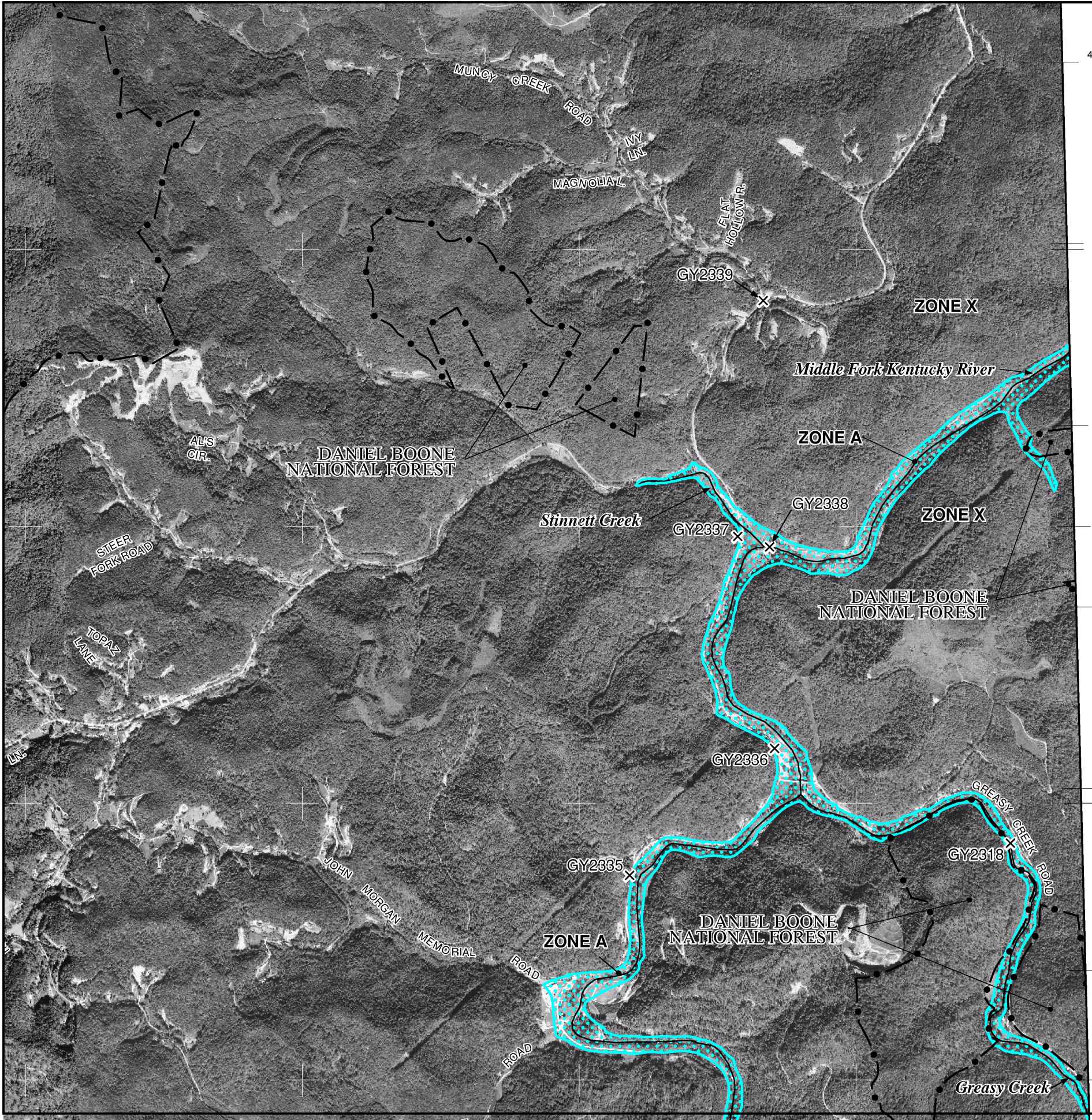
EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
September 28, 2007
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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





MAP SCALE 1" = 2000'

1000 0 2000 4000 FEET

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

NATIONAL FLOOD INSURANCE PROGRAM

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 H

-Photographs-





