

III. OPERATIONAL CONSIDERATIONS

The current and future operations of the Purchase Parkway, functioning as both a parkway and an interstate, should be evaluated for the proposed designation as I-69. The evaluation of the operational considerations includes a crash history and traffic analysis of the Purchase Parkway.

A. Crash History and Analysis

The objective of the crash history analysis was to identify locations of high crash rates and crash patterns on the Purchase Parkway and I-24. Further investigation of these high crash rate locations was conducted to establish causation or whether they occurred randomly.

1. Crash Analysis Methodology and Data Source

The Kentucky Transportation Center's *Analysis of Traffic Crash Data in Kentucky (2005-2009)* was referenced for methodology, formulas, and factors to calculate crash rates for the Purchase Parkway and I-24. Segments of the project for the analyses were established based on changes in Annual Daily Traffic (ADT), roadway features and roadway classification. The crash rate was calculated within each segment based on length, ADT, type of roadway (parkway/interstate), functional classification (rural/urban), and crashes that occurred in the segment during the crash history period. Crash data for the analyses was collected from the Collision Report Analysis for Safer Highways (CRASH) database from January 1, 2005 to December 21, 2009 within the project limits of the Purchase Parkway and I-24.



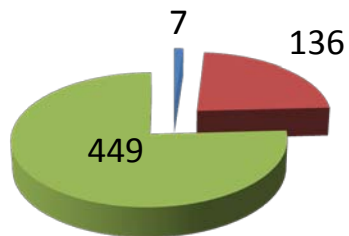
2. Types and Locations of Crashes

In order to calculate the crash rate, utilizing the referenced documentation, the parkway was divided into segments based on roadway geometry, roadway classification, and traffic volumes. The required inputs are functional classification (rural/urban), median type (divided/undivided), and changes in ADT volume.

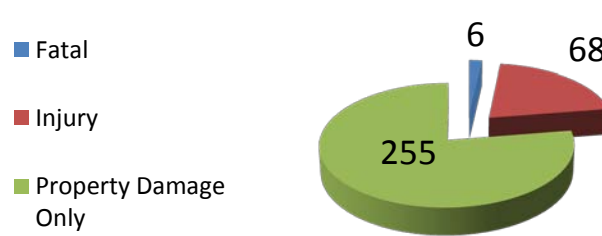
The graph below shows the total number and type of crashes during the analysis time frame for the Purchase Parkway and I-24. For this analysis, crashes were classified as fatal, injury, or property-damage-only type. Of the total crashes on the Purchase Parkway, there were 7 fatal (1%), 136 injury (23%), and 449 property-damage-only (76%) crashes.

Number of Crashes by Type (January 2005 – December 2009)

Purchase Parkway
(592 Crashes)



Interstate 24
(329 Crashes)



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

3. Analysis as a Parkway Facility

The crash history data from the Purchase Parkway was analyzed as a parkway facility and as an interstate facility. The following discussion relates to the analysis of the Purchase Parkway as a parkway facility. The analysis of the Purchase Parkway functioning as an interstate is discussed in the following section.

For the analysis of segments, a high crash segment was defined as having a critical crash rate factor greater than or equal to 1.0. A fatality crash rate factor was calculated for the segments to identify segments with a history of fatal crashes. Segments with a fatal crash rate greater than 0.7 were identified in the analysis.

The Purchase Parkway was divided into 14 segments for the analyses. Crash rates were calculated for each segment. The statewide average crash rate for all parkways is 60 crashes per one-hundred million vehicle miles (acc/hmvm) for rural areas and 104 acc/hmvm in urban areas. Based on the calculation and data, the crash rates range from 6.8 to 199.26 acc/hmvm.

Reviewing **Table 3-1**, there is a high crash segment on the Purchase Parkway in Graves County (MP25.100 – MP 27.452) and a crash rate segment in Graves and Marshall Counties (MP 27.452 – MP 41.035) with a critical crash rate factor between 0.9 and 0.99.

Using the Kentucky Transportation Center's *Analysis of Traffic Crash Data in Kentucky (2005-2009)* methodology, an additional critical "spot" analysis was conducted on the high crash segment between MP 25.100 and MP 27.452 from 2005 to 2009. The methodology defines a critical "spot" as a 0.3 mile length of roadway with more than the critical number of crashes defined by roadway type and area type. This segment has three critical "spots" that meet the eight crashes for a rural parkway. Two of these spots overlap. These spots are as follows:

- 9 Crashes - MP 25.189 – MP 25.422
- 10 Crashes - MP 26.200 – MP 26.423
- 9 Crashes - MP 26.300 – MP 26.579

COUNTY	BEGIN MP	END MP	LENGTH (miles)	ADT	Lanes	Divided Undivided	Rural Urban	Avg Crash Rate	Critical Crash Rate	Avg Fatality Rate	Critical Fatality Rate	Crashes				HMVM	Rates per HMVM				Critical Crash Rate Factor	Critical Fatality Rate Factor
												Fatal	Injury	PDO	Total		Fatal	Injury	PDO	Total		
Fulton	0.000	0.360	0.36	8,500	4	Divided	Rural	60	153.39	0.7	18.77	0	0	5	5	0.06	0.00	0.00	89.53	89.53	0.58	0.00
Fulton	0.360	1.424	1.064	7,570	4	Divided	Rural	60	115.45	0.7	9.72	0	0	1	1	0.15	0.00	0.00	6.80	6.80	0.06	0.00
Fulton	1.424	2.478	1.054	7,060	4	Divided	Rural	60	117.83	0.7	10.23	0	1	3	4	0.14	0.00	0.33	22.09	29.45	0.25	0.00
Fulton/Hickman/Graves/	2.478	13.645	11.167	7,290	4	Divided	Rural	60	76.71	0.7	2.80	1	19	43	63	1.49	0.67	0.44	28.94	42.40	0.55	0.24
Graves	13.645	21.305	7.66	8,590	4	Divided	Rural	60	78.63	0.7	3.08	3	11	50	64	1.20	2.50	0.22	41.64	53.30	0.68	0.81
Graves	21.305	22.239	0.934	14,300	4	Divided	Urban	104	159.26	0.6	6.69	0	4	16	20	0.24	0.00	0.25	65.64	82.05	0.52	0.00
Graves	22.239	23.701	1.462	13,100	4	Divided	Urban	104	149.87	0.6	5.41	0	6	15	21	0.35	0.00	0.40	42.92	60.08	0.40	0.00
Graves	23.701	24.747	1.046	12,000	4	Divided	Urban	104	161.07	0.6	6.95	0	0	6	6	0.23	0.00	0.00	26.19	26.19	0.16	0.00
Graves	24.747	25.100	0.353	7,790	4	Divided	Urban	104	231.23	0.6	19.47	0	2	8	10	0.05	0.00	0.25	159.41	199.26	0.86	0.00
Graves	25.100	27.452	2.352	7,790	4	Divided	Rural	60	96.00	0.7	5.92	1	8	29	38	0.33	2.99	0.28	86.73	113.64	1.18	0.50
Graves/Marshall	27.452	41.035	13.583	7,320	4	Divided	Rural	60	75.09	0.7	2.58	1	34	91	126	1.81	0.55	0.37	50.15	69.44	0.92	0.21
Marshall	41.035	42.555	1.52	16,700	4	Divided	Rural	60	90.40	0.7	4.95	1	11	25	37	0.46	2.16	0.44	53.97	79.87	0.88	0.44
Marshall	42.555	46.942	4.387	18,800	4	Divided	Rural	60	76.60	0.7	2.79	0	21	81	102	1.51	0.00	0.26	53.81	67.77	0.88	0.00
Marshall	46.942	51.398	4.456	19,200	4	Divided	Rural	60	76.29	0.7	2.75	0	19	76	95	1.56	0.00	0.25	48.67	60.84	0.80	0.00

Table 3-1 Purchase Parkway Crash Analysis as a Parkway Facility

Source: Collision Report Analysis for Safer Highways (CRASH) database, and the Kentucky Transportation Center's Analysis of Traffic Accident Data in Kentucky (2005-2009)

- Crash Rate Segment (CRF = 0.9-0.99)**
- High Crash Rate Segment (CRF >= 1.0)**
- Concerned Fatal Crash Segment**

Legend

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

Crash Analysis Methodology

The Kentucky Transportation Center Analysis of Traffic Accident Data in Kentucky (2005-2009) was referenced for crash analysis methodology, formulas, and factors to calculate crash rates.

4. Analysis as an Interstate Facility

In Kentucky, the average crash rate for an interstate facility is lower than a parkway facility. The statewide average crash rate for an interstate facility for urban areas is 97 acc/hmvm and 52 acc/hmvm for rural areas. The lower average crash rate for an interstate facility versus a parkway facility indicates that per vehicle-mile of travel there are fewer crashes.

Table 3-2 illustrates that there are three crash rate segments on the Purchase Parkway with a critical crash rate factor between 0.9 and 0.99. One of these segments in Graves County is between MP 24.747 and 25.100. This segment is located between the US 45 interchange and the end of the typical urban section. The other two crash segments in Marshall County are located at MP 41.035 – MP 42.555 and MP 46.942 – MP 51.398. The first segment is located between US 641 and KY 348 interchanges in Benton, KY. The second segment is located north of the US 68 Interchange and south of the I-24 Interchange on the Purchase Parkway.

There are four segments that are defined as high crash rate segments. They are located in the following mile post ranges for the Purchase Parkway: MP 25.1 - MP 27.452, MP 27.452 - MP 41.035, and MP 42.555 - MP 46.942. On I-24 there is one segment in Marshall County west of the Purchase Parkway (MP 24.941 – MP 26.558) that is a high crash rate segment.

Of the high crash rate segments identified in the analysis as an interstate facility, the MP 24.941 – MP 26.558 segment on I-24 had a critical 'spot'. For a rural interstate section, a critical 'spot' is defined to have had 18 crashes occur within a 0.3 mile segment of roadway. Nineteen crashes occurred between MP 29.41 and MP 25.200. This 'spot' coincides with the Purchase Parkway Interchange.



Figures 3-1 through **3-5** and **Table 3-2** illustrate the Purchase Parkway crash analysis as an interstate facility.

ROUTE	COUNTY	BEGIN MP	END MP	LENGTH (miles)	ADT	Lanes	Divided Undivided	Rural Urban	Avg Crash Rate	Critical Crash Rate	Avg Fatality Rate	Critical Fatality Rate	Crashes				HMVM	Rates per HMVM				Critical Crash Rate Factor	Critical Fatality Rate Factor
													Fatal	Injury	PDO	Total		Fatal	Injury	PDO	Total		
PURCHASE	Fulton	0.000	0.360	0.36	8,500	4	Divided	Rural	52	139.56	0.8	19.50	0	0	5	5	0.06	0.00	0.00	89.53	89.53	0.64	0.00
	Fulton	0.360	1.424	1.064	7,570	4	Divided	Rural	52	103.85	0.8	10.21	0	0	1	1	0.15	0.00	0.00	6.80	6.80	0.07	0.00
	Fulton	1.424	2.478	1.054	7,060	4	Divided	Rural	52	106.09	0.8	10.73	0	1	3	4	0.14	0.00	0.33	22.09	29.45	0.28	0.00
	Fulton/Hickman/Graves	2.478	13.645	11.167	7,290	4	Divided	Rural	52	67.58	0.8	3.03	1	19	43	63	1.49	0.67	0.44	28.94	42.40	0.63	0.22
	Graves	13.645	21.305	7.66	8,590	4	Divided	Rural	52	69.37	0.8	3.32	3	11	50	64	1.20	2.50	0.22	41.64	53.30	0.77	0.75
	Graves	21.305	22.239	0.934	14,300	4	Divided	Urban	97	150.44	0.5	6.24	0	4	16	20	0.24	0.00	0.25	65.64	82.05	0.55	0.00
	Graves	22.239	23.701	1.462	13,100	4	Divided	Urban	97	141.34	0.5	5.01	0	6	15	21	0.35	0.00	0.40	42.92	60.08	0.43	0.00
	Graves	23.701	24.747	1.046	12,000	4	Divided	Urban	97	152.19	0.5	6.49	0	0	6	6	0.23	0.00	0.00	26.19	26.19	0.17	0.00
	Graves	24.747	25.100	0.353	7,790	4	Divided	Urban	97	220.21	0.5	18.59	0	2	8	10	0.05	0.00	0.25	159.41	199.26	0.90	0.00
	Graves	25.100	27.452	2.352	7,790	4	Divided	Rural	52	85.62	0.8	6.28	1	8	29	38	0.33	2.99	0.28	86.73	113.64	1.33	0.48
	Graves/Marshall	27.452	41.035	13.583	7,320	4	Divided	Rural	52	66.07	0.8	2.79	1	34	91	126	1.81	0.55	0.37	50.15	69.44	1.05	0.20
	Marshall	41.035	42.555	1.52	16,700	4	Divided	Rural	52	80.37	0.8	5.26	1	11	25	37	0.46	2.16	0.44	53.97	79.87	0.99	0.41
	Marshall	42.555	46.942	4.387	18,800	4	Divided	Rural	52	67.47	0.8	3.01	0	21	81	102	1.51	0.00	0.26	53.81	67.77	1.00	0.00
	Marshall	46.942	51.398	4.456	19,200	4	Divided	Rural	52	67.19	0.8	2.96	0	19	76	95	1.56	0.00	0.25	48.67	60.84	0.91	0.00
I-24	Marshall	24.941	26.558	1.617	21,900	4	Divided	Rural	52	75.88	0.8	4.44	0	14	40	54	0.65	0.00	0.35	61.89	83.56	1.10	0.00
	Marshall/Livingston	26.558	30.742	4.184	28,200	4	Divided	Rural	52	64.89	0.8	2.60	4	24	59	87	2.15	1.86	0.41	27.40	40.40	0.62	0.71
	Livingston/Lyon	30.742	39.553	8.811	25,700	4	Divided	Rural	52	61.26	0.8	2.05	1	24	119	144	4.13	0.24	0.20	28.80	34.85	0.57	0.12
	Lyon	39.553	41.647	2.094	25,500	4	Divided	Rural	52	71.33	0.8	3.65	1	6	37	44	0.97	1.03	0.16	37.97	45.15	0.63	0.28

Table 3-2 Crash Analysis as an Interstate Facility

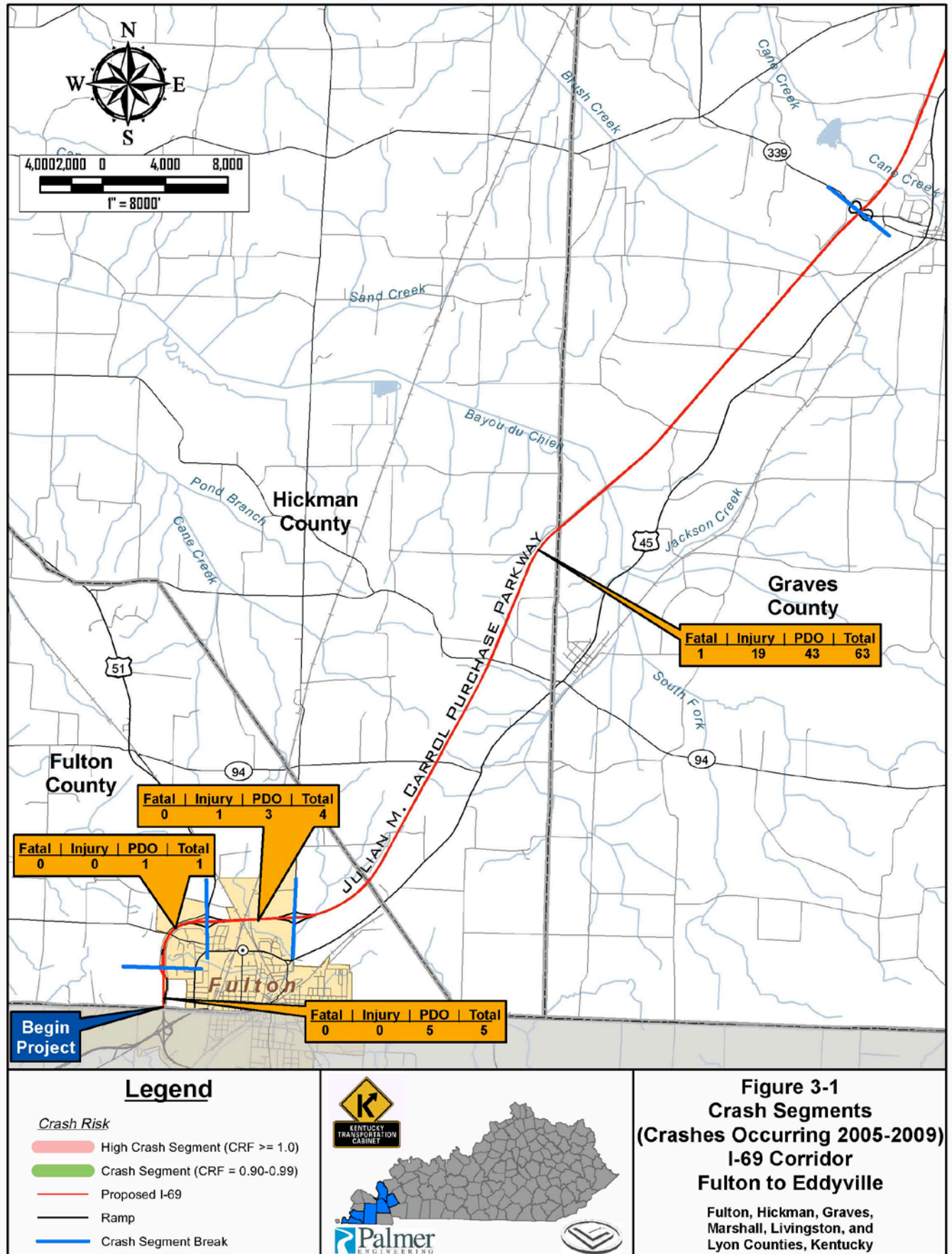
- **Crash Rate Segment (CRF = 0.9-0.99)**
- **High Crash Rate Segment (CRF => 1.0)**
- **Concerned Fatal Crash Segment**

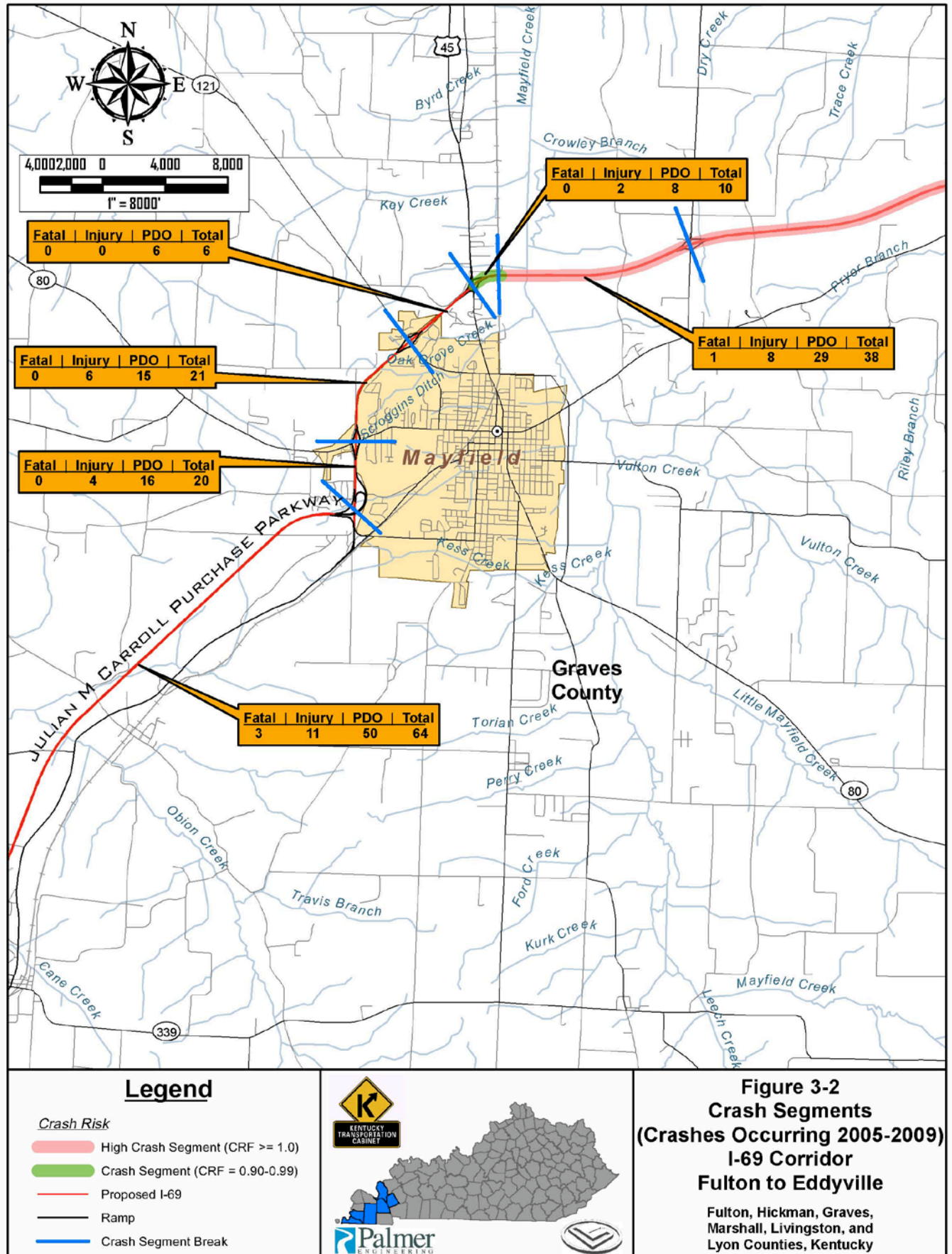
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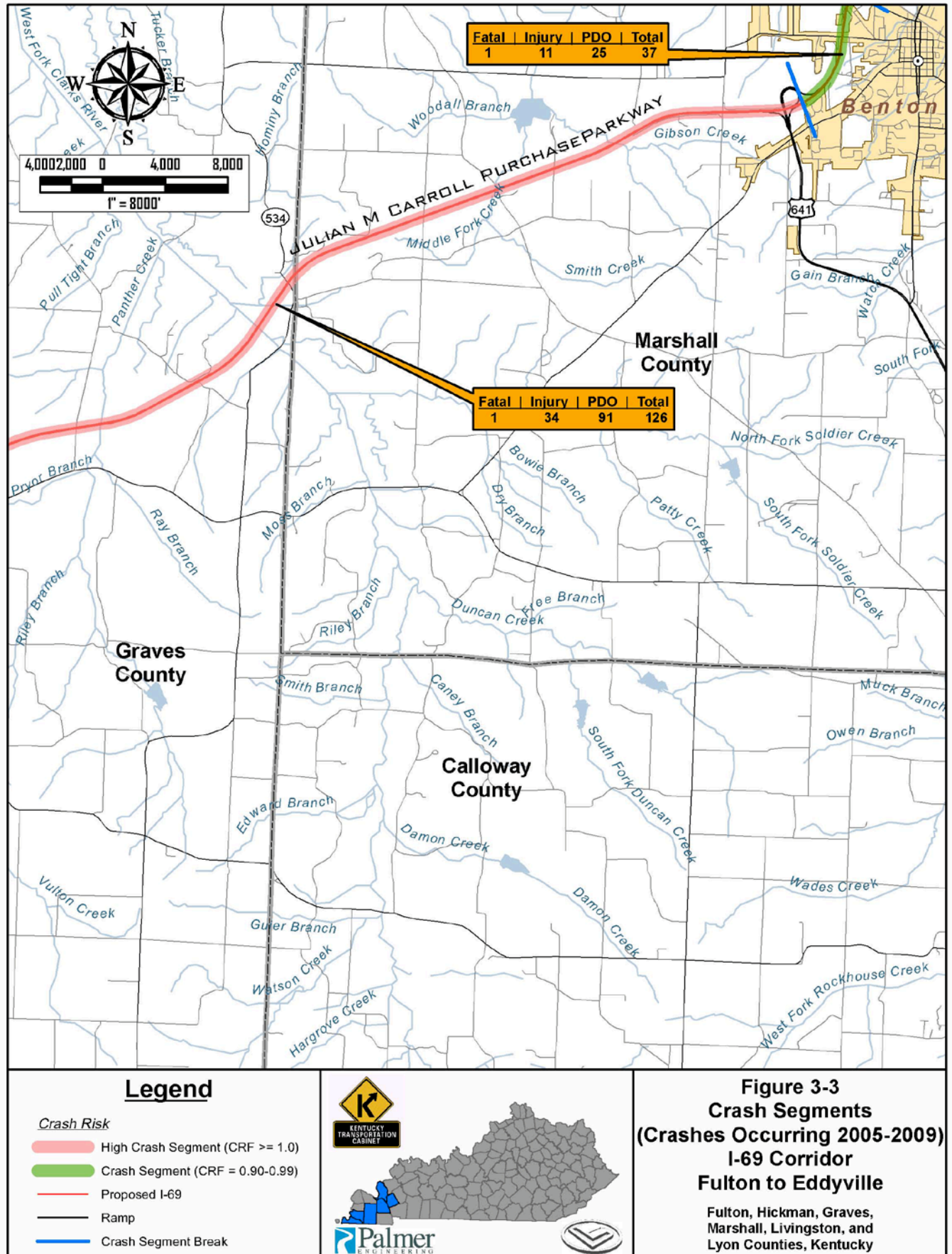
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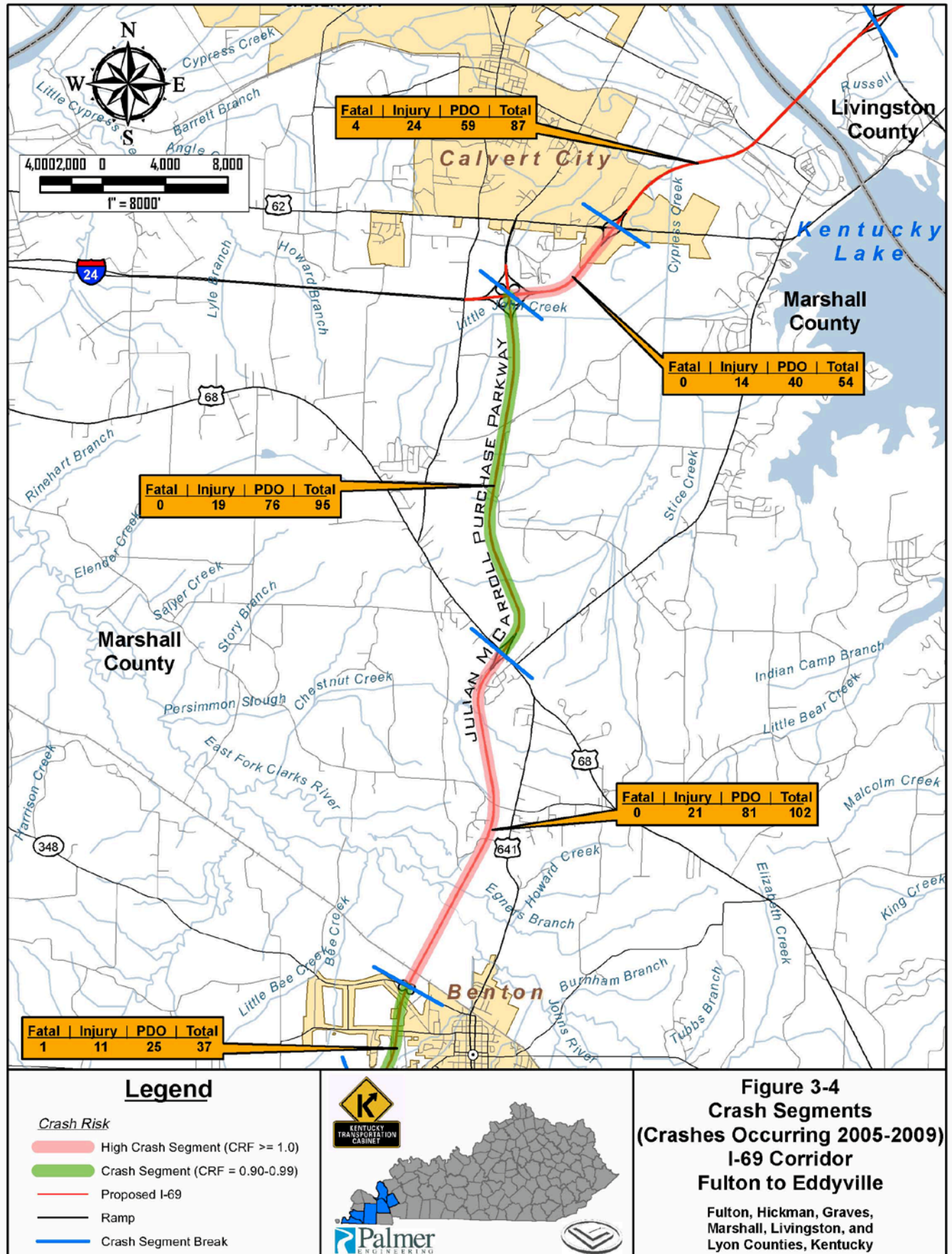
Crash Analysis Methodology

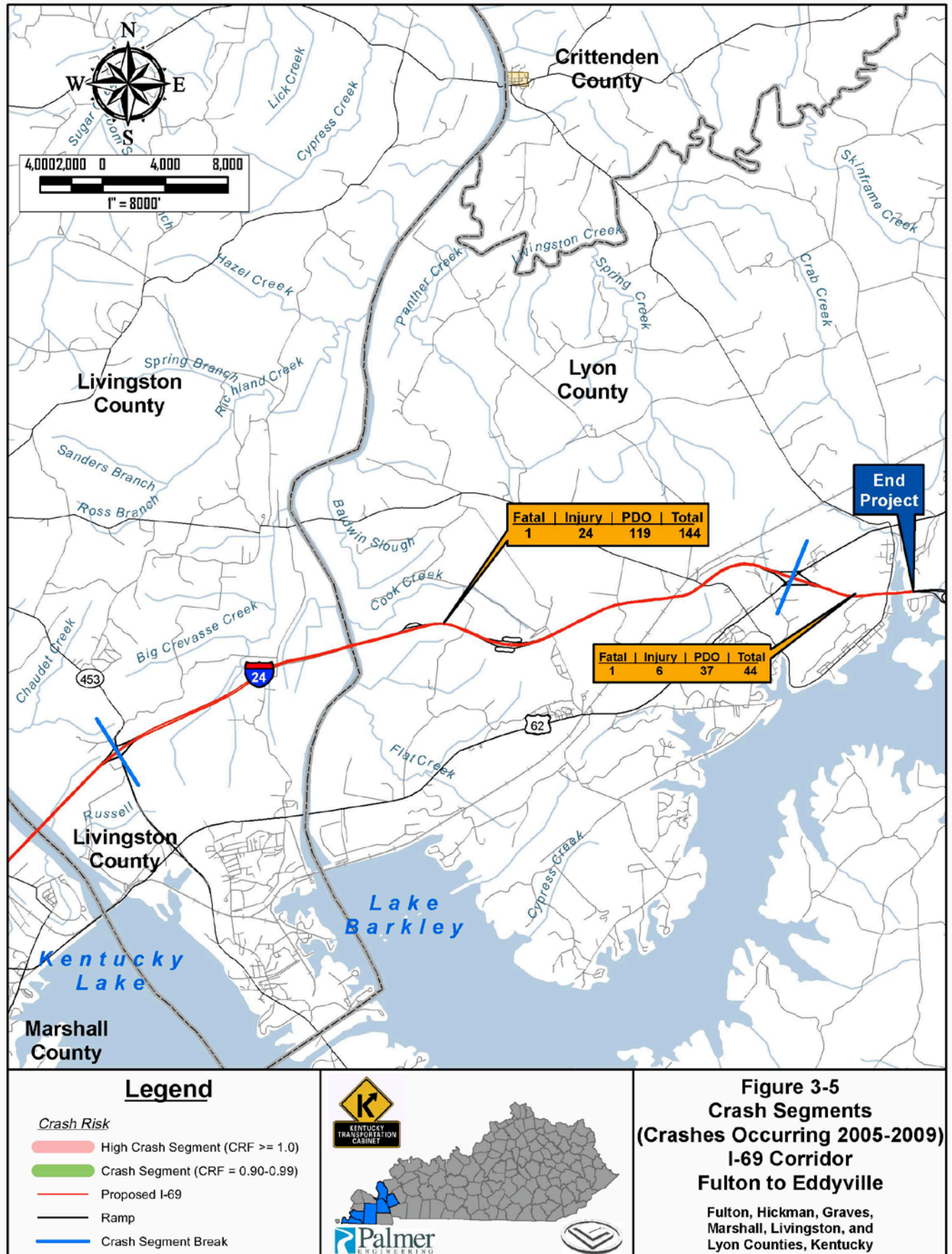
The Kentucky Transportation Center Analysis of Traffic Accident Data in Kentucky (2005-2009) was referenced for crash analysis methodology, formulas, and factors to calculate crash rates.











5. Crash Causation Factors

Determining the crash causation factors for the high crash areas will help identify potential problem areas. To identify the cause of the crash for crash rate segments, crashes for each segment were grouped into major crash types which are summarized below:

High Crash Rate Segments-Critical Crash Rate Factor ≥ 1.0

Along the Purchase Parkway in Graves County, between MP 25.1 and MP 27.452, crash causation factors included the following:

- 50% (19 crashes) of crashes were coded *Ran Off Roadway*. This percentage is much higher than the 29% of *Ran Off Roadway* crashes that occurred along the project corridor. This segment of the Purchase Parkway has one horizontal curve and it meets the minimum horizontal curve guideline. There is one vertical curve within this segment that does not meet the current minimum stopping sight distance. The road conditions for 15 of the 19 crashes were wet or icy.

Along the Purchase Parkway in Graves and Marshall County, between MP 27.452 and MP 41.035, crash causation factors included the following:

- 43% (54 crashes) of crashes were coded *Ran Off Roadway*. This percentage is much higher than the 29% of *Ran Off Roadway* crashes that occurred along the project corridor. 34 of the 54 crashes occurred with wet/icy/slushy road conditions. This segment includes Exit 27 – KY 131.
- *Collisions with Animal* represented 24% of all crashes (30 of 126 crashes), which is greater than the 19% of all crashes on the project of the same type.

Along the Purchase Parkway in Marshall County, between MP 42.555 and MP 46.942, crash causation factors included the following:

- 43 of the 102 (42%) crashes on this segment were *Collision with Fixed Object*. This percentage is much greater than the 26% of collisions for the project corridor of the same type.

Along I-24 in Graves and Marshall County, between MP 24.941 and MP 26.558, crash causation factors included the following:

- *Collision with Fixed Object* accounted for 14 of the total 54 (26%) crashes on this segment.
- 9% of the crashes on the segment were *Rear-End* collisions and 16% of collisions were coded *Sideswipe*. These percentages are comparable to the same type collisions for the project corridor, 15% and 14% respectively.

Crash Rate Segments – Critical Crash Rate Factor = 0.9-0.99

Along the Purchase Parkway in Graves County, between MP 24.747 and MP 25.1, crash causation factors included the following:

- *Collision with Fixed Object* accounted for 3 of the total 10 (30%) crashes on this segment, which is higher than the project corridor average.
- 30% of crashes (3 of 10) on this segment were *Other Type* collisions which is higher than the project corridor average.

Along the Purchase Parkway in Marshall County, between MP 41.035 and MP 42.555, crash causation factors included the following:

- *Sideswipe* collisions accounted for 16% (6 crashes) of all crashes in this segment, which is twice the 7% of all crashes of the same type for the project corridor. Only one of these *Sideswipe* crashes was coded to involve an interchange ramp.
- 38% of crashes (14 of 37) on this segment were *Ran Off Roadway* collisions which is higher than the project corridor average.

Along the Purchase Parkway in Marshall County, between MP 46.942 and MP 51.398, crash causation factors included the following:

- *Collision with Animal* accounted for 21% (20 of 95) of all crashes on this segment.

- *Collision with Fixed Object, Ran Off Roadway, and All Other Types* collisions were comparable to the average percentage of such collisions on the project corridor.

Concerned Fatal Crash Rate Segment Summary

Along the Purchase Parkway in Graves County, between MP 13.645 and MP 21.305, crash causation factors include the following:

- At MP 18.953, a fatal collision occurred that involved one vehicle. It had the following coding information: Directional Analysis=OTHER ROADWAY OR MID-BLOCK COLLISION, Weather=SNOWING, Roadway Character=STRAIGHT & LEVEL, Light Condition=DAYLIGHT. This collision occurred within 0.3 miles of a deficient vertical curve.
- At MP 20.573, a fatal collision occurred that involved one vehicle. It had the following coding information: Directional Analysis=OTHER COLLISIONS ON SHOULDER, Weather=CLOUDY/DRY, Roadway Character=CURVE & GRADE, Light Condition=DARK – HWY NOT LIGHTED.
- At MP 21.295, a fatal collision occurred that involved one vehicle. It had the following coding information: Directional Analysis=OVERTURNED IN ROADWAY, Weather=CLEAR/DRY, Roadway Character=CURVE & GRADE, Light Condition=DAWN. This collision occurred in the US 45 interchange in Graves County.

Along I-24 in Marshall and Livingston Counties, between MP 26.558 and MP 30.742, crash causation factors included the following:

- At MP 26.952, a fatal head-on collision occurred. It had the following coding information: Directional Analysis=HEAD-ON COLLISION, Weather=CLEAR/DRY, Roadway Character=STRAIGHT & LEVEL, Light Condition=DAYLIGHT. This collision occurred at the US 62 interchange.
- At MP 28.048, a fatal collision occurred that involved one vehicle. It had the following coding information: Directional Analysis=COLLISION WITH A PEDESTRIAN, Weather=CLEAR/DRY, Roadway Character=STRAIGHT & LEVEL, Light Condition=DARK-HWY NOT LIGHTED.
- At MP 30.022, a fatal head-on collision occurred. It had the following coding information: Directional Analysis=VEHICLE GOING IN WRONG DIRECTION, Weather=CLOUDY/DRY, Roadway Character=STRAIGHT & GRADE, Light Condition=DARK-HWY NOT LIGHTED.
- At MP 30.699, a fatal head-on collision occurred. It had the following coding information: Directional Analysis=VEHICLE GOING IN WRONG DIRECTION, Weather=CLEAR/DRY, Roadway Character=STRAIGHT & HILLCREST, Light Condition=DAYLIGHT. This collision occurred at the KY 453 interchange.

Table 3-3 Crash Types for Crash Segments

High Crash Rate Segments-Critical Crash Rate Factor ≥ 1.0
Purchase Parkway - Graves County - MP 25.1 – MP 27.452

Crash Type	Crashes in Segment	% in Segment	Crashes on Parkway/Interstate	% on Parkway/Interstate
Collision with Animal	4	10.53%	111	18.75%
Collision with Fixed Object	8	21.05%	152	25.68%
Ran Off Roadway	19	50.00%	170	28.72%
All Other Types	7	18.42%	159	26.86%


 Segments with % crashes higher than average for Parkway/Interstate

Table 3-3 Crash Types for Crash Segments (continued)

Purchase Parkway - Graves/Marshall Counties - MP 27.452 – MP 41.035

Crash Type	Crashes in Segment	% in Segment	Crashes on Parkway/Interstate	% on Parkway/Interstate
Collision with Animal	30	23.81%	111	18.75%
Collision with Fixed Object	22	17.46%	152	25.68%
Ran Off Roadway	54	42.86%	170	28.72%
All Other Types	20	15.87%	159	26.86%

Purchase Parkway - Marshall County - MP 42.555 – MP 46.942

Crash Type	Crashes in Segment	% in Segment	Crashes on Parkway/Interstate	% on Parkway/Interstate
Collision with Animal	16	15.69%	111	18.75%
Collision with Fixed Object	43	42.16%	152	25.68%
Ran Off Roadway	15	14.71%	170	28.72%
All Other Types	28	27.45%	159	26.86%

I-24 - Marshall County - MP 24.941 – MP 26.558

Crash Type	Crashes in Segment	% in Segment	Crashes on Parkway/Interstate	% on Parkway/Interstate
Rear-End	9	16.67%	48	14.59%
Collision with Fixed Object	14	25.93%	63	19.15%
Sideswipe	9	16.67%	45	13.68%
All Other Types	22	40.74%	173	52.58%

Crash Rate Segments – Critical Crash Rate Factor = 0.9-0.99

Purchase Parkway - Graves County - MP 24.747 – MP 25.100

Crash Type	Crashes in Segment	% in Segment	Crashes on Parkway/Interstate	% on Parkway/Interstate
Collision with Animal	2	20.00%	111	18.75%
Collision with Fixed Object	3	30.00%	152	25.68%
Ran Off Roadway	2	20.00%	170	28.72%
All Other Types	3	30.00%	159	26.86%


 Segments with % crashes higher than average for Parkway/Interstate

Table 3-3 Crash Types for Crash Segments (continued)

Purchase Parkway - Marshall County - MP 41.035 – MP 42.555

Crash Type	Crashes in Segment	% in Segment	Crashes on Parkway/Interstate	% on Parkway/Interstate
Sideswipe	6	16.22%	44	7.43%
Collision with Fixed Object	5	13.51%	152	25.68%
Ran Off Roadway	14	37.84%	170	28.72%
All Other Types	12	32.43%	226	38.18%

Purchase Parkway - Marshall County - MP 46.942 – MP 51.398

Crash Type	Crashes in Segment	% in Segment	Crashes on Parkway/Interstate	% on Parkway/Interstate
Collision with Animal	20	21.05%	111	18.75%
Collision with Fixed Object	24	25.26%	152	25.68%
Ran Off Roadway	20	21.05%	170	28.72%
All Other Types	31	32.63%	159	26.86%


Table 3-4 Concerned Fatal Crash SegmentsConcerned Fatal Crash Rate Segments

Purchase Parkway – Graves County – MP 13.645 – MP 21.305

Crash Type	Crashes in Segment	% in Segment	Crashes on Parkway/Interstate	% on Parkway/Interstate
Collision with Animal	17	26.56%	111	18.75%
Collision with Fixed Object	12	18.75%	152	25.68%
Ran Off Roadway	17	26.56%	170	28.72%
All Other Types	18	28.13%	159	26.86%

I-24 – Marshall/Livingston Counties – MP 26.558 – MP 30.742

Crash Type	Crashes in Segment	% in Segment	Crashes on Parkway/Interstate	% on Parkway/Interstate
Rear-End	22	25.29%	48	14.59%
Collision with Fixed Object	18	20.69%	63	19.15%
Sideswipe	10	11.49%	45	13.68%
All Other Types	37	42.53%	173	52.58%

 Segments with % crashes higher than average for Parkway/Interstate

6. Other Crash Considerations

In efforts to identify potential problem areas on Purchase Parkway, cross-over or head-on collisions and collisions near interchanges were further evaluated.

Cross-Over and Head-On Crashes

A trend of cross-over or head-on collisions on the parkway could indicate potential problems with median width and type, directional separation, or interchange signage. Between 2005 and 2009, there were six crashes coded *median cross-over* or *head-on collision*. These crashes are shown in **Table 3-5**. Cross-over and head-on crashes account for 0.3% of crashes on the Purchase Parkway and 1.2% of crashes on I-24.

COUNTY	MP	CRASH TYPE	INTERCHANGE WITH IN 1 MILE
Purchase Parkway			
Marshall	44.6	Median cross-over	No
Marshall	50.9	Head-on	I-24 (MP 51.4)
Interstate 24			
Marshall	27.0	Head-on	US 62 (MP26.6)
Marshall	28.7	Median cross-over	No
Livingston	31.1	Head-on	KY 453 (MP 30.7)
Lyon	36.0	Head-on	No

Table 3-5 Cross-Over and Head-on Crashes

Crashes at Interchanges

As part of this analysis, crashes occurring within 0.1 mile of either direction of an interchange were summarized by crash type. The interchange crash types are summarized as follows:

Purchase Parkway

- There were 272 crashes with in 0.1 mile of the interchanges on the Purchase Parkway
- 53% (146 of 272) were coded as ramp related crashes, including rear-end and other multiple-vehicle collisions.
- 15% (42 of 272) were collisions with a fixed object

I-24

- There were 219 crashes within 0.1 mile of the interchanges on I-24.
- 44% (97 of 219) were coded as ramp related crashes, including rear-end and other multiple-vehicle collisions.
- 10% (21 of 219) were collisions with a fixed object

Table 6-2 Interchange Crash Data provides a more detailed summary of crash types at interchanges along the Purchase Parkway and I-24

B. Traffic Volumes and Operational Level of Service

A traffic analysis was conducted on the Purchase Parkway to identify any traffic congestion problems related to increased traffic on the parkway from interstate traffic projections. Current and future traffic projections were conducted based on the parkway with and without I-69.

1. Current Traffic Volumes (2010)

The 2010 traffic volumes for this project are based on data from the KYTC HIS database and traffic classification counts conducted by KYTC in 2010. Truck percentage and directional design hourly volumes were calculated based on the classification counts in 2010.

The current traffic (2010) for the Purchase Parkway ranges from 7,060 vehicles per day (vpd) in Fulton, Kentucky, to 19,200 vpd near the I-24 interchange. On I-24, the traffic volumes range from 21,900 vpd near the Purchase Parkway interchange in Marshall County to 28,200 vpd near Calvert City, Kentucky, in Marshall County. The existing truck percentages on the Purchase Parkway range from 24.9% at Mayfield, Kentucky, in Graves County to 34.5% near Benton, Kentucky, in

Marshall County. On I-24, the truck percentage is 24.9%. Average Daily Traffic and corresponding truck percentages are provided below in **Table 3-6**.

COUNTY	BEGIN MP	END MP	LENGTH (miles)	Rural/Urban	% Trucks	2010 ADT	LOS
Purchase Parkway							
Fulton	0.000	0.360	0.36	Rural	31.5%	8,500	A
Fulton	0.360	1.424	1.064	Rural	31.5%	7,570	A
Fulton	1.424	2.478	1.054	Rural	31.5%	7,060	A
Fulton	2.478	3.434	0.956	Rural	31.5%	7,290	A
Hickman	3.434	8.352	4.918	Rural	31.5%	7,290	A
Graves	8.352	13.645	5.293	Rural	31.5%	7,290	A
Graves	13.645	21.305	7.66	Rural	31.5%	8,590	A
Graves	21.305	22.239	0.934	Urban	24.9%	14,300	A
Graves	22.239	23.701	1.462	Urban	24.9%	13,100	A
Graves	23.701	24.747	1.046	Urban	24.9%	12,000	A
Graves	24.747	25.100	0.353	Urban	34.5%	7,790	A
Graves	25.100	27.452	2.352	Rural	34.5%	7,790	A
Graves	27.452	34.487	7.035	Rural	34.5%	7,320	A
Marshall	34.487	41.035	6.548	Rural	34.5%	7,320	A
Marshall	41.035	42.555	1.52	Rural	32.9%	16,700	A
Marshall	42.555	46.942	4.387	Rural	32.9%	18,800	A
Marshall	46.942	51.398	4.456	Rural	32.9%	19,200	A
Interstate 24							
Marshall	24.941	26.558	1.617	Rural	24.9%	21,900	A
Marshall	26.558	29.352	2.794	Rural	24.9%	28,200	B
Livingston	29.352	30.742	1.39	Rural	24.9%	28,200	B
Livingston	30.742	33.880	3.138	Rural	24.9%	25,700	B
Lyon	33.880	39.553	5.673	Rural	24.9%	25,700	B
Lyon	39.553	41.647	2.094	Rural	24.9%	25,500	B

Table 3-6 Current Traffic Characteristic (2010)

Also included as part of this study is the Directional Design Hourly Volume (DDHV) in the context of minimum outside shoulders discussed in **Chapter IV**. The following table summarizes the DDHV data for the Purchase Parkway and I-24 based on classification counts conducted by KYTC in 2010 (**Appendix E**).

COUNTY	Rural/ Urban	DDHV	% Trucks at Peak Hour	DDHV	% Trucks at Peak Hour
Purchase Parkway					
		Northbound		Southbound	
Fulton	Rural	341	24%	360	24%
Hickman	Rural	293	24%	309	24%
Graves	Rural	345	24%	364	24%
Graves	Urban	574	21%	605	22%
Marshall	Rural	771	28%	813	29%
Interstate 24					
		Eastbound		Westbound	
Marshall	Rural	1132	15%	1194	17%
Livingston	Rural	1132	15%	1194	17%
Lyon	Rural	1032	16%	1088	19%

Table 3-7 Existing (2010) Directional Design Hourly Volumes (DDHV)

2. Future Traffic Volumes (2040) without I-69

The future traffic volumes (2040) were calculated using growth rates based on available previous studies. The future traffic volumes are shown in **Table 3-8**. The annual growth rate used for the Purchase Parkway and I-24 without I-69 is 2.0%. This growth rate resulted in a range from 12,800 vpd to 34,800 vpd on the Purchase Parkway and from 39,700 vpd to 51,100 vpd on I-24.

COUNTY	BEGIN MP	END MP	LENGTH (miles)	Rural/ Urban	% Trucks	2040 ADT	LOS
Purchase Parkway							
Fulton	0.000	0.360	0.36	Rural	31.5%	15,397	A
Fulton	0.360	1.424	1.064	Rural	31.5%	13,712	A
Fulton	1.424	2.478	1.054	Rural	31.5%	12,788	A
Fulton	2.478	3.434	0.956	Rural	31.5%	13,205	A
Hickman	3.434	8.352	4.918	Rural	31.5%	13,205	A
Graves	8.352	13.645	5.293	Rural	31.5%	13,205	A
Graves	13.645	21.305	7.66	Rural	31.5%	15,560	A
Graves	21.305	22.239	0.934	Urban	24.9%	25,902	B
Graves	22.239	23.701	1.462	Urban	24.9%	23,729	B
Graves	23.701	24.747	1.046	Urban	24.9%	21,736	A
Graves	24.747	25.100	0.353	Urban	34.5%	14,111	A
Graves	25.100	27.452	2.352	Rural	34.5%	14,111	A
Graves	27.452	34.487	7.035	Rural	34.5%	13,259	A
Marshall	34.487	41.035	6.548	Rural	34.5%	13,259	A
Marshall	41.035	42.555	1.52	Rural	32.9%	30,250	B
Marshall	42.555	46.942	4.387	Rural	32.9%	34,054	B
Marshall	46.942	51.398	4.456	Rural	32.9%	34,778	B
Interstate 24							
Marshall	24.941	26.558	1.617	Rural	24.9%	39,669	B
Marshall	26.558	29.352	2.794	Rural	24.9%	51,080	C
Livingston	29.352	30.742	1.39	Rural	24.9%	51,080	C
Livingston	30.742	33.880	3.138	Rural	24.9%	46,552	C
Lyon	33.880	39.553	5.673	Rural	24.9%	46,552	C
Lyon	39.553	41.647	2.094	Rural	24.9%	46,190	C

Table 3-8 Future Traffic Volumes without I-69

3. Future Traffic Volumes (2040) with I-69

The future traffic volumes (2040) with I-69 are shown in following table and figure. The annual growth rate used was 2.5%, which is consistent with previous studies. This growth rate resulted in

traffic volumes ranging from 14,800 vpd to 40,300 vpd on the Purchase Parkway and from 45,900 vpd to 53,900 vpd on I-24.

COUNTY	BEGIN MP	END MP	LENGTH (miles)	Rural/Urban	% Trucks	2040 ADT	LOS
Purchase Parkway							
Fulton	0.000	0.360	0.36	Rural	31.5%	17,829	A
Fulton	0.360	1.424	1.064	Rural	31.5%	15,879	A
Fulton	1.424	2.478	1.054	Rural	31.5%	14,809	A
Fulton	2.478	3.434	0.956	Rural	31.5%	15,291	A
Hickman	3.434	8.352	4.918	Rural	31.5%	15,291	A
Graves	8.352	13.645	5.293	Rural	31.5%	15,291	A
Graves	13.645	21.305	7.66	Rural	31.5%	18,018	A
Graves	21.305	22.239	0.934	Urban	24.9%	29,995	B
Graves	22.239	23.701	1.462	Urban	24.9%	27,478	B
Graves	23.701	24.747	1.046	Urban	24.9%	25,171	B
Graves	24.747	25.100	0.353	Urban	34.5%	16,340	A
Graves	25.100	27.452	2.352	Rural	34.5%	16,340	A
Graves	27.452	34.487	7.035	Rural	34.5%	15,354	A
Marshall	34.487	41.035	6.548	Rural	34.5%	15,354	A
Marshall	41.035	42.555	1.52	Rural	32.9%	35,029	B
Marshall	42.555	46.942	4.387	Rural	32.9%	39,434	C
Marshall	46.942	51.398	4.456	Rural	32.9%	40,273	C
Interstate 24							
Marshall	24.941	26.558	1.617	Rural	24.9%	45,937	C
Marshall	26.558	29.352	2.794	Rural	24.9%	59,151	C
Livingston	29.352	30.742	1.39	Rural	24.9%	59,151	C
Livingston	30.742	33.880	3.138	Rural	24.9%	53,907	C
Lyon	33.880	39.553	5.673	Rural	24.9%	53,907	C
Lyon	39.553	41.647	2.094	Rural	24.9%	53,488	C

Table 3-9 Future Traffic Volumes with I-69

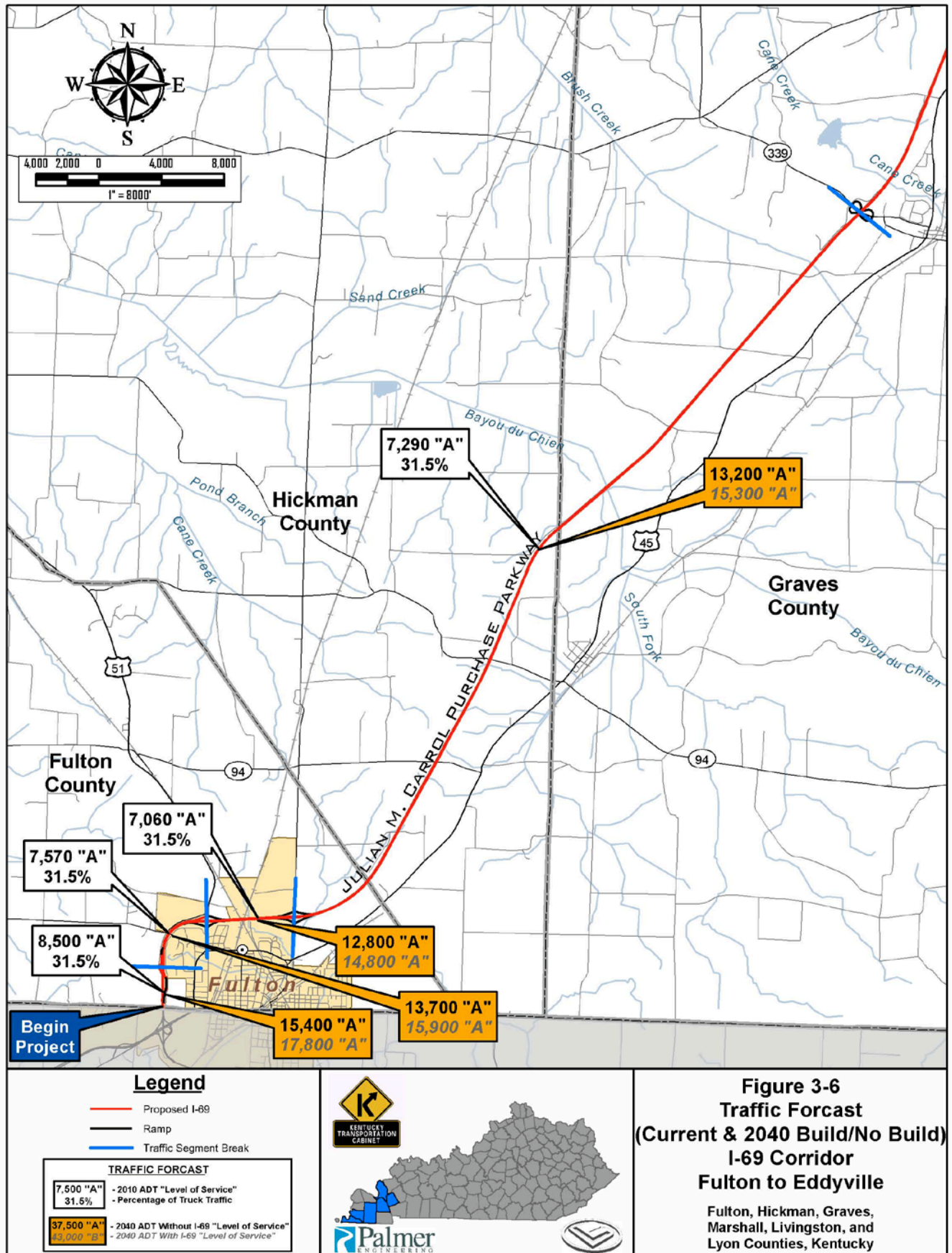
4. Level of Service

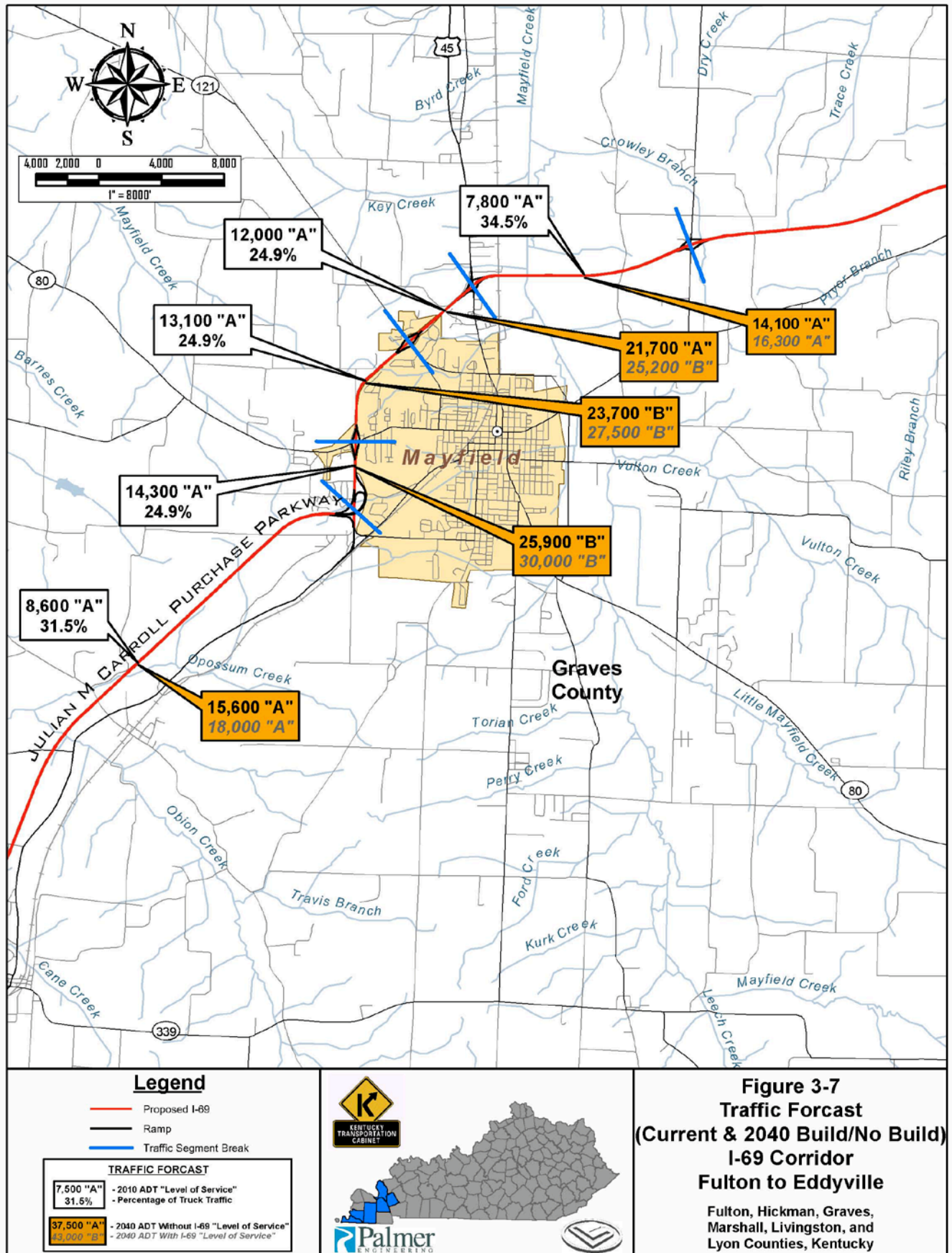
Level of service (LOS), as defined by the *Highway Capacity Manual 2000*, is a quality measure describing operational conditions within a traffic stream, based on service measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience. There are six LOS and are designated by the letters A through F. LOS A represents the best operating conditions and service and LOS F represents the worst.

It is preferred to design a rural interstate to a LOS B, but a LOS C is acceptable. For an urban interstate, it is preferred to design to a LOS C, but a LOS D is acceptable. The *Highway Capacity Manual 2000 Edition* and Highway Capacity Software were used to calculate the LOS for the project area. The LOS was calculated based on the mainline geometry and traffic operations for the Purchase Parkway and I-24. This LOS does not represent the LOS for interchanges in the project corridor.

Referring to **Tables 3-8** and **3-9**, the Purchase Parkway and I-24 will operate at a LOS C or better with or without the estimated additional I-69 projected traffic. There is an increase from LOS B to LOS C with the increased projected I-69 traffic in Marshall County (MP 42.555 – 51.398) on the Purchase Parkway and on I-24 in Marshall County (MP 24.941 – MP 26.558).

Figure 3-6 through **Figure 3-10** illustrates the current and future traffic projections with and without I-69 on the Purchase Parkway and I-24.





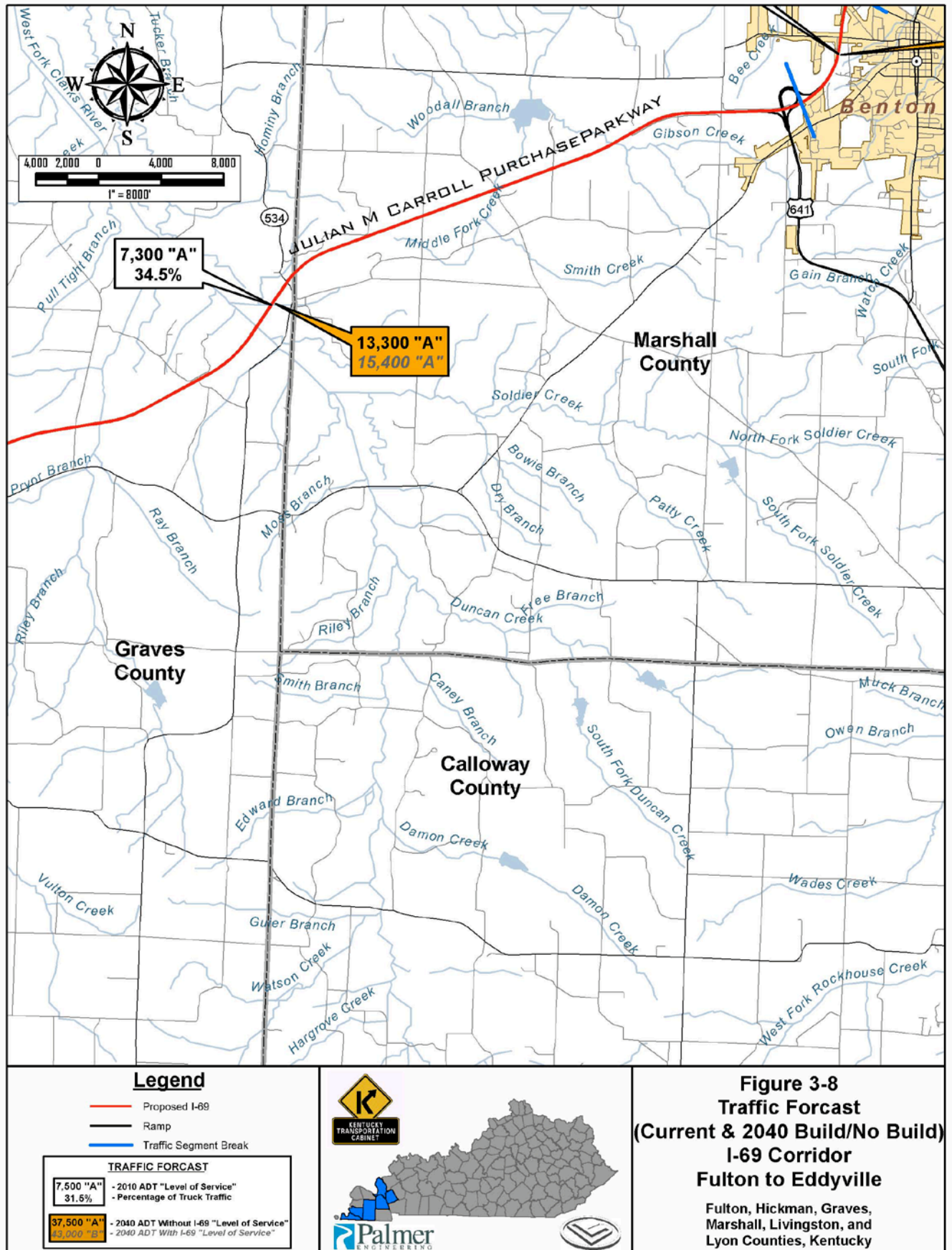
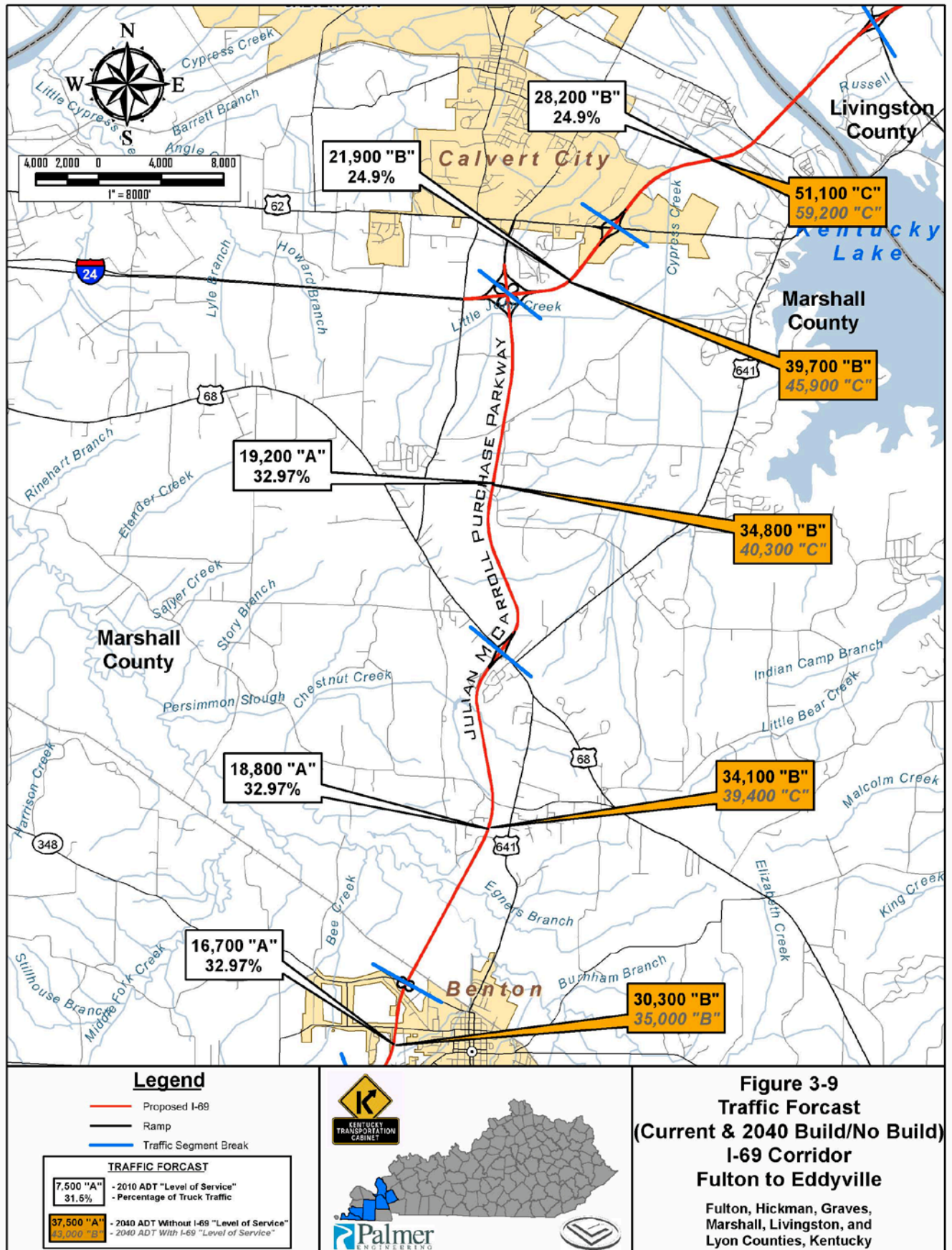
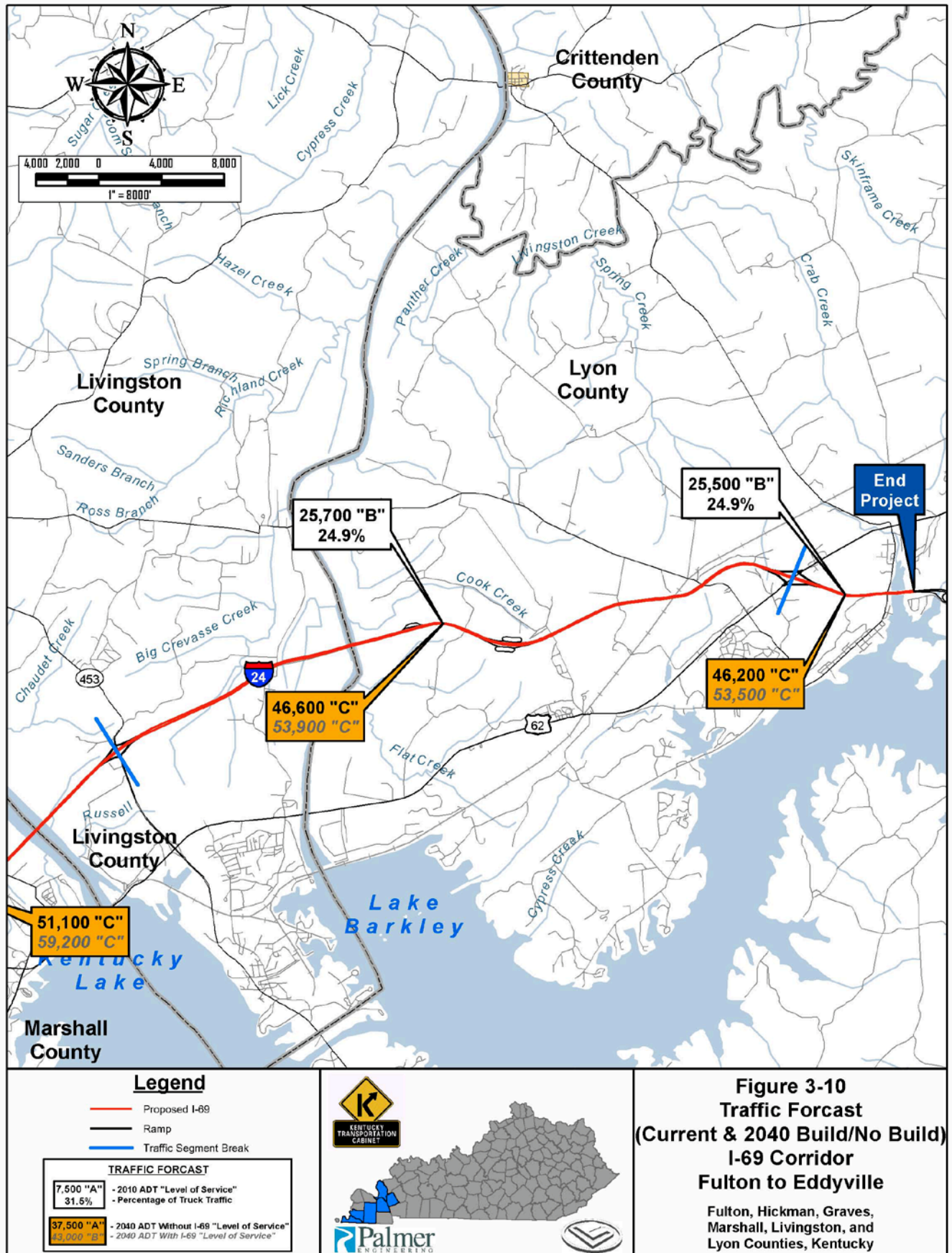


Figure 3-8
Traffic Forecast
 (Current & 2040 Build/No Build)
I-69 Corridor
Fulton to Eddyville
 Fulton, Hickman, Graves,
 Marshall, Livingston, and
 Lyon Counties, Kentucky





5. I-24 and Purchase Parkway Interchange Ramp Volumes

ADT traffic volumes were evaluated at the I-24 and Purchase Parkway interchange. The most current ramp traffic volumes were collected in 2007. The future traffic volumes (2040) without I-69 were calculated using a 2% annual growth rate. The future traffic volumes (2040) with I-69 were calculated using a 2.5% annual growth rate. The design hourly volumes (DHV) shown in **Figure 3-11** was calculated using 15% of the ADT. The northbound Purchase Parkway to eastbound I-24 movement has the largest ramp volume in the interchange with a projected 2040 DHV of 911 vehicles without I-69 and 1,054 vehicles with I-69. The second largest ramp volume is the westbound I-24 to southbound Purchase Parkway movement with a projected 2040 DHV of 820 vehicles without I-69 and 950 vehicles with I-69.

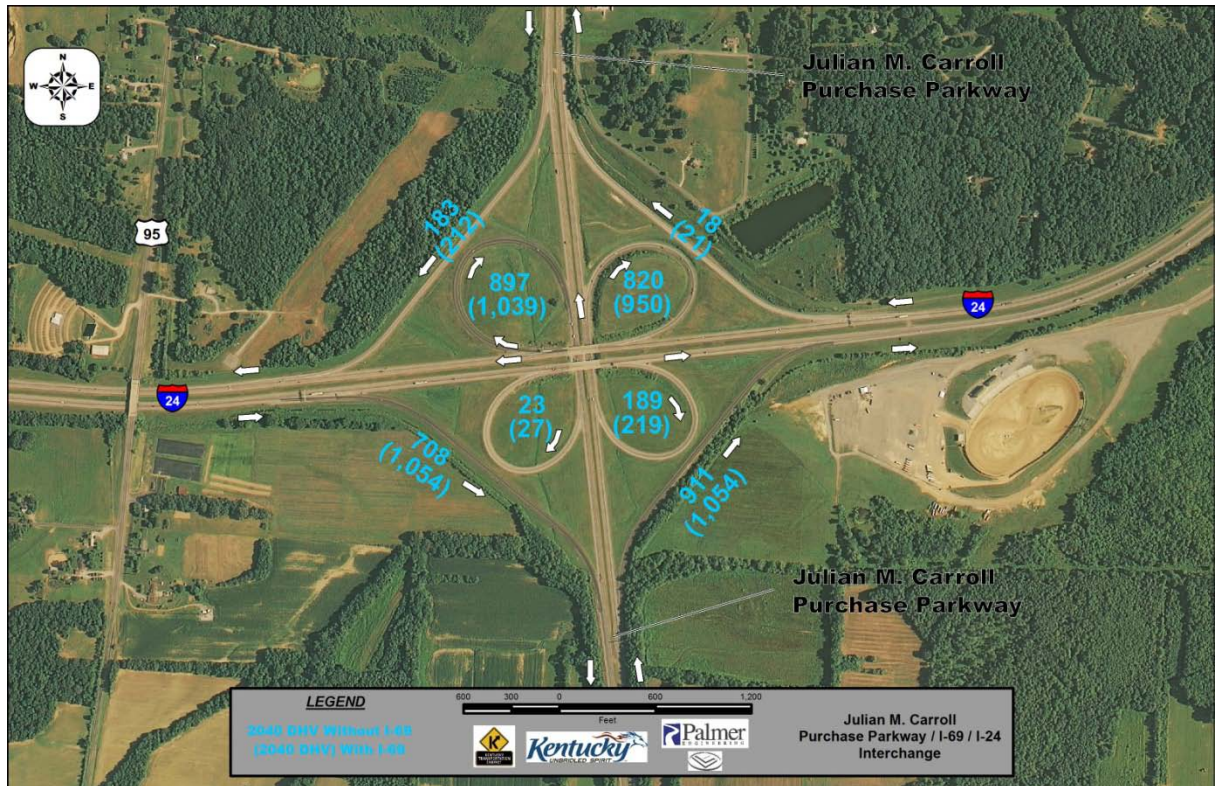


Figure 3-11 I-24 and Purchase Parkway Interchange Ramp Volumes