March, 2011

US-421 PROGRAMMING STUDY

Franklin County

ITEM NUMBER 05-8109.00

Prepared by:
Kentucky Transportation Cabinet
Division of Planning

EXECUTIVE SUMMARY

Programming Study
Franklin County - Item Number 05-8109.00
US-421 from Bald Knob Hill/End Re-construction (MP 5.390) to St. Johns Rd (MP 11.132)

This programming study was conducted to develop and to evaluate alternatives for improving US-421 in Franklin County, from the Top of Bald Knob Hill and to the intersection of US-421 with KY-12, which is also known as St. Johns Road. Given the previous re-construction along this route ended at mile point 5.390, the project team agreed to expand the study area in this rolling terrain back to the end of the reconstruction at mile point 5.390 from the original mile point of 6.700. See **Figure ES-1** for a graphic representation of the project area along with the project termini.

This study was developed using a project team approach, with the project team being composed of personnel from the Kentucky Transportation Cabinet's (KYTC) Central Office and Louisville Highway District Office, and the Bluegrass Area Development District. The process of developing this programming study included analyzing existing roadway and traffic conditions; developing a draft purpose and need statement; investigating environmental concerns in the area through an environmental overview; and developing and evaluating potential improvement alternatives. There was one local officials meeting but no public meetings were held as part of this study.

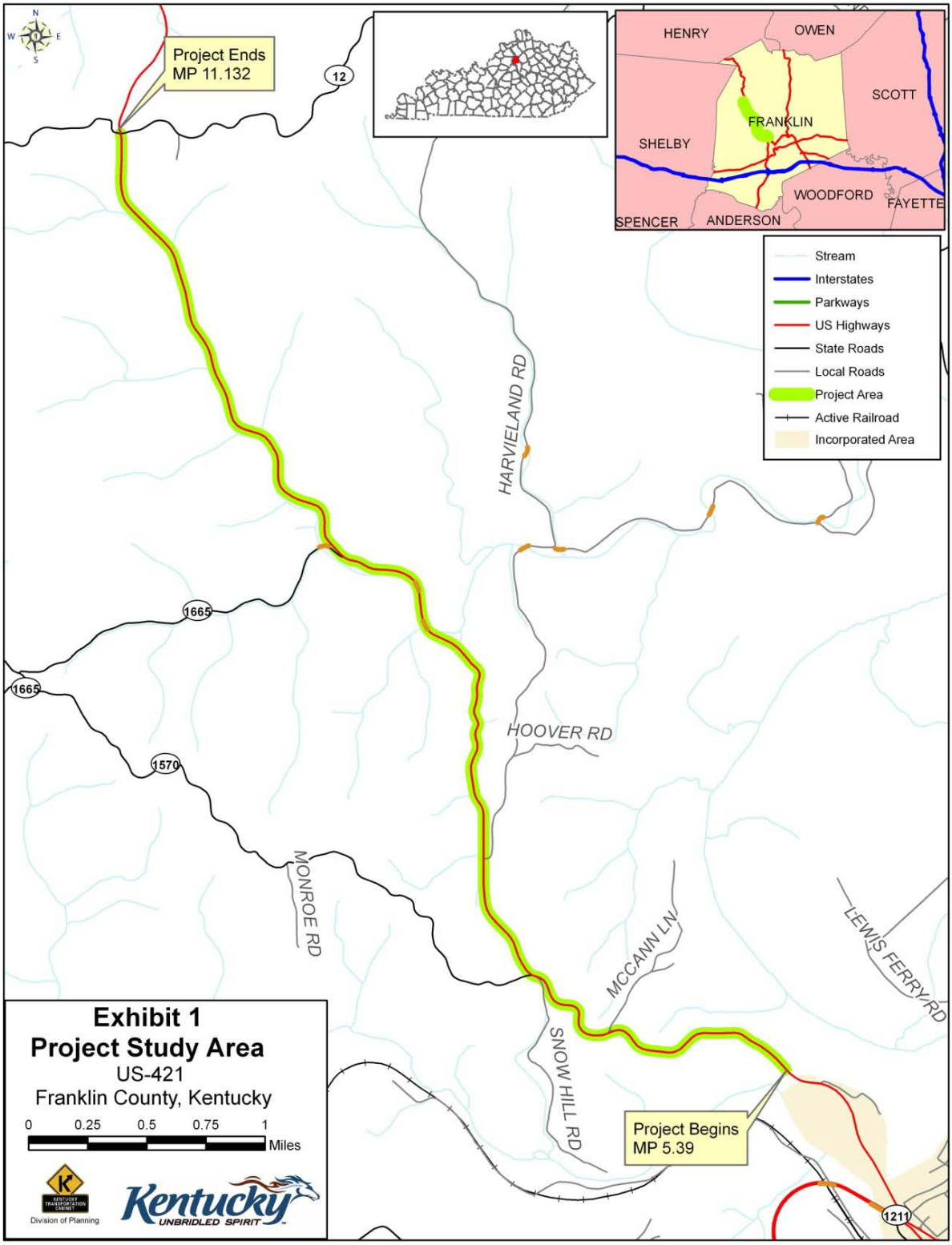
The entire length of this Rural Minor Arterial is an undivided two-lane highway with a lane width of 10 feet and an observed shoulder width of 1-3 feet. This section of US-421 had an average daily traffic (ADT) of 3,880 in 2009 with a continued drop in ADT as one approaches Henry County. Passing sight distance along this route was found to be zero percent with a total of 83 horizontal curves and 33 vertical curves. Of these curves, at least 48 horizontal curves and 10 vertical curves did not meeting the KYTC Common Geometric Practices for Rural Arterial Roads at a 60 mph design speed. The current and future level of service (LOS) for this portion of US-421 is rated D. Normally LOS C and above is considered acceptable for rural roads.

Existing conditions of interest along this US-421 study corridor include: limited sight distance, presence of utilities, possible flood zones, access management, possible underground storage tanks, variations in elevation and historically significant areas.

From January 1, 2004 through December 31, 2007, several high-crash locations with a Critical Rate Factor (CRF) greater than 1.0 were identified with no fatalities. A more recent review and crash analysis was also performed from January 1, 2007 through December 31, 2009 and concluded there were a few spot locations where the CRF exceeded 1.0 with no fatalities.

The need established for this project was to address safety concerns and geometric deficiencies for the purpose of reducing crashes along this corridor. Any improvements should also enhance interregional mobility and economic development with US-421 being a direct connection from the Milton-Madison Bridge and Interstate 71 to the City of Frankfort.

FIGURE ES-1
PROJECT STUDY AREA



Several alternative improvements for US-421 were initially considered by the project team to include: No-Build, Short-Term with Low-Cost, Long-Term Complete Rebuild and Long-Term Spot Improvements. The following **Table ES-1** shows a preliminary cost estimate from District 5 for those alternatives with an associated cost provided in 2010 dollars. This cost was developed on a cost per mile basis relative to similar projects in the area.

Of these options, the Short-Term, Low-Cost Alternative was considered favorable by the project team to address some safety concerns as part of the Purpose and Need Statement with a relatively quick approach given the limited funds available and construction dollars not yet being allocated for this project. The project team did not consider the Long-Term, Complete Rebuild Alternative to warrant further consideration due to geographic limitations, possible environmental concerns and significant cost given the relatively low ADT.

Should enough funding become available through future programming, the Long-Term, Intersection Spot Improvement Alternative was considered more favorable in addressing the Purpose and Need Statement. The total preliminary cost for improving all three intersections as part of this alternative was estimated to be $7,250,000. Further review in Phase I Design is recommended if enough construction dollars become available to determine which intersection improvements would be most beneficial to the public given the allocated dollars for such improvement.

TABLE ES-1
PRELIMINARY COST ESTIMATE

Alternatives	Length (miles)	Phased Cost ($)				Total Cost* ($)
		Design	Right-of-Way	Utilities	Construction	
Short-Term, Low-Cost Spot Improvements						
Tyre Grip, Cut Trees Back, Shoulder Layback @ 4 areas, Chevrons and Reflectors to existing Guardrail.	5.742	$100,000	$200,000	$100,000	$805,000	$1,300,000
Long-Term Intersection Spot Improvements						
US-421 @ KY-12	0.100	$50,000	$100,000	$50,000	$200,000	$400,000
US-421 @ KY-1665	0.300	$450,000	$100,000	$265,000	$5,200,000	$6,050,000
US-421 @ KY-1570 & @ Snow Hill Rd	0.200	$300,000	$500,000	$100,000	$900,000	$1,800,000
Long-Term Complete Rebuild						
Complete Rebuild	5.742	$3,800,000	$6,650,000	$6,650,000	$35,150,000	$52,250,000

*-Total Cost is rounded up to nearest $50,000 in 2010 dollars.

Table of Contents

Figures

Tables

Appendix A

Appendix B

Appendix C

Appendix D

Appendix E

I. INTRODUCTION

A. Study Purpose

The purpose of this Programming Study was to complete tasks in order to: (a) develop information for a corridor along US-421 from the end of the previous realignment at mile point (MP) 5.390 to the intersection at KY-12 (MP 11.132), in Franklin County, which can be used for future programming documents; (b) make data available for use when, and if, the project enters the design phase; and, (c) provide background information that can be utilized in the National Environmental Policy Act (NEPA) documentation for the project. Tasks undertaken as part of this project were:

- Identifying project goals and issues
- Defining the need for the project
- Determining project termini
- Describing the conditions of the existing roadway
- Identifying preliminary environmental concerns
- Identifying priority segments for future programming activities
- Initiating contact with public officials and agencies

The project goals were defined early in the first project team meeting. The first goal was to improve safety along the route. The second goal was to eliminate geometric deficiencies to improve safety and reduce maintenance.

B. Programming and Schedule

The project was described in the 2002 Kentucky Six-Year Highway Plan (FY 2003-2008) as a "Scoping Study to widen US 421 from the top of Bald Knob Hill to St. Johns Rd. (MP 6.700 – 11.132) " and identified by Item No. 05-8109.00. This study was scheduled to be started in the year 2004. There are no other phases other than planning that are defined or scheduled at this time.

A Project Identification Form (PIF) was found as control number 05 037 B0421 16.10 and was updated August 15, 2008, and most recently on May 25, 2011. This PIF listed the construction cost from mile point 5.390 to mile point 11.132 to be $37,000,000 with a total project cost of approximately $55,000,000. See **Appendix A** for a copy of both the original and updated PIF for this project.

A separate project, "Reconstruct US-421 from top of Bald Knob Hill at end of Reconstructed Section to Harvieland Road (MP 5.809 – MP 7.309)", was identified for the design phase in The Kentucky 2008 Highway Plan. This separate project identified by Item No. 05-374.00 is located inside the project limits of this scoping study.

The following is a description of the project as it is listed in the 2010-2012 General Assembly's Enacted Roadway Plan.

Item #05-0374.00, Franklin County

Phase	Fund	Year	Estimate
D:	SP	2010	$680,000
R:	SP	2011	$2,810,000
U:	SP	2011	$1,240,000
C:			$0

DESCRIPTION:
FRANKFORT-NEWCASTLE: RECONSTRUCT US-421 FROM TOP OF BALD KNOB HILL AT END OF RECONSTRUCTED SECTION TO HARVIELAND ROAD.

II. PROJECT LOCATION, EXISTING CONDITIONS AND TRAFFIC

A. Project Location

The project is located on US-421 on the main corridor from New Castle in Henry County to Frankfort in Franklin County. The project termini as originally described in the 2002 Kentucky Six-Year Highway Plan, (see previous paragraph) were found to be in need of change. Upon inspection by the project team, the decision to move the start of the project back to MP 5.390 was made. A more detailed study area for the project is described as follows:

- The beginning of the project was moved to MP 5.390. This mile-point is the end of a previous improvement project on US 421.
- Just north of this point is the intersection with KY-1570 at MP 6.750
- The end of the project is located at the intersection of US-421 and KY-12 at MP 11.132

The project area is shown graphically in **Exhibit 1** in **Appendix B** along with the project termini. Photos are also provided for the project area in **Appendix C**.

B. Existing Conditions

Data describing the existing conditions of this specific corridor of US-421 was taken from the Division of Planning's Highway Information System (HIS) database. All data came from the online version of the database and data was current as of January 2008.

The US-421 corridor in question is completely located in rolling terrain. Passing sight distance along the route in question was found to be zero percent. There were a total of 83 horizontal curves and 33 vertical curves along this corridor. Among these, there were 48 horizontal curves with a degree of curve greater than 4.276. This is the greatest degree of curvature allowed with a 60 mph design speed that is assumed for this road, under the Common Geometric Practices for Rural Arterial Roads, used by the KYTC Division of Highway Design (Exhibit 700-03). This is also assuming a maximum super-elevation of 6%. **Table II-1** shows the curves that are not designed to specification. According to the same guide, the maximum grade for a rural arterial in rolling terrain with a design speed of 60 miles per hour is 4%. Due to the fact that the data for grade given in HIS is in ranges, vertical curves within the range that include 4% are included in the table. For this reason it is noted that there were ten vertical curves with a percent grade greater than 4.5 and 5 additional curves that fell within the initial range that could not be verified exactly if they were above or below 4% in grade. The data describing these curves is shown in **Table II- 2**.

The entire length of the US-421 corridor is an undivided two-lane highway with a constant lane width of 10 feet. The shoulders are also constant along the length of the corridor at a width of 3 feet as indicated in Highway Information System Database (HIS). Inspection of the corridor proved to show that this was a generous estimate for the shoulder in some areas. Some areas inspected were found to have almost non-existent shoulders. The driving surface is an entirely high flexible asphalt pavement. This information is summarized along with the latest resurfacing date in **Table II-3**.

TABLE II-1
HORIZONTAL CURVES WITH DEGREE OF CURVE > 4.276

County Name	Route	Begin MP	End MP	Degree of Curve	Length (miles)	Radius (feet)
Franklin	US-421	5.243	5.407	4.5	0.164	1273.240
Franklin	US-421	5.570	5.635	14.5	0.065	395.143
Franklin	US-421	5.755	5.806	17.3	0.051	331.189
Franklin	US-421	5.878	5.925	13.6	0.047	421.292
Franklin	US-421	6.016	6.084	14.5	0.068	395.143
Franklin	US-421	6.124	6.206	18.7	0.082	306.395
Franklin	US-421	6.206	6.336	8.8	0.130	651.088
Franklin	US-421	6.336	6.393	19.6	0.057	292.325
Franklin	US-421	6.414	6.477	28.7	0.063	199.637
Franklin	US-421	6.503	6.586	16.6	0.083	345.155
Franklin	US-421	6.622	6.666	18.9	0.044	303.152
Franklin	US-421	6.701	6.773	8.4	0.072	682.093
Franklin	US-421	6.773	6.808	4.5	0.035	1273.240
Franklin	US-421	6.862	6.913	8.0	0.051	716.197
Franklin	US-421	6.978	7.125	6.8	0.147	842.585
Franklin	US-421	7.445	7.511	12.3	0.066	465.819
Franklin	US-421	7.511	7.572	9.8	0.061	584.651
Franklin	US-421	7.630	7.703	10.8	0.073	530.516
Franklin	US-421	7.735	7.776	16.4	0.041	349.365
Franklin	US-421	7.776	7.845	15.9	0.069	360.351
Franklin	US-421	7.845	7.870	51.5	0.025	111.254
Franklin	US-421	7.870	7.894	6.5	0.024	881.474
Franklin	US-421	7.894	7.936	24.6	0.042	232.910
Franklin	US-421	7.936	8.011	7.1	0.075	806.983
Franklin	US-421	8.011	8.066	5.8	0.055	987.858
Franklin	US-421	8.066	8.107	29.1	0.041	196.893
Franklin	US-421	8.107	8.160	4.5	0.053	1273.240
Franklin	US-421	8.207	8.264	5.6	0.057	1023.139
Franklin	US-421	8.328	8.460	9.5	0.132	603.113
Franklin	US-421	8.535	8.707	9.2	0.172	622.780
Franklin	US-421	8.749	8.811	9.5	0.062	603.113
Franklin	US-421	8.811	8.890	6.3	0.079	909.457
Franklin	US-421	8.890	8.917	12.1	0.027	473.519
Franklin	US-421	8.917	8.939	9.9	0.022	578.745
Franklin	US-421	9.004	9.068	15.5	0.064	369.650
Franklin	US-421	9.100	9.201	15.9	0.101	360.351
Franklin	US-421	9.311	9.402	13.6	0.091	421.292
Franklin	US-421	9.467	9.514	12.3	0.047	465.819
Franklin	US-421	9.569	9.621	13.4	0.052	427.580
Franklin	US-421	9.675	9.770	13.5	0.095	424.413
Franklin	US-421	9.828	9.876	4.9	0.048	1169.302
Franklin	US-421	9.937	9.985	4.4	0.048	1302.177
Franklin	US-421	10.039	10.114	5.4	0.075	1061.033
Franklin	US-421	10.170	10.245	6.3	0.075	909.457
Franklin	US-421	10.476	10.559	7.0	0.083	818.511
Franklin	US-421	10.761	10.909	6.8	0.148	842.585
Franklin	US-421	11.074	11.099	7.6	0.025	753.892
Franklin	US-421	11.099	11.177	10.6	0.078	540.526

Source: Highway Information System (HIS) Database KYTC

TABLE II-2
VERTICAL CURVES WITH GRADE > 4%

County Name	Route	Begin MP	End MP	Length (miles)	Percent Grade (Range)
Franklin	US-421	6.039	6.339	0.300	2.5 - 4.4 Percent
Franklin	US-421	6.339	6.449	0.110	2.5 - 4.4 Percent
Franklin	US-421	7.805	8.219	0.414	2.5 - 4.4 Percent
Franklin	US-421	8.219	8.276	0.057	2.5 - 4.4 Percent
Franklin	US-421	8.678	8.790	0.112	2.5 - 4.4 Percent
Franklin	US-421	5.609	5.719	0.110	4.5 - 6.4 Percent
Franklin	US-421	6.449	6.549	0.100	4.5 - 6.4 Percent
Franklin	US-421	6.549	6.734	0.185	4.5 - 6.4 Percent
Franklin	US-421	6.734	6.898	0.164	4.5 - 6.4 Percent
Franklin	US-421	7.098	7.344	0.246	4.5 - 6.4 Percent
Franklin	US-421	8.855	9.020	0.165	4.5 - 6.4 Percent
Franklin	US-421	5.449	5.609	0.160	6.5 - 8.4 Percent
Franklin	US-421	5.779	6.039	0.260	6.5 - 8.4 Percent
Franklin	US-421	6.898	7.098	0.200	6.5 - 8.4 Percent
Franklin	US-421	10.752	11.132	0.380	6.5 - 8.4 Percent

Source: Highway Information System (HIS) Database KYTC

TABLE II-3
ROADWAY CROSS-SECTION

County	Begin MP	End MP	Length (miles)	Lane Width	Year Resurfaced	Shoulder Width (HIS)	Shoulder Width (INS)
Franklin	5.390	5.504	0.114	10 Feet	2005	3 feet	1-3 feet
	End of Prev. Reconstruction						
Franklin	5.504	6.750	1.246	10 Feet	2005	3 feet	1-3 feet
		@ KY-1570					
Franklin	6.750	11.132	4.382	10 Feet	2005	3 feet	1-3 feet
	@ KY-1570	@ KY-12					

Source: Highway Information System (HIS) Database KYTC. Inspection (INS) in Field.

The corridor has two bridges which both have high sufficiency ratings of over 95. Both structures are classified as culverts and both are made of reinforced concrete. Neither structure was listed as structurally deficient or functionally obsolete. Neither was listed as having any historical significance. There was no speed reduction on any of the approach roads due to the presence of these structures. More detailed information is located in **Table II-4**.

TABLE II-4
BRIDGES

County	MP	Crossing	Length	Width	Type	Bridge Description	Sufficiency Rating
Franklin	8.438	Tucker Creek	25 feet	28 feet	Concrete Culvert	DBL 12X6X65 RC CLVT -3.5 FT FILL	97.5%
Franklin	8.600	Stoney Creek	100 feet	28 feet	Concrete Culvert	QUAD 15X7X163 RC CLVT -2 FT FILL	97.5%

Source: Highway Information System (HIS) Database KYTC

There are three major crossroads along this corridor of US-421. There were also three minor side roads listed in the HIS route log. The major crossroads are shown in **Table II-5** and the route log from the HIS is shown in **Table II-6**.

TABLE II-5
MAJOR CROSSROADS

County	MP	Description	State System	Functional Classification	ADT	
					Eastern side	Western Side
Franklin	6.750	KY-1570	Rural Secondary	Rural Local	*	383
Franklin	8.957	KY-1665	Rural Secondary	Rural Minor Collector	*	148
Franklin	11.132	KY-12	Rural Secondary	Rural Minor Collector	168	347

Source: Highway Information System (HIS) Database KYTC, 2010 ADT
* denotes T-intersection

TABLE II-6
ROUTE LOG

County	Route	Milepoint	Description
Franklin	US-421	5.390	End of Previous Reconstruction
Franklin	US-421	6.268	MCCANN LANE
Franklin	US-421	6.730	SNOW HILL ROAD
Franklin	US-421	6.750	KY-1570
Franklin	US-421	7.288	PLUM CREEK CULVERT
Franklin	US-421	7.309	HARVIELAND ROAD
Franklin	US-421	8.438	TUCKER CREEK CULVERT - B00084
Franklin	US-421	8.597	STONEY CREEK CULVERT - B00085
Franklin	US-421	8.957	KY-1665
Franklin	US-421	11.132	KY-12

Source: Highway Information System (HIS) Database KYTC

C. Highway Systems

US-421 in the study segment is functionally classified as a Rural Minor Arterial. According to the KYTC Planning website, this functional classification is used to describe a highway segment that: "Supplements the rural principal arterial system by providing inter-state and inter-county service, linking cities, large towns, major resort areas and other major traffic generators. This system is spatially distributed according to population density so all developed areas are within reasonable distance of an arterial highway."

For maintenance purposes, it is classified as a State Primary Route. US-421 in the study segment has a Truck Weight Class of "AAA" (80,000 pounds gross load limit), and is not part of the Coal Haul or of the Extended Weight Systems. It is not part of the National Highway System, the National Truck Network, the Forest Highway System, the Appalachian Development Highway System, the Bike Route System, or the National or Kentucky Scenic Byway System for the segment in question.

D. Vehicle Crash Analysis

A total of 114 vehicle crashes were recorded with valid reference points on US-421 within the study segment during the four (4) year period between January 1, 2004 and December 31, 2007. There were thirty (30) crashes with at least one person injured, and among those, there were seven (7) crashes with multiple people injured. There were no fatalities among any of these crashes. Crash analysis was performed for both "Segments" and "Spots". The summaries from these analyses are presented in **Table II-7** and **Table II-8** respectively.

TABLE II-7
US-421 SEGMENT CRASH ANALYSIS

Begin MP	End MP	Length (mi.)	ADT	Years	HMVM	Functional Class Rate	Total No. Crashes	Most Frequent Crash Type	Crash Rate/Total Accident Rate	RC/ Critical Accident Rate	Critical Rate Factor
5.390	6.750	1.360	3520	2005-2007	0.0699	**217**	**32**	Single Vehicle	379	458	1.209
6.751	8.957	2.206	2630	2005-2007	0.0847	**217**	**22**	Single Vehicle	363	260	0.715
8.958	11.132	2.174	1840	2005-2007	0.0584	**217**	**32**	Single Vehicle	395	548	1.388

Source: Highway Information System (HIS) Database KYTC
KTC Analysis of Traffic Crash Data in Kentucky (2003-2007)
KSP Collision Report Analysis for Safer Highways (CRASH) Database

TABLE II-8
US-421 ORIGINAL SPOT CRASH ANALYSIS

Begin MP	End MP	Length (mi.)	ADT	Years	HMVM	Functional Class Rate	Total No. Crashes	Total Accident Rate	RC	Critical Rate Factor
9.0	9.1	0.1	1840	2006-2008	2.69	0.22	10	3.7	1.17	3.18
10.6	10.7	0.1	1840	2006-2008	2.69	0.22	4	1.5	1.17	1.27

Source: Highway Information System (HIS) Database KYTC
KTC Analysis of Traffic Crash Data in Kentucky (2002-2006)
KSP Collision Report Analysis for Safer Highways (CRASH) Database

In the "Segment" analysis, the length of the study was divided into three segments, defined by the different average daily traffic counts. A summary of the segments and all associated data can be seen in **Table II-7**.

Of the three segments, two had a critical rate factor greater than 1.00. The first segment was 1.36 miles long and a total of 32 crashes occurred along its length. This resulted in a critical rate factor of 1.209. Of these crashes, thirteen involved two vehicles. Eight crashes resulted in injuries, three of which had multiple injuries. Twenty of the crashes were on wet pavement and one was in icy conditions. All but three of the crashes occurred on a curve. There were no fatalities in these or any other segments in the study.

The last segment in the study area had a critical rate factor of 1.388. It had a length of 2.174 miles and a total of 32 crashes. Of these crashes, six involved two vehicles. Twelve crashes resulted in injuries, one of which resulted in two injuries. Fourteen of the crashes occurred on wet pavement. Twenty-two (22) of the crashes occurred in a curve, and of the crashes that were in a straight portion of the road, six occurred on either a grade or hillcrest.

The "Spot" rate analysis was performed for one tenth mile spots. While analyzing the data, it was determined there were only two spots where the critical rate factor was over 1.00. There were ten and four crashes respectively giving critical rate factors of 3.18 and 1.27. A summary of the two high crash spots is in **Table II-8,** and the location can be viewed in **Exhibit 2** located in **Appendix B**.

For the first spot of interest, nine of the ten crashes were in a curve and grade section of the road and all were single vehicle crashes. There were five injuries but no fatalities in these incidences.

One of the four crashes at the second site was in a curve and grade section of roadway. Three involved two vehicles and the last one involved a single vehicle. None of the accidents resulted in death or injury. Only one occurred under wet roadway conditions.

The first spot described is located just north (0.2 mi.) of the intersection of US-421 and KY-1665 northbound. This section of the road had noticeable geometric deficiencies, as there was little or no shoulder on either side of the road. On the northbound side of the road there was only the cut rock-face and on the southbound side of the road there was little vegetation on the shoulder before a steep drop-off.

As we move southward along US-421, the next area of concern has a 0.1 mile spot CRF of 1.270 and is located between mile point 10.700 and 10.600. This portion of roadway appears to be the only straight section along the corridor where there is enough sight distance to allow for passing. Upon further review of the crash data at this location, no one particular type of crash indicated a consistent cause for the high CRF.

There was also an investigation into the crash history of the routes that intersected US-421, including KY-1570, KY-1665, and KY-12. One tenth mile spots of the route on either side of US-421 were investigated for possible intersection related crashes not included in the crash data for US-421. There were no crashes in the first 0.1 miles on any of the intersecting highways.

At the request of the final project team, all the segment and spot locations with high Critical Rate Factors (CRF) listed above were reviewed again from January 1, 2007 through December 31, 2009 to determine if there is current consistency in the crash analysis. Upon completion of this review, no segments were found to have a CRF greater than 1.0, which means the frequency of occurrence is not great enough to rule out coincidence during this time frame.

However, there were several areas where 0.10 or 0.30 mile spot CRFs exceeded 1.0 and are listed below in **Table II-8A**, and the location can be viewed in **Exhibit 2A** located in **Appendix B**.

TABLE II-8A
US-421 UPDATED SPOT CRASH ANALYSIS

Begin MP	End MP	Length (mi.)	ADT	Years	HMVM	Functional Class Rate	Total No. Crashes	Total Accident Rate	RC	Critical Rate Factor
5.670	5.770	0.1	3,880	2007-2009	4.25	0.21	4	0.9	0.9	1.05
8.111	8.211	0.1	2,590	2007-2009	2.84	0.21	5	1.8	1.09	1.62
8.111	8.411	0.3	2,590	2007-2009	2.84	0.64	6	2.1	2.04	1.04
9.571	9.671	0.1	1,650	2007-2009	1.81	0.21	3	1.7	1.36	1.22

Source: Highway Information System (HIS) Database KYTC
KTC Analysis of Traffic Crash Data in Kentucky (2007-2009)
KSP Collision Report Analysis for Safer Highways (CRASH) Database

E. Traffic and Level of Service

The counts utilized for this study that were taken for this section of road occurred in three different segments of the road and also occurred in three different years, as indicated in **Table II-9**. There was a variation in average daily traffic along this road from just fewer than 1800 vehicles per day near KY-12 to slightly more than 3500 vehicles per day near the end of the previous construction near the KY-1570 intersection with US-421. The projected future year (2035) average daily traffic volumes were based on an annual growth rate of 2.8% and ranged from 3990 to 7630 at the same spots along the corridor. The growth rate used came from the 2006 Traffic Forecasting Report published by the KYTC Division of Multimodal Programs.

For the purpose of Level of Service (LOS) determination, the study segment of US-421 is considered to be a Class I Highway. Highway Capacity Software (HCS) was used to calculate the LOS of the segments of roadway within this study. As shown in **Table II-10** and **Table II-11**, respectively, the LOS was found for the year 2007 and also for the data projected in **Table II-9** for the year 2035. This information can also be viewed in **Exhibit 3** and **Exhibit 4** in **Appendix B**. The LOS was found to be D for both time frames and thus the increase in traffic did not change the results. A LOS of D is considered to be below acceptable for this type of road. One thing that changed over the time frame is an increase in the percent time

spent following. The percent time spent following is a factor that contributes to the LOS determination and usually would be a factor in the decline of the LOS from acceptable standards.

TABLE II-9
AVERAGE DAILY TRAFFIC (ADT)

Begin Mile point	End Mile point	Traffic Count		Estimated 2007 ADT	Estimated 2035 ADT*
		ADT	Year		
4.523	6.750	3516	2007	3520	7630
6.750	8.957	2487	2006	2630	5700
8.957	11.132	1726	2005	1840	3990

Source: Highway Information System (HIS) Database KYTC
*2.8% growth rate

TABLE II-10
EXISTING LEVEL OF SERVICE (2007)

Section	Begin Mile point	End Mile point	Length	Average Travel Speed	Percent Time Spent Following	Volume /Service Flow	LOS
1	5.390	6.750	1.360	44.4	45.8	0.11	D
2	6.750	8.957	2.207	43.2	53	0.16	D
3	8.957	11.132	2.175	44.4	45.8	0.11	D

Source: Highway Capacity Manual 2000 Chapter 20
*Based on BFFS of 60 and 20 access points per mile

TABLE II-11
FUTURE LEVEL OF SERVICE (2035 WITH NO IMPROVEMENTS)

Section	Begin Mile point	End Mile point	Length	Average Travel Speed	Percent Time Spent Following	Volume /Service Flow	LOS
1	5.390	6.750	1.360	40.0	72.8	0.37	D
2	6.750	8.957	2.207	41.3	67.3	0.29	D
3	8.957	11.132	2.175	43.1	56.7	0.16	D

Source: Highway Capacity Manual 2000 Chapter 20
*Based on BFFS of 60 and 20 access points per mile

On the segments of US-421 north of the corridor being studied, it can be observed that there is a continuous decrease for ADT as one approaches Henry County. Also, once in Henry County there is another considerable decrease in traffic to the point that the volume drops below 600 ADT before there is an increase in volume further north on US-421. It can be concluded that this portion of US-421 is not currently being extensively used as a commuter route from Henry County to Franklin County.

F. Additional Information

Other existing conditions of interest along the study corridor include: limited sight distance, variations in elevation, presence of utilities, possible flood zones, access management, and historically significant areas. Some of these issues are discussed in greater detail below.

A major goal of this project would be to improve sight distance along the route, with attention being paid to the intersections of other routes with US-421. The intersections that appear to need the most improvement include KY-12, KY-1665, KY-1570, and Snow Hill Road.

The intersection of US-421 and KY-12, at mile point 11.132, presents a concern with sight distance and access management. There is a large earthen bank in the southwest corner of the intersection. From the west leg (KY-12) of the intersection, the driver's view to the south (US-421) is obstructed by this earthen bank. At the southeast corner, there is a grocery store with one fuel pump and paved parking with continuous access along US-421 and KY-12. There is no delineation between the parking and KY-12. Parked vehicles can block views to the south from this east leg of the intersection. See **Figure II-1**. This intersection is a part of the segment with a 1.388 Critical (Crash) Rate Factor (CRF) as previously shown in **Table II-7**.

FIGURE II-1
US-421 AND KY-12 INTERSECTION, NORTHBOUND ON US-421

The intersection of KY-1665 and US-421, at mile point 8.957, has sight distance concerns as well as issues with a steep grade when approaching the "Y" intersection from KY-1665. This variation in elevation and a very acute "Y" angle of the intersection all contribute to an obstructed view to the north when approaching this intersection from KY-1665. An added level of concern is the inability for a motorist traveling southbound on US-421 to turn right onto KY-1665 without having to backup their vehicle to make a skewed turn onto KY-1665. See **Figure II-2**. This turning movement is also assuming no vehicles are at or approaching the intersection from KY-1665. Otherwise, the vehicle traveling southbound on US-421, wanting to turn right onto KY-1665 would have to stop on US-421 and wait in the curve until the motorist on KY-1665 has cleared the intersection. This intersection is the location of the highest CRF for 0.10 mile spots with a 3.18 rating as previously shown in **Table II-8**.

FIGURE II- 2
US-421 AND KY-1665 INTERSECTION, SOUTHBOUND ON US-421

The intersection of US-421 with KY-1570, at mile point 6.750, also shares the issue of sight distance limitations. When approaching this intersection from KY-1570, a combination vertical and horizontal curve limits your sight distance when looking northbound on US-421. When looking southbound onto US-421 from KY-1570, the view of US-421 and adjacent Snow Hill Road intersection to US-421 is obstructed by an earthen bank and utilities. See **Figure II-3**. At the North West corner, motorists going southbound on US-421, turning right onto KY-1570, currently use a right turn approach constructed through a small embankment in the northwest corner of the intersection in an effort to increase the turning radius onto KY-1570 at the entrance. See **Appendix C** for more photos of this intersection. This intersection is located at the end of the segment originally identified from mile point 5.390 to 6.750 with a 1.209 CRF as previously shown in **Table II-7**.

FIGURE II-3
US-421 AND KY-1570 INTERSECTION, ON KY-1570 LOOKING SOUTH

The Snow Hill Road and US-421 intersection, at mile point 6.600, has many of the same sight distance issues as the KY-1570 intersection with US-421. When looking northbound onto US-421 from Snow Hill Road, the view of the adjacent intersection at KY-1570 is limited by the same earthen bank and utilities. See **Figure II-4**. However, this Snow Hill Road intersection with US-421 has the added issue of a steep grade when approaching the intersection from Snow Hill Road. The motorist's view is limited when looking southbound onto US 421 due to a steep grade when approaching this "Y" intersection at a skewed angle from Snow Hill Road. This intersection is located just south of US-421 and KY-1570 and in the same segment with a CRF greater than 1.0 as previously shown in **Table II-7**. This area was also closely approaching that threshold between mile points 6.646 to mile point 6.746, which includes the intersection of Snow Hill Road and KY-1570.

FIGURE II-4
US-421 AND SNOW HILL ROAD INTERSECTION, NORTHBOUND ON US-421

There are also multiple places where the route is very close to a cliff on either side of the road and the rock appears to be in a deteriorating condition. At many of these same places along the route, there are also drop-offs on the opposite side of the road.

Other segments of the roadway are very near the same level as the waterways that run alongside parts of the road and are prone to flooding in moderate to heavy rains. Attention would need to be given in later project phases to avoid damage to houses and property because of the construction or relocation of part of the route.

Utilities would be another concern that would need to be investigated in future phases of this project. Overhead lines do appear to follow the majority of the route and would be involved with most improvements. It was noticed that city water lines ran at least part of the way along the route as well. An investigation will be needed to see how far along and how close to the road the underground pipes are placed. A unique possible problem is the obvious presence of towers along the route. Although the exact nature of the towers is unknown, many appear to be radio or cellular telephone towers. Depending upon final design, companies that own and maintain these structures will need to be contacted.

III. PRELIMINARY ENVIRONMENTAL & SOCIOECONOMIC OVERVIEW

A Cultural Historic Overview for Improvements to US-421 in Franklin County, Kentucky was completed for Item No. 05-8109.00 in May 2005 by the Kentucky Transportation Cabinet. This was completed for District 5 with Rebecca Horn Turner being the Principal Investigator from the Division of Environmental Analysis. This study covers the entire area defined in this US-421 Programming Study. Although a complete historical review has not been conducted, there were two places of note that would need special attention in the process of design and construction. There is a graveyard with a single headstone near the intersection of US-421 with McCann Lane. Also, just north of the intersection of Harvieland Road and US-421, there is a church with a sizeable cemetery surrounding the church on the East Side of US-421.

A brief environmental analysis was conducted to locate places of significant historical or cultural value as well as places of potential hazards. An environmental footprint can be seen in **Exhibit 5** located in **Appendix B**. No environmental issues are expected to be encountered as a result of this project. However, further consideration should be given to the two older convenient store properties located along the US-421, at mile points 11.132 and 6.710, as they may have the potential to contain underground storage tanks.

An Environmental Overview by District 5 is pending completion during the early phase of engineering.

IV. PROJECT TEAM, LOCAL OFFICIALS AND PUBLIC INVOLVEMENT

A. KYTC Initial Project Team

A project team meeting for the US-421 (Franklin County) programming study was held in the Transportation Cabinet Office Building, Room 506 on January 20th, 2005. Those attending the meeting were as follows:

Robert Farley	FHWA
Chris Phillips	District 5 – Planning
Greg Groves	District 5 – Pre-Construction
Craig Myatt	District 5 – Maintenance
Gary Bunch	KYTC – Environmental Analysis
Ananias Calvin III	KYTC – Design
Daryl Greer	KYTC – Planning
Jim Wilson	KYTC – Planning
David Martin	KYTC – Planning
Robert Brown	KYTC – Planning

Minutes were developed for this meeting and are provided in **Exhibit 1** of **Appendix D**. As stated in these minutes, the project team agreed that the termini for this project should be at the intersection with KY-12. They also identified the benefits of this study being to help improve safety and reduce maintenance costs in part through improved geometrics. Overall data analysis information was provided to the project team. Two problem areas were identified in this meeting with crash rate factors (CRF) greater than 1.0 but no fatalities were identified throughout the corridor study area. These areas of interest will be discussed in greater detail within this report.

B. Local Officials

A local officials meeting was also held for this US-421 Study at the Capitol Annex, 4th Floor Conference Room on April 1st, 2005. The meeting was held to receive feedback and local direction in the development of the programming study. Minutes for this meeting are included in **Appendix E**.

Minutes from the project team meeting were distributed in this meeting along with data collection and analysis information. The goal of this project was also noted to be improvement of safety and reduction of maintenance costs. Those in attendance of this meeting are listed as follows:

Julian Carroll	State Senator – District 7
Derrick Graham	State Representative – District 57
Bob Roach	Franklin County Judge Executive
Howard Dawson	Franklin County Fiscal Court
Lambert Moore	Franklin County Fiscal Court
Jewel Johnson	Representative Graham - LRC
Jim Wilson	KYTC – Planning
David Martin	KYTC – Planning
Joe Tucker	KYTC – Planning

C. Public Involvement

No public meetings are anticipated during this phase of the project. However, there will be at least one public meeting should any identified project move into the design phase. This will provide ample opportunity for the public to provide their input and comments on the project.

D. KYTC Final Project Team

A second project team meeting for the US-421 (Franklin County) programming study was held in the Transportation Cabinet Office Building, Room 503 on June 15th, 2010. The following people attended this meeting:

Brian Meade – District 5 Project Development
Dane Blackburn – District 5 Planning
Keith Damron – Central Office Planning
Steve Ross – Central Office Planning
Jill Asher – Central Office Planning
Tonya Higdon – Central Office Planning

The primary initiative for holding this meeting was to update everyone on the history of this project and to determine the future course for this study. Meeting Minutes were developed for this meeting and are provided in **Exhibit 2** of **Appendix D**. As stated in these minutes, the Division of Planning provided additional information and developed recommendations for this draft study. The results of the 2nd Project Team Meeting for Item # 05-8109.00 concluded the following:

- The draft study shall be utilized "As Is" with references to any further data collected and/or analyzed.
- A "1st Look/DNA Pre-design Scoping" Study should be performed for Item # 05-0374.00

Design funds are not yet authorized for Item # 05-0374.00 with a Highway Plan design year of 2010.

The First Project Team Meeting on Item #05-0374.00 was combined with the Third Project Team Meeting for this study and held at the Transportation Cabinet Office Building, Room 512 on July 30th, 2010. Those attending the meeting were as follows:

Brian Meade – District 5 Project Development
Cathy Cornish – District 5 Utilities
Dane Blackburn – District 5 Planning
Greg Garner – District 5 Project Delivery & Preservation
Robert (Bob) Farley – Central Office Design
Ron Matar – Central Office Design Drainage
Tala Quinio – District 5 Design
Tom Hall – District 5 Planning
Keith Damron – Central Office Planning
Steve Ross – Central Office Planning
Jill Asher – Central Office Planning
Sreenu Gutti – Central Office Planning
Tonya Higdon – Central Office Planning

The goal for this meeting was to update new team members and identify possible alternatives for improvement along this route. The final options for this project identified during this meeting are summarized as follows:

A. No Build
B. Improve roadway through practical solutions following the centerline of the roadway
C. Improve roadway through reconstruction to current design standards with preliminary line and grade but will divide up into sections
D. Improve roadway through intersection and spot improvements, which may require phasing

Meeting minutes were developed for this Third Project Team Meeting and can be reviewed in **Exhibit 3** of **Appendix D**.

V. PROJECT DRAFT PURPOSE AND NEED STATEMENT

Existing conditions along US-421 need improvement to address geometric deficiencies and safety concerns for the purpose of reducing crashes along this corridor. These improvements should also enhance interregional mobility and economic development with US-421 being a direct connection from the Milton-Madison Bridge and Interstate 71 to the City of Frankfort.

VI. POSSIBLE ALTERNATIVES

The project team considered several alternatives for US-421 in Franklin County from mile point 5.390 at the end of the previous reconstruction to mile point 11.132 at KY-12 to include the No-Build Alternative. These alternatives are discussed in detail below. Cost estimates for the design, right-of-way, utilities, and construction phases for each of the viable build alternatives were also provided below.

A. No-Build Alternative

This option would be the No-Build alternative. This approach would be to wait and see what happens under current conditions into the near future before proceeding with any further significant financial investment in this portion of US-421. This alternative would be the least expensive in terms of up-front costs and would have the least community and environmental impacts. Still, this approach would not adequately address the Purpose and Need of this project, which is to improve safety and address geometric concerns.

B. Short-Term, Low-Cost Alternative

This short term alternative is to primarily address concerns along the curves and intersections of US-421 through a low cost, quick improvement approach. The improvements in this alternative would include the addition of chevrons on curves where the advised speed is more than 10 miles per hour lower than the 55 miles per hour posted speed limit. This alternative would also include the addition of reflector tabs in the "W" of existing guardrail throughout the entire length of the US-421 project area from MP 5.390 to MP 11.132.

There were several areas throughout US-421 that could be addressed with one or more of the following items: clearing trees and vegetation, laying back slopes, providing a high friction surface and adding chevrons and reflectors. Another field visit is recommended closer to the time of implementing any portion of the listed improvement to better identify the current needs along this corridor. Near the end of this study, the application of the high friction surface material was further reviewed along this route by the District. This has resulted in a contract being developed to implement this improvement between mile point 5.68 and mile point 6.25 and mile point 6.27 to mile point 6.75. However, poor pavement conditions relative to this application existing around mile point 6.4, and as such, this section may need to be repaved and repaired prior to applying the high friction surface material. Drainage ditches along this route where the roadway comes next to a hillside, should also be inspected as well and in some instances cleaned out or possibly even enlarged to meet runoff demands.

There are a few disadvantages to this approach. This option will require the purchasing of some additional right-of-way to remove enough trees and vegetation to improve sight distance and allow for proper layback of shoulder at select locations, which includes but is not limited to mile point 5.825, mile point 5.985, mile point 6.740, and mile point 11.130. This will also require the temporary relocation of some utilities. Also, geometric deficiencies throughout the route will not be addressed.

There were several advantages identified for this alternative as well. The primary advantage to this alternative is the relatively quick implementation of this alternative in the short term due in part to a much lower cost than other alternatives. This approach will improve safety through increased sight distance and enhance traction around curves while bringing added awareness to these curves with reflectors and chevrons. These improvements should be implemented without having to close the roadway or to displace anyone from their homes to minimize community impacts. Environmental impacts would also be kept to a minimum.

The following **Table VI-1** shows a preliminary cost estimate from District 5 for this alternative provided in 2010 dollars. This cost was developed on a cost per mile basis relative to similar projects in the area. KYTC will look at using other funding sources.

TABLE VI-1
SHORT-TERM, LOW COST IMPROVEMENT ALTERNATIVE – PRELIMINARY COST ESTIMATE

Short-Term Alternative	Length (miles)	Phased Cost ($)				Total Cost* ($)
		Design	Right-of-Way	Utilities	Construction	
Shoulder Layback		$100,000	$200,000	$100,000	$550,000	$950,000
Tyre Grip	1.62				$230,000	$230,000
Cut Back Trees						$40,000
Reflectors on Guardrail**					$5,000	$5,000
Chevrons**					$20,000	$20,000
TOTAL (Rounded up)	—	—	—	—	—	$1,300,000

*-Total Cost is rounded up to nearest 50,000.
**-Assumes labor cost for state forces.

C. Long-Term Complete Rebuild Alternative

During the final project team meeting, the project team discussed alternatives to address the purpose and need for this project. A total rebuild option was considered and later concluded that the updated Project Information Form (PIF) as previously discussed in the Introduction Section of this report and provided in **Appendix A** identified this cost throughout the corridor from mile point 5.309 to mile point 11.132 at KY-12.

In reviewing this alternative, some drawbacks were noted. Due to topographic limitations, a considerable amount of cut and fill material would be anticipated. As a result, the construction cost for this project would be considerable, especially given the relatively low ADT counts. This cost would require this project to be divided up into sections. Another impact would be the construction time due to the massive amounts of earthwork anticipated. The massive amounts of cut and fill material to be moved would also lead to potential environmental impacts. The local community would also be impacted by road closures wherever the existing roadway footprint matches or crosses with the proposed roadway. Considerable right-of-way would need to be purchased and a large number of homes would be removed relative to the total number of homes existing along this route. Significant utility relocation would need to occur and all these factors will tie into the extended construction time to complete the project.

There were also several benefits identified for this option. This approach would address geometric deficiencies along this route, drainage issues and sight distance limitations by bringing the roadway to current design standards and thus eliminating current safety concerns.

The following **Table VI-2** shows the preliminary cost estimate from District 5 for the Complete Rebuild Alternative in 2010 dollars. This cost was developed on a cost per mile basis relative to similar projects in the area. The right of way cost for this alternative includes an estimated cost to relocate several possible houses. Future project development phases may provide a way to avoid or reduce this cost.

TABLE VI-2
LONG-TERM, COMPLETE REBUILD ALTERNATIVE –
PRELIMINARY COST ESTIMATE

Long-Term Complete Rebuild	Length (miles)	Phased Cost ($)				Total Cost* ($)
		Design	Right-of-Way	Utilities	Construction	
	5.742	$3,800,000	$6,650,000	$6,650,000	$35,150,000	$52,250,000

*-Total Cost is rounded up to nearest 50,000.

D. Long-Term, Intersection Spot Improvement Alternative

When traveling this corridor, several areas of concern were initially identified. Due to the natural terrain having significant contour variations coupled with a relatively low average daily traffic count, improvement to the entire corridor system was not considered feasible given the current financial climate and cost per utilized vehicle. Upon further review, some recommendations were developed to help address those areas with the greatest need for improvement utilizing a practical solutions methodology with 11 ft lanes and 4 ft shoulders. The following identifies those areas of concern and provides long-term recommendations for each on a spot improvement basis.

a. US-421 & KY-12 Intersection

At the northernmost point of this corridor study is the intersection of US-421 with KY-12, at mile point 11.132. As with most intersections along this route, sight distance is a safety concern as previously shown in **Figure II-1**. This particular intersection has a very large earthen bank that significantly obstructs your view from the west leg of KY-12 when looking southbound onto US-421. It is recommended that the earthen bank be laid back to increase the sight distance at the intersection assuming an optimal grade of 4:1. This would require rock removal and given the location of nearby structures such as monitoring wells and underground utilities, District 5 does not recommend the use of blasting as a form of rock removal.

The southeast quadrant of the US-421 and KY-12 intersection would benefit from access management improvements to define entrances and delineate between the roadway and parking areas for the grocery at this location.

The following **Table VI-3** shows the preliminary cost estimate from District 5 for improvements to the intersection of US-421 and KY-12 in 2010 dollars. This cost was developed through bid tabulations on a cost per quantity basis relative to similar projects in the area. Further design may provide a way to avoid or reduce this cost.

TABLE VI-3
US-421 & KY-12 INTERSECTION IMPROVEMENTS-
PRELIMINARY COST ESTIMATE

Spot Intersection Improvement	Length (miles)	Phased Cost ($)				Total Cost* ($)
		Design	Right-of-Way	Utilities	Construction	
US-421 & KY-12	0.100	$50,000	$100,000	$50,000	$200,000	$400,000

*-Total Cost is rounded up to nearest 50,000.

b. US-421 & KY-1665 Intersection

The next location of note is the KY-1665 and US-421 intersection. This location is within a 0.1 mile spot with a CRF of 3.18. As previously noted and shown in **Figure II-2**, sight distance is the primary issue at this location. Longer term improvements would involve addressing the "Y" intersection and steep grades of the KY-1665 eastbound approach to the intersection. It is noted that such improvements would involve significant amounts of earthwork and expense given the topography and potential environmental issues associated with an adjacent stream.

One option proposes improving the intersection of US-421 and KY-1665 through the realignment of US-421 northeast into the current mountainside, thus leaving KY-1665 undisturbed except for improving the turning radii and realigning to allow for a perpendicular intersection with US-421. This option was considered most viable at this point in preliminary design for the following reasons: no dwellings required relocation, the proposed improvements stayed away from a stream that runs along the west side of US-421 at this location, and this option did not disturb the newly constructed bridge on KY-1665. As an added result, this design would likely straighten out the US-421 alignment. This alternative for the intersection also appears to be easier to maintain traffic during construction.

The obvious downside would initially be the earthwork required (particularly the amount of rock that would need to be removed) and the utility relocation and right-of-way to be purchased. There are also overhead lines in the woods that would likely require relocation.

The following **Table VI-4** provides a preliminary cost estimate from District 5 for this option to improve the intersection of US-421 and KY-1665 in 2010 dollars. This cost was developed through bid tabulations on cost per quantity basis relative to similar projects in the area.

Table VI-4
US-421 & KY-1665 INTERSECTION IMPROVEMENTS-
PRELIMINARY COST ESTIMATE

Spot Intersection Improvement	Length (miles)	Phased Cost ($)				Total Cost* ($)
		Design	Right-of-Way	Utilities	Construction	
US-421 & KY-1665	0.300	$450,000	$100,000	$265,000	$5,200,000	$6,050,000

*-Total Cost is rounded up to nearest 50,000.

c. US-421 with KY-1570 and Snow Hill Road Intersections

The intersection of US-421 with KY-1570 also has issues with sight obstruction and is a part of a crash segment with a CRF of 1.209. The sight line looking south from KY-1570 could be improved by cutting back the embankment in the southeast corner as previously shown in **Figure II-3**. Besides blocking views of US-421 southbound, the embankment also obscures the entrance to Snow Hill Road which intersects US-421 immediately south of KY-1570. The radius of the intersection when entering KY-1570 from US-421 southbound can be improved as motorists have already created an alternate dirt right turn approach that serves this very purpose.

An adjacent intersection along this corridor just south of the US-421 and KY-1570 intersection is that of Snow Hill Road and US-421. This intersection also has similar sight obstruction issues as those of the adjacent US-421 and KY-1570 intersection. The same earthen bank and utilities that block your view when looking southbound on US-421 from KY-1570 obstruct the motorists' view when looking northbound on US-421 from Snow Hill Road as previously shown in **Figure II-4**. The immediate grade change on Snow Hill Road as you approach the intersection with US-421 creates an added safety concern for motorist by further limiting sight distance, which is compounded during wet and icy weather conditions.

Both intersection concerns may best be addressed long-term together by realigning US-421 further east due to the earthen bank and stream on the west side of US-421 and the steep grade on Snow Hill Road. This would allow motorists on Snow Hill Road to extend and stop on an even grade (the original US-421 alignment) perpendicular to the "proposed" US-421 alignment before entering the intersection with the re-aligned US-421.

The downside to this option is the large amount of earthwork that would be required along with the significant amount of right-of-way associated with implementing this spot improvement for both intersections.

The following **Table VI-5** provides a preliminary cost estimate for this option to improve the intersection of US-421 with that of KY-1570 and Snow Hill Road provided by District 5 in 2010 dollars. This cost was developed through bid tabulations on cost per quantity basis relative to similar projects in the area.

TABLE VI-5
US-421 WITH KY-1570 & SNOW HILL ROAD INTERSECTION IMPROVEMENTS-PRELIMINARY COST ESTIMATE

Spot Intersection Improvement	Length (miles)	Phased Cost ($)				Total Cost* ($)
		Design	Right-of-Way	Utilities	Construction	
US-421 with KY-1570 & Snow Hill Rd	0.200	$300,000	$500,000	$100,000	$900,000	$1,800,000

*-Total Cost is rounded up to nearest 50,000.

Further in depth review of the most appropriate connection for these intersections is warranted during Phase I Design. The preferred choice from a design standpoint would be in an area with the least grade variation at the approach, while still allowing motorist's enough sight distance at the proposed intersection. An environmental review should also be performed in concert with this design review to identify impacts of new tie-ins to US-421. This is a long-term recommendation given the required undertaking to re-route this low ADT roadway due to the topographical limitations of a steep hillside and meandering creek as well as associated cost and time to address possible environmental concerns such as underground storage tanks. The total cost to make the proposed spot improvements to all three intersections is approximately $8,250,000.

VII. RECOMMENDATIONS

The No-Build Alternative does not address the Purpose and Need Statement for the project previously discussed in Section VI of this report. The Short-Term, Low-Cost Alternative, however, would address some safety concerns in a relatively quick approach to meet a portion of the Purpose and Need Statement. This alternative was considered favorable by the project team given the limited funds available and construction dollars not yet being allocated for this project in the approved highway plan. The project team did not consider the Long-Term, Complete Rebuild Alternative to warrant further consideration due to geographic limitations, possible environmental concerns and significant cost given the relatively low ADT.

If enough funding were to become available through future programming, the Long-Term, Intersection Spot Improvement Alternative was considered most favorable to address the Purpose and Need Statement. Further review in Phase I Design is recommended should construction dollars become available to determine which intersection improvement would be most beneficial to the public given the allocated dollars for such improvement.

VIII. CONTACTS

The following persons may be contacted if additional information is needed concerning the project or the study process:

Keith Damron, Director, Division of Planning.

Steve Ross, Transportation Engineer Branch Manager, Strategic Planning Activity Center, Division of Planning.

Jill Asher, Corridor Team Leader, Strategic Planning Activity Center, Division of Planning.

Tonya Higdon, Corridor Team, Strategic Planning Activity Center, Division of Planning.

The following address and phone number may be used:

Phone: (502) 564-7183
Address: Division of Planning
Kentucky Transportation Cabinet
Transportation Office Building
200 Mero Street, 5th Floor West
Frankfort, KY 40622

APPENDIX A

PIF Revised: Aug. 2004

KYTC Project Identification Form

Cycle Year: **2005**
Priority: L : **Hi** R: **Hi** D: **Hi**
Tier: **3**
Tier Rank: R: ___ D: ___
Overall Top Ten: R: ___ D: ___

Section I – General Information

Requested by: **Unknown**
Title/Organization:
Date:

Form Completed by: **B.Duncan/C.Phillips**
Title/Organization: **BGADD/DOH5**
Date: **9-27-2004**

Revision 1 by: **B.Duncan/T. Hall**
Title/Organization: **BGADD/DOH5**
Date: **8-15-2008**

Revision 2 by:
Title/Organization:
Date:

UPL Control #: **05 037 B0421 16.10** Co. #: **037**
Parent Control #: _____
RSE Unique Number: **037 US-421**

District: **5** County: FRANKLIN Route: **US 421**
ADD: **BGADD** MPO: _____ SUA: ____

Mode: **Highway** State System: **State Primary**
Type: **Major Widening** Funct'l Class: **Rural Min Art**

Project Length: 5.742 **Total Cost Estimate: $ 39700**
(P: D:3000 R:3700 U:3000 C:30000)

Possible Funding Sources (Check all that apply):
☐IM ☒NH ☐HES ☐BR ☒STP ☒SP ☐TE ☐CMAQ
☐PLH ☐Other: ____

Highway Networks (Check all that apply): ☐Non NHS ☒NHS
☐NN ☐Scenic Byway ☐Coal Haul ☐Bike ☐Forest
☐Defense ☐Strahnet ☐Ext. Wt. ☐ADHS ( )

Existing Project Studies (Year):

Section II – Problem Statement

Route Number: **US 421**
Beginning MP: **5.390**
Ending MP: **11.132**
Total Length: **5.742**

Primary Purpose: **Upgrade Existing System(Major)**

(Use Report Year)	Original	Rev. 1	Rev. 2
AdequacyRating:	**48.80**: (**05**)	: ( )	: ( )
• CRF: (Year)	**2.64**: (**05**)	: ( )	: ( )
• IRI: (Year)	**147**: (**05**)	: ( )	: ( )
• V/SF: (Year)	**0.25**: (**05**)	: ( )	: ( )
Current ADT: (Year):	**3,246**: (**02**)	: ( )	: ( )
Percent Trucks: (Year):	: ( )	: ( )	: ( )

Projected ADT (HDO): Year: **2022** %Growth: **1.25** ADT: **4,160**

Please provide a clear problem statement for this project:

Composit rating is 48.80 for segment 5.390 to MP 10.536. The remainder is 77.30. High CRF of 2.64 indicates safety problems along this segment of US 421 from aproximately 0.9 miles north of US 127 to KY 12 in Franklin County. IRI varies from 113 to 147. V/SF ranges from 0.10 to 0.25. Vertical Alignment of 4 indicates significant sight distance restrictions. Horizontal Alignment of 3 indicates infrequent curves with design speeds less than the prevailing speed limit. US 127 is on the NHS and the State Authorized Truck Network.

Section III – Project Description

Project Description Narrative:

Improve safety and level of service on US 421 (Bald Knob Hill) from the end of existing improvements approx. 0.9 miles north of US 127 to KY 12 in Franklin County.

Regional Goals/Objectives Addressed: **To promote the safe and efficient movement of people, goods, and services to benefit all of the residents of the region.**

UPL #: 05 037 B0421 16.10
County: FRANKLIN Co. #: 037 Route: US-421

Section IV – Project Area Information:

1. Miscellaneous Roadway Conditions

Access Control:	Existing: **Permit** Proposed: **Permit**	Median Type:	Existing: **N/A** Proposed: _____	Width: **NA** Width: _____
Lane No./Width:	Existing: **2/12** Proposed: ____/____	Shoulders:	Existing: **Earth** Proposed: _____	Width: **3** Width: _____
No. of Bridges:	Existing: **5** Proposed: _____	Other Improvement Projects in Area:	☐None ☐SYP ☐Resurface ☐Other _____	

Comments: **mp 8.438, 8.6, 13.088,14.061**

2. Right of Way

Avg. Width: Existing: **45** Source: ☒ HIS ☐Plans ☐Microfilm ☐Other _____

Current Primary Use: ☐Industrial ☐Commercial ☐Residential ☒Farmland ☐Other: _____

☐ No ☒ Yes Project may require additional R/W. | Possible Relocations : Homes: _____ Businesses: _____

Comments:

3. Utilities

Existing Utilities: ☒Power ☒Gas ☒Telephone ☒Cable ☐Sewer ☒ Water ☐ ITS ☐None ☐ Other: _____

☐ No ☒ Yes Project may require Utility Relocations. | Comments:

4. Environmental Impacts

(Check all that apply):

☒Blueline Streams ☐Wetlands ☐Floodplain ☐Wildlife Managed Areas ☐Historic Properties
☐Cemeteries ☐Schools ☐Churches ☐Endangered Species ☐Public Land/Park
☐Noise Impact ☐Arch. Sites ☐NR Properties ☐Potential NR Properties ☐Other:

☐ Potential Contaminated sites: ☒ Gas Stations ☐ Landfills ☐ Auto Repair ☐ Junkyards ☒Other

Comments: **Boat Repair Shop**

5. Air Quality

☒No ☐Yes Project is located in a Maintenance or Nonattainment Area ☐ Ozone ☐ PM 2.5

☒No ☐Yes Project adds through lane capacity

☒No ☐Yes Project results from a Congestion Management Plan

☒No ☐Yes Project is included in TIP/STIP TIP Page # STIP Page #

Comments:

6. Economic Impacts

☐No ☒Yes Planning/Zoning Regulations exist in Community | ☒No ☐Yes Project may affect established Business, Commercial or Industrial Districts.

☒ No ☐ Yes This project has economic impacts on regional/local economy:
☐ Development ☐Tax Revenues ☐Employment Opportunity ☐Retail Sales ☐ Other
Please Describe:

☒ No ☐ Yes This project provides direct access to major points of interest:
☐ Nat'l/State Parks ☐Monuments ☐Historic Sites ☐Amusement Parks ☐US Public Land ☐ Other
Please Describe:

☒ No ☐ Yes This project provides direct access to major traffic generators:
☐ Shopping Centers ☐Schools ☐Industries ☐Military Installations ☐ Other
Please Describe:

7. Multimodal Opportunities	This project is a candidate for: (check all that apply)	☐ Bicycle Paths ☐ Sidewalks ☐ Shared-Use Paths ☐ Park/Ride Lots ☒ N/A
	This project improves direct access to: (check all that apply)	☐ Airports ☐ Railways ☐ Riverports ☐ Trucking Routes ☒ N/A
	Type of Public Transportation available:	☐ Fixed Route ☒ Demand Response
	Comments:	
8. Social Impacts	This project may affect: (Check all that apply)	☐ Neighborhood or Community Cohesion ☐ Travel Patterns (Vehicular, commuter, bicycle, pedestrian) ☐ Household Relocations ☐ Elderly, disabled, nondrivers, minorities, low-income persons ☐ No adverse effects to neighborhoods apparent.
	Comments/Impact Descriptions:	

Section V – Cost Estimate Information (to be completed by Hwy District Office):

Cost Estimate by Phase:

Phase	Original Estimate	By:	Revision 1	Date	By:	Revision 2	Date	By:
Planning								
Design	$2,500,000	MA	$3,000,000	11/5/08	th			
ROW	$3,000,000	MA	$3,700,000	11/5/08	th			
Utilities	$2,500,000	MA	$3,000,000	11/5/08	th			
Construction	$25,000,000	MA	$30,000,000	11/5/08	th			
Total Cost	**$33,000,000**	**MA**	**$39,700,000**					

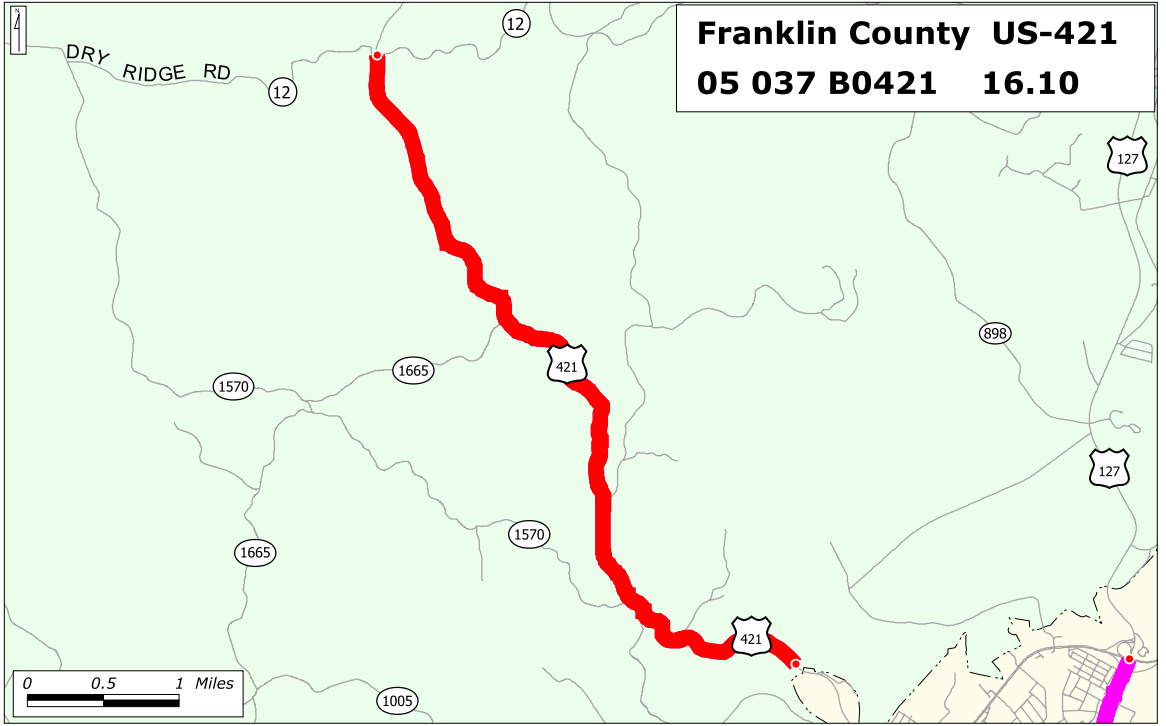
Estimate Procedure Used:

Original Estimate:	Revision 1:	Revision 2:
☒ Per Mile@ $ **5.75M** Terrain: **Rolling**	☐ Per Mile@ $ _____ Terrain: _____	☐ Per Mile@ $ _____ Terrain: _____
☐ Detailed Estimate with Calculations Attached	☐ Detailed Estimate with Calculations Attached	☐ Detailed Estimate with Calculations Attached
Estimate Assumptions:	Estimate Assumptions: **Update to 2008 dollars.**	Estimate Assumptions:
Estimate Class: **E-Requires further study**	Estimate Class: _____	Estimate Class: _____

Section VI – Attachments:

The following items are attached to this document: ☒ Location Map ☒ Photograph(s) ☐ Other:

Comments:


Franklin County US-421
05 037 B0421 16.10
DRY RIDGE RD
12
12
127
898
421
1665
1570
1570
127
1665
421
0 0.5 1 Miles
1005


55


421

GENERAL INFORMATION

The PIF has an attachment. Click this Image for PDF:

Control No:	05 037 B0421 16.10	**Status:**	Active
Requestor Name:		**Mode:**	Highways
Requestor Title:		**Type:**	Major widening
Requested By Date:	08/14/2008	**ADD:**	BLUEGRASS
Form Completed By:	B.Duncan/T.Hall	**MPO:**	Select
Title/Organization:	BGADD/DOH5	**Urban Area:**	Rural
Form Completed Date:	08/15/2008	**Parent Control No:**	05 037 B0421 16.10
District:	5	**RSE Unique No:**	037-US-0421 -000
County:	Franklin		
Prefix:	US		
Route No:	421		
Route Type:	B		
Suffix:			
BMP :	5.390	**EMP:**	11.132
Length:	5.742		
Existing Studies:	NONE		

State System:

BMP	EMP	SPRS
4.5230	17.8860	State Primary (Other)

Functional System:

BMP	EMP	FC
4.5230	17.8860	Rural Minor Arterial

Project Description:

Improve safety and level of service on US 421 (Bald Knob Hill) from the end of existing improvements approx. 0.9 miles north of US 127 to KY 12 in Franklin County.

To promote the safe and efficient movement of people, goods, and services to benefit all of the residents of the region.

Regional Goal:

Last Updated By: Regan.clauson **Last Updated Date:** 10/4/2010 12:20:13 PM

Possible Funding source: ☐IM ☑NH ☐HES ☐BR ☑STP ☑SP ☐TE ☐CMAQ ☐PLH

Other:

Highway Network: Non NHS NHS NN Scenic Way Coal Haul Bike Forest Strahnet Ext Weight ADHS

Cancel

Kentucky UNBRIDLED SPIRIT

RIGHT OF WAY

Avg. Width: 45

Source: ☐ HIS ☐ Plans ☐ Microfilm

Other:

Current Primary Use: ☐ Industrial ☐ Commercial ☐ Residential ☑ Farmland

Other:

Project may require additional R/W: ○ False ◉ True

Possible Number of Relocations: Homes Businesses

Comments: unknown

UTILITIES

Existing Utilities: ☑ Electrical ☑ Gas ☑ Telephone ☑ Cable

☐ Sewer ☑ Water ☐ ITS ☐ None

Other:

Project may require Utility Relocations: ○ False ◉ True

Comments:

Kentucky UNBRIDLED SPIRIT

COST ESTIMATE

PIF #: 05 037 B0421 16.10
Revision #: 2
BMP: 5.390
EMP: 11.132
Last Updated By: 5/26/2011 9:21:57 AM
Last Updated Date: dane.blackburn

Estimate Class: Based on Limited Studies

Per Mile

Terrain:

BMP	EMP	TERRAIN
4.5230	8.9570	Rolling
8.9570	17.8860	Rolling

Detailed Estimate with Calculations Attached

EstimateAssumptions:

Planning: No Records
Design: No Records
Right of Way: No Records
Utilities: No Records
Construction: No Records

Original Estimate:

Planning:	00.00
Design:	4,000,000.00
Right of Way:	7,000,000.00
Utilities:	7,000,000.00
Construction:	37,000,000.00
Total Cost:	55,000,000.00

Estimate Procedure Used:

Attachments: Location Map . Photograph(s) Others: Sheet showing Cost Estimate

Comments:

Kentucky UNBRIDLED SPIRIT

HIGHWAY ATTRIBUTES

PIF #: 05 037 B0421 16.10
BMP: 5.390
EMP: 11.132
Last Updated By: bruce.duncan
Last Updated Date: 10/8/2010 8:25:16 AM

Adequacy Rating Range

	From	To	Problem Statement
Adequacy Rating:	48.80	48.80	High CRF indicates safety problems along this segment of US 421 from approximately 0.9 miles north of US 127 to KY 12 in Franklin County. There is significant truck trafiic on this two lane road. Vertical Alignment of 4 indicates significant sight distance restrictions. Horizontal Alignment of 3 indicates infrequent curves with design speeds less than the prevailing speed
CRF:	0.4960	1.0220	
IRI:	0	1256	
V/SF:	0.15	0.15	
ADT:	957	3750	
% Trucks (Single):	9.40	9.40	
% Trucks (Combination):	1.30	1.30	
Speed Limit:	55	55	

ProjectedADT (HDO)/Year: Coming Soon **% Growth:** Coming Soon **ProjectedADT:** Coming Soon

Miscellaneous Roadway Conditions

Access Control:

BMP	EMP	TYPE
4.5230	17.8860	None

Proposed Access Control: Partial *

Lane Width:

BMP	EMP	WIDTH	LANES
5.4210	17.8860	10	2
4.5230	5.4210	12	2

Proposed Lane Width: 0 *

Proposed Lanes: 0 *

MedianType:

BMP	EMP	WIDTH	TYPE
4.5230	17.8860		None

Proposed Median Type: None *

Proposed Median Width: 0 *

Shoulders:

BMP	EMP	WIDTH	TYPE	X SECT
5.22	5.4210	10	Combination	CR
5.22	5.4210	10	Combination	NR
5.4210	14.24	2	Combination	CR
5.4210	15.35	2	Combination	NR

Proposed Shoulder Type: Earth *

Proposed Shoulder Width: 0 *

No. of Bridges: 5

Traffic Loop: Coming Soon

Other Improvement Projects in Area: ☑ None ☐ SYP ☐ Resurface ☐ Others

Comments: mp 8.438, 8.6, 13.088,14.061

ENVIRONMENTAL IMPACT

Environmental Impact:
- ☑ Blue Line Streams
- ☐ Wetlands
- ☐ Floodplain
- ☐ Wildlife Managed Areas
- ☐ Historic Properties
- ☐ Cemeteries
- ☐ Schools
- ☐ Churches
- ☐ Endangered species
- ☐ Public land/Park
- ☐ Noise Impact
- ☐ Arch. Sites
- ☐ NR Properties
- ☐ Potential NR Properties

Other:

☑ Potential Contaminated sites:
- ☑ Gas Stations
- ☐ Landfills
- ☐ Auto Repair
- ☐ Junkyards

Other: Boat Repair Shop

Comments:

AIR QUALITY

Maintenance or Nonattainment Area: ◉ False ○ True ☐ Ozone ☐ PM

Adds through Lane Capacity: ○ False ◉ True

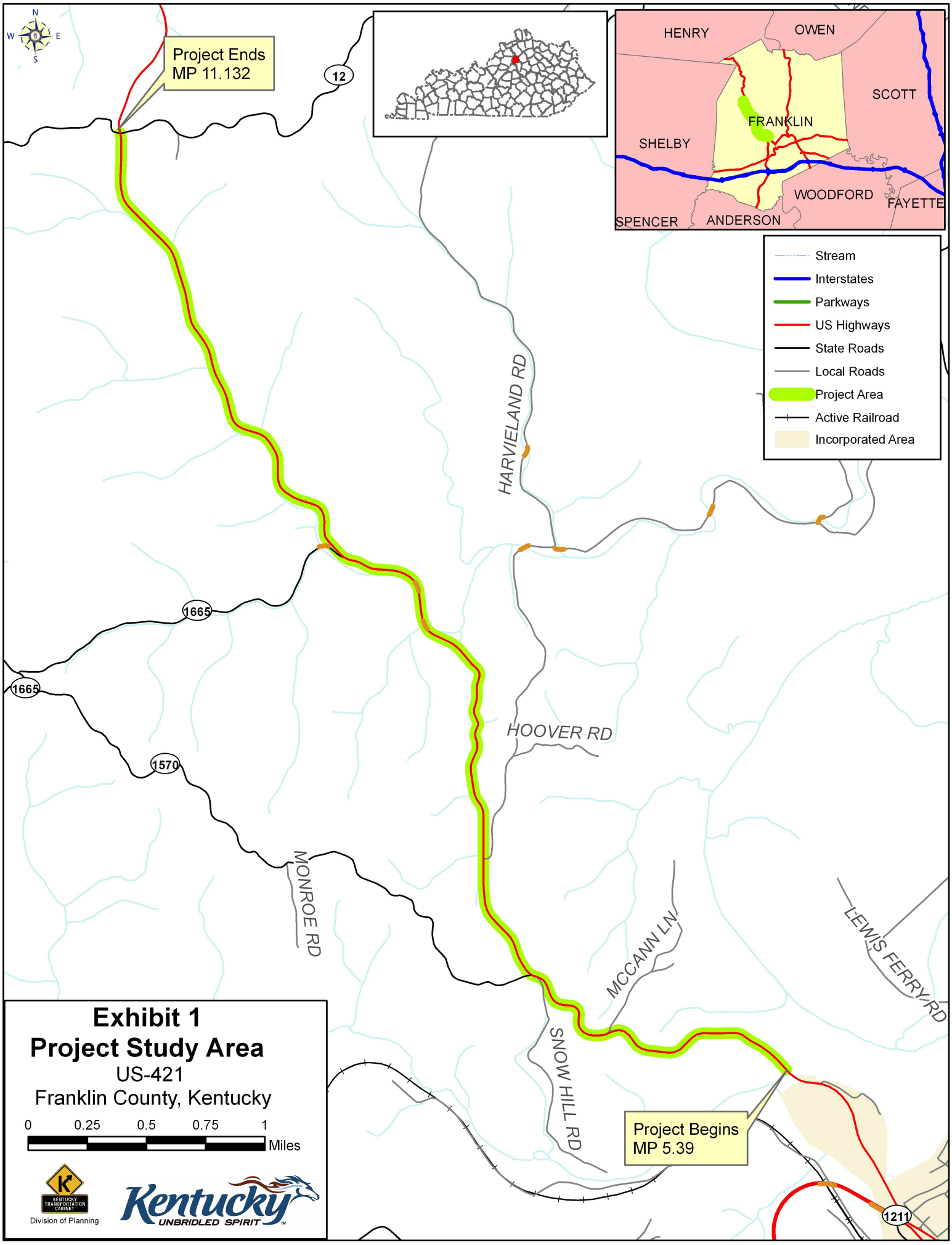
Congestion Management Plan: ◉ False ○ True

Project is included in TIP/STIP: ◉ False ○ True

Comments:

Kentucky UNBRIDLED SPIRIT

APPENDIX B


Project Ends
MP 11.132
12
HENRY
OWEN
SCOTT
FRANKLIN
SHELBY
WOODFORD
FAYETTE
SPENCER
ANDERSON
Stream
Interstates
Parkways
US Highways
State Roads
Local Roads
Project Area
Active Railroad
Incorporated Area
HARVIELAND RD
1665
1665
1570
HOOVER RD
MONROE RD
MCCANN LN
LEWIS FERRY RD
SNOW HILL RD
Project Begins
MP 5.39
1211
Exhibit 1
Project Study Area
US-421
Franklin County, Kentucky
0
0.25
0.5
0.75
1
Miles
Division of Planning
Kentucky
UNBRIDLED SPIRIT

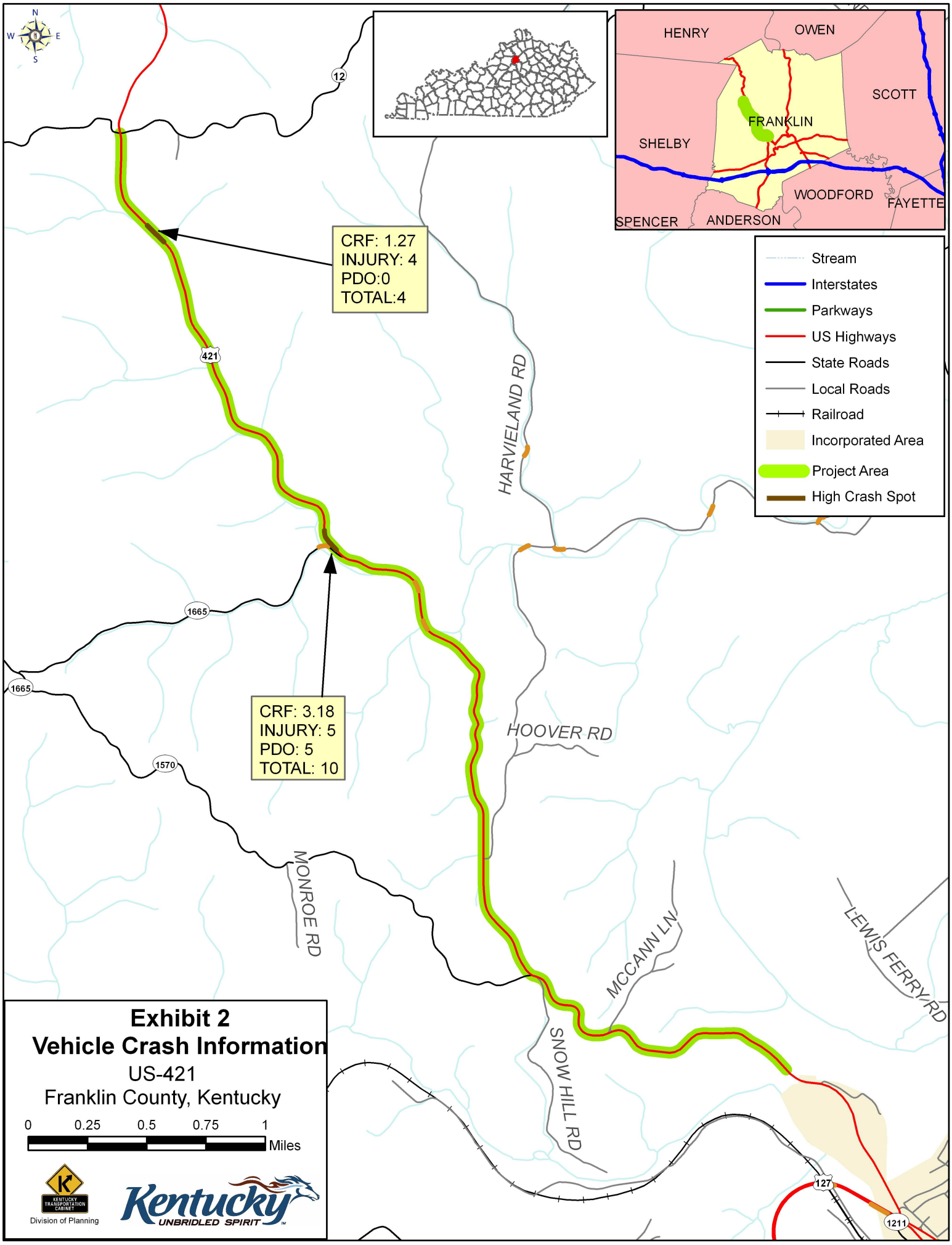
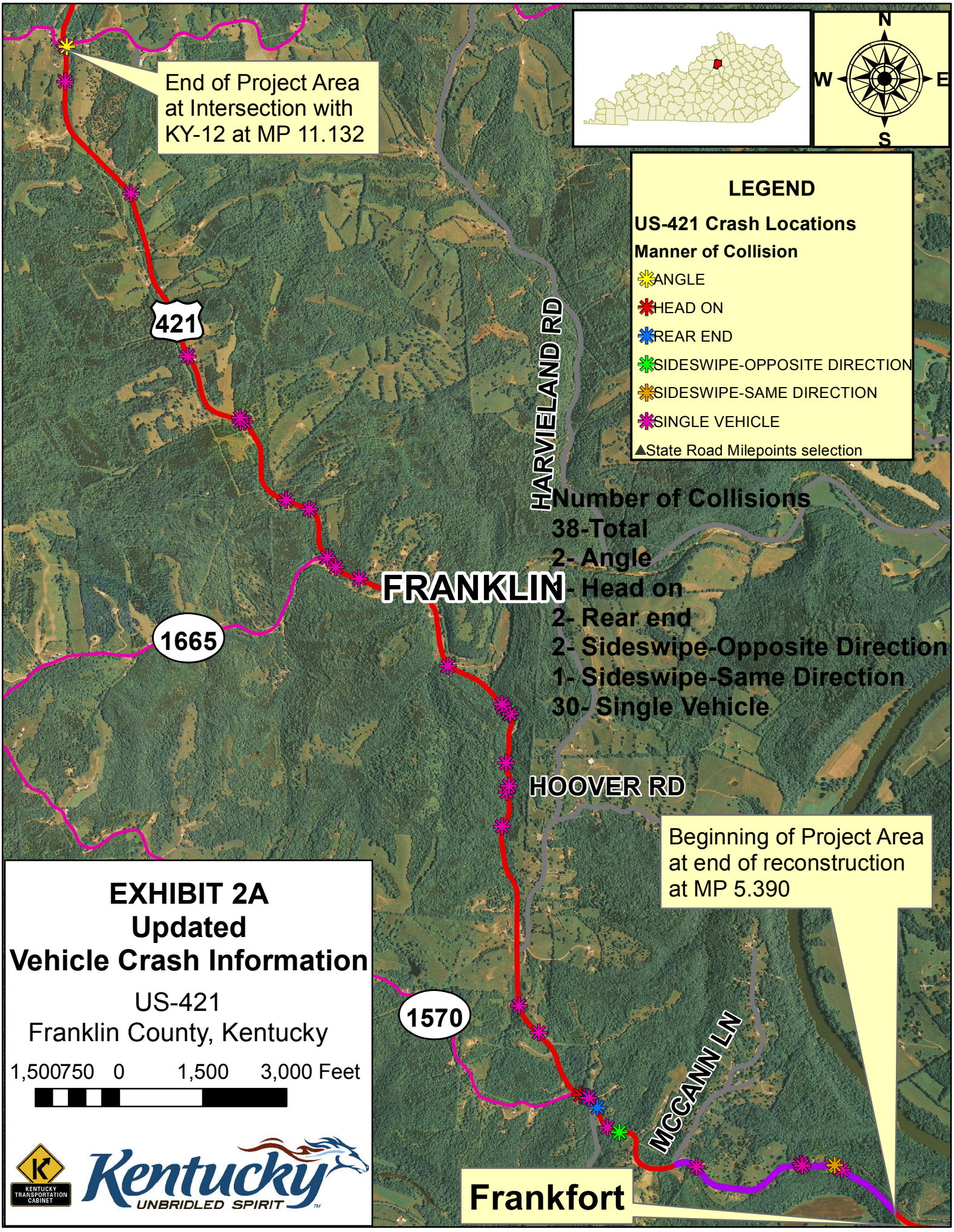
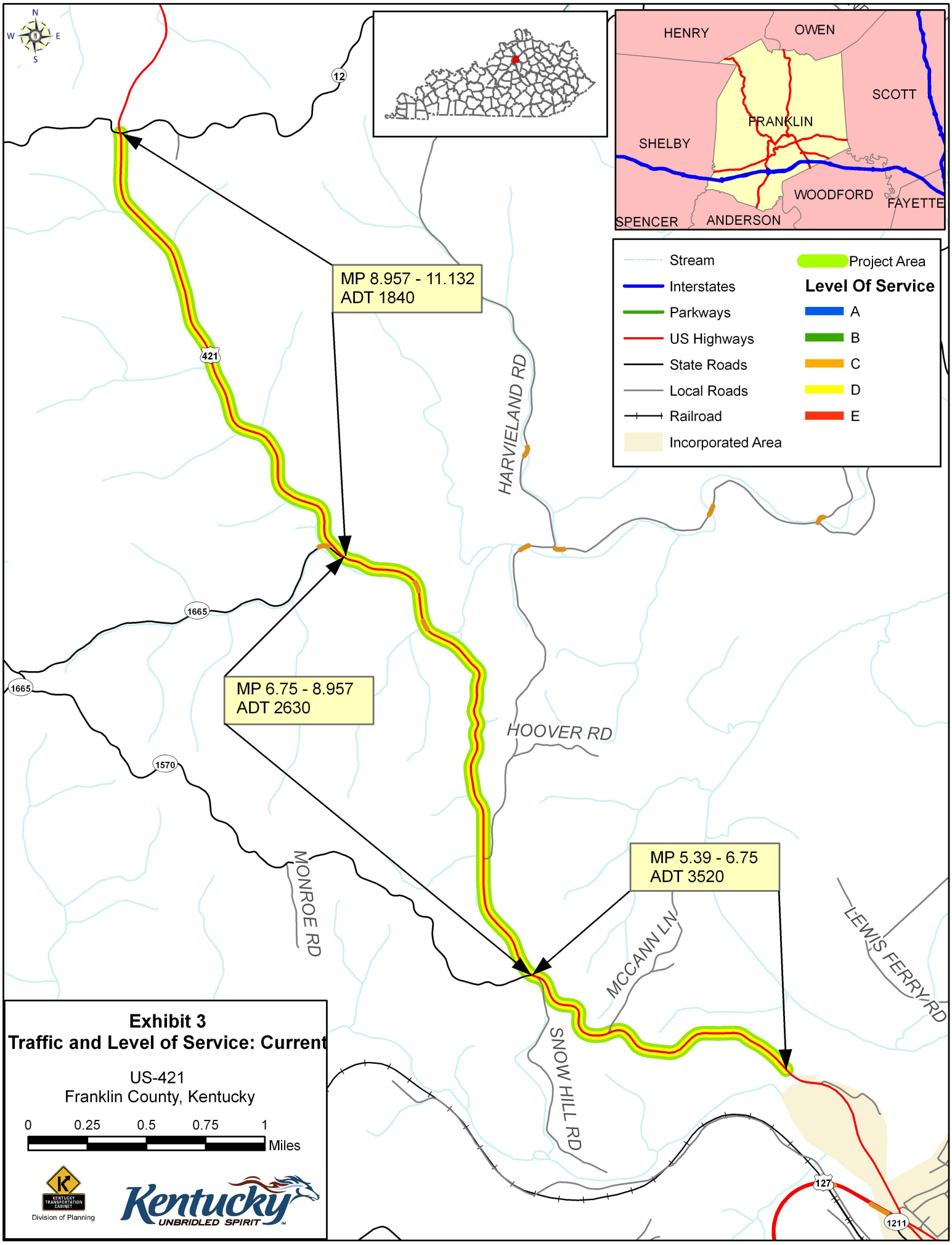


Exhibit 2
Vehicle Crash Information

US-421

Franklin County, Kentucky


End of Project Area at Intersection with KY-12 at MP 11.132
421
HARVIELAND RD
FRANKLIN
1665
HOOVER RD
1570
MCCANN LN
Frankfort
Beginning of Project Area at end of reconstruction at MP 5.390
N
W
E
S
LEGEND
US-421 Crash Locations
Manner of Collision
ANGLE
HEAD ON
REAR END
SIDESWIPE-OPPOSITE DIRECTION
SIDESWIPE-SAME DIRECTION
SINGLE VEHICLE
State Road Milepoints selection
Number of Collisions
38-Total
2- Angle
- Head on
2- Rear end
2- Sideswipe-Opposite Direction
1- Sideswipe-Same Direction
30- Single Vehicle
EXHIBIT 2A
Updated
Vehicle Crash Information
US-421
Franklin County, Kentucky
1,500750 0 1,500 3,000 Feet
KENTUCKY TRANSPORTATION CABINET
Kentucky
UNBRIDLED SPIRIT


HENRY
OWEN
SCOTT
FRANKLIN
SHELBY
WOODFORD
FAYETTE
SPENCER
ANDERSON
Stream
Interstates
Parkways
US Highways
State Roads
Local Roads
Railroad
Incorporated Area
Project Area
Level Of Service
A
B
C
D
E
MP 8.957 - 11.132
ADT 1840
MP 6.75 - 8.957
ADT 2630
MP 5.39 - 6.75
ADT 3520
HARVIELAND RD
HOOVER RD
MONROE RD
MCCANN LN
SNOW HILL RD
LEWIS FERRY RD
12
421
1665
1570
127
1211
Exhibit 3
Traffic and Level of Service: Current
US-421
Franklin County, Kentucky
0
0.25
0.5
0.75
1
Miles
Division of Planning
Kentucky
UNBRIDLED SPIRIT

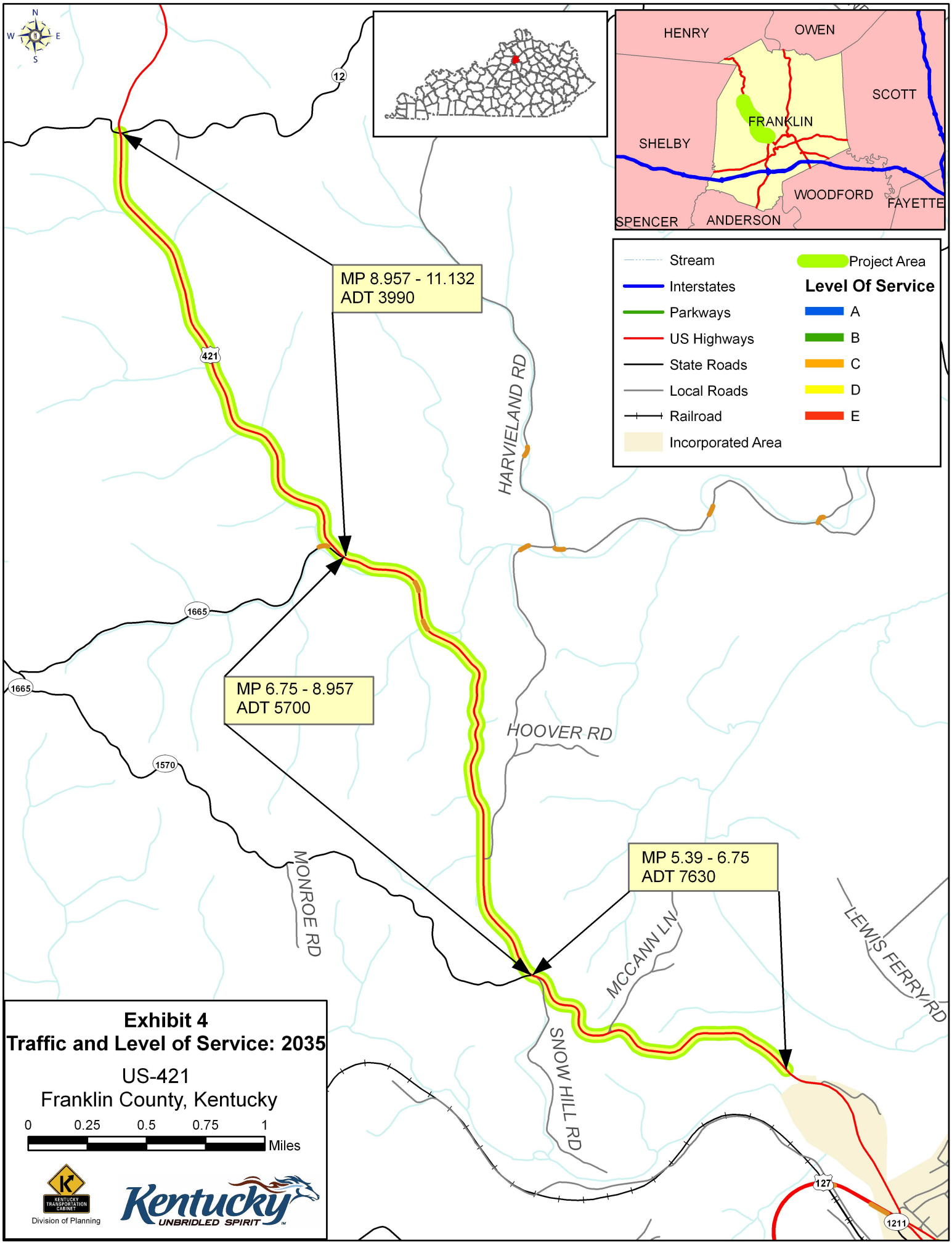
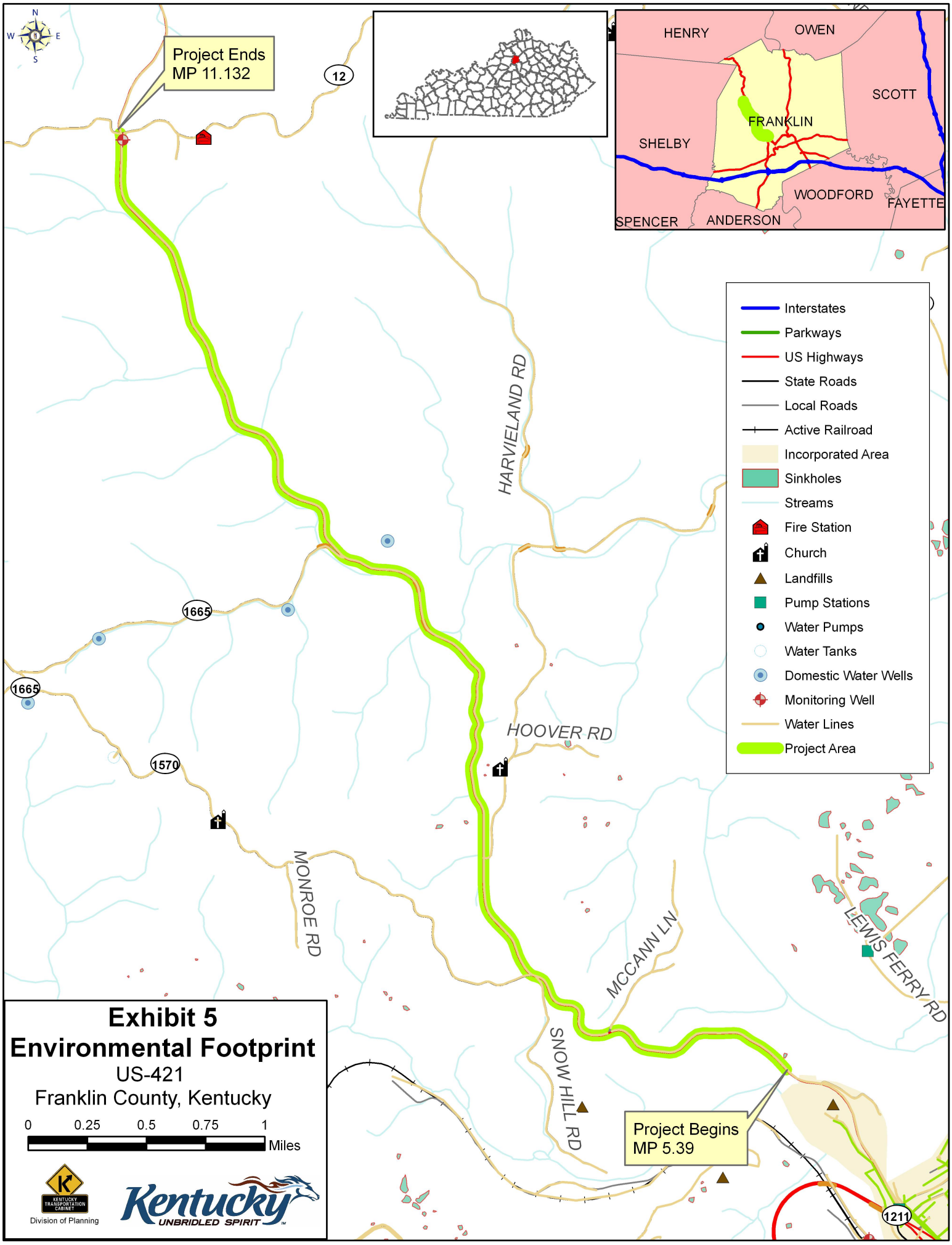


Exhibit 4
Traffic and Level of Service: 2035

US-421
Franklin County, Kentucky


Project Ends
MP 11.132
12
HENRY
OWEN
SCOTT
FRANKLIN
SHELBY
WOODFORD
FAYETTE
SPENCER
ANDERSON
Interstates
Parkways
US Highways
State Roads
Local Roads
Active Railroad
Incorporated Area
Sinkholes
Streams
Fire Station
Church
Landfills
Pump Stations
Water Pumps
Water Tanks
Domestic Water Wells
Monitoring Well
Water Lines
Project Area
HARVIELAND RD
1665
1665
HOOVER RD
1570
MONROE RD
MCCANN LN
LEWIS FERRY RD
SNOW HILL RD
Project Begins
MP 5.39
1211
Exhibit 5
Environmental Footprint
US-421
Franklin County, Kentucky
0
0.25
0.5
0.75
1
Miles
Division of Planning
Kentucky
UNBRIDLED SPIRIT

APPENDIX C

Photo 1 - US 421 at mile point 5.500, looking north

Photo 2 – US 421 at mile point 5.750, looking north

Photo 3 - US 421 at mile point 6.200, looking north

Photo 4 - US 421 at McCann Lane, looking north

Photo 5 – US 421 approaching Snow Hill Road, looking north

Photo 6 - US 421 approaching KY 1570 at mile point 6.750, looking north

Photo 7 - US 421 at mile point 7.000, looking north

Photo 8 - US 421 at mile point 7.500, looking north

Photo 9 – US 421 at mile point 8.000, looking south

Photo 10 - US 421 at mile point 8.300, looking north

Photo 11 – US 421 at mile point 8.950, looking south

Photo 12 - US 421 approaching KY 1665 at mile point 9.000, looking north

Photo 13 – US 421 approaching KY 1665 at mile point 9.150, looking south

Photo 14 – US 421 at mile point 9.400, looking south

Photo 15 – US 421 at mile point 9.900, looking south

Photo 16 – US 421 at mile point 10.600, looking north

Photo 17 – US 421 at mile point 10.700, looking south

Photo 18 – US 421 approaching KY 12 at mile point 11.000, looking north

Photo 19 – US 421 approaching KY 12 at mile point 11.132, looking north

Photo 20 – US 421 at intersection with KY 12 at mile point 11.132, looking west

APPENDIX D

Meeting Minutes
Franklin County Item No. 5-8109.00
US 421 From Frankfort City Limits (also end of previous construction) to KY 12
10:00 a.m. E.S.T. January 20th, 2005

A project team meeting for the US 421 (Franklin County) programming study was held in the Transportation Cabinet Office Building, Room 506 on January 20th, 2005. Those attending the meeting were as follows:

Robert Farley	FHWA
Chris Phillips	District 5 – Planning
Greg Groves	District 5 – Pre-construction
Craig Myatt	District 5 – Maintenance
Gary Bunch	KYTC – Environmental Analysis
Ananias Calvin III	KYTC – Design
Daryl Greer	KYTC – Planning
Jim Wilson	KYTC – Planning
David Martin	KYTC – Planning
Robert Brown	KYTC – Planning

Jim Wilson began the meeting stating the purpose of the meeting was to assist in the development of a programming study on the segment of US 421 in Franklin County. At this point everyone at the meeting introduced themselves.

The project was discussed as outlined on the attached agenda with the observations and conclusions as noted.

2. Project Goals and Objectives

    a. Project Area - Discussion was held concerning the project area as currently standing and if the area should be expanded. Currently the area of the project is from the end of previous reconstruction (also stated as the city limits of Frankfort) to the intersection of US 421 with state route KY 12. There was discussion also about other logical termini for the project that included Harvieland Road, KY 1665 and New Castle in Henry County. The project team decided that there the most logical termini was KY 12 pending new information from future meetings with the local officials.

    b. Prior Reports - There was no previous work.

    c. Roadway Conditions - Gathered data about this project was discussed at this time.

        i) Traffic data - Data shows a decline in the amount of traffic as traffic travels north toward Henry County. There is an ADT of approximately 4500 near the start of the project, and the ADT drops to approximately 1800 at the end of the project. Also noted in the meeting that using HIS

data, the ADT along the same route drops to approximately 800 in southern Henry County. The Level of Service (LOS) was also discussed at the meeting. It was noted that current LOS along the entire corridor is D. Also noted was the LOS was not projected to change through 2030 along any segment of the route.

Concerning truck traffic along the road, there was no truck percentage data found in HIS. There was discussion that trucks are probably traveling on KY 55 instead, because it has been improved.

ii) Crash data - Crash data was discussed in terms of segment crash analysis and spot crash analysis. Tables and maps were distributed to those in attendance showing that the majority of the route had a Critical Rate Factor higher than 1.0 in the segment analysis. Two places were also noted where the critical rate in the spot crash analysis was greater than 1.0. One thing that was brought to the group's attention was the prevalence of wet road conditions at the majority of these accidents. Also noted were the absence of fatalities and the low number of accidents involving injuries and multiple vehicles.

iii) Existing geometry - Two sets of handouts of pictures of the corridor were made available to show, in part, the geometry of the corridor in question. It was also noted that some attendees had recently driven at least part of the route. The road contains multiple curves, both horizontal and vertical, that do not meet the current geometric guidelines of the AASHTO Green Book. A list of all curves in question was distributed to those in attendance. A short discussion was held about the multiple S-curves along the route.

iv) Other - Additional information discussed was the presence of two moderate to large culverts along the route that are designated as bridges in HIS.

The issue of maintenance was also a big concern. Though no data was available from maintenance from District 5 on flooding, there was the common knowledge of the large flood that affected much of the low-lying areas along this route recently. Maintenance had also stated that there have been problems keeping the ditches cleaned out, specifically on the left side of the road traveling northbound. Maintenance has also placed some gabion baskets at some locations to try to keep the road out of the streams. Specific problem locations along the road included near the intersection with KY 1665, where there is a known slip problem just north of this intersection. There were several cross drains, along the entire route, that are in bad condition because they are separating and filling up. Another maintenance issue brought forward is that there is a scheduled resurfacing of this road in Spring 2005.

d) Identify additional information needed to document problems.

i) Environmental Footprint - If the road is reconstructed, the consensus was that much of it would be on new location. An environmental footprint area approximately 2000 feet wide along the existing roadway will probably not be adequate. District 5 will review the topographic maps and suggest an area for the environmental footprint.

ii) Environmental Justice - There were no apparent minority groups or communities in the area in discussion. There is the probability of issues with low-income housing areas and family clusters. The decision was made to request an Environmental Justice Report from the Bluegrass Area Development District.

iii) Real Estate/Relocation Information - There could be some issues with replacement housing if a large number of displacements are required. Most of the houses along the route are on the top of the hills and next to the road. These issues become very important if the road is completely reconstructed.

iv) Utilities - There are common utilities along the route. These include water, electric, cable, etc, but no sewer. It was noted that there are some cell towers along the route. Other than the relocation costs, there are no other apparent unusual utility issues.

v) There are no apparent issues that could have ITS solutions for this corridor. Also there is little need for or issues concerning bikeways, pedestrians, access management, or freight along the road.

e) Identify logical termini – Logical termini that would have to be used in the development of an environmental document in future phases of this project were discussed. There was a proposal by Robert Farley to extend the termini from KY 12 to New Castle in Henry County. If the road is going to be a total reconstruction, Harvieland Road, KY 1665, and KY 12 were discussed as other possible northern termini. There was not a definite conclusion made at the meeting, but further discussion will be held with stakeholders to help further define the purpose and need for the project. This may help clarify the project termini. This decision will also have to be made before any environmental document can be processed.

Other information about the termini included the fact that there is now another project scheduled in the SYP for a 1.5 mile section for design for the reconstruction of the road to Harvieland Road. The schedule is for design in 2008 (Item No. 5-374.00, $650,000 Federal funds).

f) Benefits of the proposed project - The benefits that were discussed for the road were: improved safety, improved geometrics, and reduced maintenance costs. Also discussed at this point was the question of whether a benefit/cost analysis for this study would include the benefit of crash reduction if a new roadway were built.

g) Develop Goals and Objectives - Two goals were agreed upon for this project. The first goal was to improve safety along the route. The second goal was to eliminate geometric deficiencies to improve safety and reduce maintenance. When addressing the second goal, further questions were raised concerning future cost of maintenance along the route if the road is not improved.

3. Probable Design Criteria

a) Functional Class - US 421 along the corridor in question is classified as a Rural Minor Arterial.

b) ATD/DHV - The ADT was discussed earlier and ranges from approximately 4500 to 1800 decreasing as one travels northward.

c) Design Speed - A design speed of 55mph was suggested. This is also the current posted speed limit along the corridor.

d) Typical Section – For purposes of the study it will be assumed that the road will be constructed as a Super Two (two 12-foot lanes with 12 foot shoulders).

e) Other Criteria – Due to the possibility of steep grades, there could be the need for truck climbing lanes. This issue will be investigated briefly as part of the study.

4. Agency Coordination Needs

In addition to those agencies in Franklin County that will be contacted normally, the county judge executive from Henry County will be contacted and then included in the agency coordination mailing list. All utilities involved will also be added to the list.

5. Public Involvement Needs

No public meetings are anticipated during this phase of the project.

6. Documentation/Reports

The project team did not know of any prior reports on the project.

District 5 will be assisting with the cost estimates if needed, taking into consideration the contingency factors to the costs.

Meeting Minutes
Franklin County Item No. 5-8109.00
US 421-Franklin County-Bald Knob Programming Study
Second Project Team Meeting – 10:00 a.m. E.S.T. on June 15, 2010

A second project team meeting for the US 421(Franklin County-Bald Knob) Programming Study was held in the Transportation Cabinet Office Building, Room 503 on June 15, 2010. The meeting began at 10:00 a.m. and ended at 12:30 p.m. The following people attended the meeting:

Brian Meade – District 5 Project Development
Dane Blackburn – District 5 Planning
Keith Damron – Central Office Planning
Steve Ross – Central Office Planning
Jill Asher – Central Office Planning
Tonya Higdon – Central Office Planning

After introductions were made, Tonya Higdon began the meeting by explaining that the most recent project team meeting for this US 421 study was been held in 2005, and that the purpose of the current meeting was to update everyone on the history of this project and to determine the future course for this study. The following items were discussed:

- The first project team meeting was held on January 20, 2005 and was followed with a first local officials meeting on April 1, 2005. Of those in attendance at either meeting, none of the KYTC staff are in the positions originally identified at that time and the many are retired. Julian Carroll still holds the position of State Senator representing Anderson, Franklin and Woodford Counties. Derrick Graham is the State Representative for District 57, which includes the portion of Franklin County containing this study area. The local government officials that attended the last meeting have since been replaced.

- Due in part to retirements and promotions, this study has since been handed down through several individuals before Tonya received in late March of 2010.

- Upon review of the draft report, no recommendations were identified. Tonya and fellow Division of Planning staff then performed a field visit and took photos to gain a greater understanding of the project in question.

- During this field visit, some maintenance issues were raised and brought to the attention of Chris Poe who is the Branch Manager of Project Development and Preservation for this area of District 5. Brian Meade then noted that he would check with Chris on the status of this request.

- A revised draft of this report was developed after the field visit to include a new section on additional information with added photographs and initial project recommendations. This draft was then presented to Tom Hall, Brian and Division of Planning staff in attendance for their review a few weeks prior to this meeting.

- The subject of a new item in the 2010 Highway Plan was then noted as being a part of this study area. This project is item number is 05-0374 and described in the Highway Plan as "Frankfort-Newcastle; Reconstruct US-421 from top of Bald Knob Hill at end of reconstructed section to Harvieland Road." This project was identified to have SP funds with $680,000 for design, $ 2,810,000 for right of way, $1,240,000 for utilities but no construction phase dollars were identified.

- Tonya proceeded to go over this draft report with all meeting attendees and discuss project specific information including describing the study area and areas of concern along this corridor. The major goal of this project is to improve sight distance along this route with particular attention being paid to the intersections of other routes with US 421 as several of these locations have high critical rate factors.

- The intersection of US 421 and KY 12 at mile point 11.132 was initially discussed. At this location, sight distance and access management were considered the main concerns. The recommendation for this location was to lay back the slope of the large earthen bank that can obstruct a motorist's view from the east leg of the intersection with KY 12. Access management control could be addressed through defining the entrance to the convenient store and delineating between the roadway and their parking areas.

- The "Y" intersection of US 421 and KY 1665 at mile point 8.957 was reviewed next. Topographic and environmental concerns were the main limitations at this location as a stream branched just west of this intersection and multiple shoring efforts have been put into place to stabilize a portion of KY 1665. The Critical Rate Factor at this location was 3.18. Long term improvements at this location would involve addressing the "Y" intersection and the steep grades of the KY 1665 approach. A significant amount of earthwork would be required on either direction of the current US 421 alignment. However, by re-aligning US 421 eastward towards the hillside, environmental factors are more likely minimized at this location. This would also provide the KY 1665 approach to this intersection to become aligned near or at the same elevation with US 421. Other alternative routes may need to be considered at this location.

- The adjacent intersections of US 421 with KY 1570 and Snow Hill Road between mile points 6.500-6.750 were then considered. There is also has a high critical rate factor along this segment of roadway. This location has a similar concern with sight distance that could be improved by cutting back an earthen embankment located between KY 1570 and Snow Hill Road along the west side of US 421. Utilities should be considered for relocation as well. Extending the turn radius from US 421 (North leg) onto KY 1570 (West leg) is also a warranted improvement. Snow Hill Road has the added issue of a steep grade when approaching the intersection with US

421. The study recommended further review of the most appropriate connection of Snow Hill Road to US 421 during Phase 1 Design. Since Snow Hill Road is on a steep grade, the approach with the least variation to the intersection with US 421 would be preferred. An environmental review should be performed in concert with this design review to identify the overall best location for a new tie-in or revised tie-in to US 421.

- Another area of concern was recognized between mile points 10.600 to 10.700 as this location had a high critical rate factor. This is the only straight and open segment on the north side of the study area route where passing is permitted. Upon review of the crash data previously collected from the state police collision database, no one particular type of crash was most frequent in occurrence at this location. As such, no specific cause could be identified.

- When comparing the current conditions of this project area with that originally identified back in 2005, rock slides no longer appear to be an issue. No indication of further damage to roadway was apparent after repaving occurred throughout this study area later that year in 2005.

- Further discussion by the attendees of previous and current conditions of the study lead to the conclusion by Brian that this study should be published "As Is". References should be made throughout the study to any updates from the current draft. This will help identify different dates for any further data collected and/or analyzed.

- More recent crash data shall be collected at those spots and segments originally identified to have high Critical Rate Factors for comparison purposes.

- Actual crash reports will be pulled at these locations. Keith Damron and Steve Ross are looking into getting passwords for the corridor team members.

- The most important part of this study is to make sure that project goals get addressed.

- A "First Look Study" for the new project identified will be performed.

- Brian will ask Jason H. to look into potential Highways Safety Improvement Projects (HSIP) during a road audit. He considers this study helpful with that process.

- The district will be responsible for providing preliminary cost estimates on any programmable project identified in this study.

- The project schedule was then discussed before beginning the field visit. Tonya will develop and distribute meeting minutes. This project will then move forward with another Project Team Meeting to include district representatives from various divisions as they pertain to potential programmable projects. Eventually, another local officials meeting should be held to discuss the findings of the study.

Meeting Minutes
Franklin County Item No. 5-0374.00
US 421-Frankfort-Newcastle Pre-design Scoping Study
First Project Team Meeting &
Franklin County Item No. 5-8109.00
US 421-Franklin County-Bald Knob Programming Study
Third Project Team Meeting – 10:00 a.m. E.S.T. on July 30, 2010

The third project team meeting for the US 421(Franklin County-Bald Knob) Programming Study and first project team meeting for US 421 Pre-design Scoping Study was held in the Transportation Cabinet Office Building, Room 512 on July 30, 2010. The meeting began at 10:00 a.m. and ended at 12:45 p.m. The following people attended the meeting:

Brian Meade – District 5 Project Development
Cathy Cornish – District 5 Utilities
Dane Blackburn – District 5 Planning
Greg Garner – District 5 Project Delivery & Preservation
Robert (Bob) Farley – Central Office Design
Ron Matar – Central Office Design Drainage
Tala Quinio – District 5 Design
Tom Hall – District 5 Planning
Keith Damron – Central Office Planning
Steve Ross – Central Office Planning
Jill Asher – Central Office Planning
Sreenu Gutti – Central Office Planning
Tonya Higdon – Central Office Planning

Tonya Higdon began the meeting by thanking everyone for taking the time to attend. She noted this meeting would serve a dual purpose as both the 3rd Project Team Meeting for the Programming Study and as the 1st Project Team Meeting of the Pre-design Scoping Study for the project Identified in the 2010-2012 Kentucky Highway Plan under Item # 05-0374.00. The reason both are being combined in this meeting is due to Item # 05-374.00, forthwith known as the "New Project", being within the study termini of this US-421 Programming Study.

After introductions were made, the purpose of a Pre-design Scoping Study was explained by Tonya to those in attendance. This study follows the Federal Highway Administration (FHWA) Nine elements towards developing a purpose and need statement. These elements are intended to be a guide and are usually not all inclusive. The information collected through the review of these nine steps will help us also identify alternatives and all are welcome at this stage. Keith Damron noted that representative cost estimates would also be needed from District-5 to provide more accurate information on these studies. Keith further stated that this would even apply to those projects with SP funds and that districts should put together a plan on which studies to do next. Brian Meade followed by asking if the districts need to request design funds to do the pre-design

scoping studies. Keith replied, Yes, further stating the request should be somewhere between $5,000-$10,000, unless a forecast is needed. Modeling can be done in the beginning or later. Central Office Planning will work with the districts and the districts will request that Central Office Planning send in the final request to for authorization.

Tonya continued by discussing the current Legislation for the new project to consist of SP funds and stated there is no date or dollar amount defined for construction of this project. Tom Hall then asked, "Where did the Legislation cost estimates come from?" No one was sure and Tom noted it was likely from him at a per mile cost. Keith asked if a Project Identification Form (PIF) had been created for this project. Tonya noted she had looked a while back with no luck. She will check again to see if the estimate came from the PIF and if a construction cost was assigned.

Due to the majority of the current project team being unfamiliar with either project, the meeting continued with the history of the US-421 Programming Study, under Item # 05-8109.00 as well as its connection to Item # 05-0374.00. The progression of both projects was discussed as follows:

- The US-421 Programming Study under Item # 05-8109.00 was identified under the 2002 Kentucky Six-year Highway Plan (FY 2003-2008) and will be known as the "Original Project or Programming Study" throughout the remaining presentation.

- The 1st Project Team Meeting and 1st Local Officials Meeting took place in 2005. Of those in attendance at either meeting, none of the KYTC staff are in the positions originally identified at that time and many are retired. Julian Carroll still holds the position of State Senator representing Anderson, Franklin and Woodford Counties. Derrick Graham is the State Representative for District 57, which includes the portion of Franklin County containing this study area. The local government officials that attended the last meeting have since been replaced.

- Due in part to retirements and promotions, this study has since been reassigned through several project managers before the current Corridor Team received it in late March of 2010.

- The draft report provided no recommendations.

- During a field visit, some maintenance issues were raised and brought to the attention of Brian and Chris Poe, who is the Branch Manager of Project Development and Preservation for District 5. As requested, Brian and Chris both followed up with these requests and it appears that all five locations of interest are being addressed in some form or fashion.

- A revised draft of this report was developed after the field visit to include a new section on additional information and project recommendations.

- The General Assembly approved the 2010-2012 Kentucky Highway Plan in May of 2010 and included Item # 05-0374.00. This project is within the original programming study and runs from the southernmost termini of both projects at MP 5.390 to MP 7.309 at Harvieland Road. Tonya noted that MP 5.390 is the end point of the last improvements to this portion of US-421.

- The 2nd Project Team Meeting for the US-421 Programming Study was held in June 2010 for the purpose of determining the future course of this study and how to proceed with the new project. This meeting concluded that the draft study should remain "As Is" with any references to further data collected and/or analyzed being incorporated into the draft report. Item # 05-0374.00 should have a "1st Look/Pre-design Scoping" Study completed.

- The new project has yet to have design funds authorized and the design year is scheduled for 2010.

- Tonya proceeded to go over the Original Project's draft report with all meeting attendees and discuss project specific information including describing the study area and areas of concern along this corridor including those locations with high Critical Rate Factors (CRF). The major goal of this project, as identified in the 2nd Project Team Meeting, was to reduce crashes along the corridor by improving sight distance along this route. Particular attention should be paid to the intersections of other routes with US-421 as several are within high CRF areas and have geometric deficiencies. Draft recommendations for four particular intersections with US-421 were discussed to include: Snow Hill Road, KY 1570, KY 1665 and KY 12. Tonya requested any further insight from the group on these locations. The project team noted that they did not want to address any area that did not indicate a problem either through public involvement or collisions.

The focus of the presentation was then redirected to primarily address the new project identified by Item # 05-0374.00 with the remainder of the presentation focusing primarily around the remaining nine points to be addressed in developing a purpose and need statement.

- System linkage was reviewed and Tom inquired if the project area was in the urban boundary of Frankfort as it will impact the design? Tonya did not think so but will double check.
- Roadway classifications were discussed with the higher identified truck percentage coming from the HPMS database.
- Modal relationships were also examined and Tom wondered if the Bluegrass Area Development District (BGADD) should attend these meetings. Jill Asher noted that all Area Development Districts (ADD) are on our future lists but this meeting had already been scheduled before the ADDs were incorporated into Pre-Design Scoping Meetings.
- Social demands and economic development were considered.

- Traffic demands, roadway deficiencies and crash data were discussed through the remaining presentation in three separate sections. These sections were broken out due to the need to cover current data for both the Original and New Projects, associated change in Average Daily Traffic (ADT) at each Section as well as to improve the overall level of detail in each slide image.
- Traffic demands may have dropped since Bob Farley pointed out that the Bald Knob School is no longer apart of the project area on KY12. The school closed in 2004, which was after the US-421 Programming Study was originally requested as part of the 2002 Kentucky Highway Plan.
- During the Roadway Deficiencies review, it was noted that all sections did not meet current design standards and that the geometrics of the roadway was a significant issue. However, the two bridges/concrete culverts located in Section 2 had high sufficiency rating.
- Capacity was identified through volume to service flow ratio (VSF), Adequacy Rating and Future ADTs for each section. All sections were found to have a low VSF of 0.25 but with an Adequacy rating of 10.04%,
- Environmental Considerations were discussed from MP 5.390 to MP 11.132 at KY 12 to include two locations for possible Underground Storage Tanks (UST) at MP 6.740 and MP 11.100. The project team inquired if an Environmental Overview had been performed? An Environmental Footprint was provided for this meeting. Keith noted that he will be sending out an example environmental study needed to each District Environmental Coordinator.
- Safety was the next element of the purpose and need statement presented. The new crash data being utilized was from the time frame of January 1, 2007 through December 31, 2009. Crash locations were discussed for each of the three separate sections of the corridor to include manner of collision and type of collision. Mapping was provided to show individual crash areas and locations of high CRFs along the corridor.
- Utilities were also reviewed throughout each of the three corridor sections previously defined. Water lines and meters, overhead electric lines and power poles including telephone and cable were identified throughout all three sections. An electric transmission line was also shown in the database crossing US-421 near MP 6.990. Tonya then asked Cathy if she could get a copy of all the utility names in the study area as well as a contact person and associated telephone number for each. Cathy agreed and asked Tonya to send her a PDF copy of the utility maps via email to give to the utility companies.

After each section was reviewed individually, the project team reviewed photos and video footage of driving each section from both a northbound and southbound perspective. Upon completion of the video on each section, possible options for that particular section were discussed. These options were initially presented as follows to start discussion for all of the sections:

Section (__)

A. No Build-Wait and see what happens under current conditions

B. Improve roadway to current design standards

C. Improve roadway at high segment and/or spot CRF areas

D. Improve the most critical design areas

E. Other ideas?

Of these options, each section was discussed in greater detail more specifically regarding geometric concerns with the associated intersections along that particular section of roadway as well as noting those specific segments and spots along each section with high CRF.

The project team then brainstormed relative idea. Keith noted the plan calls for reconstruction and asked if we want to look at this? Brian stated that the cost for improvements will be outrageous given the number of hills and cut and fill required. Keith agreed the cost per mile will be high and thought $6.5-7 Million per mile for construction costs. Keith agreed and said the ROW will also be costly. Bob noted that spot improvements along this route may not be an option as the entire route has geometric deficiencies, and by fixing one area, we may just move the problem on to another location. Keith asked if we should do a Road Audit. Keith and Brian both agreed that the areas of concern could be addressed throughout the project with HSIP money but consideration must be given to the cost/benefit ratio. Brian did not think this project would have previously qualified for HES money to address geometric problems. He thought we should be able to do with state funds only. The New Project is just short of 2 miles and begins from MP 5.390 at end of reconstruction to MP 7.309 at Harvieland Road.

The project team concluded that the study should have the long-term solution be a total reconstruction with some interim solutions. This total reconstruction will likely not follow the current center line due to the large number of curves with geometric deficiencies. Keith asked to consider reconstruction for both a new alignment and that following the centerline of the roadway as much as possible. Keith and Bob agreed that the reconstruction should be implemented in sections with cost estimates for each of the sections (i.e. Phase I cost separate from Phase II costs).

The project team noted if spot improvements are considered as part of the interim solutions, they should probably be associated with problem intersections. These intersections are more specific to each of the three sections. Also, the project team looked into providing other practical solutions in an attempt to improve safety until an adequate amount of dollars can be provided. The project team agreed that the "Y" intersection with KY 1665 is an issue with significant geometric concerns. Keith asked Greg Garner to check with Jon Wilcoxson to see where this portion of US-421 was on the

Pavement Rehabilitation List. Brian noted that he could find out. Jill offered to check her most recent list as well. Brian considered most spot improvements to be maintenance related and a systematic approach would be needed for the future. The short-term maintenance solutions would include consideration for the following:

- Rumble strips,
- Lay back slopes,
- Delineator posts,
- Clearing trees,
- Raised pavement markers, and
- Tire grip.

Due to geometric limitations, rumble strips may not be doable as the roadway is not wide enough to include and raised pavement markers are no longer allowed on 2 lane roads. It was also mentioned that tire grip may no longer be allowed.

The final options for this project are summarized as follows:

A. No Build
B. Improve roadway through practical solutions following the centerline of the roadway
C. Improve roadway through reconstruction to current design standards with preliminary line and grade but will divide up into sections
D. Improve roadway through intersection and spot improvements, which may require phasing

Once all three sections of the roadway were reviewed individually, the meeting preceded with a summary review of the Original Project termini verses the New Project termini. The Purpose and Need Checklist was discussed once again as an essential aspect in developing a Purpose and Need Statement for the New Project. The draft Purpose and Need Statement was then presented to the project team for review and discussion.

The draft Purpose and Need Statement was provided as follows:

"US-421 provides a direct connection from the Milton-Madison Bridge and Interstate 71 to the City of Frankfort. Existing conditions need improvement to enhance safety and mobility for the purpose of reducing crashes along this corridor. These improvements should accommodate social demands for retail and recreational opportunities."

The revised Purpose and Need Statement was concluded as follows:

"Existing conditions along US-421 need improvement to address geometric deficiencies and safety concerns for the purpose of reducing crashes along this corridor. These improvements should also enhance interregional mobility and economic development with US-421 being a direct connection from the Milton-Madison Bridge and Interstate 71 to the City of Frankfort."

Upon completion of the Purpose and Need Statement, Tonya noted she will review notes from this meeting and provide minutes to all who attended as well as the maps requested by Cathy.

The project team then proceeded to gather for a field visit along US-421 to help the team members become more familiar with the site and more clearly understand the concerns along this corridor.

APPENDIX E

Local Officials Meeting Minutes

US 421 Programming Study, Item No. 5-8109.00
1:00 p.m. EST, April 1st, 2005

A Local Officials meeting for the US 421 (Franklin County) Programming Study was held in the Capitol Annex, 4th Floor Conference Room on April 1st, 2005. Those attending the meeting were as follows:

Julian Carroll	State Senator – District 7
Derrick Graham	State Representative – District 57
Bob Roach	Franklin County Judge Executive
Howard Dawson	Franklin County Fiscal Court
Lambert Moore	Franklin County Fiscal Court
Jewel Johnson	Representative Graham - LRC
Jim Wilson	KYTC – Planning
David Martin	KYTC – Planning
Joe Tucker	KYTC – Planning

David Martin began the meeting stating the purpose of the meeting was to receive feedback and local direction in the development of the programming study. This study will look at the segment of US 421 (Bald Knob Road) in Franklin County from the terminus of the new construction to KY 12 (Flat Creek Road).

Representative Graham noted that the road needed to be expanded to improve driving conditions for those travelling the road. The road users are mainly comprised of commuters and state employees. It was also noted that road improvements may add some economic development opportunities along the corridor. Rep. Graham described it as the most substandard arterial and weakest link coming into Frankfort. Complete reconstruction of this segment was emphasized by the local officials as the option that would be best for resolving the issues along this segment.

Meeting minutes from the Initial Project Team Meeting on January 20th, 2005 were handed out to all attendees.

The project was further discussed as outlined on the attached agenda with the observations and conclusions as noted.

2. Project Issues, Goals and Objectives

a. Project Issues and Purpose - Issues identified were the current substandard conditions of the roadway; curves, mainly horizontal; sight distance at various intersections; rockslides and continuous maintenance; flooding and drainage problems; culverts washing out along with the creek washing out the roadway, and overall stability problems from the hilly terrain. The main purpose for this project was indicated to be safety related for those travelling the road and to construct an improved roadway into the city of Frankfort from the northern part of the county and adjacent northern counties.

b. Project Goals - Goals for the project were noted as safety and reduced maintenance and associated costs. More discussion on this will develop as the study progresses. A brief discussion was given on the road building phases and timetables to inform the officials on the transportation road building process.

c. Logical Termini - In the long range, US 421 should be evaluated to the north into Henry County. This study, however, would end at KY 12 and local efforts should continue to see that further phases are prioritized for inclusion into the Six-Year Plan (6YP). KY 12 is the logical terminus for this project as outlined in the current 6YP. This study will develop phase costs and priorities for sections that can be improved.

It was noted that another project, Item No. 5-374.00, overlays this study from the end of new construction, MP 5.809, to Harvieland Road, MP 7.309. This project is federally funded for design in FY 2007. The monies allocated for this phase are $650,000.

Senator Carroll provided the attendees a pending 6YP to review the project status and associated costs. Additional monies would be required for Phase I Design and Environmental for the entire section to KY 12. This information will be provided to Senator Carroll and Rep. Graham.

Mr. Moore inquired about the status of a slide repair project on KY 1005 in Franklin County. The Division of Planning will look into this and respond to Mr. Moore.

d. Project Area - Discussion was held concerning the project area as currently described and if the area should be expanded. With a new alignment being proposed, the Environmental Overview would need to encompass a larger area to include various corridor options. The Division of Planning will conduct another windshield survey to review the area. Environmental concerns will be prevalent with the existing roadway following the creek bed.

It was explained that a proposed highway configuration could be two 12-foot lanes with full 10 to 12 foot shoulders and a possible truck/passing lane where needed and feasible.

e. Project Benefits - Numerous benefits were mentioned in the progression of this highway project. Those included safety improvements and possible reduction in the number of crashes, a quicker and safer route for commuters and other traffic from the north to get into Frankfort, and to promote economic development. This project is envisioned to resemble the US 127 reconstruction towards Owenton and spur similar development.

f. Prior Reports - The Division of Planning has no record of any other planning studies done on this segment of road. However, the plans for the new section already constructed showed the reconstruction to the top of the hill and approximately only half of the hill portion was constructed. KYTC will check on the old plans and resolve this issue.

g. Roadway Conditions

i) Traffic Data - David Martin handed out a packet of exhibits with a fact sheet showing the current roadway conditions. This data shows a steady decline in the amount of traffic travelling north toward Henry County. There is an average daily traffic (ADT) of approximately 4500 vehicles per day near the start of the project, and the ADT drops to approximately 1800 at the end of the project. It was also mentioned at the meeting that using HIS data the ADT along the same route drops to approximately 800 in southern Henry County beyond the KY 12 intersection. This indicates that the majority of the traffic turns east or west going towards Baghdad and/or Shelbyville.

The Level of Service (LOS) was also discussed at the meeting. It was noted that current LOS along the entire corridor is D. Also noted was the LOS was not projected to change through 2030 along any segment of the route. This LOS is most likely attributed to “percent time following” and not volume, which is indicative of the curvy sections of roadway.

Concerning truck traffic along the road, there was no truck percentage data found in HIS. There was discussion that trucks are probably traveling on KY 55 instead, because it has been improved recently. Numerous officials indicated that a truck lane would be very beneficial at various locations for ease of flow.

ii) **Crash Data** - Crash data was discussed in terms of segment crash analysis and spot crash analysis. The Vehicle Crash Information, Exhibit 4, showed that the majority of the route had a Critical Rate Factor higher than 1.0 in the segment analysis. Two places were also noted where the critical rate in the spot crash analysis was greater than 1.0. One thing that was brought to the group's attention was the prevalence of wet road conditions at the majority of these accidents. Also noted were the absence of fatalities and the low number of accidents involving injuries and multiple vehicles. Mr. Moore indicated that there was a fatality on US 421 north of KY 12 a few years ago near Lebanon Ridge Road.

iii) **Other** - Two sets of handouts of pictures of the corridor were made available to show the geometry of the corridor in question. There were discussions about the various intersections and past flooding problems that have impacted the roadway. The road contains multiple curves, both horizontal and vertical, that do not meet the current geometric guidelines of the AASHTO Green Book.

Rep. Graham indicated that the Bald Knob Elementary School is no longer operating and presently vacant. School traffic, mainly buses, is a major issue because of the long bus ride and dangerous road. It was thought that more buses travel US 421 now since the Bald Knob Elementary School is closed and those students now attend Westridge Elementary School.

h. Additional Information - The issue of maintenance was also a big concern. There was common knowledge of the large flood that affected much of the low-lying areas along this route in August of 2003. KYTC Division of Maintenance has previously stated that there have been numerous problems with maintenance along the roadway. Specific problem locations along the road include the intersection with KY 1665, where there is a known slip problem just north of this intersection. There were several cross drains, along the entire route, that are in bad condition because they are separating and filling up.

It was noted that there have been several improvements to the road and that two of these were at bridge locations possibly as long as 25 years ago.

It was mentioned that existing businesses would not like a relocated roadway if it moves the traffic away from their businesses.

3. Agency Coordination

In addition to those agencies in Franklin County that will be contacted normally, the Henry County Judge Executive and other officials (including the senator and

representative in that area) will be included in the agency coordination mailing list for their comments and input. Additionally, all utilities impacted will also be added to the list. Mr. Dawson indicated there are not many utilities along the roadway except for a 4-inch water line and that no gas lines are present. It was also mentioned that there are several cell towers and a radio station tower located along the ridge.

4. Public Involvement

No public meetings are anticipated during this phase of the project. However, there will be a public meeting(s) if this project moves into the design phase. This will provide ample opportunity for the public to provide their input and comments on this project.

5. Documentation / Reports

The Division of Planning did not know of any prior reports on the project. However, there was mention from local officials of an old study and KYTC will review their files.

6. Follow Up Actions

- The Division of Planning will provide to Senator Julian Carroll the amount of funds required for Phase I Design and Environmental for the entire project segment.

- The Division of Planning will check on the status of the rockslide project, Item No. 5-5009.00, on KY 1005 and respond back to Mr. Lambert Moore.