III. OPERATIONAL CONSIDERATIONS

There are operational factors that should be addressed to adequately assess existing conditions along the Parkways, as well as future needs related to their proposed designation as I-69. The primary considerations include crash history, traffic volumes, and operational levels of service. These factors also have some bearing on the geometric and design issues presented in the following chapters of this report.

A. Crash History and Analysis

An analysis of highway crashes was performed for this study to determine (a) whether crashes are a major concern along the Ford and Breathitt Parkways, (b) whether segments of the Ford and Breathitt Parkways have a higher rate of crashes than comparable parkway segments throughout Kentucky, and, finally, (c) whether crashes occur randomly within the study corridor or whether they may be a result of some unidentified problem along the Parkways.

1. Crash Analysis Methodology

The methodology used in this crash analysis can be referenced in the Kentucky Transportation Center's *Analysis of Traffic Accident Data in Kentucky (1995-1999)*, the most recent guideline available at the time of the analysis. This guide provides formulas, factors, and other detailed information that can be used to calculate crash rates for all roadway facilities within Kentucky. Included in this information is the critical crash rate, which is the maximum number of crashes expected along similar roadways. The guide also provides formulas to calculate the actual annual crash rate for the facility being studied, or the Parkways in this case. For this analysis, this rate is based upon the actual number of crashes along a segment for a given period of four years, the type of roadway, the length of section, and the ADT volume for the segment that is being analyzed.

To determine whether a segment of roadway is a high crash segment, the critical crash rate for similar roadways is compared to the actual annual crash rate for the facility being studied. The ratio of these two rates produces a critical rate factor, or measure of crash frequency, for each segment or spot. If a segment has a critical rate factor greater than 1.00, it indicates that the segment is a high crash segment and that crashes at this location may not be occurring randomly. Also, if a critical rate factor ranges from 0.90 to 0.99, the segment is considered to be a potentially high crash segment.

2. Source and Date of Crash Data

Crash data for the Ford and Breathitt Parkways were considered for a four-year period from January 1, 1998, to December 31, 2001. This data was the most recent available at the time of analysis and was provided by the KYTC from the Collision Report Analysis for Safer Highways (CRASH) database. The data represents the crash history along the 38.3-mile section of the Ford Parkway from MP 0.000 in Lyon County to MP

38.332 in Hopkins County, and the 42.0-mile section of the Breathitt Parkway from MP 34.271 in Hopkins County to MP 76.258 in Henderson County.

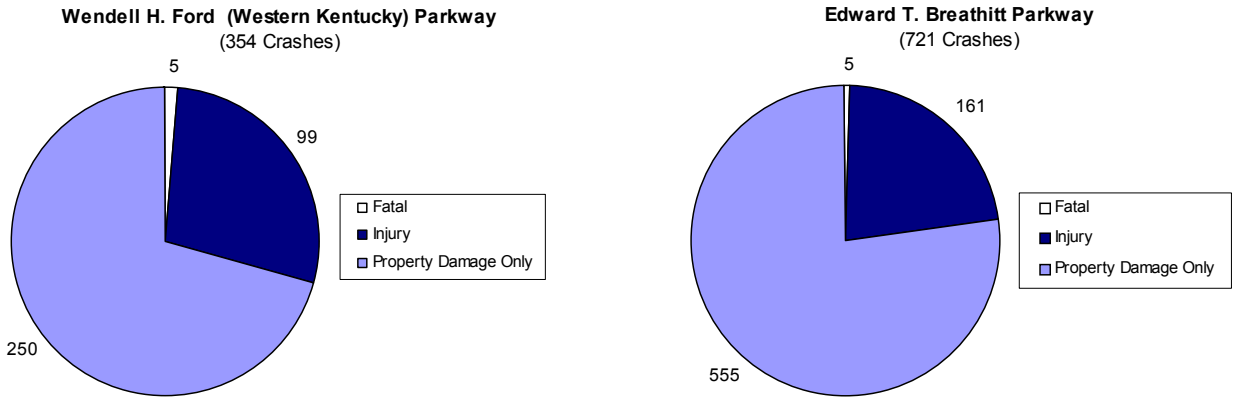
3. Types and Location of Crashes

The locations of crashes with valid milepoint designations are identified by segment along the Ford and Breathitt Parkways in **Table 2**. Each Parkway was broken into segments to be analyzed for high crash locations. A segment, in this case, is any length of roadway within the same county, having the same ADT, number of lanes, median type (divided/undivided), and functional classification (rural/urban). These criteria are used to define segments because they are the inputs necessary for calculating the Critical Rate Factor, and therefore need to be constant along any segment analyzed. Analysis segments were also kept below 10 miles in length.

As shown in **Table 2** and in the following charts, there were 1,075 reported crashes along these roadways during the period from 1998-2001. Of this total, 354 (33%) were reported on the Ford Parkway and 721 (67%) were reported on the Breathitt Parkway.

For this analysis, crashes were classified into one of three categories based on the degree of severity: fatal, injury, or property-damage-only. Of the total on the Ford Parkway, there were five (5) fatal (1%), 99 injury (28%), and 250 property-damage-only (71%) crashes. Of the total on the Breathitt Parkway, there were five (5) fatal (1%), 161 injury (22%), and 555 property-damage-only (77%) crashes.

Number of Crashes by Type
(January 1998 – December 2001)



Source: Collision Report Analysis for Safer Highways (CRASH) database

Table 2. Crash Analysis as a Parkway Facility

Ford Parkway	County	Begin MP	End MP	Length (Miles)	ADT	Number of Lanes	Divided Undivided	Rural Urban	Avg. Crash Rate	Critical Crash Rate	Crashes				HMVM	Rates per HMVM				Critical Rate Factor
											Fatal	Injury	PDO	Total		Fatal	Injury	PDO	Total	
	Lyon	0.000	3.702	3.702	9,350	4	Divided	R	60	89.06	0	10	32	42	0.51	0.00	19.79	63.32	83.11	0.93
	Lyon	3.702	5.610	1.908	9,020	4	Divided	R	60	101.80	0	9	23	32	0.25	0.00	35.82	91.54	127.35	1.25
	Caldwell	5.610	11.109	5.499	9,020	4	Divided	R	60	84.14	1	12	27	40	0.72	1.38	16.57	37.28	55.24	0.66
	Caldwell	11.109	11.700	0.591	9,020	4	Divided	U	105	206.04	0	0	3	3	0.08	0.00	0.00	38.55	38.55	0.19
	Caldwell	11.700	13.116	1.416	10,400	4	Divided	R	60	105.36	0	1	11	12	0.22	0.00	4.65	51.16	55.81	0.53
	Caldwell	13.116	21.764	8.648	9,440	4	Divided	R	60	78.70	1	14	49	64	1.19	0.84	11.75	41.11	53.70	0.68
	Hopkins	21.764	24.435	2.671	9,440	4	Divided	R	60	94.25	2	6	14	22	0.37	5.43	16.30	38.03	59.76	0.63
	Hopkins	24.435	31.581	7.146	10,400	4	Divided	R	60	79.62	0	27	48	75	1.09	0.00	24.88	44.24	69.12	0.87
	Hopkins	31.581	38.332	6.751	10,400	4	Divided	R	60	80.20	1	20	43	64	1.03	0.98	19.51	41.95	62.43	0.78
Breathitt Parkway	**County**	**Begin MP**	**End MP**	**Length (Miles)**	**ADT**	**Number of Lanes**	**Divided Undivided**	**Rural Urban**	**Avg. Crash Rate**	**Critical Crash Rate**	**Crashes**				**HMVM**	**Rates per HMVM**				**Critical Rate Factor**
											Fatal	**Injury**	**PDO**	**Total**		**Fatal**	**Injury**	**PDO**	**Total**	
	Hopkins	34.271	37.070	2.799	22,500	4	Divided	R	60	81.35	1	15	46	62	0.92	1.09	16.31	50.03	67.43	0.83
	Hopkins	37.070	41.002	3.932	21,700	4	Divided	R	60	78.28	0	13	61	74	1.25	0.00	10.44	48.97	59.40	0.76
	Hopkins	41.002	42.437	1.435	21,700	4	Divided	U	105	145.25	1	18	82	101	0.45	2.20	39.59	180.36	222.16	1.53
	Hopkins	42.437	44.337	1.900	27,000	4	Divided	U	105	136.17	0	23	70	93	0.75	0.00	30.71	93.46	124.17	0.91
	Hopkins	44.337	45.200	0.863	16,700	4	Divided	U	105	164.92	0	2	13	15	0.21	0.00	9.50	61.78	71.29	0.43
	Hopkins	45.200	47.472	2.272	14,700	4	Divided	U	105	143.83	0	7	40	47	0.49	0.00	14.36	82.03	96.39	0.67
	Hopkins	47.472	48.990	1.518	14,700	4	Divided	R	60	96.49	0	1	13	14	0.33	0.00	3.07	39.90	42.97	0.45
	Hopkins	48.990	54.070	5.080	20,700	4	Divided	R	60	76.43	2	16	45	63	1.54	1.30	10.42	29.31	41.03	0.54
	Hopkins	54.070	55.003	0.933	17,500	4	Divided	R	60	102.97	0	4	7	11	0.24	0.00	16.78	29.36	46.14	0.45
	Webster	55.003	62.637	7.634	12,900	4	Divided	R	60	76.99	1	24	66	91	1.44	0.70	16.69	45.90	63.29	0.82
	Webster	62.637	65.305	2.668	12,400	4	Divided	R	60	89.75	0	11	25	36	0.48	0.00	22.77	51.76	74.53	0.83
	Henderson	65.305	68.363	3.058	14,200	4	Divided	R	60	85.85	0	7	18	25	0.63	0.00	11.04	28.39	39.43	0.46
	Henderson	68.363	76.258	7.895	16,400	4	Divided	R	60	74.78	0	20	69	89	1.89	0.00	10.58	36.50	47.08	0.63

Source: Collision Report Analysis for Safer Highways (CRASH) database, and the Kentucky Transportation Center's Analysis of Traffic Accident Data in Kentucky (1995-1999)

Legend

Abbreviations shown in the above table are defined as follows: MP – Milepoint; ADT - Average Daily Traffic (measured in vehicles per day); PDO - Property Damage Only Crash; HMVM - Hundred Million Vehicle Miles (vehicle miles per year divided by 100,000,000 for manageability)

Crash Analysis Methodology and Criteria

The methodology used in this crash analysis can be referenced in the Kentucky Transportation Center's Analysis of Traffic Accident Data in Kentucky (1995-1999). This guide provides formulas, factors, and other detailed information that can be used to calculate crash (or accident) rates for all roadway facilities within Kentucky. Included in this information is the critical crash rate, which is defined as the maximum number of crashes expected to occur on a road given the average statewide crash rates, type of roadway, length of section, and average daily traffic (ADT) volume. In addition, the guide provides formulas to calculate the actual annual crash rate. This rate is based upon the actual number of crashes along a segment, the type of roadway, the length of section, and the ADT volume for the segment that is being analyzed.

To determine whether a segment of roadway is a high crash segment, the critical crash rate is compared to the actual annual crash rate. The ratio of these two rates produces a critical rate factor, or measure of crash frequency, for each segment or spot. If a segment has a critical rate factor greater than 1.00, it indicates that the segment is a high crash segment and that crashes at this location may not be occurring randomly. Also, if a critical rate factors ranges from 0.90 to 0.99, the segment is considered to be a potentially high crash segment.

Each Parkway was broken into segments to be analyzed for high crash locations. A segment, in this case, is any length of roadway within the same county, having the same ADT, number of lanes, median type (divided/undivided), and functional classification (rural/urban). Analysis segments were also kept below 10 miles in length. These criteria are used to define segments because they are the inputs necessary for calculating the Critical Rate Factor, therefore need to be constant along any segment analyzed.

4. Analysis as a Parkway Facility

The crash data identified for the Parkways was analyzed in two ways as part of this study. The actual annual crash rates calculated for the Parkways were compared to the critical crash rates identified for both Parkway and Interstate facilities. Interstate facilities have lower critical crash rates compared to Parkways, which indicates that Interstates typically have fewer crashes. As a result, the same number of crashes which result in a high crash segment along an Interstate may not result in a high crash segment along a geometrically similar Parkway facility.

The following sections discuss the crash rates and resulting high crash segments when the Parkways are analyzed as Parkways. Part 5 of this discussion below considers the crash rates and resulting high crash segments when the Parkways are analyzed as Interstates.

Crash Rates

The Wendell H. Ford Western Kentucky Parkway was divided into eight (8) segments, for which the crash history was statistically evaluated. Of the eight segments, the calculated crash rate ranged from 38.55 crashes per one-hundred million vehicle miles (acc/hmvm) to 127.35 acc/hmvm. The statewide average crash rate for all parkways in rural areas is 60 acc/hmvm and 105 acc/hmvm in urban areas. The data in **Table 2** indicates that there is one high crash segment along the Ford Parkway near the US 62 interchange at Eddyville in Lyon County (MP 3.702 to MP 5.610) where the actual crash rate exceeds the statewide average for all parkways. Another segment between MP 0.000 and MP 3.702, just east of the I-24 interchange in Lyon County, nearly exceeds the statewide average for parkways and should be considered a potential high crash segment.

The Edward T. Breathitt Parkway was divided into thirteen segments for analysis. The calculated crash rate along these segments ranged from 39.43 acc/hmvm to 222.16 acc/hmvm. **Table 2** indicates that there is one (1) high crash segment where the actual crash rate exceeds the statewide average for Parkways. The high crash segment is in Hopkins County between MP 41.002 and MP 42.437, near the KY 70/85 exit at Madisonville. There is also one potential high crash segment in Hopkins County between MP 42.437 and 44.337, near the US 41A exit at Madisonville.

5. Analysis as an Interstate Facility

Crash analysis usually involves the comparison of a highway with roads of a similar classification and geometrics. However, one of the purposes of this study is to examine the degree to which the Ford and Breathitt Parkways are suitable for designation as an interstate highway. Interstate facilities have lower critical crash rates compared to parkways, indicating that interstates typically have fewer crashes per vehicle-mile of travel, as shown in the following table.

Facility	Crash Rates (Crashes per 100 MVM)	
	Rural	Urban
Parkway	60	105
Interstate	52	96

Source: Analysis of Traffic Accident Data in Kentucky (1995-1999), Kentucky Transportation Center

Therefore, it is helpful to perform an analysis that compares crash data on the two Parkways with data on Kentucky interstate highways.

Crash Rates

As shown in **Table 3**, when compared to Kentucky interstate highways, one additional high accident segment is identified along the Ford Parkway. This segment is located just east of the I-24 interchange in Lyon County (between MP 0.000 and MP 3.702). **Figure 3** shows the crash data by severity and location, along with the identified high crash segments based on both the Parkway and Interstate analyses. Highlighted in red are the identified portions of both the Ford and Breathitt Parkways that have historical crash rates that are higher than the critical crash rates for all parkways in Kentucky. These sections are considered to be high crash segments. Similarly, highlighted in yellow, segments where crash rates are close to the critical crash rates for parkways are identified as potentially high crash segments.

Table 3. Crash Analysis as an Interstate Facility

Ford Parkway	County	Begin MP	End MP	Length (Miles)	ADT	Number of Lanes	Divided Undivided	Rural Urban	Avg. Crash Rate	Critical Crash Rate	Crashes				HMVM	Rates per HMVM				Critical Rate Factor
											Fatal	Injury	PDO	Total		Fatal	Injury	PDO	Total	
	Lyon	0.000	3.702	3.702	9,350	4	Divided	R	52	79.12	0	10	32	42	0.51	0.00	19.79	63.32	83.11	1.05
	Lyon	3.702	5.610	1.908	9,020	4	Divided	R	52	91.05	0	9	23	32	0.25	0.00	35.82	91.54	127.35	1.40
	Caldwell	5.610	11.109	5.499	9,020	4	Divided	R	52	74.52	1	12	27	40	0.72	1.38	16.57	37.28	55.24	0.74
	Caldwell	11.109	11.700	0.591	9,020	4	Divided	U	96	192.89	0	0	3	3	0.08	0.00	0.00	38.55	38.55	0.20
	Caldwell	11.700	13.116	1.416	10,400	4	Divided	R	52	94.39	0	1	11	12	0.22	0.00	4.65	51.16	55.81	0.59
	Caldwell	13.116	21.764	8.648	9,440	4	Divided	R	52	69.43	1	14	49	64	1.19	0.84	11.75	41.11	53.70	0.77
	Hopkins	21.764	24.435	2.671	9,440	4	Divided	R	52	83.97	2	6	14	22	0.37	5.43	16.30	38.03	59.76	0.71
	Hopkins	24.435	31.581	7.146	10,400	4	Divided	R	52	70.29	0	27	48	75	1.09	0.00	24.88	44.24	69.12	0.98
	Hopkins	31.581	38.332	6.751	10,400	4	Divided	R	52	70.83	1	20	43	64	1.03	0.98	19.51	41.95	62.43	0.88
Breathitt Parkway	**County**	**Begin MP**	**End MP**	**Length (Miles)**	**ADT**	**Number of Lanes**	**Divided Undivided**	**Rural Urban**	**Avg. Crash Rate**	**Critical Crash Rate**	**Crashes**				**HMVM**	**Rates per HMVM**				**Critical Rate Factor**
											Fatal	**Injury**	**PDO**	**Total**		**Fatal**	**Injury**	**PDO**	**Total**	
	Hopkins	34.271	37.070	2.799	22,500	4	Divided	R	52	71.92	1	15	46	62	0.92	1.09	16.31	50.03	67.43	0.94
	Hopkins	37.070	41.002	3.932	21,700	4	Divided	R	52	69.04	0	13	61	74	1.25	0.00	10.44	48.97	59.40	0.86
	Hopkins	41.002	42.437	1.435	21,700	4	Divided	U	96	134.53	1	18	82	101	0.45	2.20	39.59	180.36	222.16	1.65
	Hopkins	42.437	44.337	1.900	27,000	4	Divided	U	96	125.83	0	23	70	93	0.75	0.00	30.71	93.46	124.17	0.99
	Hopkins	44.337	45.200	0.863	16,700	4	Divided	U	96	153.40	0	2	13	15	0.21	0.00	9.50	61.78	71.29	0.46
	Hopkins	45.200	47.472	2.272	14,700	4	Divided	U	96	133.17	0	7	40	47	0.49	0.00	14.36	82.03	96.39	0.72
	Hopkins	47.472	48.990	1.518	14,700	4	Divided	R	52	86.08	0	1	13	14	0.33	0.00	3.07	39.90	42.97	0.50
	Hopkins	48.990	54.070	5.080	20,700	4	Divided	R	52	67.32	2	16	45	63	1.54	1.30	10.42	29.31	41.03	0.61
	Hopkins	54.070	55.003	0.933	17,500	4	Divided	R	52	92.14	0	4	7	11	0.24	0.00	16.78	29.36	46.14	0.50
	Webster	55.003	62.637	7.634	12,900	4	Divided	R	52	67.84	1	24	66	91	1.44	0.70	16.69	45.90	63.29	0.93
	Webster	62.637	65.305	2.668	12,400	4	Divided	R	52	79.76	0	11	25	36	0.48	0.00	22.77	51.76	74.53	0.93
	Henderson	65.305	68.363	3.058	14,200	4	Divided	R	52	76.12	0	7	18	25	0.63	0.00	11.04	28.39	39.43	0.52
	Henderson	68.363	76.258	7.895	16,400	4	Divided	R	52	65.78	0	20	69	89	1.89	0.00	10.58	36.50	47.08	0.72

Source: Source: Collision Report Analysis for Safer Highways (CRASH) database, and the Kentucky Transportation Center's Analysis of Traffic Accident Data in Kentucky (1995-1999)
Note: It should be noted that critical rate factors for this analysis were calculated using the assumption that the Parkways were part of the I-69 Corridor. Interstate facilities have lower critical crash rates compared to parkways, which indicates that interstates typically have fewer crashes. As a result, the same number of crashes along a parkway may not produce a high crash segment when compared to a geometrically similar interstate facility that is considered a high crash segment.

Legend

Abbreviations shown in the above table are defined as follows: MP – Milepoint; ADT - Average Daily Traffic (measured in vehicles per day); PDO - Property Damage Only Crash; HMVM - Hundred Million Vehicle Miles (vehicle miles per year divided by 100,000,000 for manageability)

Crash Analysis Methodology and Criteria

The methodology used in this crash analysis can be referenced in the Kentucky Transportation Center's Analysis of Traffic Accident Data in Kentucky (1995-1999). This guide provides formulas, factors, and other detailed information that can be used to calculate crash (or accident) rates for all roadway facilities within Kentucky. Included in this information is the critical crash rate, which is defined as the maximum number of crashes expected to occur on a road given the average statewide crash rates, type of roadway, length of section, and average daily traffic (ADT) volume. In addition, the guide provides formulas to calculate the actual annual crash rate. This rate is based upon the actual number of crashes along a segment, the type of roadway, the length of section, and the ADT volume for the segment that is being analyzed.

To determine whether a segment of roadway is a high crash segment, the critical crash rate is compared to the actual annual crash rate. The ratio of these two rates produces a critical rate factor, or measure of crash frequency, for each segment or spot. If a segment has a critical rate factor greater than 1.00, it indicates that the segment is a high crash segment and that crashes at this location may not be occurring randomly. Also, if a critical rate factor ranges from 0.90 to 0.99, the segment is considered to be a potentially high crash segment.

Each Parkway was broken into segments to be analyzed for high crash locations. A segment, in this case, is any length of roadway within the same county, having the same ADT, number of lanes, median type (divided/undivided), and functional classification (rural/urban). Analysis segments were also kept below 10 miles in length. These criteria are used to define segments because they are the inputs necessary for calculating the Critical Rate Factor, therefore need to be constant along any segment analyzed.

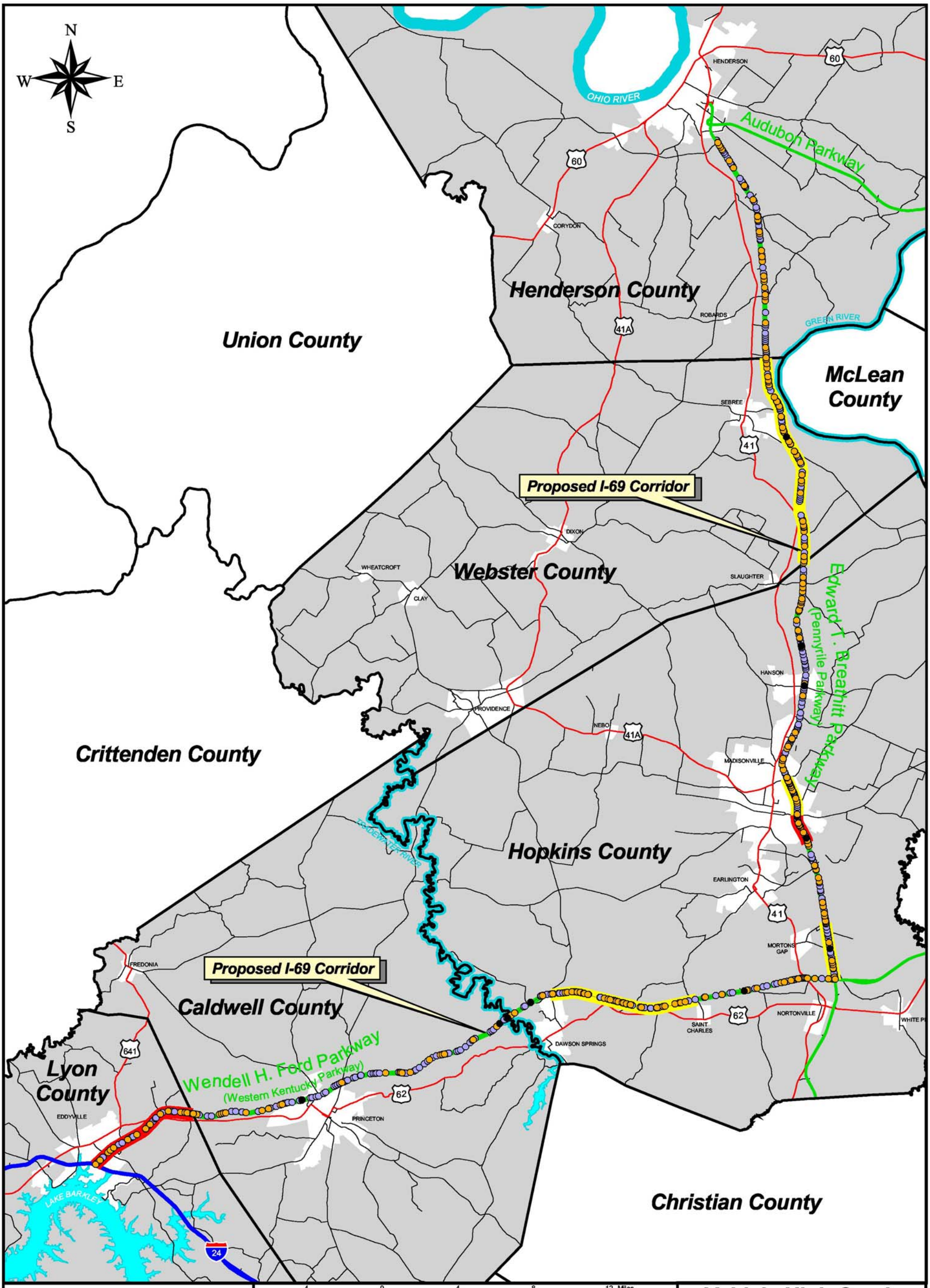


Figure 3. Crashes by Location and Severity

6. Crash Causation Factors

The determination of crash causes can help to evaluate potential problems represented by high crash areas and the suitability of the Parkways for interstate travel. For the high and potentially high crash segments along the Ford and Breathitt Parkways shown in **Figure 3**, the causation factors have been summarized from the 1998-2001 crash data. The major crash cause categories are listed for each segment in **Table 4** and are summarized for the high crash segments below:

High Crash Segments

Along the Ford Parkway in Lyon County, between MP 3.702 and MP 5.610, crash causation factors included the following:

- Collisions with fixed objects accounted for 44% of crashes (14 of 32) during the analysis period. This percentage is higher than the 34% of crashes (121 of 354) along the study section of the Ford Parkway that were the result of collisions with fixed objects.
- Collisions with an animal made up 28% of all crashes (9 of 32), which is comparable to the 27% of all crashes of the same type (94 of 354) along the study section of the Ford Parkway.

Exit 42, along the Breathitt Parkway, is the location of many rear-end crashes.

Along the Breathitt Parkway in Hopkins County, between MP 41.002 and 42.437, crash causation factors included the following:

- 69% of crashes (70 of 101) were the result of rear-end collisions. The majority of the rear-end crashes (67 of 70) in this section occurred along the Parkway near Exit 42, the interchange with KY 70. The crash data indicates that 54% of these were coded as 'rear-end collision on a ramp' and 46% were coded as 'rear-end collision in traffic lanes'. The ramp at Exit 42 does not meet entrance radius or taper guidelines for interstates as shown in Table 17 (Chapter 7). Only 21% of crashes (154 of 721) along the study section of the Breathitt Parkway were the result of rear-end collisions.

Along the Ford Parkway in Lyon County, between MP 0.000 and MP 3.702, crash causation factors included:

- 38% of crashes (16 of 42) were the result of collisions with an animal. This percentage is higher than the 27% of crashes that resulted from collisions with animals along the entire study section of the Ford Parkway.
- Collisions with a fixed object made up 36% of crashes (15 of 42), which is slightly more than the 34% of crashes (121 of 354) of the same type along the study section of the Ford Parkway.

Table 4. Crash Types for High and Potentially High Crash Segments

High Crash Segments

Ford Parkway
MP 0.000 - MP 3.702 (Lyon County)

Crash Type	Crashes in Segment	% in Segment	Crashes on Parkway	% on Parkway
Collision With Animal	16	38%	94	27%
Collision With Fixed Object	15	36%	121	34%
Ran Off Roadway	5	12%	49	14%
All Other Types	6	14%	90	25%

Ford Parkway
MP 3.702 - MP 5.610 (Lyon County)

Crash Type	Crashes in Segment	% in Segment	Crashes on Parkway	% on Parkway
Collision With Animal	9	28%	94	27%
Collision With Fixed Object	14	44%	121	34%
Ran Off Roadway	3	9%	49	14%
All Other Types	6	19%	90	25%

Breathitt Parkway
MP 41.002 - MP 42.437 (Hopkins County)

Crash Type	Crashes in Segment	% in Segment	Crashes on Parkway	% on Parkway
Collision With Animal	6	6%	156	22%
Collision With Fixed Object	10	10%	134	19%
Rear-end	70	69%	154	21%
All Other Types	15	15%	277	38%

Segments with % of crashes higher than average for respective Parkway

continued on next page

Table 4. Crash Types for High and Potentially High Crash Segments (cont.)

Potentially High Crash Segments

Ford Parkway
MP 24.435 - MP 31.581 (Hopkins County)

Crash Type	Crashes in Segment	% in Segment	Crashes on Parkway	% on Parkway
Collision With Animal	17	23%	94	27%
Collision With Fixed Object	30	40%	121	34%
Ran Off Roadway	14	19%	49	14%
All Other Types	14	19%	90	25%

Breathitt Parkway
MP 34.371 - MP 37.070 (Hopkins County)

Crash Type	Crashes in Segment	% in Segment	Crashes on Parkway	% on Parkway
Collision With Animal	12	19%	156	22%
Collision With Fixed Object	16	26%	134	19%
Rear End In Traffic Lanes Both Vehicles Moving	7	11%	154	21%
All Other Types	27	44%	277	38%

Breathitt Parkway
MP 42.437 - MP 44.337 (Hopkins County)

Crash Type	Crashes in Segment	% in Segment	Crashes on Parkway	% on Parkway
Collision With Animal	15	16%	156	22%
Collision With Fixed Object	10	11%	134	19%
Rear End	37	40%	154	21%
All Other Types	31	33%	277	38%

Breathitt Parkway
MP 55.003 - MP 62.637 (Webster County)

Crash Type	Crashes in Segment	% in Segment	Crashes on Parkway	% on Parkway
Collision With Animal	21	23%	156	22%
Collision With Fixed Object	23	25%	134	19%
Ran Off Roadway	26	29%	107	15%
All Other Types	21	23%	324	45%

Breathitt Parkway
MP 62.637 - MP 65.305 (Webster County)

Crash Type	Crashes in Segment	% in Segment	Crashes on Parkway	% on Parkway
Collision With Animal	7	19%	156	22%
Collision With Fixed Object	11	31%	134	19%
Ran Off Roadway	4	11%	107	15%
All Other Types	14	39%	324	45%

Segments with % of crashes higher than average for respective Parkway

7. Other Crash Considerations

Consideration of other crash types and locations along the Parkways was undertaken to identify potential problem areas. These include cross-over or head-on collisions as well as collisions near interchanges along the Parkways.

Cross-Over Crashes

Cross-over or head-on crashes along the Parkways could indicate potential problems with median width, directional separation or entrance/exit ramp signage. For the years considered, there were six (6) crashes coded as 'median cross-over' or 'head-on collisions.'

Crashes occurring along the Ford Parkway included the following locations:

- Two head-on crashes in Caldwell County near milepoint 16.0;
- One head-on crash at milepoint 22.0 in Hopkins County, near the Tradewater River bridge (B00138); and
- Two head-on crashes in Hopkins County near milepoint 25.0.

Crashes occurring along the Breathitt Parkway included the following:

- One median cross-over crash in Webster County at milepoint 63.3.

Head-on and cross-over crashes make up about 0.6% of the total crashes along the Parkways for the years studied. Statewide, cross-over or head-on crashes accounted for about 0.5% of the crashes along Parkways and Interstates. This indicates that head-on and cross-over crashes are generally not more prevalent along the Parkways under study than along similar routes statewide.

Crashes at Interchanges

Crashes at interchanges along the study section of the Parkways were also considered as part of this analysis. Crashes occurring within a 0.1-mile section on either side of an interchange were summarized by crash type. Along the Parkways, the major interchange crash types are summarized as follows:

- 31% (59 of 188) were coded as ramp related crashes, including rear-end and other multiple-vehicle collisions;
- 21% (39 of 188) were identified as rear-end crashes, including crashes in the traffic lanes, with one stopped vehicle and with both vehicles moving; and
- 21% (39 of 188) were collisions with a fixed object.

Three (3) of the interchanges along the Parkways fall within high crash segments identified previously in **Sections 4** and **5** of this Chapter. Interchanges along the Ford Parkway include:

- Exit 1 in Lyon County, at the interchange with I-24; and
- Exit 4 in Lyon County, at the interchange with US 62.

Along the Breathitt Parkway, there is one interchange that falls within a high accident segment:

- Exit 42 in Hopkins County, at the interchange with KY 70/85 in the urban area of Madisonville.

Additional comments related to interchange crashes are included in **Chapter VI, Section E**.

8. Summary of Findings of Crash Analysis

Review of the crash data for the four years under study revealed the following:

- The number of collisions with fixed objects may indicate that there are locations where objects are too close to the roadway and horizontal clearance issues could be addressed.
- The number of collisions with an animal may mean there are locations where wildlife crossings could be addressed with fencing, deer reflectors or other measures.
- Due to the number of crashes caused by rear-end collisions, problems with the ramp design and/or operational controls may exist at Exit 42 in Hopkins County (i.e., at the KY 70 interchange in Madisonville). Therefore, reconstruction of this ramp may be needed to improve safety at this location.
- Head-on and cross-over crashes do not seem to be more prevalent along the Parkways under study than along similar routes statewide.
- The number of ramp and rear-end crashes at interchanges may indicate the need for entrance and exit improvements along both Parkways.

B. Traffic Volumes and Operational Level of Service

An analysis of traffic congestion and level of service was performed for this study to identify locations where traffic problems could be an issue along the Ford and Breathitt Parkways. In addition, future traffic characteristics of the Parkways with and without I-69 were considered as part of this analysis.

For this project, both existing (Year 2002) and future (Year 2030) average daily traffic (ADT) volumes have been determined and are discussed further in the following subsections.

1. Year 2002 Traffic Volumes

Existing traffic volumes (Year 2002) for segments of the Ford and Breathitt Parkways were summarized based on information provided in the KYTC HIS database. Existing truck percentages were determined for the study area routes using several data sources, including the HIS database and Year 2003 classification counts at Parkway count stations. The ADT volumes and the corresponding truck percentages for the Year 2002 are shown in **Table 5** and **Figure 4**.

The existing traffic volumes along the Ford Parkway range from 9,000 vpd in Lyon County to 10,900 vpd in Hopkins County. For the Breathitt Parkway, 2002 traffic volumes range from 10,500 vpd in Hopkins County near the Ford Parkway to 26,400 vpd in Hopkins County within the urban area of Madisonville. Existing truck percentages range from 25.0% to 31.3% along the Ford Parkway, and from 22.9% to 32.9% along the Breathitt Parkway.

Directional design hourly volumes (DDHV) have also been considered as part of this study and are discussed further in reference to outside shoulder width standards in **Chapter IV**. A summary of the DDHV data along the Parkways was compiled from Year 2003 classification counts (see **Appendix E**) performed by the KYTC in four of the five study counties, as shown below:

Directional Design Hourly Volumes

	Peak Hour Vehicles	% Trucks at Peak Hour	Peak Hour Vehicles	% Trucks at Peak Hour
Ford Parkway				
	Eastbound		Westbound	
Caldwell County	358	23.5%	340	25.9%
Breathitt Parkway				
	Northbound		Southbound	
Hopkins County	692	18.4%	570	20.4%
Henderson County	861	11.6%	819	10.5%
Webster County	439	24.4%	333	14.7%

Source: Year 2003 KYTC classification counts

Table 5. Existing Traffic Characteristics

Ford Parkway	County	Begin MP	End MP	Length (miles)	Rural/ Urban	% Trucks	2002 ADT	2002 LOS
	Lyon	0.000	3.702	3.702	Rural	30.3 [1]	9,870	A
	Lyon	3.702	5.610	1.908	Rural	30.3 [1]	9,000	A
	Caldwell	5.610	11.109	5.499	Rural	30.1 [2]	9,000	A
	Caldwell	11.109	11.700	0.591	Urban	30.1 [2]	9,000	A
	Caldwell	11.700	13.116	1.416	Rural	25.0 [2]	10,900	A
	Caldwell	13.116	21.764	8.648	Rural	29.9 [2]	9,440	A
	Hopkins	21.764	24.435	2.671	Rural	27.2 [1]	9,440	A
	Hopkins	24.435	38.332	13.897	Rural	31.3 [2]	10,900	A
Breathitt Parkway	**County**	**Begin MP**	**End MP**	**Length (miles)**	**Rural/ Urban**	**% Trucks**	**2002 ADT**	**2002 LOS**
	Hopkins	28.095	29.568	1.473	Rural	28.1 [1]	10,500	A
	Hopkins	29.568	32.861	3.293	Rural	30.0 [2]	11,300	A
	Hopkins	32.861	34.271	1.410	Rural	24.9 [2]	16,400	A
	Hopkins	34.271	37.070	2.799	Rural	23.8 [2]	19,200	B
	Hopkins	37.070	41.002	3.932	Rural	23.4 [2]	19,300	B
	Hopkins	41.002	42.437	1.435	Urban	23.4 [2]	19,300	B
	Hopkins	42.437	44.337	1.900	Urban	22.9 [2]	26,400	B
	Hopkins	44.337	45.200	0.863	Urban	22.9 [2]	20,600	B
	Hopkins	45.200	47.472	2.272	Urban	24.2 [2]	14,700	A
	Hopkins	47.472	48.990	1.518	Rural	24.2 [2]	14,700	A
	Hopkins	48.990	54.070	5.080	Rural	27.9 [2]	17,800	B
	Hopkins	54.070	55.003	0.933	Rural	27.9 [2]	15,300	A
	Webster	55.003	62.637	7.634	Rural	24.1 [2]	15,300	A
	Webster	62.637	65.305	2.668	Rural	32.9 [2]	13,600	A
	Henderson	65.305	68.363	3.058	Rural	24.5 [2]	13,600	A
	Henderson	68.363	76.258	7.895	Rural	28.2 [2]	15,400	A

[1] Truck percentages were taken from KYTC's HIS database.
[2] Truck percentages were taken from KYTC 2003 classification counts.

Source: Kentucky Transportation Cabinet Highway Information System, 2002

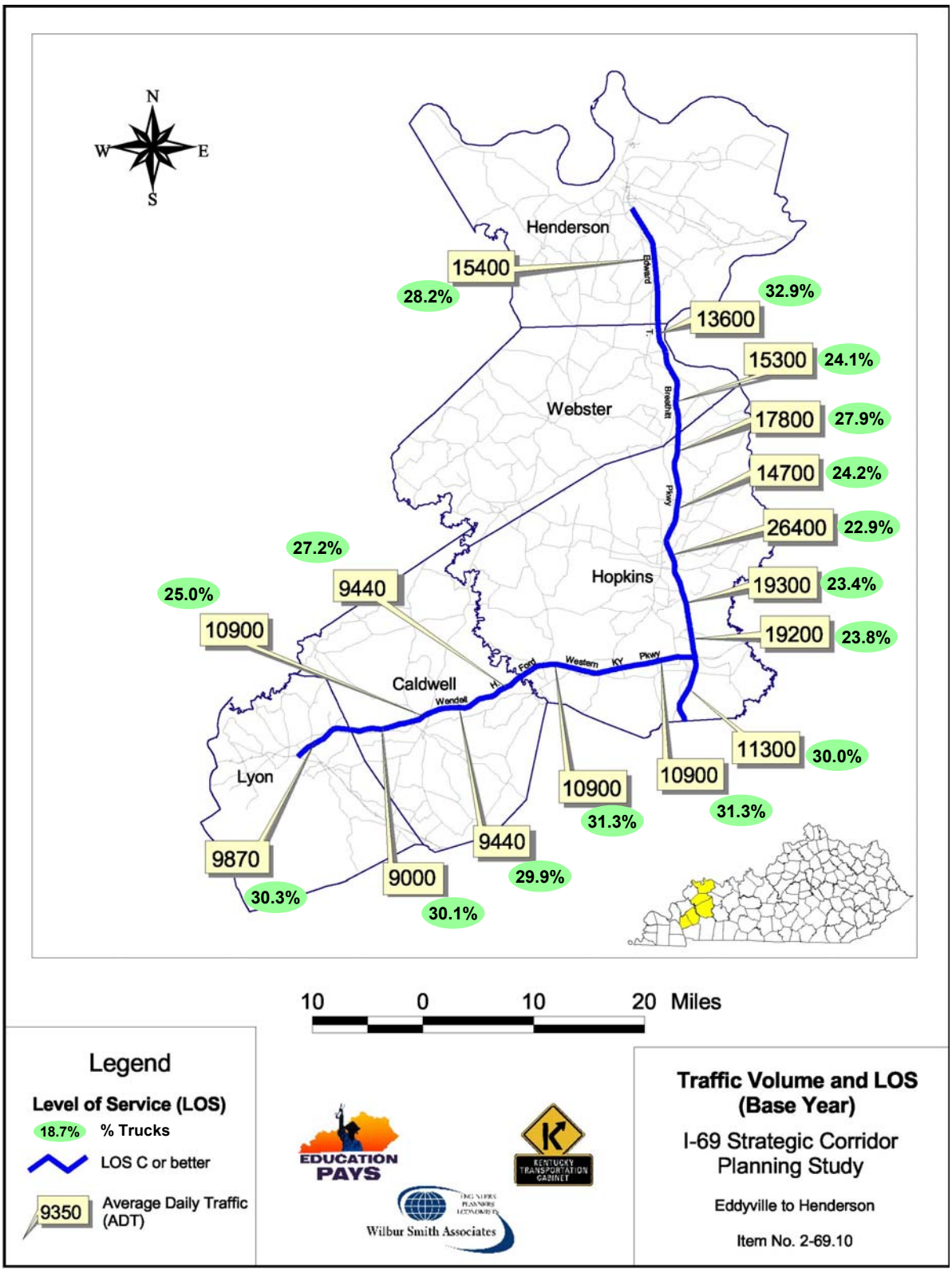


Figure 4. Year 2002 Traffic Volumes, Percent Trucks, and Level of Service

2. Year 2030 Traffic Volumes (without I-69)

Growth rates along the Ford and Breathitt Parkways were calculated to predict the growth on these roads in the Year 2030. These rates were based on the Kentucky Statewide Traffic Model (KYSTM), which is a mathematical model used to predict future traffic growth and traffic characteristics within Kentucky. The KYSTM has been used for several years for various tasks related to planning-level studies.

The future (2030) traffic volumes without I-69 are shown in **Table 6** and **Figure 5**. Year 2002 traffic volumes are also shown in the table for comparison purposes. As shown, average annual growth rates along the Parkways range from 1.7% to 2.1%. These rates result in traffic volumes ranging from 15,100 vpd to 18,100 vpd along the Ford Parkway and from 17,200 vpd to 43,800 vpd along the Breathitt Parkway.

Table 6. Future (2030) Traffic Volumes without I-69

Ford Parkway										
County	Begin MP	End MP	Length (miles)	Rural/ Urban	% Trucks	2002 ADT	2002 LOS	Annual Growth Rate[1]	2030 ADT (w/out I-69/ I-66)	2030 LOS (w/out I-69)
Lyon	0.000	3.702	3.702	Rural	30.3	9,870	A	2.0%	17,300	A
Lyon	3.702	5.610	1.908	Rural	30.3	9,000	A	2.1%	16,000	A
Caldwell	5.610	11.109	5.499	Rural	30.1	9,000	A	2.0%	15,600	A
Caldwell	11.109	11.700	0.591	Urban	30.1	9,000	A	2.0%	15,700	A
Caldwell	11.700	13.116	1.416	Rural	25.0	10,900	A	1.8%	18,100	B
Caldwell	13.116	21.764	8.648	Rural	29.9	9,440	A	1.8%	15,600	A
Hopkins	21.764	24.435	2.671	Rural	27.2	9,440	A	1.7%	15,100	A
Hopkins	24.435	38.332	13.897	Rural	31.3	10,900	A	1.7%	17,500	B
Breathitt Parkway										
County	Begin MP	End MP	Length (miles)	Rural/ Urban	% Trucks	2002 ADT	2002 LOS	Annual Growth Rate[1]	2030 ADT (w/out I-69/ I-66)	2030 LOS (w/out I-69)
Hopkins	28.095	29.568	1.473	Rural	28.1	10,500	A	1.8%	17,200	A
Hopkins	29.568	32.861	3.293	Rural	30	11,300	A	1.8%	18,500	B
Hopkins	32.861	34.271	1.410	Rural	24.9	16,400	A	1.8%	27,000	B
Hopkins	34.271	37.070	2.799	Rural	23.8	19,200	B	1.8%	31,600	C
Hopkins	37.070	41.002	3.932	Rural	23.4	19,300	B	1.8%	31,800	C
Hopkins	41.002	42.437	1.435	Urban	23.4	19,300	B	1.8%	31,900	C
Hopkins	42.437	44.337	1.900	Urban	22.9	26,400	B	1.8%	43,800	D
Hopkins	44.337	45.200	0.863	Urban	22.9	20,600	B	1.8%	34,300	C
Hopkins	45.200	47.472	2.272	Urban	24.2	14,700	A	1.8%	24,200	B
Hopkins	47.472	48.990	1.518	Rural	24.2	14,700	A	1.8%	24,200	B
Hopkins	48.990	54.070	5.080	Rural	27.9	17,800	B	1.8%	29,300	C
Hopkins	54.070	55.003	0.933	Rural	27.9	15,300	A	1.8%	25,200	B
Webster	55.003	62.637	7.634	Rural	24.1	15,300	A	1.8%	25,200	B
Webster	62.637	65.305	2.668	Rural	32.9	13,600	A	1.8%	22,400	B
Henderson	65.305	68.363	3.058	Rural	24.5	13,600	A	1.8%	22,400	B
Henderson	68.363	76.258	7.895	Rural	28.2	15,400	A	1.7%	24,700	B

[1] *Annual growth rates are based on the Kentucky Statewide Traffic Model (KYSTM) and historical travel data provided by the KYTC.*

Source: Kentucky Transportation Cabinet Highway Information System, 2002

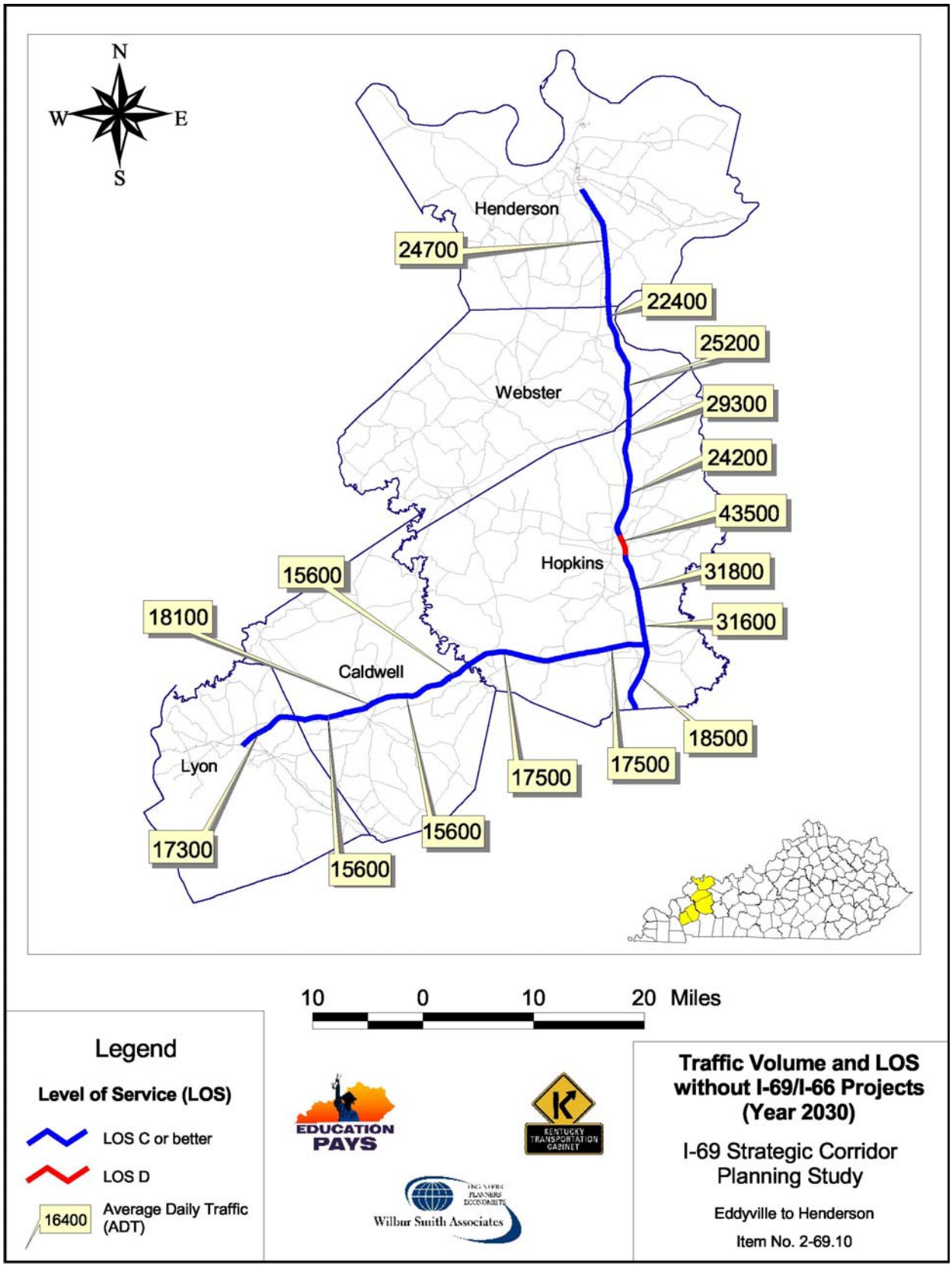


Figure 5. Future (2030) Traffic Volumes without I-69

3. Year 2030 Traffic Volumes (with I-69)

The KYSTM was also utilized to predict traffic volumes along the Ford and Breathitt Parkways assuming they are part of the I-69 Corridor. The section of the Ford Parkway considered in this study is also being considered as part of the I-66 Corridor, a proposed east-west interstate that would span across southern Kentucky. As a result of the inclusion of both the I-66 and I-69 Corridors, traffic volumes along the Ford Parkway are expected to increase more than volumes along the Breathitt Parkway.

The future (2030) traffic volumes with I-69 are shown in **Table 7** and **Figure 6**. As shown, growth rates range from 3.2% to 3.7% along the Ford Parkway, while rates range from 2.2% to 2.3% along the Breathitt Parkway. These rates result in traffic volumes ranging from 23,100 vpd to 30,500 vpd along the Ford Parkway and from 19,100 vpd to 50,500 vpd along the Breathitt Parkway.

Along the Breathitt Parkway, the future traffic volumes estimated as part of this study reflect an overall growth rate between 82% and 91% by the year 2030 (28 years of growth). These growth rates are consistent with those estimated in previous studies of Corridor 18. The *Corridor 18 Special Environmental Study* (2000) indicates that vehicular travel for the period 1995-2020 is expected to show an overall increase of 69% (25 years of growth).

Along the Ford Parkway, the future traffic volumes estimated as part of this study reflect an overall growth rate between 145% and 180% by the year 2030. Traffic volume growth along the Ford Parkway is expected to be more aggressive due to the addition of traffic from the I-66 corridor as well as I-69.

Table 7. Future (2030) Traffic Volumes with I-69

Ford Parkway										
County	**Begin MP**	**End MP**	**Length (miles)**	**Rural/ Urban**	**% Trucks**	**2002 ADT**	**2002 LOS**	**Annual Growth Rate[1]**	**2030 ADT (w/I-69)**	**2030 LOS (w/I-69)**
Lyon	0.000	3.702	3.702	Rural	30.3	9,870	A	3.7%	27,000	B
Lyon	3.702	5.610	1.908	Rural	30.3	9,000	A	3.7%	25,200	B
Caldwell	5.610	11.109	5.499	Rural	30.1	9,000	A	3.6%	24,100	B
Caldwell	11.109	11.700	0.591	Urban	30.1	9,000	A	3.6%	24,100	B
Caldwell	11.700	13.116	1.416	Rural	25.0	10,900	A	3.3%	27,000	B
Caldwell	13.116	21.764	8.648	Rural	29.9	9,440	A	3.2%	23,100	B
Hopkins	21.764	24.435	2.671	Rural	27.2	9,440	A	3.7%	26,400	B
Hopkins	24.435	38.332	13.897	Rural	31.3	10,900	A	3.7%	30,500	C
Breathitt Parkway										
County	**Begin MP**	**End MP**	**Length (miles)**	**Rural/ Urban**	**% Trucks**	**2002 ADT**	**2002 LOS**	**Annual Growth Rate[1]**	**2030 ADT (w/I-69)**	**2030 LOS (w/I-69)**
Hopkins	28.095	29.568	1.473	Rural	28.1	10,500	A	2.2%	19,100	B
Hopkins	29.568	32.861	3.293	Rural	30.0	11,300	A	2.2%	20,600	B
Hopkins	32.861	34.271	1.410	Rural	24.9	16,400	A	2.3%	31,300	C
Hopkins	34.271	37.070	2.799	Rural	23.8	19,200	B	2.3%	36,700	C
Hopkins	37.070	41.002	3.932	Rural	23.4	19,300	B	2.3%	36,900	C
Hopkins	41.002	42.437	1.435	Urban	23.4	19,300	B	2.3%	36,900	C
Hopkins	42.437	44.337	1.900	Urban	22.9	26,400	B	2.3%	50,500	D
Hopkins	44.337	45.200	0.863	Urban	22.9	20,600	B	2.3%	39,400	C
Hopkins	45.200	47.472	2.272	Urban	24.2	14,700	A	2.3%	28,100	C
Hopkins	47.472	48.990	1.518	Rural	24.2	14,700	A	2.3%	28,100	B
Hopkins	48.990	54.070	5.080	Rural	27.9	17,800	B	2.3%	34,000	C
Hopkins	54.070	55.003	0.933	Rural	27.9	15,300	A	2.3%	29,200	C
Webster	55.003	62.637	7.634	Rural	24.1	15,300	A	2.3%	29,200	C
Webster	62.637	65.305	2.668	Rural	32.9	13,600	A	2.3%	26,000	B
Henderson	65.305	68.363	3.058	Rural	24.5	13,600	A	2.2%	25,100	B
Henderson	68.363	76.258	7.895	Rural	28.2	15,400	A	2.2%	28,400	C

[1] *Annual growth rates are based on the Kentucky Statewide Traffic Model (KYSTM) and historical travel data provided by the KYTC.*

Source: Kentucky Transportation Cabinet Highway Information System, 2002

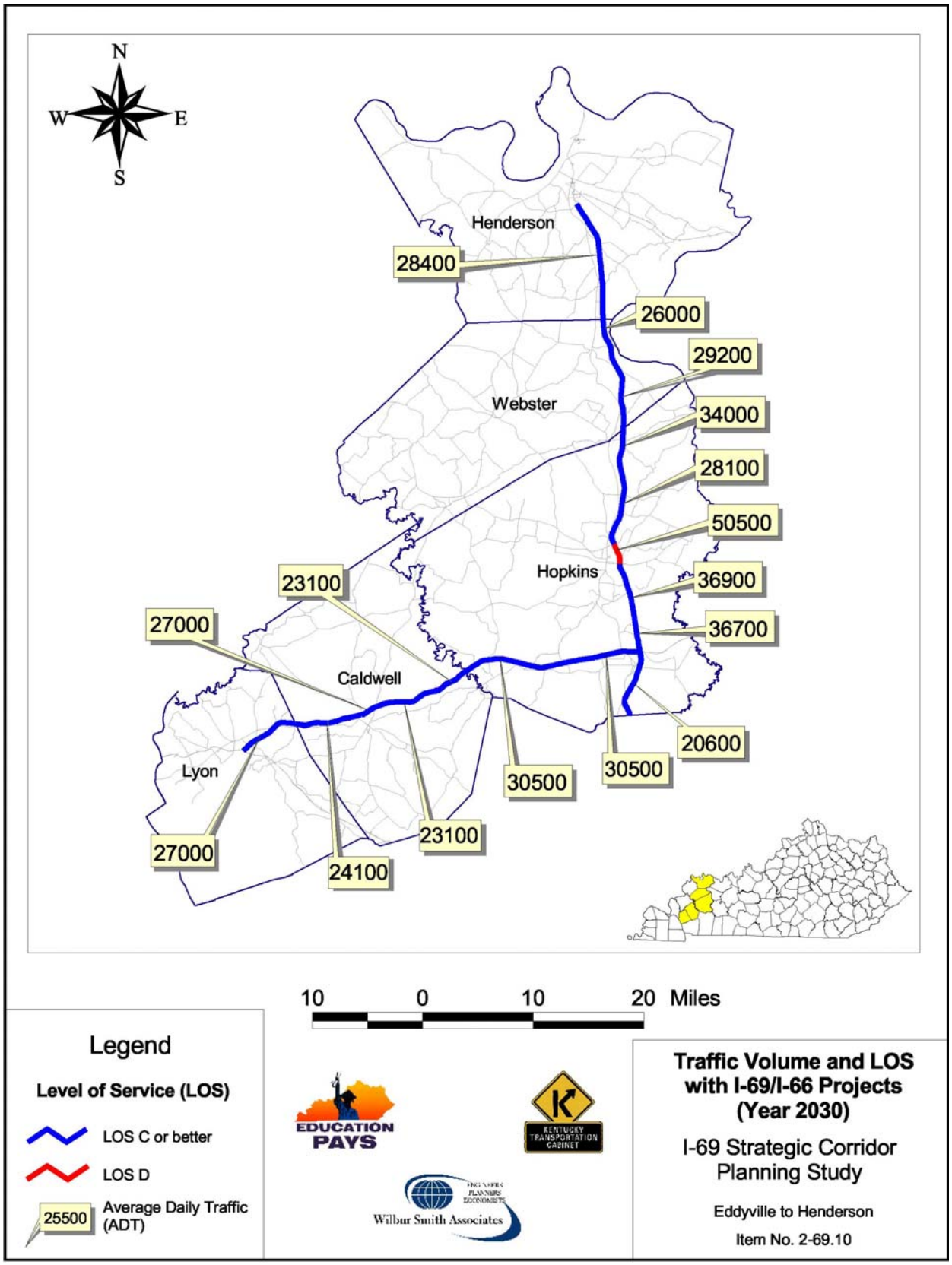


Figure 6. Future (2030) Traffic Volumes With I-69

4. Level of Service (LOS)

Level of service is a qualitative measure defined in the *2000 Highway Capacity Manual*, published by the Transportation Research Board (TRB), and used to describe traffic conditions. Individual levels of service characterize these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Six (6) levels of service are defined and have been given letter designations ranging from A to F, with LOS A representing the best service (i.e., free flow conditions) and LOS F representing the worst service (i.e., severe congestion and gridlock).

According to the American Association of State Highway and Transportation Officials (AASHTO) guidelines, it is preferred to design for a LOS B in rural areas and a LOS C in urban areas. However, a minimum of LOS D in urban areas and LOS C in rural areas is considered acceptable. The TRB's Highway Capacity Software (HCS) was used to estimate level of service for the study area roadways.

Table 5 and **Figure 4** show the calculated current year (2002) level of service conditions for the Ford and Breathitt Parkways. As shown, all Parkway segments operate at LOS C or better in the Year 2002 and should therefore be considered acceptable at present.

LOS was also calculated for the forecasted traffic volumes both with and without I-69, as shown in **Tables 6-7** and **Figures 5-6**. Future year (Year 2030) levels of service are expected to operate at acceptable conditions throughout the study area, since only one segment along either Parkway is expected to fall below LOS C. This segment, expected to operate at LOS D, is found in Hopkins County in the urban area of Madisonville and can, therefore, be considered an acceptable LOS.

The procedures used to measure LOS along the Parkways differ from the procedures used to determine LOS at interchanges. As a result, traffic congestion that may exist at an interchange may not be reflected in the LOS conditions described above.