

**Appendix B: Traffic Forecast Report**



## TRANSPORTATION CABINET

Frankfort, Kentucky 40622  
www.transportation.ky.gov/

**Steven L. Beshear**  
Governor

**Michael W. Hancock, P.E.**  
Secretary

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### MEMORANDUM

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**TO:** Corbett Caudill, P.E.  
Chief District Engineer  
District 10 – Jackson

**ATTN:** Jason Blackburn, P.E.

**FROM:** Keith Dotson *Keith Dotson*  
Assistant Director  
Acting Director  
Division of Planning

**DATE:** September 20, 2013

**SUBJECT:** Breathitt/Owsley County Traffic Forecast  
KY 30 Scoping Study  
Item No. N/A

In response to your April 26, 2013 request, we are providing the following forecasts on the attached report:

- 2013 and 2040 Average Daily Traffic
- 2013 and 2040 Design Hour Volumes
- Truck Percentages and 20-year ESALs

If you have any questions, please contact Jay Balaji of this Division at (502) 782-5045.

KD/JB/BC

Attachments

c/att: Keith Caudill  
Dan Hite  
Paul Looney



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# *Executive Summary*

## **Traffic Forecast Report Owsley/Breathitt County KY 30 Scoping Study Item No. N/A**

Prepared for:



Prepared by:  
**Jayalakshmi Balaji**  
Division of Planning  
Kentucky Transportation Cabinet  
September 19, 2013

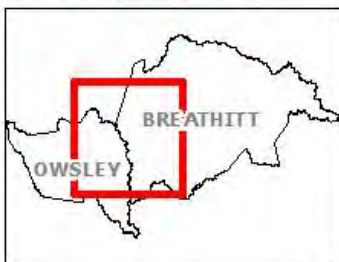
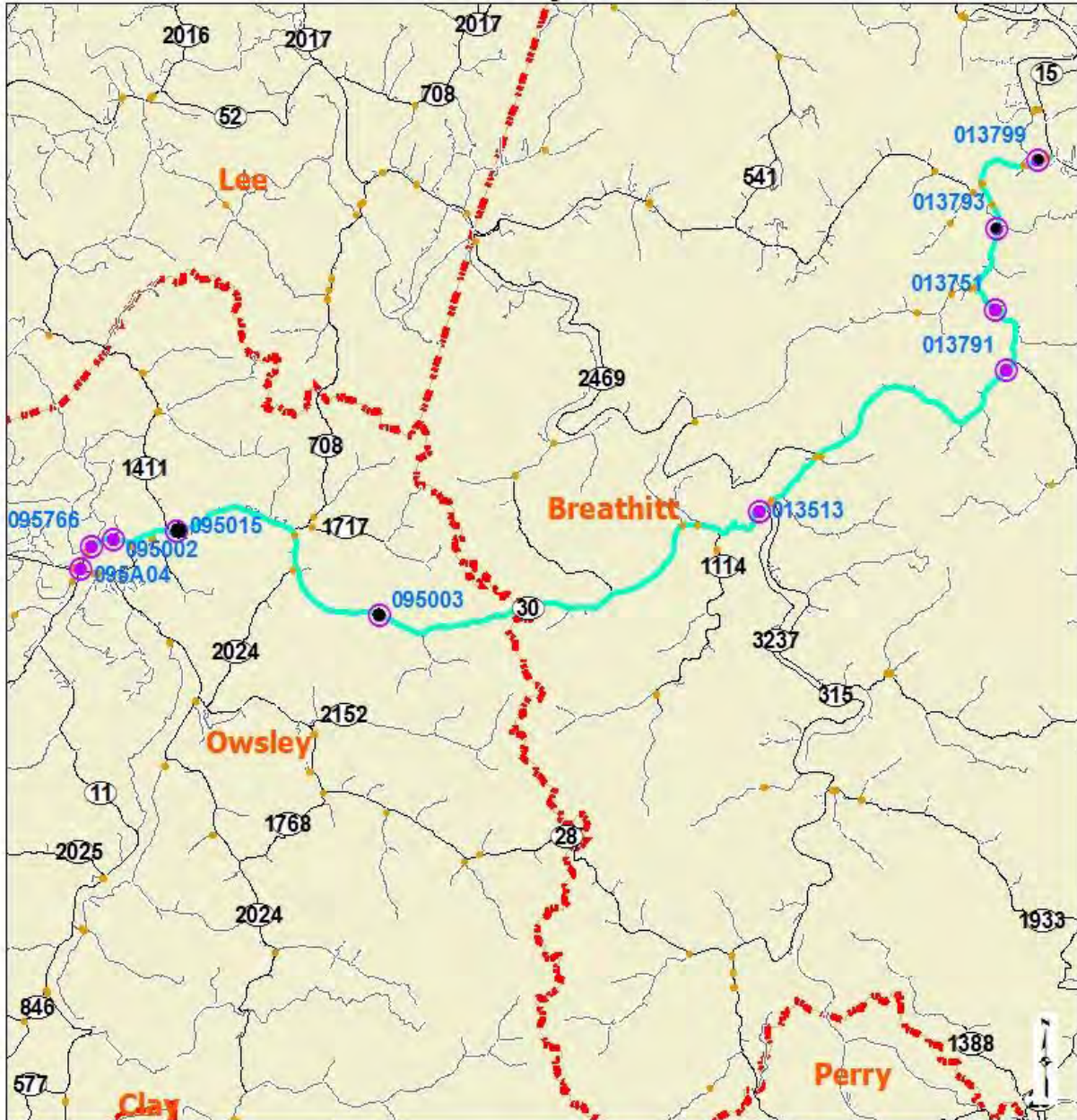
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## Commonly Used Abbreviations and their Descriptions

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

# Vicinity Map



Breathitt & Owsley County  
 Improvement of KY 30 from KY 15  
 in Jackson to KY 11 in Booneville  
 Item # N/A

**Legend**

- Project Road
- Count Stations
- 2013 Class Counts

0 1.5 3 Miles



## **Traffic Forecast Executive Summary Owsley/Breathitt County: KY 30 Scoping Study Item No. N/A**

### **FORECAST SUMMARY**

The project calls for the safety improvements, local mobility between Jackson and Booneville, and regional connectivity between the Mountain Parkway and I-75 in London. The purpose of this forecast is to analyze the current and future traffic.

### **FORECAST TYPE**

The following types of forecasts were developed:

- 2013 and 2040 truck percent forecasts (light/heavy, ADT, DHV).
- 2013 and 2040 ADT and DHV values.
- 20-year ESALs.

### **CURRENT-YEAR VOLUMES**

The 2013 ADT volumes were based on historical counts at traffic stations 095A04 (MP 11.4), 013751(MP 11.2), and a recent class count at station 013799(MP 14.6) on KY 30, as well as the class counts performed for this forecast. All figures are subject to rounding.

### **DESIGN-YEAR/GROWTH FACTORS**

Kentucky State Data Center suggests population for Owsley and Breathitt County to decline annually by 0.3 % and 1.2% respectively, over the next 20 years. Exponential growth analyses performed on historical data at traffic stations shown in the vicinity map estimates a growth of 0.5% to 2.1% in traffic volumes. Therefore the whole corridor was divided into three segments and an average growth rate of 1.2% was applied to each segment individually.

This forecast uses a growth rate of 1.2% for the segment of road with the bridge (ID: 013B00017N), which is different from the 1.6 % used in Item no: 10-1096. Also the volume and truck percentage is different. This is due to two main reasons. One is due to the fact, this forecast is looking at a corridor that is 23.3 miles long and not at a particular section of the road, and second is the use of an updated class counts performed in 2013. Moreover the design years for the forecasts are different also.

### **DESIGN HOUR FACTORS**

DHVs were estimated by analyzing the most recent hourly volume data collected at station 095A04, 013751, and 013799. The peak AM and PM volumes were derived by dividing the highest hourly volumes from these counts by the daily total. Functional class design hour factors based on the day and month of these counts were then applied. Finally, the calculated K-factors were used in combination with the ADT forecast to produce the DHVs for 2013 and 2040.

**TRUCK PERCENTAGE**

The truck percentage was based on a 2013 classification counts conducted on KY 30 at stations 095015, 095003, 013793, and 013799. This class count provided a variable truck percentage for the entire corridor. KY 30 in Breathitt County is a coal haul route from MP 14.14 to 14.83.

Column1 ▼	Column2 ▼	Column3 ▼	Column4 ▼	Column5 ▼	Column6 ▼	Column7 ▼
	From MP	To MP	Truck Volume	ADT	T%	Truck Growth rate
Segment 1	11.127 in Owsley	12.799 in Owsley	250	5350	4.6	1.00%
Segment 2	12.799 in Owsley	11.699 in Breathitt	70	2500	2.6	1.00%
Segment 3	11.699 in Breathitt	14.83 in Breathitt	190	5100	3.7	1.00%

**ESALS**

Functional class averages from ATR data, traffic counts, and the 2040 ADT projections were used to estimate 20-year ESALs on the project road segment. The 2007 aggregated ESAL report, generated by the Kentucky Transportation Center in collaboration with the Kentucky Transportation Cabinet were used to grow the important ESAL calculation variables.



**HISTORICAL POPULATION SUMMARY**

	1960	1970	1980	1990	2000	2010	60 - 70	70 - 80	80 - 90	90 - 00	00 - 10
	Population	Population	Population	Population	Population	Population	Change	Change	Change	Change	Change
Kentucky	3,038,156	3,220,711	3,660,334	3,686,892	4,041,769	4,339,367	6.0%	13.6%	0.7%	9.6%	7.4%
Breathitt Co	-	14,221	17,004	15,703	16,100	13,878	-	19.6%	-7.7%	2.5%	-13.8%
Owsley Co	-	5,023	5,709	5,036	4,858	4,755	-	13.7%	-11.8%	-3.5%	-2.1%
							Pct	Pct	Pct	Pct	Pct

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

**FUTURE POPULATION PROJECTIONS SUMMARY**

	2010	2015	2020	2025	2030	2035	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35
	Projection	Projection	Projection	Projection	Projection	Projection	Change	Change	Change	Change	Change
Kentucky	4,339,367	4,509,429	4,672,754	4,820,390	4,951,178	5,063,331	3.9%	3.6%	3.2%	2.7%	2.3%
Breathitt Co	13,878	13,216	12,495	11,750	11,000	10,275	-4.8%	-5.5%	-6.0%	-6.4%	-6.6%
Owsley Co	4,755	4,738	4,704	4,633	4,529	4,405	-0.4%	-0.7%	-1.5%	-2.2%	-2.7%
							Pct	Pct	Pct	Pct	Pct

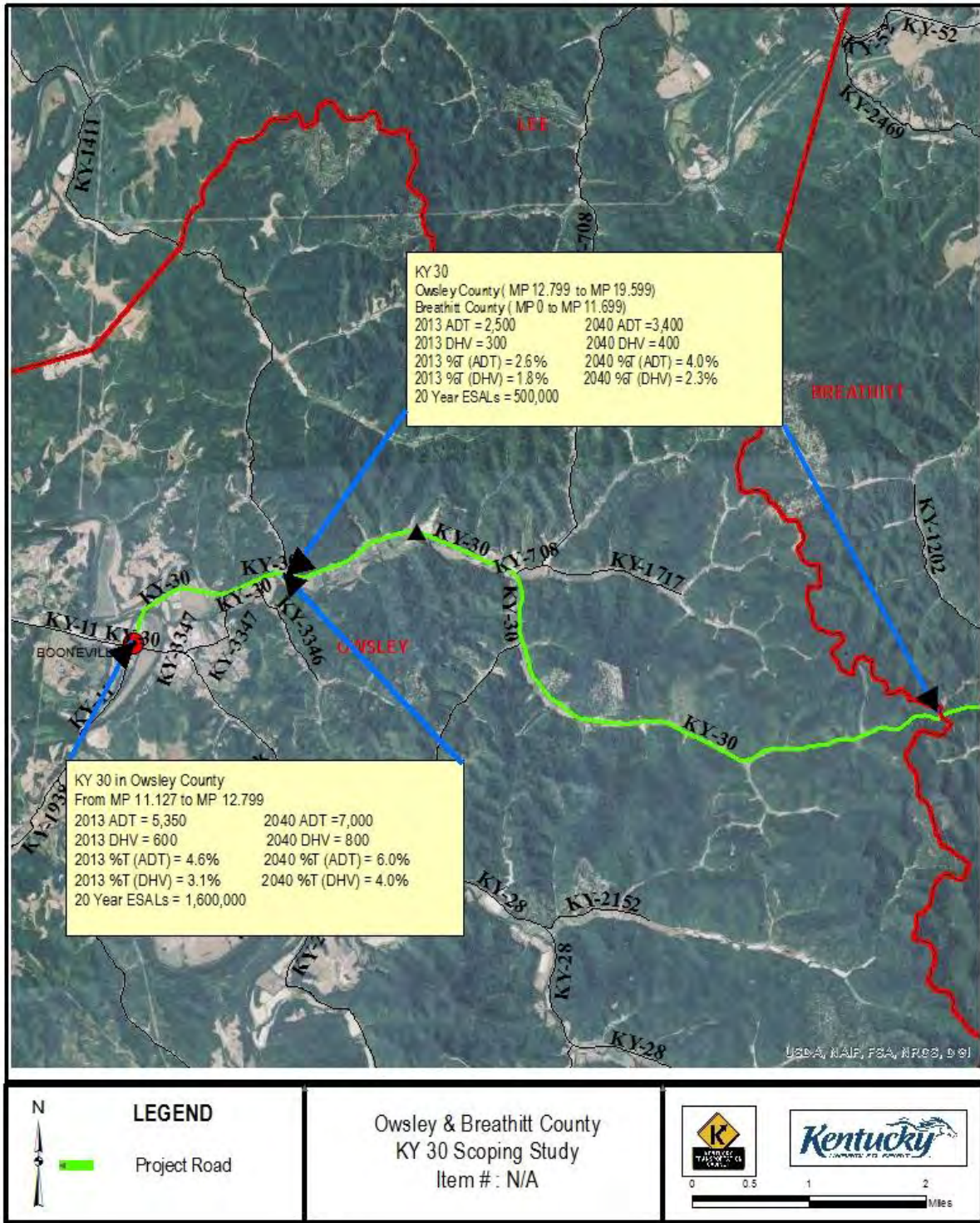
Sources: US Bureau of the Census; Kentucky State Data Center

**ANNUAL POPULATION GROWTH RATES FROM HISTORICAL DATA AND PROJECTIONS**

	60 - 70	70 - 80	80 - 90	90 - 00	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	10 - 30
	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR
Kentucky	0.59%	1.29%	0.07%	0.92%	0.77%	0.71%	0.62%	0.54%	0.45%	0.53%
Breathitt Co	-	1.80%	-0.79%	0.25%	-0.97%	-1.12%	-1.22%	-1.31%	-1.35%	-0.83%
Owsley Co	-	1.29%	-1.25%	-0.36%	-0.07%	-0.14%	-0.30%	-0.45%	-0.55%	-0.13%

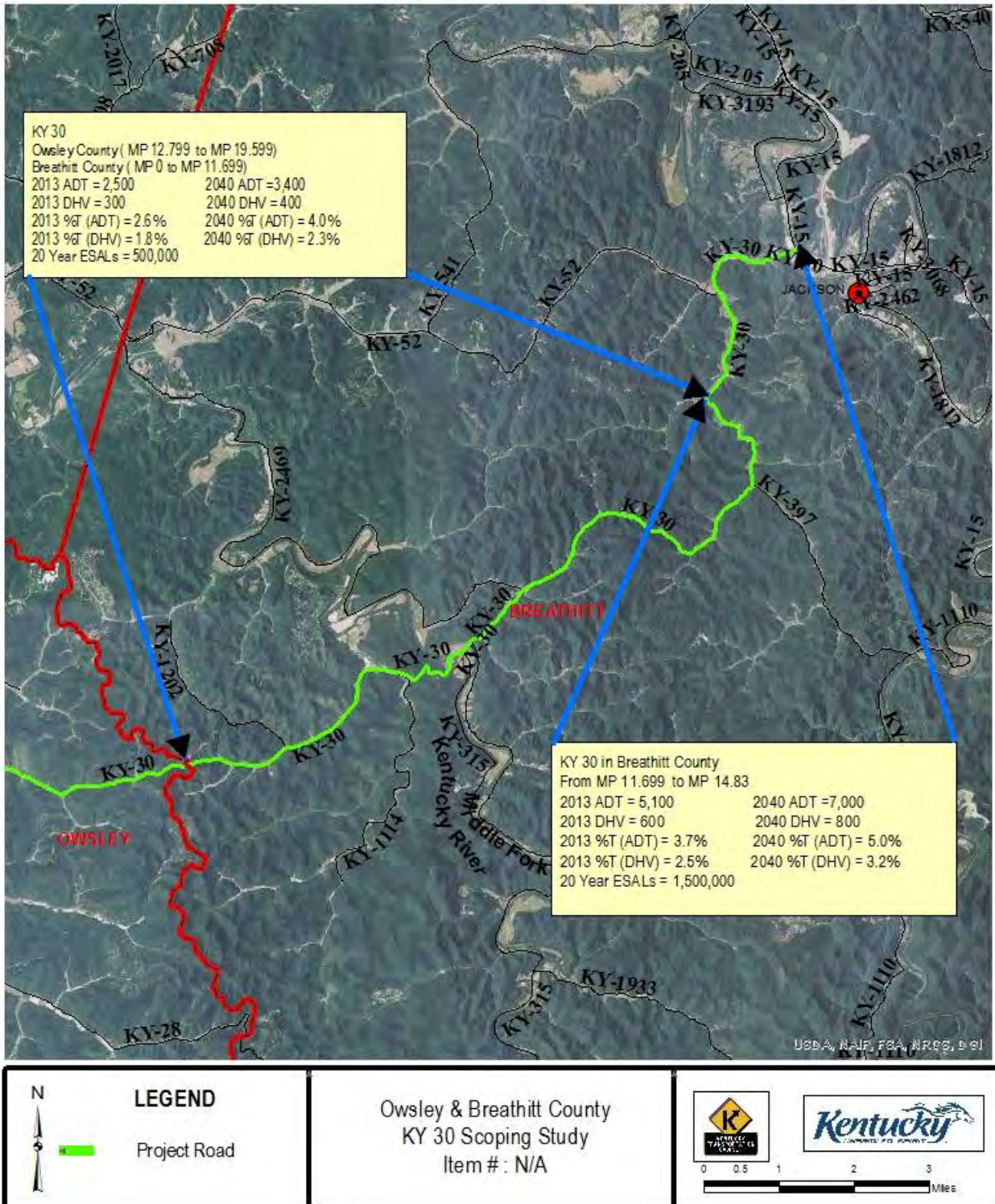


# Summary Map





# Summary Map



## **ESAL FORECAST SUMMARY SHEETS**

Traffic Forecast Technical Report  
 Owsley/Breathitt County: KY 30 Scoping Study  
 Item No. N/A

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

**ROUTE ID:**

County	Owsley	Date	09/19/13
Road Name	Mulberry St	Forecaster	Jay Balaji
Functional Class	7 - Rural Major Collector	MARS No.	8658308P
Project Description	KY 30 Scoping Study	Item No.	N/A
Scenario	Build	Route No.	KY 30
Segment Description	KY 30 from milepoint 11.127 to 12.799	Beg. MP	11.127
		End MP	12.799
		T.F. No.	TF 13-015
		No. of Lanes	2
		1 or 2 way	2

**REFERENCES:**

Previous Forecasts	N/A	K-Factor Value	11.8%
Traffic Volume	095A04	K-Factor Source	095A04
Milepoint	11.4	PHF	0.85
Truck Percent	095A04	Full Route Unique Identifier	
Milepoint	11.4		095-KY-0030 -000
ESAL Information	2007 Aggregated ESALS		
Growth Rate	1.20%		

**TRAFFIC PARAMETERS:**

	Present Year	Growth Rate	Construction Year	Median Year	Design Year
	2013		2020	2030	2040
Volume (AADT)	5350	1.20%	5800	6600	7000
Percent Trucks (%T)	4.6%	1.0%	5%	5%	6%
Number of Trucks	250	2.2%	280	330	420
Percent Trucks Hauling Coal (%CT)	0%	0.0%	0%	0%	0%
<i>Non-Coal Trucks:</i>					
Axles/Truck (A/T)	3.060	0.70%	3.213	3.445	3.694
ESALs/Axle (ESAL/A)	0.245	1.60%	0.274	0.321	0.376
<i>Coal Trucks:</i>					
Axles/Truck (A/CT)	0	0.00%	0.000	0.000	0.000
ESALs/Axle (ESAL/CA)	0	0.00%	0.000	0.000	0.000

**ESAL CALCULATIONS:** SEE ATTACHED ESAL CALCULATION SHEET

Design ESALs in Critical Lane 1,600,000

General Comments:

Traffic Forecast Technical Report  
 Owsley/Breathitt County: KY 30 Scoping Study  
 Item No. N/A

**KY 30 FROM MP 11.127 TO 12.799 IN OWSLEY COUNTY**

Year	ADT	Car %	Truck %	Cars	Trucks	CT%	AX/T	ESAL/AX	AX/CT	ESAL/CA	LDF	ESALS
2020	5,816	95.1%	4.9%	5530	286	0.00%	3.21	0.27	0	0	0.500	50,997
2021	5,886	95.0%	5.0%	5593	293	0.00%	3.24	0.28	0	0	0.500	53,156
2022	5,956	95.0%	5.0%	5657	299	0.00%	3.26	0.28	0	0	0.500	55,413
2023	6,028	94.9%	5.1%	5722	306	0.00%	3.28	0.29	0	0	0.500	57,771
2024	6,100	94.9%	5.1%	5788	312	0.00%	3.30	0.29	0	0	0.500	60,234
2025	6,173	94.8%	5.2%	5854	319	0.00%	3.33	0.30	0	0	0.500	62,809
2026	6,247	94.8%	5.2%	5921	326	0.00%	3.35	0.30	0	0	0.500	65,499
2027	6,322	94.7%	5.3%	5989	334	0.00%	3.37	0.31	0	0	0.500	68,309
2028	6,398	94.7%	5.3%	6057	341	0.00%	3.40	0.31	0	0	0.500	71,247
2029	6,475	94.6%	5.4%	6127	348	0.00%	3.42	0.32	0	0	0.500	74,316
2030	6,553	94.6%	5.4%	6197	356	0.00%	3.45	0.32	0	0	0.500	77,524
2031	6,631	94.5%	5.5%	6267	364	0.00%	3.47	0.33	0	0	0.500	80,876
2032	6,711	94.5%	5.5%	6339	372	0.00%	3.49	0.33	0	0	0.500	84,379
2033	6,791	94.4%	5.6%	6411	380	0.00%	3.52	0.34	0	0	0.500	88,040
2034	6,873	94.3%	5.7%	6484	389	0.00%	3.54	0.34	0	0	0.500	91,866
2035	6,955	94.3%	5.7%	6558	397	0.00%	3.57	0.35	0	0	0.500	95,865
2036	7,039	94.2%	5.8%	6633	406	0.00%	3.59	0.35	0	0	0.500	100,045
2037	7,123	94.2%	5.8%	6708	415	0.00%	3.62	0.36	0	0	0.500	104,413
2038	7,209	94.1%	5.9%	6785	424	0.00%	3.64	0.36	0	0	0.500	108,979
2039	7,295	94.1%	5.9%	6862	434	0.00%	3.67	0.37	0	0	0.500	113,751
2040	7,383	94.0%	6.0%	6940	443	0.00%	3.69	0.38	0	0	0.500	118,739

5-yr ESALS  
290,000

10-yr ESALS  
650,000

15-yr ESALS  
1,100,000

20-yr ESALS  
1,600,000

Traffic Forecast Technical Report  
 Owsley/Breathitt County: KY 30 Scoping Study  
 Item No. N/A

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

**ROUTE ID:**

County	Owsley/Breathitt	Date	09/13/13
Road Name	KY 30	Forecaster	Jay Balaji
Functional Class	7 - Rural Major Collector	MARS No.	8658308P
Project Description	KY 30 Scoping Study	Item No.	N/A
Scenario	Build	Route No.	KY 30
Segment Description	KY 30 MP from 12.799 in Owsley County to 11.699 in Breathitt County	Beg. MP	12.799(Owsley)
		End MP	11.699(Breathitt)
		T.F. No.	TF 13-015
		No. of Lanes	2
		1 or 2 way	2

**REFERENCES:**

Previous Forecasts	N/A	K- Factor Value	11.7%
Traffic Volume	013751	K-Factor Source	013751
Milepoint	11.2	PHF	0.85
Truck Percent	013793	Full Route Unique Identifier	
Milepoint	11.699		095-KY-0030 -000
ESAL Information	2007 Aggregated ESALS		
Growth Rate	1.20%		

**TRAFFIC PARAMETERS:**

	Present Year	Growth Rate	Construction Year	Median Year	Design Year
	2013		2020	2030	2040
Volume (AADT)	2500	1.20%	2700	3100	3400
Percent Trucks (%T)	2.6%	1.0%	3%	3%	4%
Number of Trucks	70	2.2%	80	100	120
Percent Trucks Hauling Coal (%CT)	0%	0.0%	0%	0%	0%
<i>Non-Coal Trucks:</i>					
Axles/Truck (A/T)	2.965	0.70%	3.113	3.338	3.579
ESALs/Axle (ESAL/A)	0.245	1.60%	0.274	0.321	0.376
<i>Coal Trucks:</i>					
Axles/Truck (A/CT)	0	0.00%	0.000	0.000	0.000
ESALs/Axle (ESAL/CA)	0	0.00%	0.000	0.000	0.000

**ESAL CALCULATIONS:** SEE ATTACHED ESAL CALCULATION SHEET

Design ESALs in Critical Lane 500,000

General Comments: Owsley County MP 12.799 to 19.599  
Breathitt County MP 0 to 11.699

Traffic Forecast Technical Report  
 Owsley/Breathitt County: KY 30 Scoping Study  
 Item No. N/A

**KY 30 FROM MP 12.799 IN OWSLEY TO 11.699 IN BREATHITT COUNTY**

Year	ADT	Car %	Truck %	Cars	Trucks	CT%	AX/T	ESAL/AX	AX/CT	ESAL/CA	LDF	ESALS
2020	2,718	97.2%	2.8%	2641	77	0.00%	3.11	0.27	0	0	0.500	14,376
2021	2,750	97.1%	2.9%	2672	79	0.00%	3.14	0.28	0	0	0.500	14,952
2022	2,783	97.1%	2.9%	2703	80	0.00%	3.16	0.28	0	0	0.500	15,553
2023	2,817	97.1%	2.9%	2735	82	0.00%	3.18	0.29	0	0	0.500	16,180
2024	2,851	97.1%	2.9%	2767	84	0.00%	3.20	0.29	0	0	0.500	16,836
2025	2,885	97.0%	3.0%	2799	86	0.00%	3.22	0.30	0	0	0.500	17,520
2026	2,919	97.0%	3.0%	2832	88	0.00%	3.25	0.30	0	0	0.500	18,234
2027	2,954	97.0%	3.0%	2865	90	0.00%	3.27	0.31	0	0	0.500	18,980
2028	2,990	96.9%	3.1%	2898	92	0.00%	3.29	0.31	0	0	0.500	19,759
2029	3,026	96.9%	3.1%	2932	94	0.00%	3.32	0.32	0	0	0.500	20,573
2030	3,062	96.9%	3.1%	2966	96	0.00%	3.34	0.32	0	0	0.500	21,423
2031	3,099	96.8%	3.2%	3001	98	0.00%	3.36	0.33	0	0	0.500	22,311
2032	3,136	96.8%	3.2%	3036	100	0.00%	3.39	0.33	0	0	0.500	23,238
2033	3,174	96.8%	3.2%	3071	102	0.00%	3.41	0.34	0	0	0.500	24,207
2034	3,212	96.7%	3.3%	3107	104	0.00%	3.43	0.34	0	0	0.500	25,219
2035	3,250	96.7%	3.3%	3143	107	0.00%	3.46	0.35	0	0	0.500	26,276
2036	3,289	96.7%	3.3%	3180	109	0.00%	3.48	0.35	0	0	0.500	27,380
2037	3,329	96.6%	3.4%	3217	112	0.00%	3.51	0.36	0	0	0.500	28,533
2038	3,369	96.6%	3.4%	3255	114	0.00%	3.53	0.36	0	0	0.500	29,738
2039	3,409	96.6%	3.4%	3292	117	0.00%	3.55	0.37	0	0	0.500	30,997
2040	3,450	96.5%	3.5%	3331	119	0.00%	3.58	0.38	0	0	0.500	32,313

5-yr ESALS  
80,000

10-yr ESALS  
180,000

15-yr ESALS  
300,000

20-yr ESALS  
500,000



Traffic Forecast Technical Report  
 Owsley/Breathitt County: KY 30 Scoping Study  
 Item No. N/A

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

**ROUTE ID:**

County	Breathitt	Date	09/13/13
Road Name	KY 30	Forecaster	Jay Balaji
Functional Class	7 - Rural Major Collector	MARS No.	8658308P
Project Description	KY 30 Scoping Study	Item No.	N/A
Scenario	Build	Route No.	KY 30
Segment Description	KY 30 MPfrom 11.699 to 14.83 in Breathitt County	Beg. MP	11.699
		End MP	14.83
		T.F. No.	TF 13-015
		No. of Lanes	2
		1 or 2 way	2

**REFERENCES:**

Previous Forecasts	N/A	K- Factor Value	11.0%
Traffic Volume	13799	K-Factor Source	013799
Milepoint	14.6	PHF	0.85
Truck Percent	013799	Full Route Unique Identifier	
Milepoint	14.6		013-KY-0030 -000
ESAL Information	2007 Aggregated ESALS		
Growth Rate	1.20%		

**TRAFFIC PARAMETERS:**

	Present Year	Growth Rate	Construction Year	Median Year	Design Year
	2013		2020	2030	2040
Volume (AADT)	5100	1.20%	5500	6200	7000
Percent Trucks (%T)	3.7%	1.0%	4%	4%	5%
Number of Trucks	190	2.2%	210	270	350
Percent Trucks Hauling Coal (%CT)	5%	-2.3%	5%	4%	3%
<i>Non-Coal Trucks:</i>					
Axles/Truck (A/T)	2.720	0.70%	2.856	3.062	3.284
ESALs/Axle (ESAL/A)	0.245	1.60%	0.274	0.321	0.376
<i>Coal Trucks:</i>					
Axles/Truck (A/CT)	4.356	0.00%	4.356	4.356	4.356
ESALs/Axle (ESAL/CA)	2.7	0.00%	2.700	2.700	2.700

**ESAL CALCULATIONS:** SEE ATTACHED ESAL CALCULATION SHEET

Design ESALs in Critical Lane 1,500,000

General Comments:

Traffic Forecast Technical Report  
 Owsley/Breathitt County: KY 30 Scoping Study  
 Item No. N/A

**KY 30 FROM MP 11.699 TO 14.83 IN BREATHITT COUNTY**

Year	ADT	Car %	Truck %	Cars	Trucks	CT%	AXIT	ESAL/AX	AX/CT	ESAL/CA	LDF	ESALS
2020	5,544	96.1%	3.9%	5325	219	4.57%	2.86	0.27	4,356	2.7	0.500	56,114
2021	5,611	96.0%	4.0%	5387	224	4.47%	2.88	0.28	4,356	2.7	0.500	57,565
2022	5,678	96.0%	4.0%	5449	229	4.38%	2.90	0.28	4,356	2.7	0.500	59,081
2023	5,746	95.9%	4.1%	5513	234	4.28%	2.92	0.29	4,356	2.7	0.500	60,666
2024	5,815	95.9%	4.1%	5576	239	4.19%	2.94	0.29	4,356	2.7	0.500	62,322
2025	5,885	95.9%	4.1%	5641	244	4.10%	2.96	0.30	4,356	2.7	0.500	64,052
2026	5,955	95.8%	4.2%	5706	249	4.01%	2.98	0.30	4,356	2.7	0.500	65,861
2027	6,027	95.8%	4.2%	5772	255	3.92%	3.00	0.31	4,356	2.7	0.500	67,750
2028	6,099	95.7%	4.3%	5839	261	3.84%	3.02	0.31	4,356	2.7	0.500	69,726
2029	6,172	95.7%	4.3%	5906	266	3.75%	3.04	0.32	4,356	2.7	0.500	71,790
2030	6,247	95.6%	4.4%	5974	272	3.67%	3.06	0.32	4,356	2.7	0.500	73,947
2031	6,321	95.6%	4.4%	6043	278	3.59%	3.08	0.33	4,356	2.7	0.500	76,202
2032	6,397	95.5%	4.4%	6113	284	3.52%	3.11	0.33	4,356	2.7	0.500	78,559
2033	6,474	95.5%	4.5%	6183	291	3.44%	3.13	0.34	4,356	2.7	0.500	81,022
2034	6,552	95.5%	4.5%	6255	297	3.37%	3.15	0.34	4,356	2.7	0.500	83,597
2035	6,630	95.4%	4.6%	6327	304	3.29%	3.17	0.35	4,356	2.7	0.500	86,288
2036	6,710	95.4%	4.6%	6400	310	3.22%	3.19	0.35	4,356	2.7	0.500	89,101
2037	6,791	95.3%	4.7%	6473	317	3.15%	3.22	0.36	4,356	2.7	0.500	92,042
2038	6,872	95.3%	4.7%	6548	324	3.08%	3.24	0.36	4,356	2.7	0.500	95,116
2039	6,954	95.2%	4.8%	6623	331	3.02%	3.26	0.37	4,356	2.7	0.500	98,329
2040	7,038	95.2%	4.8%	6699	339	2.95%	3.28	0.38	4,356	2.7	0.500	101,688

5-yr ESALS  
300,000

10-yr ESALS  
650,000

15-yr ESALS  
1,100,000

20-yr ESALS  
1,500,000