PROGRAMMING STUDY
CLARK-ESTILL-POWELL COUNTIES
POWER PLANT CONSTRUCTION
TRANSPORTATION IMPACT STUDY

Prepared by the
KENTUCKY TRANSPORTATION CABINET
DIVISION OF PLANNING
March, 2006

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I. INTRODUCTION

A. Study Purpose

The purpose of this Programming Study was to (a) evaluate the roadway network anticipated to be most affected by the proposed construction of power generating plants at Trapp in southeast Clark County and northwest of Irvine in Estill County; (b) determine possible alternatives to improve safety and traffic flow that can be used for future programming documents; (c) provide data to be used when and if the project enters the design phase; (d) provide background information that can be utilized in the National Environmental Policy Act (NEPA) documentation for the project. Tasks undertaken as part of this effort included:

- Identifying project goals and issues
- Determining project termini and potential corridors
- Describing the conditions along the existing roadways
- Identifying preliminary environmental concerns
- Estimating the project costs
- Identifying priority segments for future programming activities
- Initiating contact with public officials, agencies, and the general public

One of the steps in this process was the collection of technical and resource agency input concerning the project. This was accomplished by:

- Compiling information from existing data and reports
- Establishing a project team to provide direction and review for the study
- Coordinating with resource agencies and local officials

B. Scheduled Projects

The 2005 Kentucky Six-Year Highway Plan (FY 2005-2010) includes a bridge replacement project on KY 89 at Ruckerville in Clark County, improvements to KY 89 north of Irvine, and a curve revision project on KY 82 in Estill County at the Salem Church (Milepoint 4.5).

"Because of the enormous impact of the $500 million East Kentucky Power Cooperative power plant being constructed in the Trapp area, ...the Fiscal Court requests the Kentucky Transportation Cabinet (to) review the impact of the plant on the future transportation and public safety needs of Clark County."

Resolution of Clark County Fiscal Court
November 24, 2004.

II. PRELIMINARY PURPOSE AND NEED

Two specific goals were envisioned to be achieved by the completion of this project:

- Provide system connectivity between the Mountain Parkway and proposed power generating facilities at Trapp and Irvine;
- Improve safety by correcting horizontal and vertical curvature deficiencies and bridge weight restrictions, and by providing lane and shoulder widths that meet current standards.

In terms of meeting federal (Federal Highway Administration and Council on Environmental Quality) and Kentucky Transportation Cabinet guidance for development of a purpose and need statement for subsequent project development phases, if any, these two project goals reflect respectively the factors of system linkage, and safety/roadway deficiencies.

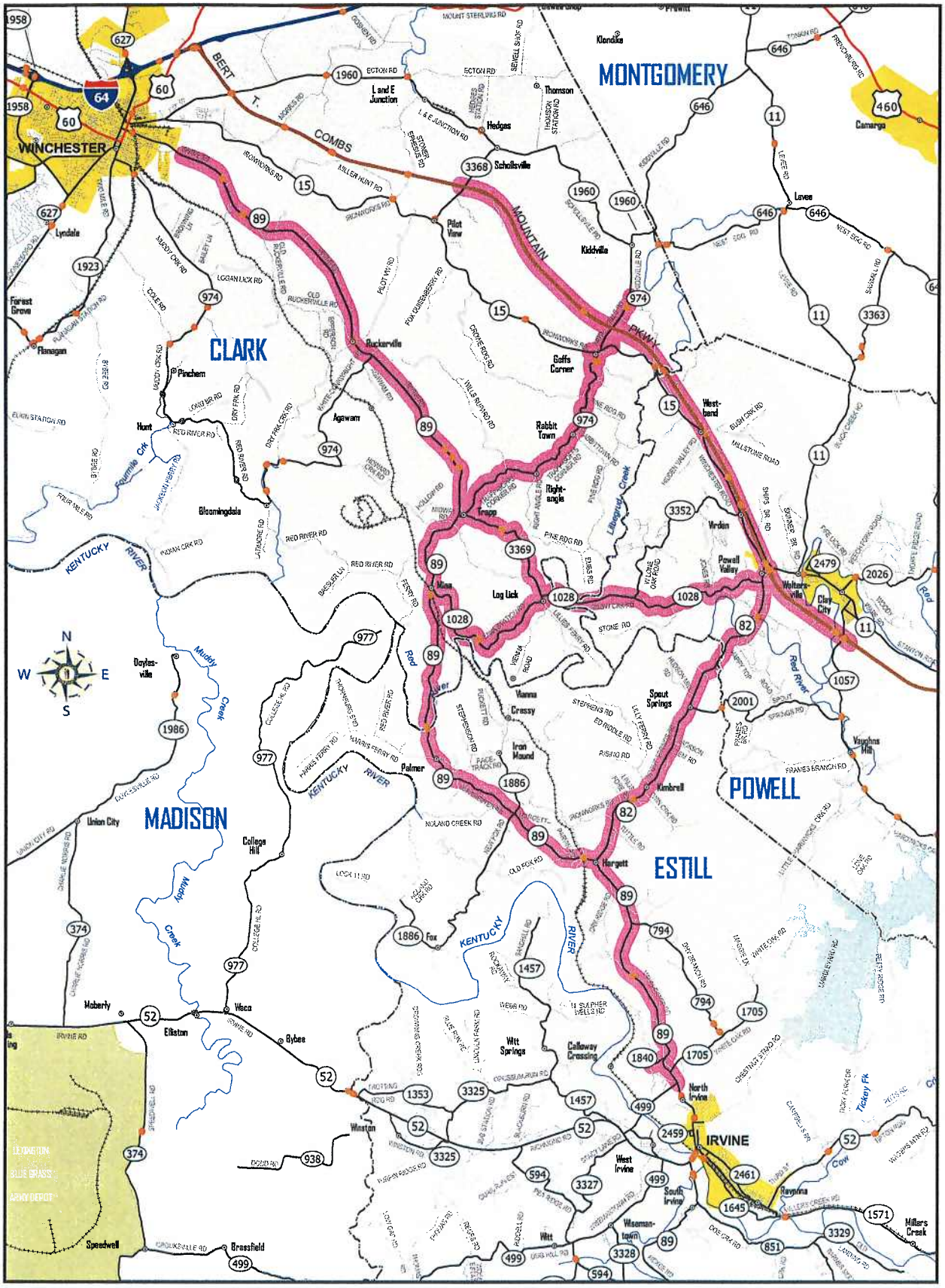
III. PROJECT LOCATION, EXISTING CONDITIONS, AND TRAFFIC

A. Project Location

After initial review by project staff and subsequent discussions with the Cabinet's project team and local elected officials in Clark, Estill, and Powell Counties, the roadway segments identified for analysis were:

- KY 82
  - Estill County: MP 0.00 to MP 5.03
  - Powell County: MP 0.00 to MP 2.06
- KY 89
  - Clark County: MP 0.000 to MP 14.43
  - Estill County: MP 14.58 to MP 22.52
- KY 974
  - Clark County: MP 15.04 to MP 20.26
- KY 1028
  - Clark County: MP 0.00 to MP 3.99
  - Powell County: MP 0.00 to MP 4.71
- KY 3369
  - Clark County: MP 0.00 to MP 2.57
- KY 9000 (Mountain Parkway)
  - Clark County MP 6.43 to MP 11.91
  - Powell County MP 11.91 to MP 18.62

These segments are shown in Exhibit 1.



LEGEND

- Interstate
- Parkway
- US Highway
- State Highway
- Local Road
- Bridge
- Study Roads
- Community
- Study Area
- Incorporated Area
- County Boundary
- River or Stream
- Railroad

2 0 2 4 Miles

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Exhibit 1

Project Location

Trapp-Irvine Regional Transportation Study: Clark, Estill, Powell Counties

B. Existing Highway Features

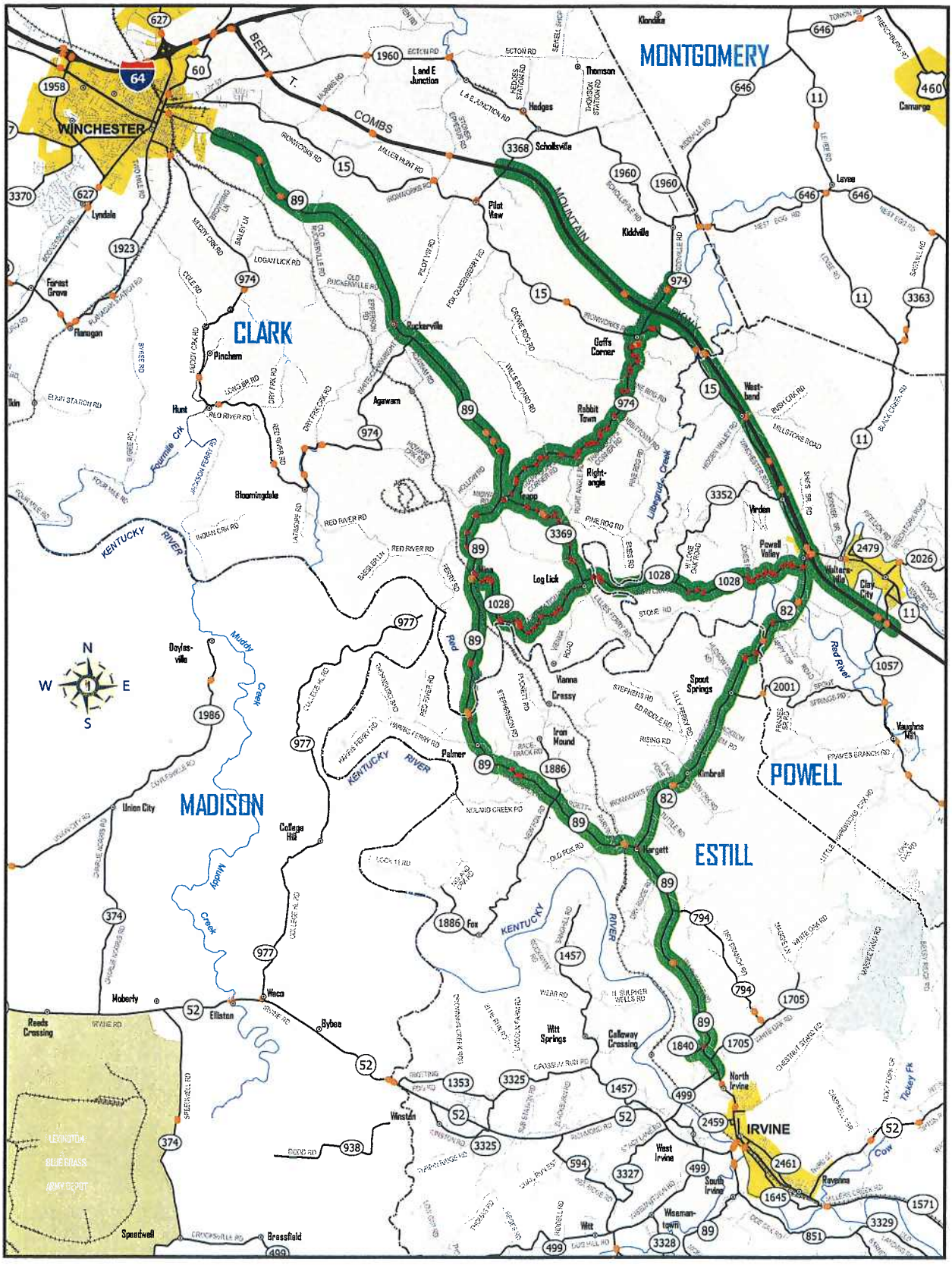
Data on the existing conditions along the roadway segments described above were taken from the Division of Planning's Highway Information System (HIS) database. The study area is located in generally rolling terrain. Passing sight distance varies from zero percent to one hundred percent with a weighted average of about forty percent. As shown in Table 1 and in Exhibit 2, there are one hundred fifteen horizontal curves along these roadway segments which are greater than 9.5 degrees. Further, there are at least seven vertical curves along these roadway segments with approach grades equal to or greater than 4.5 percent as shown in Table 2 and in Exhibit 3. (Note that vertical curve data is not available for all roadway segments included in the study.) Most of the roadway segments in the study area are undivided two-lane highways with lane widths ranging from 7 to 12; the Mountain Parkway segments within the study area have four 12 foot wide lanes. Other than on the Parkway, the shoulder width is generally three feet or less. Lane and shoulder width data are shown in Table 3. The major roadways in the study area (KY 82, KY 89, Mountain Parkway) are paved with a high flexible pavement type, while the other segments (KY 974, KY 1028, KY 3369) are paved with a mixed bituminous pavement type. Widths of existing rights-of-way currently held by the Kentucky Transportation Cabinet range from 40 to 100 feet off the Mountain Parkway and from 200 to 300 feet on the Mountain Parkway as shown in Table 4.

TABLE 1
HORIZONTAL CURVES GREATER THAN 9.5 DEGREES

Route	County	Begin MP	End MP	Degree of Curve
KY 82	Estill	0.000	0.017	10.9
KY 82	Estill	0.017	0.031	25.4
KY 82	Estill	4.462	4.547	13.8
KY 82	Estill	4.701	4.778	13.0
KY 82	Powell	0.356	0.433	14.6
KY 89	Clark	0.975	1.110	10.2
KY 89	Clark	1.635	1.677	13.8
KY 89	Clark	3.262	3.390	11.6
KY 89	Clark	3.444	3.574	10.0
KY 89	Clark	3.775	3.847	10.6
KY 89	Clark	4.139	4.242	10.2
KY 89	Clark	5.671	5.790	12.0
KY 89	Estill	20.706	20.774	11.0
KY 89	Estill	20.774	20.851	12.1
KY 89	Estill	20.933	20.996	10.5
KY 89	Estill	22.405	22.456	10.2
KY 974	Clark	15.070	15.133	21.8
KY 974	Clark	15.292	15.331	10.1
KY 974	Clark	15.493	15.554	10.9

Route	County	Begin MP	End MP	Degree of Curve
KY 974	Clark	15.554	15.591	21.7
KY 974	Clark	15.591	15.633	19.8
KY 974	Clark	15.833	15.855	14.8
KY 974	Clark	15.855	15.910	16.2
KY 974	Clark	16.108	16.151	26.1
KY 974	Clark	16.179	16.198	10.7
KY 974	Clark	16.249	16.351	10.1
KY 974	Clark	16.398	16.448	26.7
KY 974	Clark	16.724	16.769	14.0
KY 974	Clark	16.769	16.815	11.9
KY 974	Clark	17.033	17.121	19.3
KY 974	Clark	17.159	17.227	12.5
KY 974	Clark	17.377	17.398	17.3
KY 974	Clark	17.446	17.486	15.6
KY 974	Clark	17.510	17.560	28.2
KY 974	Clark	17.580	17.610	44.4
KY 974	Clark	17.640	17.658	28.0
KY 974	Clark	17.735	17.786	17.3
KY 974	Clark	17.816	17.880	23.8
KY 974	Clark	17.939	17.961	11.1
KY 974	Clark	17.993	18.056	13.1
KY 974	Clark	18.286	18.319	14.4
KY 974	Clark	18.614	18.647	10.6
KY 974	Clark	18.806	18.839	53.8
KY 974	Clark	18.909	18.959	31.2
KY 974	Clark	19.210	19.230	18.3
KY 974	Clark	19.298	19.334	19.7
KY 974	Clark	19.361	19.427	22.1
KY 974	Clark	19.557	19.626	22.3
KY 974	Clark	19.675	19.707	34.7
KY 974	Clark	19.740	19.794	24.2
KY 974	Clark	19.882	19.952	23.6
KY 974	Clark	20.053	20.114	41.7
KY 1028	Clark	0.025	0.105	11.0
KY 1028	Clark	0.217	0.252	19.7
KY 1028	Clark	0.299	0.322	22.9
KY 1028	Clark	0.379	0.536	13.4
KY 1028	Clark	1.183	1.299	9.6
KY 1028	Clark	1.518	1.534	39.9
KY 1028	Clark	1.596	1.669	21.4
KY 1028	Clark	1.669	1.741	15.1
KY 1028	Clark	1.741	1.8	22.9
KY 1028	Clark	1.937	1.96	23.0
KY 1028	Clark	2.024	2.063	43.8
KY 1028	Clark	2.124	2.160	17.5
KY 1028	Clark	2.190	2.217	15.5
KY 1028	Clark	2.297	2.330	27.0
KY 1028	Clark	2.407	2.444	22.7
KY 1028	Clark	2.444	2.471	11.4

Route	County	Begin MP	End MP	Degree of Curve
KY 1028	Clark	2.471	2.488	15.6
KY 1028	Clark	2.638	2.661	16.9
KY 1028	Clark	2.731	2.751	36.6
KY 1028	Clark	2.751	2.805	9.6
KY 1028	Clark	2.836	2.862	31.6
KY 1028	Clark	2.914	2.952	13.0
KY 1028	Clark	3.132	3.155	17.7
KY 1028	Clark	3.323	3.344	15.0
KY 1028	Clark	3.428	3.446	25.4
KY 1028	Clark	3.478	3.495	12.8
KY 1028	Clark	3.923	3.956	13.5
KY 1028	Powell	0.036	0.132	12.7
KY 1028	Powell	0.157	0.189	34.0
KY 1028	Powell	1.996	2.045	32.6
KY 1028	Powell	2.154	2.234	10.2
KY 1028	Powell	2.295	2.365	12.0
KY 1028	Powell	2.729	2.774	11.8
KY 1028	Powell	2.799	2.843	14.5
KY 1028	Powell	2.843	2.874	24.8
KY 1028	Powell	2.906	2.932	30.1
KY 1028	Powell	3.025	3.07	28.0
KY 1028	Powell	3.316	3.352	33.1
KY 1028	Powell	3.372	3.411	27.8
KY 1028	Powell	3.433	3.503	18.4
KY 1028	Powell	3.586	3.619	18.9
KY 1028	Powell	3.705	3.746	23.8
KY 1028	Powell	3.776	3.841	24.5
KY 1028	Powell	3.890	3.919	11.9
KY 1028	Powell	3.939	3.984	25.5
KY 1028	Powell	4.028	4.045	11.7
KY 1028	Powell	4.204	4.239	12.6
KY 1028	Powell	4.273	4.311	24.5
KY 1028	Powell	4.338	4.363	23.8
KY 1028	Powell	4.378	4.406	41.2
KY 1028	Powell	4.406	4.436	12.6
KY 1028	Powell	4.466	4.501	19.2
KY 1028	Powell	4.615	4.711	13.1
KY 3369	Clark	0.389	0.435	11.9
KY 3369	Clark	0.480	0.527	27.3
KY 3369	Clark	0.571	0.601	12.3
KY 3369	Clark	0.79	0.821	13.5
KY 3369	Clark	1.240	1.271	13.5
KY 3369	Clark	1.342	1.384	11.9
KY 3369	Clark	1.440	1.50	38.3
KY 3369	Clark	1.622	1.685	18.7
KY 3369	Clark	2.067	2.098	11.9
KY 3369	Clark	2.130	2.158	10.5



Source: KYTC Highway Information System

LEGEND

- Horizontal curves greater than 9.5 degrees
- Study Roads
- Study Area

2 0 2 4 Miles

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Exhibit 2

Horizontal curve greater than 9.5 degrees

Trapp-Irvine Regional Transportation Study: Clark, Estill, Powell Counties

TABLE 2
VERTICAL CURVES WITH GRADES GREATER THAN 4.5%

Route	County	Begin MP	End MP	Percent of Grade (Range)
KY 82	Estill	4.350	4.660	4.5-6.4%
KY 82	Powell	0.500	0.800	4.5-6.4%
KY 82	Powell	1.660	1.780	4.5-6.4%
KY 82	Powell	1.780	1.890	4.5-6.4%
KY 89	Estill	19.450	19.880	4.5-6.4%
KY 89	Estill	20.820	21.400	4.5-6.4%
KY 89	Estill	21.980	22.520	4.5-6.4%

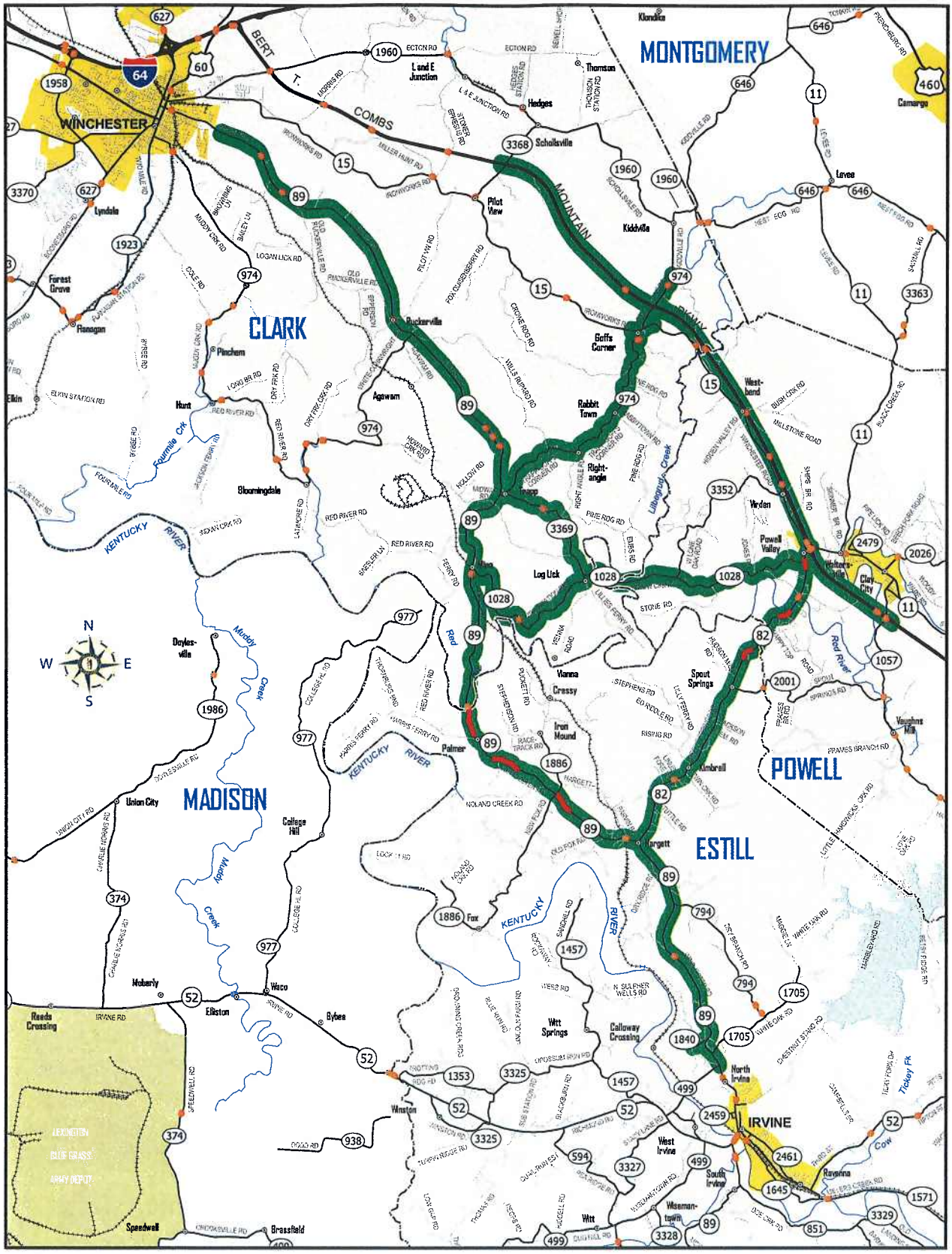
Note: Vertical curve data not available on all roadway segments

Long term there will be 30 coal trucks per day, 38 daily truck shipments of limestone, and additional shipments of fuel oil (at the proposed Trapp facility).

East Kentucky Power Cooperative

Posted speed limits and Roadway Adequacy Ratings along the study segments are shown in Table 5 while Table 6 lists, and Exhibit 4 shows, structures and their structural sufficiency ratings. Three structures (Bridge Numbers B00017, B00035, and B00092) have structural sufficiency ratings less than fifty, meaning they are eligible for rehabilitation or replacement under the Federal Bridge Replacement Program. Functional classifications of area roadways as well as their classification for state maintenance purposes are shown in Table 7. Table 8 lists, and Exhibit 5 shows, the truck weight classification for study area roadway segments, as well as whether that segment is on the Extended Weight System and/or the Coal Haul Highway System. There are no "at-grade" rail-highway crossings along the study area roadway segments. However, a trunk line of the CSX Transportation System operates in the region and serves the site of each proposed power generating plant. This trunk line has a medium density of current utilization, with between twenty and fifty million gross ton-miles per mile of commodities shipped annually, and connects to numerous coal tipples in Perry and surrounding counties. More information about this rail line can be found in the Kentucky Transportation Cabinet's 2002 Kentucky Statewide Rail Plan available at this web site: http://transportation.ky.gov/Multimodal/railsystems.htm.

Except for the Mountain Parkway, none of the area highway segments are part of the Kentucky portion of the National Truck Network or the National Highway System. None of the study segment roadways are part of the National or Kentucky Scenic Byway System, the Forest Highway System, or the Bicycle Route System.



Source: KYTC Highway Information System

LEGEND

- Vertical curves greater than 4.5 %
- Study Roads
- Study Area

2 0 2 4 Miles

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Exhibit 3

Vertical curves greater than 4.5 %

Trapp-Irvine Regional Transportation Study: Clark, Estill, Powell Counties

TABLE 3
LANE AND SHOULDER WIDTHS

Route	County	Begin MP	End MP	Lane Width	Shoulder Width
KY 82	Estill	0.000	5.029	9	2
KY 82	Powell	0.000	2.058	10	3
KY 89	Clark	0.000	15.955	9-10	2-6
KY 89	Estill	12.811	22.520	9	2
KY 974	Clark	15.036	21.474	8	1
KY 1028	Clark	0.000	3.991	7	1
KY 1028	Powell	0.000	4.771	8	2
KY 3369	Clark	0.000	2.574	9-12	1
KY 9000	Clark	6.433	11.913	12	8
KY 9000	Powell	11.913	18.625	12	10

TABLE 4
AVERAGE RIGHTS-OF-WAY WIDTH

Route	County	Begin MP	End MP	Avg R/W Width in Feet
KY 82	Estill	0.000	5.029	60
KY 82	Powell	0.000	2.058	60-100
KY 89	Clark	0.000	15.955	40-60
KY 89	Estill	12.811	22.520	75
KY 974	Clark	15.036	21.474	50
KY 1028	Clark	0.000	3.991	45
KY 1028	Powell	0.000	4.771	50
KY 3369	Clark	0.000	2.574	45
KY 9000	Clark	6.433	11.913	200
KY 9000	Powell	11.913	18.625	300

TABLE 5
POSTED SPEED LIMITS AND ADEQUACY RATINGS

Route	County	Begin MP	End MP	Posted Speed Limit	Adequacy Rating Percentile
KY 82	Estill	0.000	5.029	55	39
KY 82	Powell	0.000	1.800	55	30
KY 82	Powell	1.800	2.058	45	46
KY 89	Clark	0.000	14.885	55	75
KY 89	Estill	12.811	22.520	55	13
KY 974	Clark	15.036	21.474	55	N/A*
KY 1028	Clark	0.000	3.991	55	N/A*
KY 1028	Powell	0.000	4.771	55	N/A
KY 3369	Clark	0.000	2.574	55	N/A*
KY 9000	Clark	6.433	11.913	65	100
KY 9000	Powell	11.913	18.625	65	100

* Insufficient data available to calculate

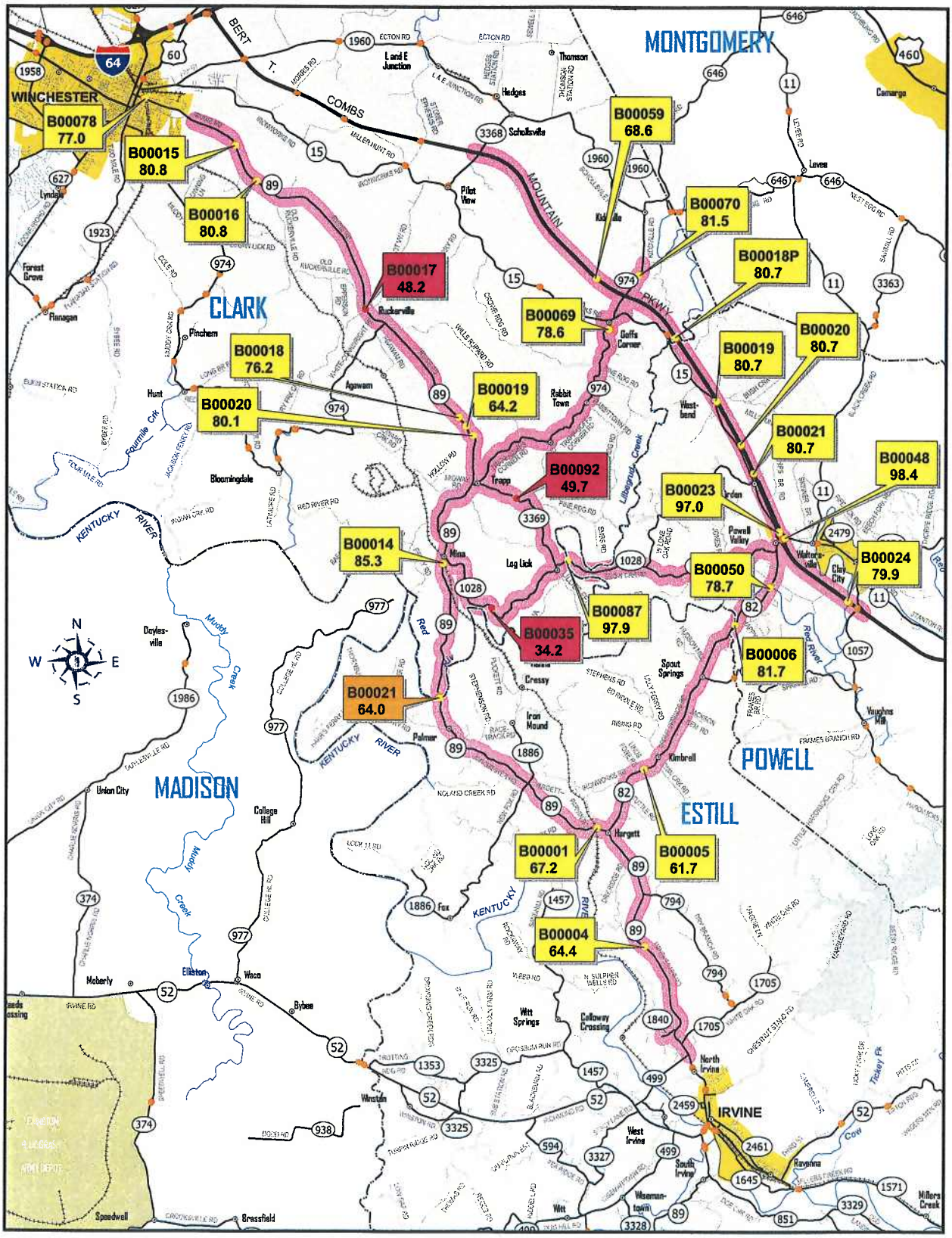
TABLE 6
STRUCTURE DATA

Route	County	MP	Bridge Number	Sufficiency Rating
KY 82	Estill	1.515	B00005	61.7
KY 82	Estill	5.025	B00006	81.7
KY 82	Powell	1.084	B00050	78.7
KY 89	Clark	0.000	B00021	64.0
KY 89	Clark	2.789	B00014	85.3
KY 89	Clark	5.737	B00020	80.1
KY 89	Clark	5.977	B00019	64.2
KY 89	Clark	6.205	B00018	76.2
KY 89	Clark	9.144	B00017	48.2
KY 89	Clark	12.821	B00016	80.8
KY 89	Clark	13.639	B00015	80.8
KY 89	Clark	15.770	B00078	77.0
KY 89	Estill	15.280	B00004	64.4
KY 89	Estill	18.142	B00001	67.2
KY 974	Clark	20.040	B00069	78.6
KY 974	Clark	21.254	B00070	81.5
KY 1028	Clark	1.700	B00035	34.2
KY 1028	Clark	3.991	B00087	97.9
KY 3369	Clark	1.737	B00092	49.7
KY 9000	Clark	9.883	B00059	68.6
KY 9000	Clark	9.884	B00059P	68.6
KY 9000	Powell	11.913	B00018	79.7
KY 9000	Powell	11.914	B00018P	80.7
KY 9000	Powell	13.433	B00019	80.7
KY 9000	Powell	14.421	B00020	80.7
KY 9000	Powell	15.017	B00021	80.7
KY 9000	Powell	16.246	B00023	97.0
KY 9000	Powell	16.275	B00022	81.8
KY 9000	Powell	18.223	B00024	79.9
KY 9000	Powell	18.224	B00024P	79.9

TABLE 7
FUNCTIONAL AND STATE MAINTENANCE CLASSIFICATION OF ROADWAY SEGMENTS

Route	County	Begin MP	End MP	Functional Classification*	SPRS Classification
KY 82	Estill	0.000	5.029	Major Collector	State Secondary
KY 82	Powell	0.000	2.058	Major Collector	State Secondary
KY 89	Clark	0.000	14.828	Major Collector	State Secondary
KY 89	Estill	12.811	22.520	Major Collector	State Secondary
KY 974	Clark	15.036	21.474	Minor Collector	Rural Secondary
KY 1028	Clark	0.000	3.617	Local	Rural Secondary
KY 1028	Clark	3.617	3.991	Minor Collector	Rural Secondary
KY 1028	Powell	0.000	4.771	Minor Collector	Rural Secondary
KY 3369	Clark	0.000	2.574	Minor Collector	Rural Secondary
KY 9000	Clark	6.433	11.913	Principal Arterial	State Primary
KY 9000	Powell	11.913	18.625	Principal Arterial	State Primary

* Rural, unless otherwise indicated



Source: KYTC Highway Information System

LEGEND

- B00000 99.9 — Sufficiency rating 50 or greater
- B00000 99.9 — Sufficiency rating 50 or greater but load limit below standard
- B00000 99.9 — Sufficiency rating less than 50
- Study Roads
- Study Area

2 0 2 4 Miles

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Exhibit 4

Bridge Sufficiency Ratings

Trapp-Irvine Regional Transportation Study: Clark, Estill, Powell Counties

TABLE 8
TRUCK WEIGHT CLASSIFICATION, EXTENDED WEIGHT, AND COAL HAUL HIGHWAY SYSTEM DATA

Route	County	Begin MP	End MP	Truck Weight Classification	Extended Weight System	On Coal Haul Highway System
KY 82	Estill	0.000	5.029	AA	No	No
KY 82	Powell	0.000	2.058	AAA	No	No
KY 89	Clark	0.000	15.955	AAA	No	No
KY 89	Estill	12.811	22.520	AAA	No	No
KY 974	Clark	15.036	21.474	A	No	No
KY 1028	Clark	0.000	3.991	A	No	No
KY 1028	Powell	0.000	4.771	AAA	No	No
KY 1840	Estill	0.000	0.354	AAA	No	No
KY 3369	Clark	0.000	2.574	A	No	No
KY 9000	Clark	6.433	11.913	AAA	Yes	Yes
KY 9000	Powell	11.913	18.625	AAA	Yes	Yes

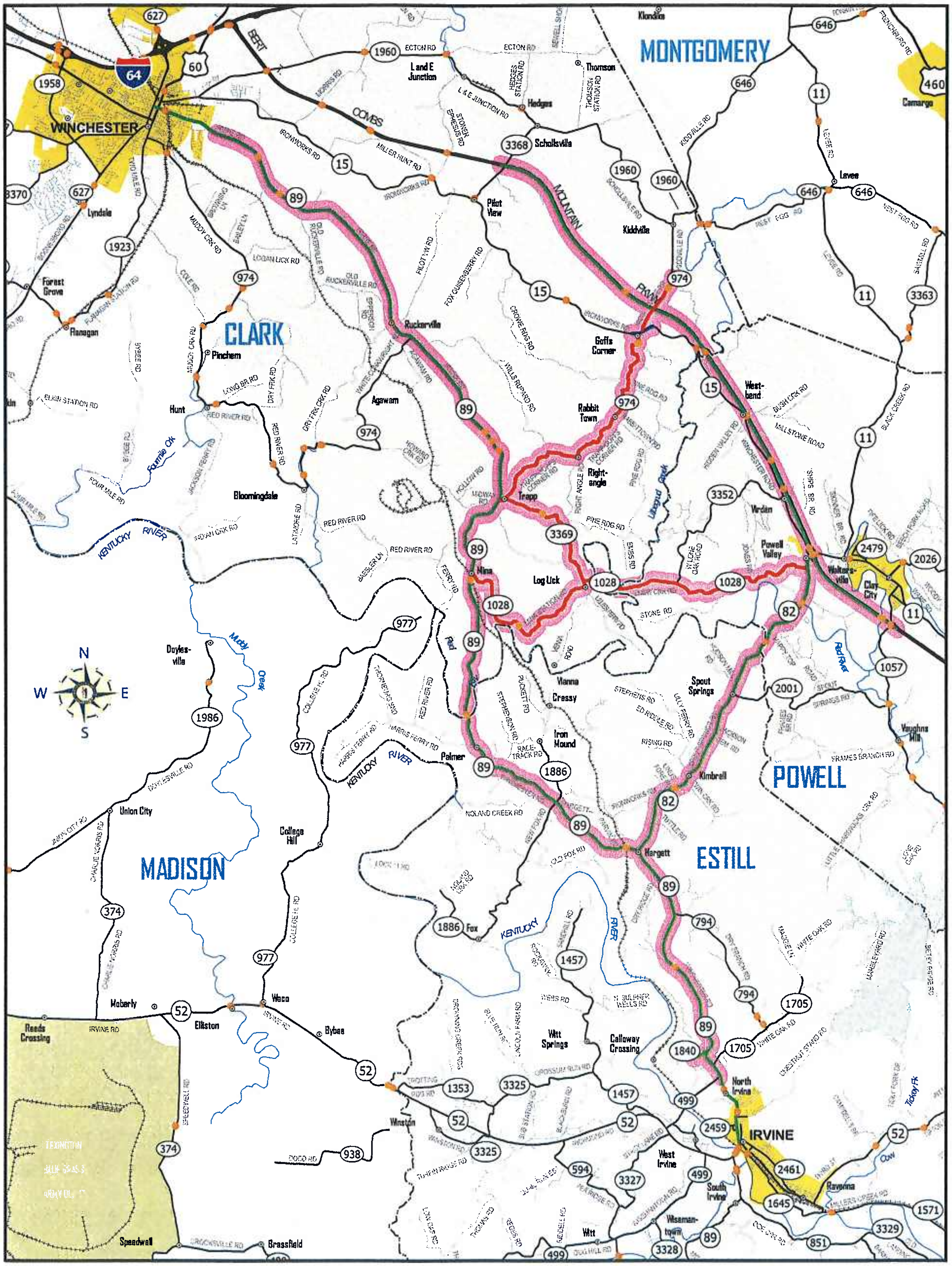
C. Highway Systems

As shown in Table 7, the functional classification of highway segments in the study area ranges from Principal Arterial to Local. The Mountain Parkway is classified as a Principal Arterial which is the highest functional classification possible for a highway. Principal Arterial routes serve traffic with substantial statewide origins and destinations. KY 82 and KY 89 are each functionally classified as Major Collector routes; this classification describes highway segments that principally serve shorter, inter-county trips. KY 974, KY 1028 between Powell Valley and Log Lick, and KY 3369 are classified as Minor Collector routes which serve lower volume inter-county trips. Finally, KY 1028 between Mina and Log Lick is classified as a Local route, meaning most traffic is of local purpose.

D. Vehicle Crash Analysis

A total of 486 vehicle crashes were recorded with valid reference points on the study highway segments during the six-year period between January 1, 1999 and December 31, 2004 as shown in Exhibit 6. One hundred eight-one (181) of the crashes produced injuries to at least one person, while thirteen crashes resulted in fatalities. Table 9 depicts an analysis of the study highway segments. As indicated therein, there are no segments with a critical rate factor (CRF) in excess of 1.0; however one section has a CRF of just below 1.0. [1] Pinpointing spots within these sections indicate seven spots with a CRF in excess of 1.0.

1. The critical crash rate factor (CRF) is the quotient of the crash rate for a roadway spot or segment divided by the critical crash rate for roadway spots or sections based on the roadway type, number of lanes, and median type. The critical crash rate is the sum of the average crash rate for a given roadway type plus a factor which measures the exposure (vehicle miles of travel) to possible crashes. A critical crash rate factor greater than one is indicative of the statistical probability that crashes are not occurring randomly at the spot or in that segment.



Source: KYTC Highway Information System

LEGEND

Truck Weight Classification Road Segments:

AAA (80,000 lbs gross weight)

AA (62,000 lbs gross weight)

A (40,000 lbs gross weight)

Study Roads

Study Area

2 0 2 4 Miles

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Exhibit 5

Truck Weight Classification

Trapp-Irvine Regional Transportation Study: Clark, Estill, Powell Counties

TABLE 9
CRASH DATA OVERVIEW

Route	County	Begin MP	End MP	Total Number of Crashes	Critical Total Crash Rate Factor	Number of Injury Crashes	Number of Fatal Crashes
KY 82	Estill	0.000	1.980	9	0.222	1	0
KY 82	Estill	1.980	3.798	12	0.244	6	1
KY 82	Estill	3.798	5.029	15	0.422	7	0
KY 82	Powell	0.000	1.183	23	0.668	10	0
KY 82	Powell	1.183	1.856	22	0.809	7	1
KY 82	Powell	1.856	2.058	0	0.000	0	0
KY 89	Clark	0.000	2.921	14	0.499	5	0
KY 89	Clark	2.921	3.930	7	0.556	2	0
KY 89	Clark	3.930	4.270	5	0.821	1	0
KY 89	Clark	4.270	4.815	6	0.728	2	0
KY 89	Clark	4.815	5.115	3	0.340	0	0
KY 89	Clark	5.115	7.500	21	0.501	9	1
KY 89	Clark	7.500	7.658	1	0.171	0	0
KY 89	Clark	7.658	8.662	7	0.333	0	0
KY 89	Clark	8.662	8.770	1	0.171	0	0
KY 89	Clark	8.770	8.921	0	0.000	0	0
KY 89	Clark	8.921	11.400	28	0.468	12	1
KY 89	Clark	11.400	11.614	0	0.000	0	0
KY 89	Clark	11.614	12.370	6	0.264	1	0
KY 89	Clark	12.370	13.644	14	0.407	7	1
KY 89	Clark	13.644	14.828	17	0.515	6	0
KY 89	Estill	13.400	14.099	11	0.425	3	1
KY 89	Estill	14.099	17.903	43	0.371	14	0
KY 89	Estill	17.903	22.520	34	0.763	13	3
KY 974	Clark	15.036	18.930	10	0.840	4	0
KY 974	Clark	18.930	20.260	8	0.848	2	0
KY 1028	Clark	0.000	3.617	2	0.355	1	0
KY 1028	Clark	3.617	3.726	0	0.000	0	0
KY 1028	Clark	3.726	3.991	0	0.000	0	0
KY 1028	Powell	0.000	1.693	0	0.000	0	0
KY 1028	Powell	1.693	3.719	9	0.829	4	0
KY 1028	Powell	3.719	4.771	6	0.666	4	0
KY 3369	Clark	0.000	2.574	11	**0.980**	1	1
KY 9000	Clark	6.433	9.883	29	0.399	14	1
KY 9000	Clark	9.883	11.913	33	0.712	12	1
KY 9000	Powell	11.913	16.412	58	0.634	26	1
KY 9000	Powell	16.412	18.471	21	0.481	7	0
KY 9000	Powell	18.471	18.625	0	0.000	0	0

Source: CRASH data for six-year period between January 1, 1999 and December 31, 2004

Specific crash data summaries were prepared for the seven spots for which the CRF exceeded 1.0; this information is summarized in Tables 10 and 11. In general terms, it does not appear that there are any discernable commonalities at these seven spots except for the preponderance of single vehicle crashes.

TABLE 10
CRASH DATA SPOTS

County	Route	Beginning MP	Ending MP	Number of Crashes	Spot CRF
Powell	KY 1028	3.8	4.1	4	1.68
Clark	KY 89	9.149	9.449	9	1.40
Clark	KY 974	19.578	19.878	3	1.33
Powell	KY 1028	2.6	2.9	3	1.26
Clark	KY 3369	1.237	1.537	2	1.20
Powell	KY 82	0.5	0.8	10	1.18
Clark	KY 89	5.8	6.1	7	1.15

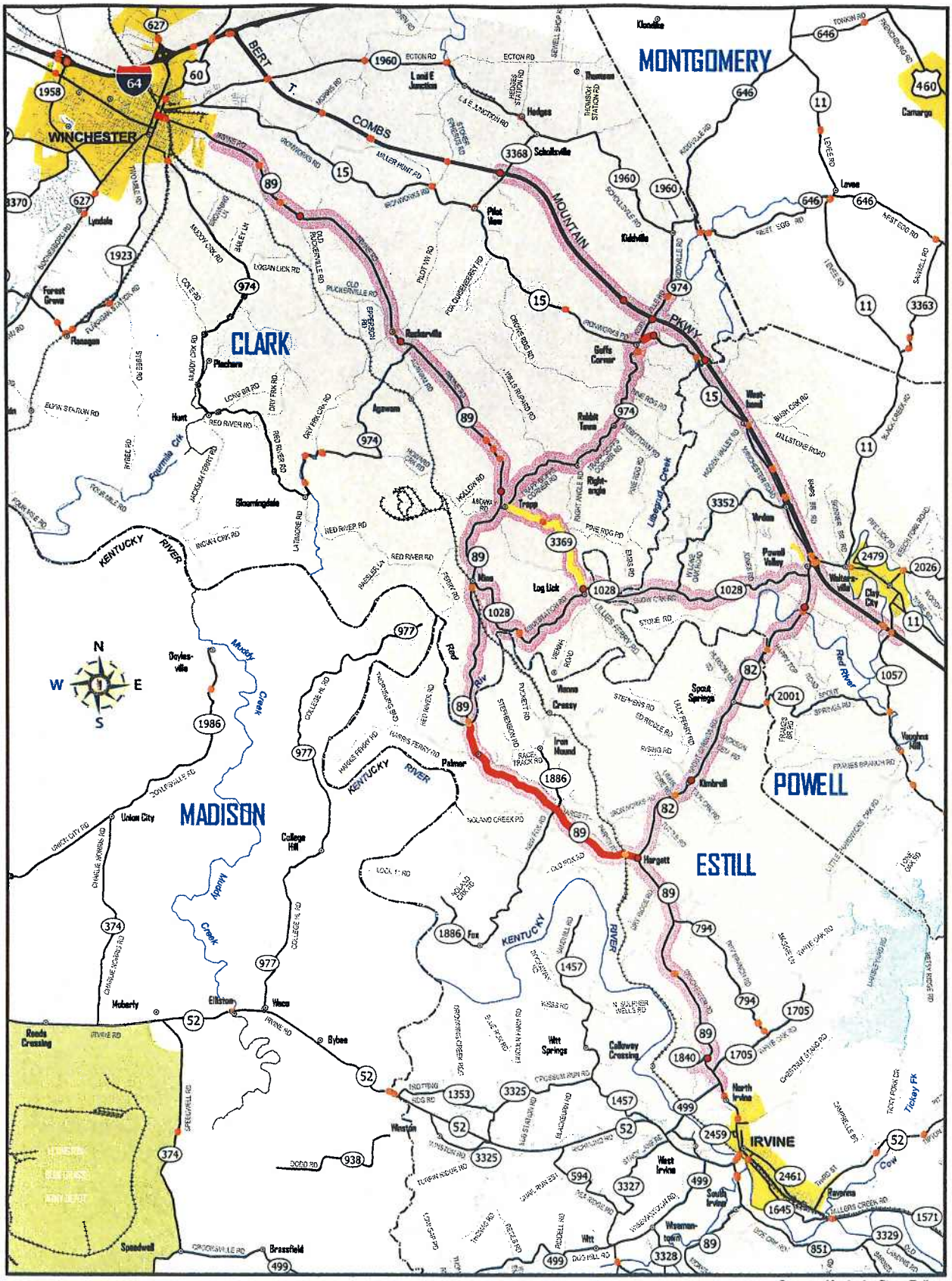
TABLE 11
CRASH CONDITIONS

County	Route	Begin MP	End MP	% Crashes w/ Dry Roadway	% Crashes in Daylight Conditions	Most Prevalent Roadway Characteristic	Most Frequent "Manner of Collision"
Powell	KY 1028	3.8	4.1	20%	80%	Curve and Grade (60%)	Ran Off Roadway (40%)
Clark	KY 89	9.1	9.4	53%	60%	No Dominant Pattern	Single Vehicle (53%)
Clark	KY 974	19.6	19.9	80%	No Dominant Pattern	Curve and Level (60%)	Single Vehicle (60%)
Powell	KY 1028	2.6	2.9	67%	67%	Curve and Grade (67%)	Single Vehicle (100%)
Clark	KY 3369	1.2	1.5	50%	50%	Curve and Level (100%)	Single Vehicle (100%)
Powell	KY 82	0.5	0.8	46%	69%	No Dominant Pattern	Single Vehicle (77%)
Clark	KY 89	5.8	6.1	57%	57%	No Dominant Pattern	Single Vehicle (57%)

E. Traffic and Level of Service

Current year average daily traffic data and level of service estimates are shown in Table 12 and on Exhibit 7, while estimates of future year (2030) average daily traffic[1] and level of service are depicted in Table 13 and on Exhibit 8. The current average daily traffic volume (ADT) varied from about 100 vehicles per day on the Clark County segment of KY 1028 to nearly 13,000 on the Mountain Parkway near the Clark-Powell County line. Except for a short section of KY 89 in Winchester that

1. Table 4B, 2003-2023 Functional Class Average Growth Rate Multipliers, Traffic Forecasting Report 2004, Division of Multimodal Programs, Kentucky Transportation Cabinet, December, 2004



LEGEND

- Fatal Crash
- Potentially High Vehicle Crash Segment (Critical Rate 0.9 - 0.99)
- High Vehicle Crash Segment (Critical Rate >= 1)
- Study Roads
- Study Area

2 0 2 4 Miles

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Exhibit 6

Vehicle Crash Information

Trapp-Irvine Regional Transportation Study: Clark, Estill, Powell Counties

TABLE 12
CURRENT YEAR AVERAGE DAILY TRAFFIC VOLUMES AND LEVELS OF SERVICE

Route	County	Begin MP	End MP	Current ADT	Current Level of Service
KY 82	Estill	0.000	1.980	3000	C
KY 82	Estill	1.980	5.029	4200	C
KY 82	Powell	0.000	1.183	4200	C
KY 82	Powell	1.183	2.000	5400	C
KY 82	Powell	2.000	2.058	5400	A
KY 89	Clark	0.000	4.815	1300	B
KY 89	Clark	4.815	5.115	2600	C
KY 89	Clark	5.115	8.662	2600	B
KY 89	Clark	8.662	12.370	3900	C
KY 89	Clark	12.370	13.644	3900	B
KY 89	Clark	13.644	14.828	3900	C
KY 89	Clark	14.828	15.507	6500	C
KY 89	Clark	15.507	15.955	9400	D
KY 89	Estill	12.811	13.069	6600	C
KY 89	Estill	13.069	14.099	4900	C
KY 89	Estill	14.099	17.903	4900	C
KY 89	Estill	17.903	18.608	2500	B
KY 89	Estill	18.608	22.520	1300	B
KY 974	Clark	15.036	18.930	300	A
KY 974	Clark	18.930	20.260	700	A
KY 1028	Clark	0.000	3.991	100	A
KY 1028	Powell	0.000	1.693	300	A
KY 1028	Powell	1.693	3.719	500	A
KY 1028	Powell	3.719	4.771	800	A
KY 3369	Clark	0.000	2.574	400	A
KY 9000	Clark	6.433	11.913	12800	A
KY 9000	Powell	11.913	16.412	12800	A
KY 9000	Powell	16.412	18.471	11800	A
KY 9000	Powell	18.471	18.625	12300	A

Sources: Highway Information System (HIS) Database and Highway Capacity Manual 2000

currently operates at level of service "D", current year levels of service are "C" or higher; approximately seventy percent of the study area roadway segments currently operate at level of service "A" or "B". Estimated future year (2030) average daily traffic volumes range from about 160 vehicles to nearly 30,000 vehicles per day. These projected future year average daily traffic volumes would reduce the percentage of study area roadways operating at level of service "A" or "B" to about sixty percent; those operating at level of service "D" increase to more than eighteen percent.

The proposed power plant (at Irvine) will consume....approximately 120,000 tons of (non-reclaimed) coal per year...hauled in by truck or delivered by rail. Truck deliveries would average about 15 per day. In addition, limestone and lime will be transported to the site via truck or rail. It is expected that 20 trucks per day would be required... ...

Review and Site Assessment Report of Estill County Energy Partners, LLC Prepared for The Kentucky State Board on Electric Generation and Transmission Siting

TABLE 13
FUTURE YEAR (2030) AVERAGE DAILY TRAFFIC VOLUMES AND LEVELS OF SERVICE

Route	County	Begin MP	End MP	Future ADT	Future Level of Service
KY 82	Estill	0.000	1.980	5100	C
KY 82	Estill	1.980	5.029	7500	D
KY 82	Powell	0.000	1.183	7500	D
KY 82	Powell	1.183	2.000	9800	D
KY 82	Powell	2.000	2.058	9800	A
KY 89	Clark	0.000	4.815	2300	B
KY 89	Clark	4.815	5.115	4400	C
KY 89	Clark	5.115	8.662	4400	C
KY 89	Clark	8.662	12.370	6700	C
KY 89	Clark	12.370	13.644	6700	C
KY 89	Clark	13.644	14.828	6700	C
KY 89	Clark	14.828	15.507	9900	D
KY 89	Clark	15.507	15.955	14100	D
KY 89	Estill	12.811	13.069	11200	D
KY 89	Estill	13.069	14.099	8300	D
KY 89	Estill	14.099	17.903	8700	D
KY 89	Estill	17.903	18.608	4400	C
KY 89	Estill	18.608	22.520	2300	B
KY 974	Clark	15.036	18.930	500	A
KY 974	Clark	18.930	20.260	900	A
KY 1028	Clark	0.000	3.991	200	A
KY 1028	Powell	0.000	1.693	600	A
KY 1028	Powell	1.693	3.719	1100	A
KY 1028	Powell	3.719	4.771	1600	B
KY 3369	Clark	0.000	2.574	900	A
KY 9000	Clark	6.433	11.913	29900	A
KY 9000	Powell	11.913	16.412	29900	A
KY 9000	Powell	16.412	18.471	27400	A
KY 9000	Powell	18.471	18.625	28700	A

IV. CABINET, PUBLIC, AND AGENCY INPUT

A. Project Team Meetings

1. An initial study project team meeting was conducted on May 3, 2005. The purpose of the meeting was to discuss the project and to assist in determining issues and concerns to be addressed in the study. A copy of the agenda is included in Appendix A. Issues and concerns discussed by the project team with some observations and conclusions are as follows:

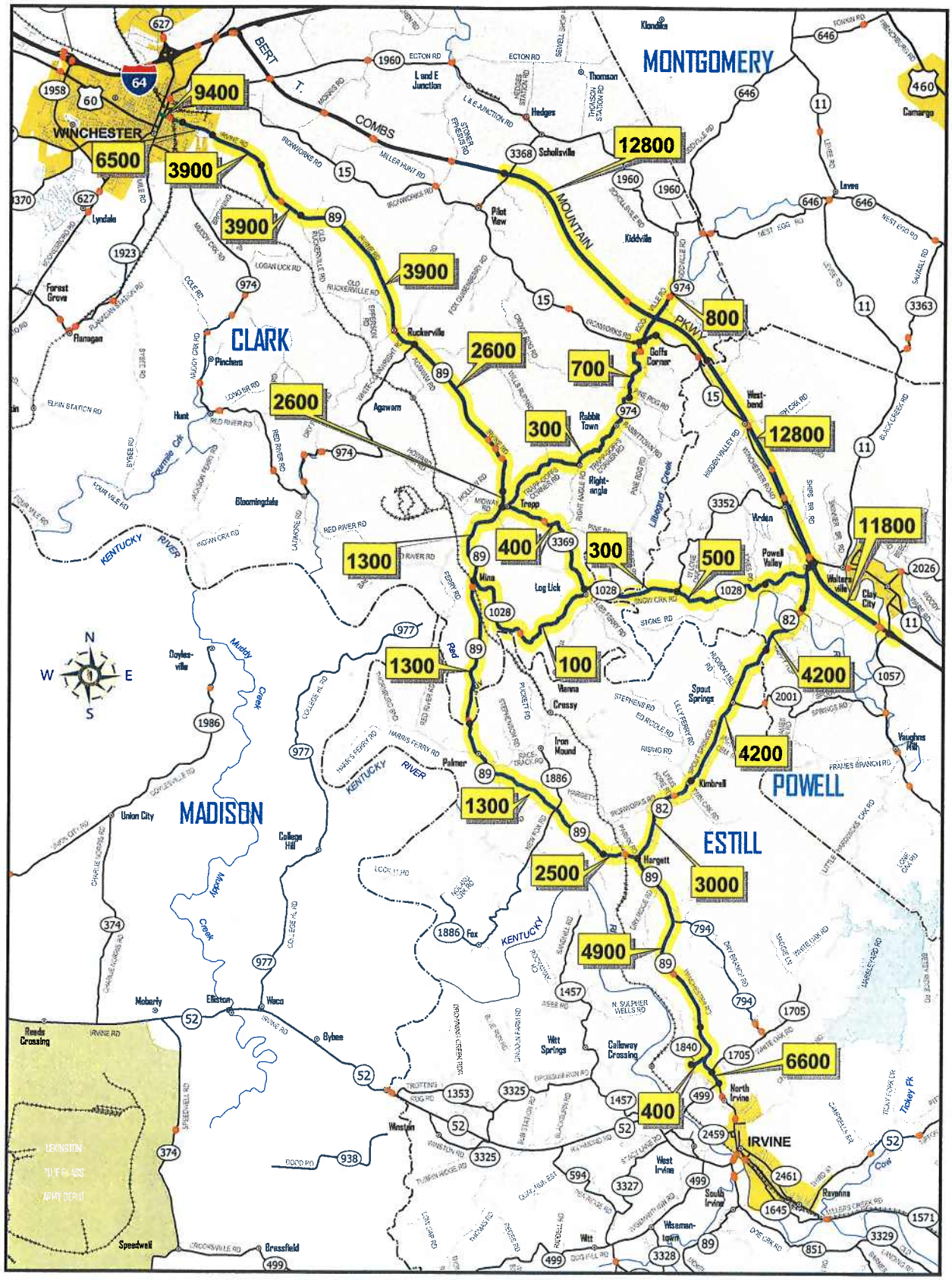
- The project area and the roadway segments as proposed by the Division of Planning appear to be all inclusive.
- Lane and shoulder width data (as discussed above)
- Traffic data (as discussed above)
- Though not shown on environmental mapping (as dictated by Cabinet policy), several archaeological sites were likely present in the study area
- Cost estimates prepared by the Division of Highway Design are not low but appear to be accurate
- A courtesy meeting with local elected officials in Powell County should be scheduled similar to meetings with local elected officials in Clark and Estill Counties.
- Public information meetings should be scheduled in Clark and Estill Counties. Though the project team did not believe that a third public meeting in Powell County was necessary, it was agreed that local elected officials in Powell County should be given that option.
- The status of the Design phase for a new interchange at KY 974 and the Mountain Parkway was briefly discussed for informational purposes.
- No ITS solutions were apparent to the project team
- Project Goals and Objectives were determined to be:
  - Provide corridor and system connectivity between the Mountain Parkway and the sites of proposed power generation facilities at Trapp and northwest of Irvine
  - Improve geometrics of critical area roadways to handle projected future traffic volumes associated with the delivery of materials to each plant
  - Improve safety by improving horizontal deficiencies, and lane and shoulder widths
- Probable Design Criteria for improvements to KY 974, KY 1028, and/or KY 3369 may necessitate a 45 mph design speed

2. A final study project team meeting was conducted on October 18, 2005. The purpose of the meeting was to discuss study recommendations for the project in order to complete this report. Based on those discussions, the recommended improvements and the recommended priority order for implementation are as listed in Section VIII below.

B. Local Officials and Group Meetings

Separate meetings with local elected officials were held in Estill, Powell, and Clark Counties. The Estill and Powell County meetings were each held on May 12, while the Clark County meeting was held on May 16. The agendas for each meeting were similar to that for the project team meeting, and are also included in Appendix A. Highlights of these three meetings were:

- Estill County: Indicated that KY 82 from Hargett to the Mountain Parkway and KY 89 from Hargett to North Irvine were part of a system of roadways that, along with KY 499 in northwest Irvine and KY 52 from Irvine to I-75 at Richmond, provided a regional connection from the Mountain Parkway to



Source: KYTC Highway Information System

LEGEND

- LOS C or Better
- LOS D
- LOS E
- Traffic Section Breaks
- 123 ADT (Average Daily Traffic)
- Study Roads
- Study Area

2 0 2 4 Miles

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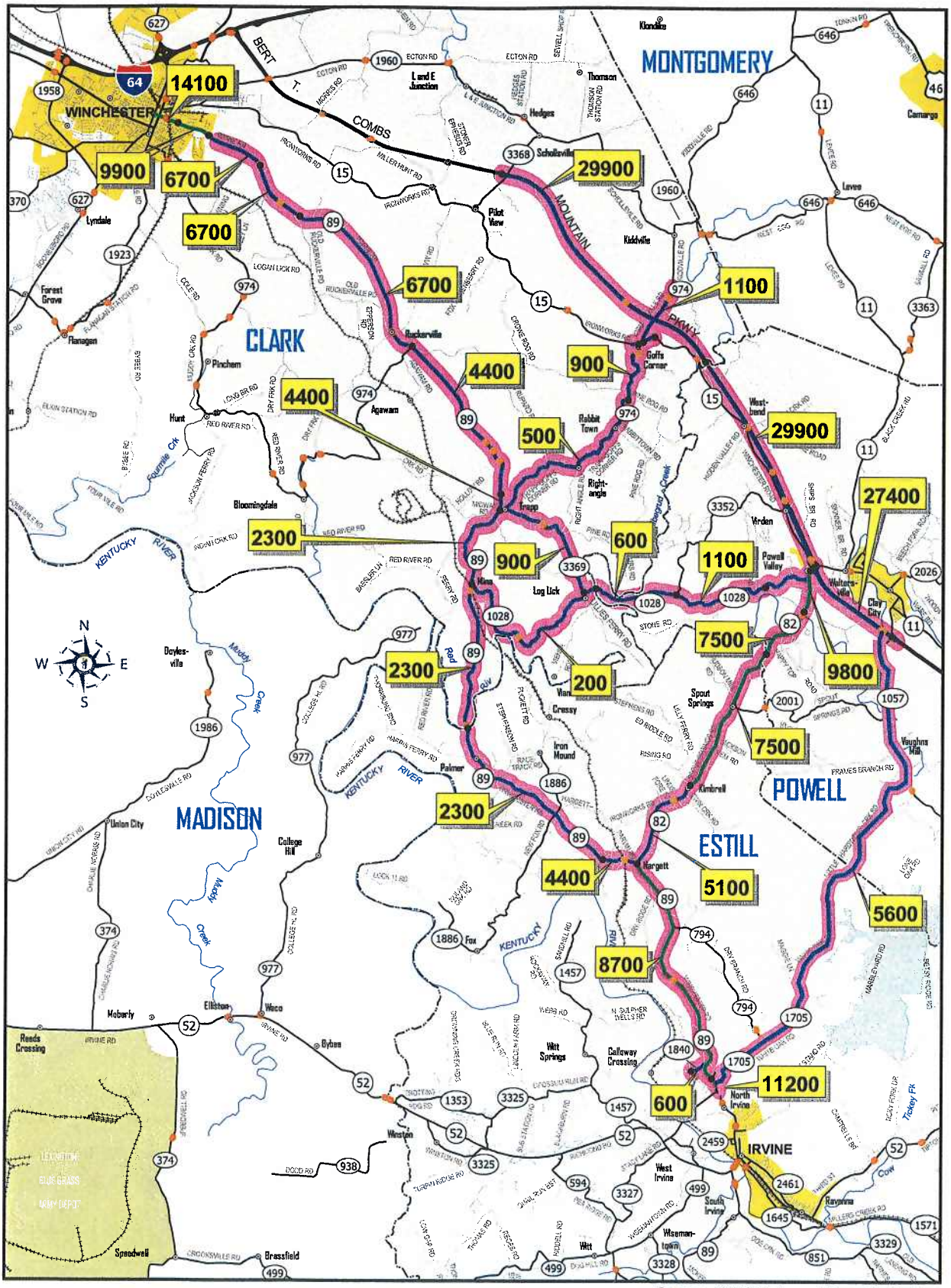
Exhibit 7

Current Traffic & Level of Service

Trapp-Irvine Regional Transportation Study: Clark, Estill, Powell Counties



LEGEND

- LOS C or Better
- LOS D
- LOS E
- Traffic Section Breaks
- 123 ADT (Average Daily Traffic)
- Study Roads
- Study Area

2 0 2 4 Miles

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Exhibit 8

2030 Traffic & Level of Service

Trapp-Irvine Regional Transportation Study: Clark, Estill, Powell Counties

I-75. Current and anticipated systematic usage of this connector articulated by Judge-Executive Wallace Taylor, Irvine Mayor Tom Williams, Ravenna Mayor Charles Crowe, and other local officials included students traveling to and from Eastern Kentucky University and Berea College, truck traffic associated with solid waste and logging, school bus traffic, an emergency evacuation route for the Bluegrass Army Depot, as well as enhanced transportation service for medical and recreation facilities.

- Powell County: Judge-Executive Bobby Drake and First District Magistrate Bobby Ginter stressed the importance to Powell County of the proposed Mountain Parkway interchange at KY 974. Judge Drake and Squire Ginter were assured that the current study was being conducted based on the assumption that the KY 974 interchange project was proceeding to completion. Otherwise, the comments from the Powell County officials echoed the comments of those made in Estill County. While they appreciated our offer to do so, they felt that a public meeting in Powell County on the current study would not be necessary.

- Clark County: Judge-Executive John Myers, Third District Magistrate Gerald Rogers, and Road Supervisor Phillip Vaughn stressed the importance of short and long term improvements to KY 89 between Winchester and Trapp. A previous resolution unanimously adopted by the Clark County Fiscal Court had emphasized improvements to KY 89 as well as completion of the KY 974 interchange, reconstruction of the Mountain Parkway interchange at I-64, and completion of the Winchester Bypass. They welcomed the opportunity for the Cabinet to conduct an informational public meeting near Trapp as part of the current study.

C. Public Meetings

Public information meetings were held on June 23, 2005 and June 27, 2005. The first meeting was held at the Estill County High School in Irvine, Kentucky and the second at the Trapp Elementary School in Trapp, Kentucky. Both meetings were conducted from 5:00 p.m. to 7:00 p.m.; at each meeting several attendees were present at approximately 4:30 p.m. and were assisted by Cabinet and ADD personnel. There were nearly 50 citizens in attendance at Irvine (44 signed in) and 60 citizens in attendance at Trapp (all signed in). Handouts were provided to all attendees who signed in. A short presentation was given at 5:00 p.m. at each public meeting. The remainder of each meeting was conducted in an "open house" format. The attendees were given the opportunity to view exhibits depicting the study area roadway segments being analyzed, horizontal and vertical curvature, current and estimated future traffic volumes and levels of service, bridge sufficiency rating data, vehicle crash information, and truck weight classification and to discuss issues relating to these roadway segments with Cabinet and ADD staff. Attendees were asked to complete a survey/comment form. The meeting at Irvine continued until approximately 7:30

p.m. to accommodate late-arrivers and those still present after 7:00 p.m.; the meeting at Trapp concluded at 7:00 p.m. as the last remaining attendee had left at approximately 6:50 p.m.

The following summarizes the information provided on the 63 non-duplicative, completed survey forms that were either turned in at one of the public meetings or mailed in afterwards. The responses were virtually equally divided between those associated with the Irvine meeting (32) and those associated with the Trapp meeting (31). (Four participants completed a survey form at each meeting. The summary counts each of those respondent's answers only one time.)

43% of the respondents were from Winchester
40% of the respondents were from Irvine/Ravenna
5% of the respondents were from the Trapp area
5% of the respondents were from Clay City
5% of the respondents were from Stanton
2% of the respondents were from other locations

Sixty percent (38) of the respondents identified KY 82 from the Mt. Parkway interchange at Powell Valley to KY 89 at Hargett as a priority segment for improvement. 33% suggested improvements to KY 974 from the new Mt. Parkway interchange at Goffs Corner to KY 89 at Trapp, while only 10% suggested improvements to KY 1028/KY 3369 from the Mt. Parkway interchange at Powell Valley to KY 89 at Trapp. Nearly one-third (32%) suggested improvements to KY 89 from the Winchester Bypass to Trapp, while 22% recommended KY 89 from Trapp to Hargett. Less than 5% of the respondents suggested extending KY 1705 in Estill County to KY 1057 in Powell County, rebuilding the I-64/ Mt. Parkway interchange, a new route from Goffs Corner to Trapp, or rail improvements. (Note that percentages sum to more than 100% because some respondents listed more than one priority.)

The most frequently cited roadway deficiencies were sharp curves (81% of all respondents), followed by narrow shoulders (75%), narrow lanes (65%), few passing opportunities (63%), and large trucks (57%). Less frequent mention was made of poor visibility (40%), low travel speeds and steep grades (30% each), and high speeds (25%). The most often cited sensitive area of concern was personal property or homes (33%), with others citing farmland (21%), natural areas or habitats (11%), scenic areas, viewsheds, or recreational areas (6%), and business properties (5%).

> Estill County Judge-Executive Wallace Taylor said improving KY 82 and KY 89 would allow each road to handle a higher volume of traffic more safely. He said the plan has both economic development and safety tied to it.
>
> Citizen Voice and Times
> Irvine, KY June 23, 2005

In summary, survey participation was excellent, was evenly balanced between the two meetings, and has provided valuable information for the study project team.

D. Resource Agency Coordination

Early agency coordination letters were sent to various resource agencies, interested organizations, local officials, and internal Cabinet offices to obtain input and comments regarding the potential impacts associated with this project. Copies of the request letter, mailing list, and the responses are included in Appendix B. Issues identified and concerns raised as a result of this process include:

- U. S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention: Outlined issues that they want considered as a part of future project development phases, including air quality, water quality and quantity; wetlands and floodplains, hazardous materials and wastes, non-hazardous solid wastes and other materials, noise, occupational health and safety, land use and housing, and environmental justice.
- University of Kentucky, Kentucky Geological Survey: Articulated concerns associated with karst, shale, silt, and clay features, oil and gas wells, materials suitability for construction, fault potential, and earthquake ground motions.
- Kentucky Commerce Cabinet, Department of Fish and Wildlife Resources: Notes likely presence of federally and/or state designated threatened or endangered species and included a list; recommended procedural and mitigational efforts during subsequent project development phases.
- Kentucky Transportation Cabinet, Division of Materials: Noted presence of clay shales and problems likely to be associated therewith; noted potential environmental concerns associated with New Albany Shale; noted presence of numerous faults in the area but opined that no major problems associated with those faults were anticipated.
- Kentucky Transportation Cabinet, Division of Environmental Analysis: Noted likely presence of major archaeological resources in project study area; provided a list of known or suspected federal and/or state designated threatened or endangered species in the three county area.
- Kentucky Environmental and Public Protection Cabinet, Department for Natural Resources, Division of Forestry: Noted presence of highly erodible and shaly soils in southeastern Clark County and potential impact on Red River corridor and its main tributaries; further noted potential archaeological sites of historic significance, including a Native American settlement.
- Kentucky State Police: Expressed concern about the likely need for increased enforcement levels on both KY 82 and KY 89 during construction of the power generating facility at Trapp.
- Kentucky Environmental and Public Protection Cabinet, Department for Environmental Protection, Division of Air Quality: Noted general concerns about fugitive emissions, open burning, and air quality conformity.
- Kentucky Commerce Cabinet, Department of Tourism: Endorsed concept of improved roadways in the region in order to positively impact conventional economic development as well as expansion of tourism, but urged that the area's historical, cultural, and natural assets be considered.

- Kentucky Justice and Public Safety Cabinet, Department of Vehicle Enforcement: Expressed concern about truck traffic between the Mountain Parkway and KY 89 until improvements are made.
- Kentucky Transportation Cabinet, Division of Traffic: Urged that any ultimate design for new or upgraded facilities be partially controlled access, match the design speed to the anticipated posted speed, and that an access control fence be installed.
- Commerce Cabinet, Department of Parks: Expressed a general concern about environmental protection.
- Kentucky Transportation Cabinet, Department of Aviation: Informed study team about air navigation restrictions in regard to the Stanton Airport.
- Bridge Branch, United States Coast Guard: Determined that there are no waterways in the study area over which the Coast Guard exercises jurisdiction for bridge administration purposes.
- The following agencies responded to KYTC's solicitation for comments, but had none at this time:
  - Kentucky Education Cabinet
  - Cabinet for Health and Family Services
  - Environmental and Public Protection Cabinet, Department for Natural Resources, Commissioner's Office
  - Kentucky Department of Agriculture

E. Other Input

During the course of this planning study, several other independently initiated comments were received by The Kentucky Transportation Cabinet. Madison County Judge-Executive Kent Clark urged construction of an eastward extension of KY 499 to the Mountain Parkway, presumably in the KY 1705/White Oak Road, Little Hardwick's Creek Road, KY 1057 corridor. Also, State Representative Don Pasley urged improvements to KY 89 between Winchester and Trapp and reconstruction of KY 974 between KY 15 at Goffs corner and KY 89 at Trapp. These comments are shown in Appendix C.

V. ENVIRONMENTAL AND SOCIOECONOMIC OVERVIEW

A. Environmental Base Data

An extensive file inventory of known environmental features was prepared and sent to the Kentucky Transportation Cabinet's Division of Environmental Analysis for their review and comment. The response of that agency is summarized below:

- Clark, Estill, and Powell Counties are each currently in attainment for transportation related air pollutants. If potential alignments are identified in subsequent project development phases, then micro-scale analyses should be performed at intersections. Further, these alignments should be configured in a manner so as to avoid or minimize effects on noise sensitive receptors, such as residences and schools.

- Small communities are scattered throughout the study area. In selecting future alignments, effort should be made to avoid disrupting community cohesion. Executive Order 12898 regarding Environmental Justice dictates that disproportionately high and adverse effects on minority and low-income populations be avoided. Further, these alignments should, to the maximum extent possible, avoid any prime and/or unique farmland soil and minimize the splitting of farmlands.
- Alternative alignments developed should avoid underground storage tanks and hazardous materials sites.
- Noted that the future development of alternative alignments should identify habitats conducive to identified threatened and endangered species and identified procedures to be followed in that regard. Table 14 lists the known threatened and endangered species in the study region.
- All structures greater than 50 years old should be surveyed for their eligibility of listing on the National Register of Historic Places. The development of alternative alignments should avoid eligible structures if at all possible.
- The development of alternative alignments should avoid public parks, recreation areas, wildlife and waterfowl refuges and historic sites.

TABLE 14
KNOWN THREATENED AND ENDANGERED SPECIES

Known Species Listed As Threatened and Endangered			
Terrestrial Species	Clark	Estill	Powell
Gray Bat	X		
Indiana Bat		X	X
Virginia Big-Eared Bat			X
Running Buffalo Cover	X		
White-Haired Goldenrod			X
Aquatic Species			
Fanshell Mussel			X

B. Environmental Justice

As part of this study, a brief review of the 2000 Census data was conducted for the purpose of identifying environmental justice and community impact issues. The purpose of this review was to assist the Kentucky Transportation Cabinet in meeting the requirements of Federal Executive Order 12898, which states that "....each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations..." and hence to ensure equal environmental protection to all groups potentially impacted by potential transportation improvements. Although EO 12898 does not specifically address consideration of the elderly population, the U. S. Department of Transportation encourages the consideration of this demographic subset in Environmental Justice discussions.

This brief review concluded that the potential for disproportionately high and/or adverse affects on minority, low income, and/or elderly populations impacted by potential transportation improvements identified in this study is generally small. The study area encompasses three Census Tracts: Tract 20104 (particularly Block Groups 1, 2, and 3) in Clark County, Tract 980200 (particularly Block Groups 1, 2, 3, and 4) in Estill County, and Tract 970200 (particularly Block Groups 4 and 5) in Powell County. Table 15 summarizes the pertinent demographic factors of these Census Tracts and Block Groups in comparison to county, statewide, and nationwide figures. Data is shown for the lowest Census geographic unit for which data is readily available, and then rolled up to aggregate numbers for larger geographic units. Demographic measures for which the data in a Census Tract or Block Group significantly exceeds the corresponding figure for the relevant county as a whole are highlighted in red. As can be seen therein, some potential environmental justice consequences exist in Estill and Powell Counties with respect to minority population and in Clark and Powell Counties with respect to low income population.

TABLE 15
SELECTED CENSUS DATA FOR STUDY REGION

County	Census Tract	Census Block Group	% Minority Persons[1]	% Elderly Persons	% Low Income
Clark	All	All	6.40%	12.45%	10.49%
	20104	All	0.80%	14.95%	**14.95%**
	20104	1	0.87%	12.83%	[2]
	20104	2	1.03%	10.39%	
	20104	3	0.38%	9.95%	
Estill	All	All	0.93%	26.16%	26.16%
	980200	All	0.62%	27.67%	27.67%
	980200	1	0.35%	15.10%	
	980200	2	**1.54%**	19.71%	
	980200	3	0.67%	15.87%	
	980200	4	0.33%	11.95%	
Powell	All	All	1.44%	23.19%	23.19%
	970200	All	2.38%	**27.68%**	**27.68%**
	970200	4	**3.43%**	9.83%	
	970200	5	1.28%	8.05%	
Kentucky			9.92%	12.43%	12.05%
United States			24.86%	12.46%	15.37%

1. For purposes of this table, "minority" is defined as non-white.; (2) Income data not readily available below the Census Tract level

VI. TRAVEL TIMES

As one of several measures to compare the effectiveness of various roadway improvement options, travel times from a common point on the Mountain Parkway to the location of each proposed power generating facility were estimated using average travel speeds from Highway Capacity Software; the common point chosen for analysis is the Powell Valley Exit (16) on the

Mountain Parkway. The average travel time to each proposed facility was then calculated. Table 16 presents this information in tabular format.

TABLE 16
ESTIMATED TRAVEL TIMES

Description of Proposed Route Improvements	Travel Time (minutes) to Irvine Plant	Travel Time (minutes) to Trapp Plant	Average Travel Time (minutes)
KY 974 from Goffs Corner to Trapp; KY 89 from Winchester Bypass to North Irvine	64.1	21.6	42.8
KY 1028 from Powell Valley to Log Lick; KY 3369 from Log Lick to Trapp; KY 89 from Winchester Bypass to North Irvine	62.8	20.2	41.5
KY 1028 from Powell Valley to Mina; KY 89 from Winchester Bypass to North Irvine	60.3	27.2	43.8
KY 82 from Powell Valley to Hargett; KY 89 from Winchester Bypass to North Irvine	34.7	33.9	34.3

Sources: Highway Information System (HIS) Database and Highway Capacity Manual 2000

VII. ESTIMATED IMPROVEMENT COSTS

Cost estimates for improvements to various roadway segments were generated as part of this planning study. These cost estimates have been segmented to allow for various combinations of roadway improvements to be considered. These segments are described below along with the cost estimate and a brief discussion of the basis for that segment's cost estimate. Table 17 provides a summary of this data.

A. KY 89 from MP 4.8 in Clark County (KY 974 East at Trapp) to MP 14.5 in Clark County (Winchester Bypass): 9.7 miles; estimated cost to provide spot improvements to match segments previously improved: $19.2 million.
B. KY 89 from MP 2.9 in Clark County (KY 1028 East at Mina) to MP 4.8 in Clark County (KY 974 East at Trapp): 1.9 miles; $12.3 million based on reconstructing roadway.
C. KY 89 from MP 17.9 in Estill County (KY 82 at Hargett) to MP 2.9 in Clark County (KY 1028 East at Mina): 7.5 miles; $48.9 million based on reconstructing roadway.

D. KY 89 from MP 14.6 in Estill County (2000 feet north of Estill County High School) to MP 17.9 in Estill County (KY 82 at Hargett): 3.3 miles; $21.6 million based on reconstructing roadway.
E. KY 82 from MP 0.0 in Estill County (KY 89 at Hargett) to MP 2.1 in Powell County (KY 15): 7.1 miles; $20.4 million based on reconstructing roadway.
F. KY 1028 from MP 3.7 in Clark County (KY 3369 at Log Lick) to MP 4.7 in Powell County (KY 82 at Powell Valley): 5.2 miles; $15.8 million based on constructing new roadway.
G. KY 1028 from MP 0.0 in Clark County (KY 89 at Mina) to MP 3.7 in Clark County (KY 3369 at Log Lick); 3.7 miles; $11.4 million based on constructing new roadway.
H. KY 3369 from MP 0.0 in Clark County (KY 1028 at Log Lick) to MP 2.6 in Clark County (KY 974 at Trapp); 2.6 miles: $8.1 million based on constructing new roadway.
I. KY 974 from MP 15.0 in Clark County (KY 89 at Trapp) to MP 20.3 in Clark County (KY 15 at Goffs Corner): 5.3 miles; $25.3 million based on reconstructing roadway on new alignment close to existing roadway.
J. Structural reinforcement of KY 89 bridge over Red River at Clark-Estill County line: $5 million.

VIII. RECOMMENDATIONS

A. Preferred Improvements

The goal of this study is to consider improvements to the regional highway network and to identify those recommended for improvement. Two primary factors were considered: (1) connectivity between the Mountain Parkway and proposed power generating facilities at Trapp and Irvine, and (2) improving safety by correcting horizontal and vertical curvature deficiencies and by providing lane and shoulder widths that meet current standards. Identified needs were balanced with a desire for fiscal prudence and rational selection from among duplicative improvement options. As a result, two corridors were recommended for improvement:

1. KY 89 between the junction with the Winchester Bypass (Clark County MP 14.5) and a point approximately 2000 feet north of Estill County High School (Estill County MP 14.6), a distance of approximately 22.4 miles. Priority segmentation of this improvement is discussed below. Composite Adequacy Rating Percentiles for KY 89 range from 13 (87% of statewide Rural Major Collector routes are better) in Estill County to 75 (25% of statewide Rural Major Collector routes are better) in the sections of KY 89 in Clark County. Narrow traveling lanes and shoulders

TABLE 17
COST ESTIMATES FOR SEGMENT IMPROVEMENTS

Route	Beginning MP	Ending MP	Length (miles)	Type of Improvement	Estimated Cost (millions)
KY 89	Clark Co. 4.8	Clark Co. 14.5	9.7	Spot Improvements	$19.2
KY 89	Clark Co. 2.9	Clark Co. 4.8	1.9	Reconstruction	$12.3
KY 89	Estill Co. 17.9	Clark Co. 2.9	7.5	Reconstruction	$48.9
KY 89	Estill Co. 14.6	Estill Co. 17.9	3.3	Reconstruction	$21.6
KY 82	Estill Co. 0.0	Powell Co. 2.1	7.1	Reconstruction	$20.4
KY 1028	Clark Co. 3.7	Powell Co. 4.7	5.2	Construct New Roadway	$15.8
KY 1028	Clark Co. 0.0	Clark Co. 3.7	3.7	Construct New Roadway	$11.4
KY 3369	Clark Co. 0.0	Clark Co. 2.6	2.6	Construct New Roadway	$8.1
KY 974	Clark Co. 15.0	Clark Co. 20.3	5.3	Reconstruction on New Alignment	$25.3
KY 89	Estill Co. 22.5	Clark Co. 0.0	0.1	Bridge Rehabilitation or Replacement	$5.0

are present for most of this route segment. Previous spot improvements south of Winchester create inconsistent roadway cross sections and may affect driver expectations. Horizontal, and to a lesser extent vertical, curvature deficiencies are present along this route. Traffic volumes along this roadway segment are among the highest in the study area. The most immediate need is the rehabilitation or replacement of the bridge over the Red River at the Clark-Estill County line.

2. KY 82 between the junction with KY 89 at Hargett (Estill County MP 0.0) and the junction with KY 15 at Powell Valley (Powell County MP 2.1), a distance of 7.1 miles. Priority segmentation of this improvement is discussed below. Composite Adequacy Rating Percentiles for KY 82 range from 16 for a short section in Powell County to 84 in Estill County. Narrow traveling lanes and shoulders are present for most of this route segment. Traffic volumes along this roadway segment are among the highest in the study area. Improvements to KY 82 would provide better average travel times between the Mountain Parkway and both plants than improvements to KY 1028/KY 3369 (or a new parallel route) or improvements to KY 974 (or a new parallel route). Cost estimates for improvements to KY 82 ($20.4 million) are less than those for a new route parallel to KY 1028 ($27.2 million), a new route parallel to KY 1028/KY 3369 ($23.9 million), or improvements to KY 974 along a new alignment ($25.3 million). Though not an explicit goal for this study, KY 82 nonetheless is part of a regional link between the Mountain Parkway and I-75 in Madison County and improvements thereto would enhance this additional aspect of the regional transportation system.

B. Priority Segments

The roadway segments listed above constitute nearly thirty miles of roadway improvements with a total estimated cost of $125.0 million. This figure would be a significant public sector complement to the aggregate $650 million private sector investment at the two proposed power generating facilities, and is in addition to the nearly $25 million in improvements currently planned for KY 89 north of Irvine and at the Ruckerville bridge, for the KY 82 curve revision at Salem Church, and for the KY 974 interchange. Such a large public sector investment likely would not be made all at once and thus would need to be staged. Priority staging of these improvements is recommended to be as follows:

1. Bridge Rehabilitation of KY 89 Bridge at Clark-Estill County line: This structure currently has a weight restriction of 62,000 pounds for tri-axle trucks (the standard weight limit is 68,000 pounds). Rehabilitation of the existing structure would likely be preferred from an aesthetic perspective (though the structure is not a historic bridge); however it may be more cost effective to replace the existing structure with a new one. An approximate estimate for this project is $5 million.
2. Spot improvements to KY 89 from MP 4.8 in Clark County (KY 974 East at Trapp) to MP 14.5 in Clark County (Winchester Bypass), a distance of 9.7 miles. Estimated cost to match segments previously improved: $19.2 million.
3. Reconstruct KY 82 from MP 4.6 in Estill County (the end of the curve revision at Salem Church) to MP 2.1 in Powell County (KY 15), a distance of 2.5 miles. Data indicate this is the more deficient of two sections of KY 82. This segment of KY 82 combined with the segment identified as priority #4 below were recently ranked as the 6th highest priority unscheduled project in the seventeen county Bluegrass Area Development District region and the 8th highest priority unscheduled project in the Kentucky Transportation Cabinet's District 7. Estimated cost for this project is $7.1 million.
4. Reconstruct KY 82 from MP 0.0 in Estill County (junction with KY 89) to MP 4.5 in Estill County (the beginning of the curve revision at Salem Church), a distance of 4.5 miles. This section will complete the improvements of KY 82 from KY 89 at Hargett to KY 15 at the Mountain Parkway. Estimated cost for this project is $13.3 million.
5. Reconstruct KY 89 from MP 17.9 in Estill County (KY 82 at Hargett) to MP 22.5 (south end of bridge over Red River), a distance of 4.6 miles. Data indicate this is the most deficient section of KY 89 between Irvine and Winchester. Estimated cost: $30.0 million.
6. Reconstruct KY 89 from MP 0.0 in Clark County (north end of the bridge over Red River) to MP 4.6 (entrance to Trapp plant), a distance of 4.6 miles. This section will complete the improvements on KY 89 from KY 82 at Hargett to the entrance to the Trapp plant. Estimated cost: $28.8 million.

7. Reconstruct KY 89 from MP 17.9 in Estill County (KY 82 at Hargett) to MP 14.6 in Estill County (2000 feet north of Estill County High School), a distance of 3.3 miles. This section will complete the improvements to KY 89 from KY 82 at Hargett to the entry road to the Irvine plant. Estimated cost for this project is $21.6 million.

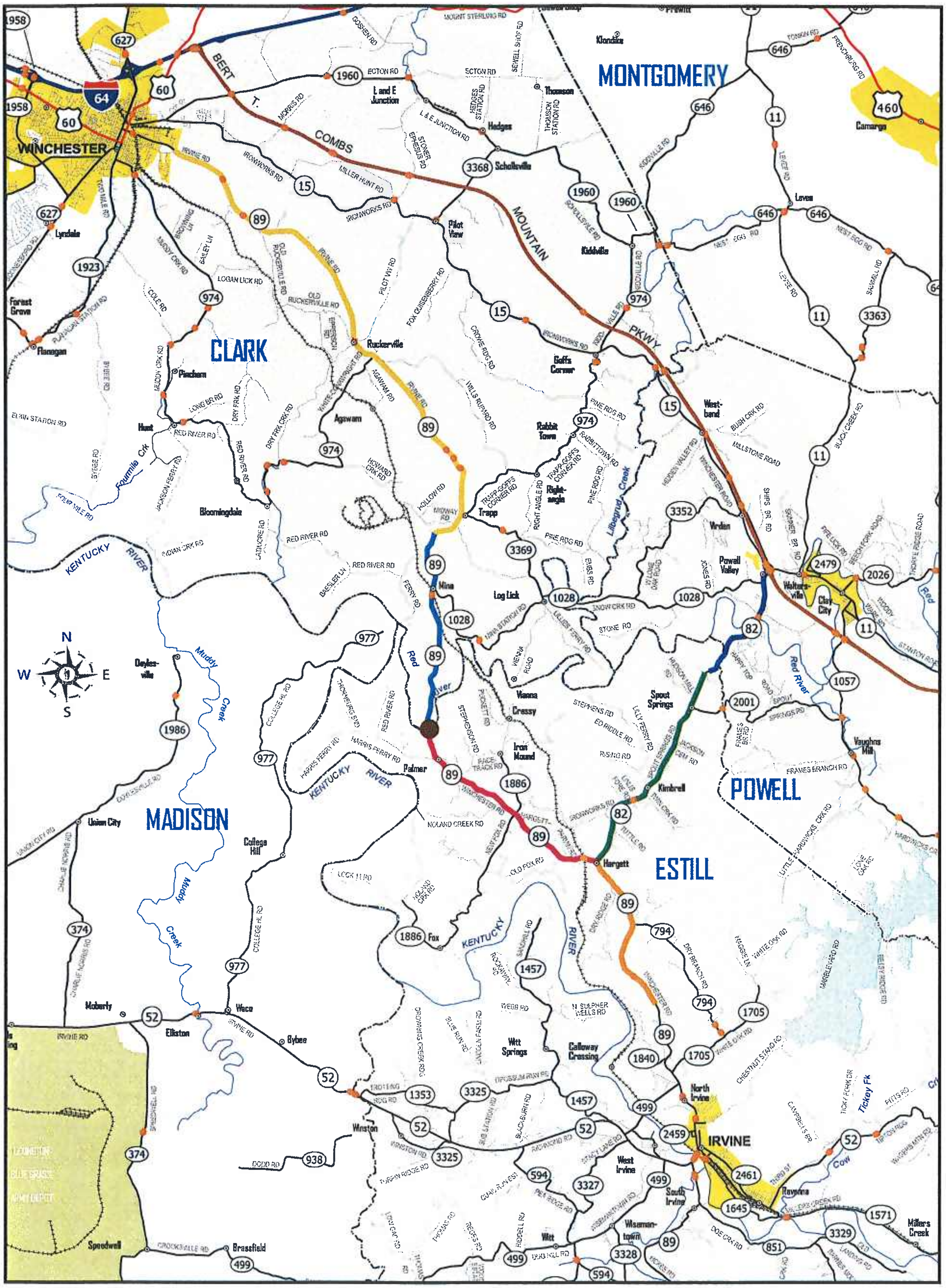
These recommendations are depicted graphically in Exhibit 9. Cumulative costs of these proposed improvements are shown in Table 18. Estimated phase costs for these recommended projects are shown in Table 19.

TABLE 18
CUMULATIVE COSTS OF RECOMMENDED PROJECTS

Recommended Improvement ID Number (Priority)	Route	Beginning MP	Ending MP	Type of Improvement	Cost Estimate for This Improvement Item (Millions)	Cumulative Cost Estimate for This and All Previous Improvement Items (Millions)
1	KY 89	Estill Co. 22.5	Clark Co. 0.0	Bridge Rehabilitation or Replacement	$5.0	$5.0
2	KY 89	Clark Co. 4.8	Clark Co. 14.5	Spot Improvements	$19.2	$24.2
3	KY 82	Estill Co. 4.6	Powell Co. 2.1	Reconstruction	$7.1	$31.3
4	KY 82	Estill Co. 0.0	Estill Co. 4.6	Reconstruction	$13.3	$44.6
5	KY 89	Estill Co. 17.9	Estill Co. 22.5	Reconstruction	$30.0	$74.6
6	KY 89	Clark Co. 0.0	Clark Co. 4.6	Reconstruction	$28.8	$103.4
7	KY 89	Estill Co. 14.6	Estill Co. 17.9	Reconstruction	$21.6	$125.0

TABLE 19
PHASE COSTS OF RECOMMENDED PROJECTS

Recommended Improvement ID Number (Priority)	Route	Beginning MP	Ending MP	Type of Improvement	Cost Estimate for Design Phase (Millions)	Cost Estimate for R/W Phase (Millions)	Cost Estimate for Utilities Phase (Millions)	Cost Estimate for Construction Phase (Millions)
1	KY 89	Estill Co. 22.5	Clark Co. 0.0	Bridge Rehabilitation or Replacement	$ 0.5	$ 0.2	$ 0.3	$ 4.0
2	KY 89	Clark Co. 4.8	Clark Co. 14.5	Spot Improvements	$ 2.4	$ 3.1	$ 2.6	$ 11.1
3	KY 82	Estill Co. 4.6	Powell Co. 2.1	Reconstruction	$ 0.4	$ 1.3	$ 1.2	$ 4.2
4	KY 82	Estill Co. 0.0	Estill Co. 4.6	Reconstruction	$ 1.2	$ 2.4	$ 2.2	$ 7.5
5	KY 89	Estill Co. 17.9	Estill Co. 22.5	Reconstruction	$3.0	$4.4	$ 2.0	$20.6
6	KY 89	Clark Co. 0.0	Clark Co. 4.6	Reconstruction	$2.9	$4.2	$ 2.0	$19.7
7	KY 89	Estill Co. 14.6	Estill Co. 17.9	Reconstruction	$2.2	$3.1	$1.5	$14.8



LEGEND
KY 89 Bridge Rehab
KY 89 Phase I Spot Improvements
KY 82 Phase I
KY 82 Phase II
KY 89 Phase II
KY 89 Phase III
KY 89 Phase IV
Study Area

2 0 2 4 Miles

Kentucky UNBRIDLED SPIRIT

KENTUCKY TRANSPORTATION CABINET

Division of Planning

Exhibit 9

Recommended Priorities

Trapp-Irvine Regional Transportation Study: Clark, Estill, Powell Counties

IX. CONTACTS

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

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