

**Traffic Forecast Technical Report
Bardstown
Item No. 04-8809.00**

FINAL REPORT

Prepared for:

Kentucky Transportation Cabinet (KYTC)



Prepared by:



July 2017

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Commonly Used Abbreviations and their Descriptions

%T	Truck Percentage	The ratio of trucks to total traffic volume
ADT	Average Daily Traffic	The average daily traffic at a certain location
ATR	Automatic Traffic Recorder	A permanent and continuous recording traffic count station
D-Factor	Directional Factor	The percentage of traffic flow by direction
DHV	Design Hour Volume	The 30 th highest hourly traffic volume in a year
ESAL	Equivalent Single Axle Load	A measure of traffic volume impact on roadway condition
FC	Functional Class	A numerical code indicating roadway purpose
GR	Growth Rate	A calculated value used to estimate future traffic volumes
K-Factor	K-30 th Hour Factor	DHV divided by ADT (DHV/ADT)
MP	Mile Point	A location description; MPs increase in cardinal direction
PHF	Peak Hour Factor	The highest traffic volume in 15 minutes out of an hour

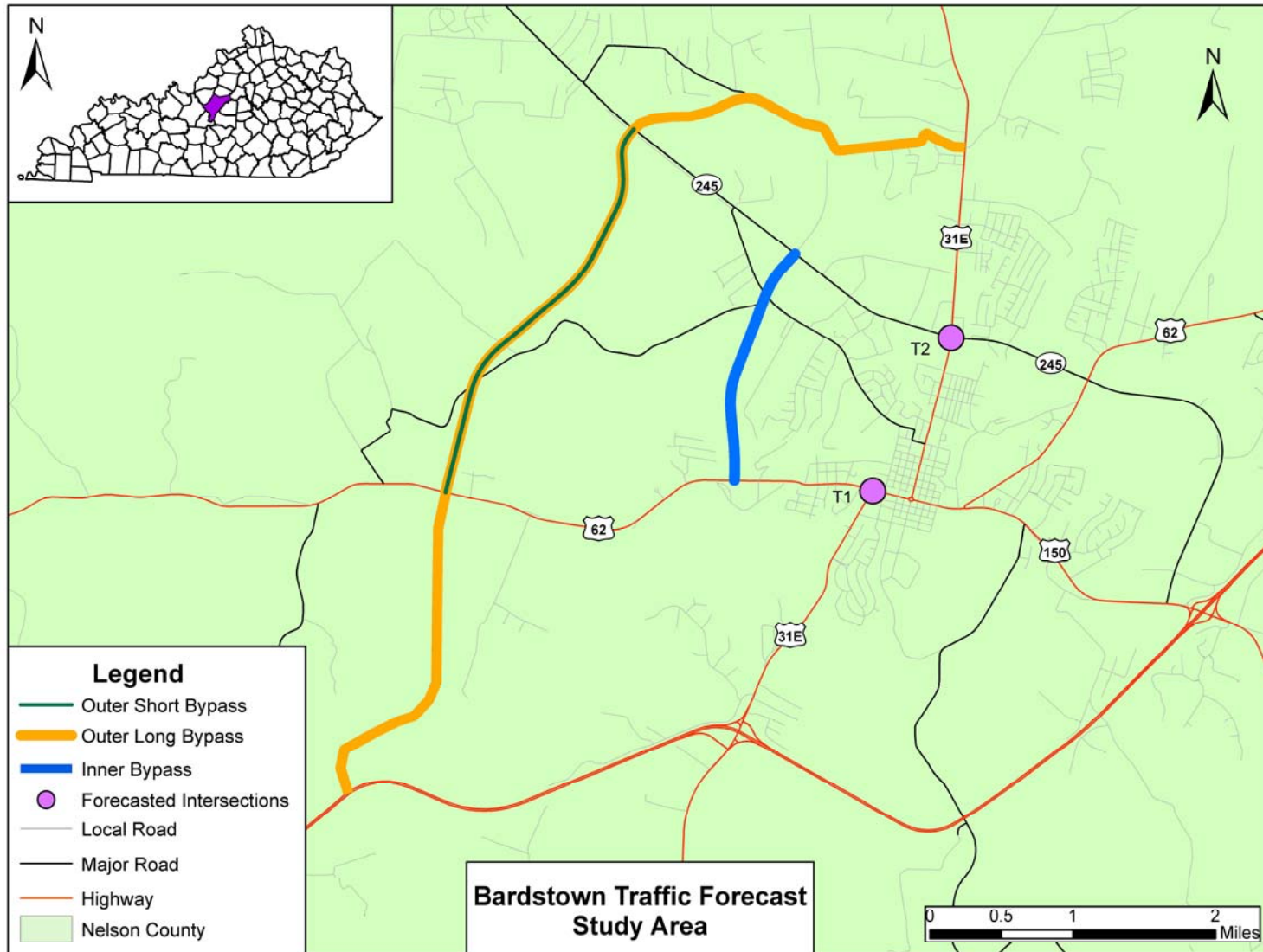
1.0 INTRODUCTION

This document summarizes the steps completed by WSP to prepare a traffic forecast for three alternate bypass options west of Bardstown in Nelson County, Kentucky. The Kentucky Transportation Cabinet (KYTC) District 4 requested this forecast for Item No. 4-8809.00. The three options include an inner bypass between KY 245 and US 62 near Bardstown, a short outer bypass between KY 245 and US 62, and a long outer bypass from US 31E to the Bluegrass Parkway, which includes the short outer bypass and extends the alignment further north and south.

Figure 1 shows a map of the study area.

Three types of forecasts included in this report are Average Daily Traffic (ADT), Design Hourly Volume (DHV), and truck percentages. All three forecast types were completed using the following scenarios: base year 2017, open to traffic year 2025, and future year 2040, for both Build and No-Build conditions.

Figure 1: Study Area



2.0 SEGMENT TRAFFIC VOLUMES

The KYTC collected traffic counts and calculated average daily traffic (ADT) volumes at seven traffic count stations within the study area. All counts were conducted between the years 2014 and 2016. Locations for the count stations, the year of the last traffic count, traffic count station number, and total ADT are listed below:

- US 31E – Beall Ave to Bardstown Bypass (2016): Station A02 = 16,646
- US 31E – US 62W to US 62E (2014): Station A79 = 17,623
- US 31E – KY 245 to KY 332 (2016): Station A99 = 16,134
- US 31E – Martha Collins Bluegrass Pkwy to US 62W (2014): Station B07 = 9,845
- US 62 – Elm Grove St to US 31E (2016): Station A78 = 7,808
- KY 245 – US 31E to KY 1430 (2016): Station A89 = 23,793
- KY 245 – US 62 to US 31E (2015): Station B06 = 28,493

The original counts were updated to a base year of 2017 using a historical traffic growth analysis. Details of that analysis are discussed later in this report.

3.0 INTERSECTION TURNING MOVEMENT VOLUMES

The two intersections included as part of this forecast are identified as US 31E / US 62 (T1) and US 31E / KY 245 (T2).

Turning movement counts were conducted at the two intersections during the AM (7:00 AM – 9:00 AM) and PM (3:00 PM – 5:00 PM) peak periods (Eastern Standard Time). The turning movement counts were then factored to account for seasonal variations.

Intersection turning movement forecasts for 2017 can be found in **Appendix A**. The 2017 No-Build turning movements were forecasted to the open to traffic year 2025 and future year of 2040. No-Build turning movement forecasts for 2025 and 2040 can be found in **Appendices B** and **C**.

4.0 GROWTH RATES

Growth rates were determined based on historical traffic growth analysis, population trends and projections, and results from the Kentucky Statewide Traffic Model (KYSTM).

The growth rates identified for each segment within the study area are shown in **Table 1**. Further discussion regarding the selection of the growth rate can be found in the Traffic Forecast Methodology Report as submitted to the KYTC Division of Planning on June 27, 2017.

Table 1: Proposed Growth Rates

KYTC Count Station	Route	From	To	No-Build Growth Rate	Inner Bypass Growth Rate	Outer Short Bypass Growth Rate	Outer Long Bypass Growth Rate
New Bardstown Bypass	-	-	-	-	2.5%	2.0%	2.0%
A02	US 31E	Beall Ave	Bardstown Bypass	1.0%	0.0%	0.0%	0.0%
A79	US 31E	US 62W	US 62E	1.0%	0.5%	1.0%	1.0%
A99	US 31E	KY 245	KY 332	1.0%	1.5%	0.5%	0.5%
B07	US 31E	Martha Collins Bluegrass Pkwy	US 62W	1.0%	1.5%	1.5%	1.5%
A78	US 62	Elm Grove St	US 31E	1.0%	0.0%	0.0%	0.0%
A89	KY 245	US 31E	KY 1430	0.5%	1.0%	0.5%	0.5%
B06	KY 245	US 62	US 31E	1.0%	1.5%	1.5%	1.5%

Tables 2 through **5** on the following pages detail the forecasted travel volumes for the No-Build and Build scenarios. **Figures 2** through **5** show segment descriptions and provide summaries of key study area segments' forecasted traffic for the No-Build and Build traffic forecasts, respectively.

Table 2: No-Build Traffic Forecast Summary

APPROACH	ROUTE	BEGINNING DESCRIPTION	ENDING DESCRIPTION	2017 ADT	2017 Truck % ADT	2017 Trucks (Daily)	2017 AM K Factor	2017 PM K Factor	2017 AM DHV	2017 PM DHV	2017 Truck % DHV	2017 Trucks (DHV)	2025 No Build ADT	2025 Truck % ADT	2025 Trucks (Daily)	2025 NB AM K FACTOR	2025 NB PM K FACTOR	2025 NB AM DHV	2025 NB PM DHV	2025 Truck % DHV	2025 Trucks (DHV)	2040 No Build ADT	2040 Truck % ADT	2040 Trucks (Daily)	2040 NB AM K FACTOR	2040 NB PM K FACTOR	2040 NB AM DHV	2040 NB PM DHV	2040 Truck % DHV	2040 Trucks (DHV)
W	KY 245	KY 1430	US 31E	24,020	14.1%	3387	9.0%	10.3%	2,150	2,470	5.0%	124	25000	14.7%	3668	9.0%	10.3%	2240	2580	5.2%	134	26940	15.8%	4260	8.9%	10.3%	2410	2770	5.4%	150
E	KY 245	US 62	US 31E	29,920	7.7%	2304	8.6%	10.6%	2,560	3,160	5.1%	161	32380	8.3%	2700	8.6%	10.6%	2770	3430	5.5%	189	37580	9.7%	3638	8.5%	10.5%	3210	3960	6.4%	253
N	US 31E	KY 332	KY 245	17,440	6.9%	1203	9.0%	10.0%	1,570	1,740	1.8%	31	18870	7.5%	1410	9.0%	10.0%	1700	1890	2.0%	38	21900	8.7%	1900	8.9%	10.0%	1960	2190	2.3%	50
S	US 31E	E Beall Ave	KY 245	18,840	7.5%	1413	9.6%	9.8%	1,800	1,850	2.2%	41	20410	8.1%	1658	9.6%	9.9%	1950	2020	2.4%	49	23680	9.4%	2233	9.5%	9.9%	2240	2340	2.8%	66
W	US 62	N Elm Grove St	US 31E	9,630	8.7%	838	9.7%	11.4%	930	1,100	2.5%	28	10430	9.4%	983	9.6%	11.3%	1000	1180	2.7%	32	12110	10.9%	1325	9.7%	11.5%	1170	1390	3.1%	43
E	US 31E	S 3rd St	US 62	18,100	6.1%	1104	9.8%	11.3%	1,770	2,040	2.9%	59	19600	6.6%	1295	9.7%	11.2%	1910	2200	3.1%	68	22750	7.7%	1745	9.8%	11.3%	2230	2570	6.7%	172
S	US 31E	Bluegrass Pkwy	US 62	11,030	8.4%	927	10.0%	11.2%	1,100	1,240	2.8%	35	11950	9.1%	1087	10.0%	11.2%	1190	1340	3.0%	40	13860	10.6%	1464	10.0%	11.3%	1380	1560	3.5%	55

Table 3: Inner Bypass Traffic Forecast Summary

APPROACH	ROUTE	BEGINNING DESCRIPTION	ENDING DESCRIPTION	2017 ADT	2017 Truck % ADT	2017 Trucks (Daily)	2017 AM K Factor	2017 PM K Factor	2017 AM DHV	2017 PM DHV	2017 Truck % DHV	2017 Trucks (DHV)	2025 Inner Bypass ADT	2025 Truck % ADT	2025 Trucks (Daily)	2025 IB AM K FACTOR	2025 IB PM K FACTOR	2025 IB AM DHV	2025 IB PM DHV	2025 Truck % DHV	2025 Trucks (DHV)	2040 Inner Bypass ADT	2040 Truck % ADT	2040 Trucks (Daily)	2040 IB AM K FACTOR	2040 IB PM K FACTOR	2040 IB AM DHV	2040 IB PM DHV	2040 Truck % DHV	2040 Trucks (DHV)
W	KY 245	KY 1430	US 31E	24,020	14.1%	3387	9.0%	10.3%	2,150	2,470	5.0%	124	26000	15.3%	3970	8.9%	10.3%	2320	2680	5.4%	145	30200	17.7%	5353	8.9%	10%	2680	3130	6.3%	197
E	KY 245	US 62	US 31E	29,920	7.7%	2304	8.6%	10.6%	2,560	3,160	5.1%	161	33680	8.7%	2921	8.5%	10.5%	2870	3550	5.8%	206	42120	10.8%	4568	8.5%	10.6%	3590	4450	6.4%	285
N	US 31E	KY 332	KY 245	17,440	6.9%	1203	9.0%	10.0%	1,570	1,740	1.8%	31	19640	7.8%	1527	9.0%	10.0%	1760	1970	2.0%	39	24560	9.7%	2387	8.8%	10.1%	2160	2480	2.5%	62
S	US 31E	E Beall Ave	KY 245	18,840	7.5%	1413	9.6%	9.8%	1,800	1,850	2.2%	41	18840	7.5%	1413	9.5%	9.8%	1790	1840	2.2%	41	18840	7.5%	1413	9.5%	9.9%	1790	1860	2.2%	41
W	US 62	N Elm Grove St	US 31E	9,630	8.7%	838	9.7%	11.4%	930	1,100	2.5%	28	9620	8.7%	837	9.7%	11.4%	930	1100	2.5%	28	9640	8.7%	839	10.9%	12.8%	1050	1230	2.5%	31
E	US 31E	S 3rd St	US 62	18,100	6.1%	1104	9.8%	11.3%	1,770	2,040	2.9%	59	18820	6.3%	1195	9.8%	11.3%	1850	2120	3.0%	64	20300	6.8%	1389	10.3%	11.9%	2100	2410	3.2%	77
S	US 31E	Bluegrass Pkwy	US 62	11,030	8.4%	927	10.0%	11.2%	1,100	1,240	2.8%	35	12420	9.5%	1175	10.0%	11.3%	1240	1400	3.2%	45	15540	11.8%	1838	10.0%	11.2%	1550	1740	3.9%	68
1	Inner Bypass	US 62	KY 245	-	-	-	-	-	-	-	-	-	3710	14.9%	552	15.1%	22.9%	560	850	2.6%	22	5380	14.9%	800	15.1%	22.9%	810	1230	3.7%	46

Table 4: Short Outer Bypass Traffic Forecast Summary

APPROACH	ROUTE	BEGINNING DESCRIPTION	ENDING DESCRIPTION	2017 ADT	2017 Truck % ADT	2017 Trucks (Daily)	2017 AM K Factor	2017 PM K Factor	2017 AM DHV	2017 PM DHV	2017 Truck % DHV	2017 Trucks (DHV)	2025 Short Outer Bypass ADT	2025 Truck % ADT	2025 Trucks (Daily)	2025 SOB AM K FACTOR	2025 SOB PM K FACTOR	2025 SOB AM DHV	2025 SOB PM DHV	2025 Truck % DHV	2025 Trucks (DHV)	2040 Short Outer Bypass ADT	2040 Truck % ADT	2040 Trucks (Daily)	2040 SOB AM K FACTOR	2040 SOB PM K FACTOR	2040 SOB AM DHV	2040 SOB PM DHV	2040 Truck % DHV	2040 Trucks (DHV)
W	KY 245	KY 1430	US 31E	24,020	14.1%	3387	9.0%	10.3%	2,150	2,470	5.0%	124	25000	14.7%	3668	8.9%	10.3%	2230	2570	5.2%	134	26,940	15.8%	4260	9.4%	11.0%	2,520	2,950	6.3%	186
E	KY 245	US 62	US 31E	29,920	7.7%	2304	8.6%	10.6%	2,560	3,160	5.1%	161	33700	8.7%	2923	8.6%	10.5%	2900	3550	5.8%	206	42,120	10.8%	4568	8.5%	10.5%	3,590	4,440	6.4%	284
N	US 31E	KY 332	KY 245	17,440	6.9%	1203	9.0%	10.0%	1,570	1,740	1.8%	31	18160	7.2%	1304	9.0%	10.0%	1630	1810	1.9%	34	19,560	7.7%	1514	9.5%	10.7%	1,850	2,100	2.5%	53
S	US 31E	E Beall Ave	KY 245	18,840	7.5%	1413	9.6%	9.8%	1,800	1,850	2.2%	41	18840	7.5%	1413	9.6%	9.8%	1800	1850	2.2%	41	18,860	7.5%	1415	10.5%	11.0%	1,980	2,070	2.2%	46
W	US 62	N Elm Grove St	US 31E	9,630	8.7%	838	9.7%	11.4%	930	1,100	2.5%	28	8840	8.7%	769	10.5%	12.3%	930	1090	2.5%	27	9,620	8.7%	837	9.7%	11.5%	930	1,110	2.5%	28
E	US 31E	S 3rd St	US 62	18,100	6.1%	1104	9.8%	11.3%	1,770	2,040	2.9%	59	19600	6.6%	1295	9.7%	11.3%	1910	2210	3.1%	69	22,750	7.7%	1745	9.8%	11.3%	2,230	2,580	3.2%	83
S	US 31E	Bluegrass Pkwy	US 62	11,030	8.4%	927	10.0%	11.2%	1,100	1,240	2.8%	35	12420	9.5%	1175	10.0%	11.2%	1240	1390	3.2%	45	15,530	11.8%	1837	10.0%	11.3%	1,560	1,750	3.9%	68
2	Short Outer Bypass	US 62	KY 245	-	-	-	-	-	-	-	-	-	2290	13.0%	297	14.9%	23.4%	340	540	2.3%	12	3,080	13.0%	400	14.9%	23.4%	460	720	3.1%	22

Table 5: Long Outer Bypass Traffic Forecast Summary

APPROACH	ROUTE	BEGINNING DESCRIPTION	ENDING DESCRIPTION	2017 ADT	2017 Truck % ADT	2017 Trucks (Daily)	2017 AM K Factor	2017 PM K Factor	2017 AM DHV	2017 PM DHV	2017 Truck % DHV	2017 Trucks (DHV)	2025 Long Outer Bypass	2025 Truck % ADT	2025 Trucks (Daily)	2025 LOB AM K FACTOR	2025 LOB PM K FACTOR	2025 LOB AM DHV	2025 LOB PM DHV	2025 Truck % DHV	2025 Trucks (DHV)	2040 Long Outer Bypass ADT	2040 Truck % ADT	2040 Trucks (Daily)	2040 LOB AM K FACTOR	2040 LOB PM K FACTOR	2040 LOB AM DHV	2040 LOB PM DHV	2040 Truck % DHV	2040 Trucks (DHV)
W	KY 245	KY 1430	US 31E	24,020	14.1%	3387	9.0%	10.3%	2,150	2,470	5.0%	124	25000	14.7%	3668	8.9%	10.3%	2230	2570	5.2%	134	26,950	15.8%	4262	9.4%	11.0%	2,530	2,960	6.3%	187
E	KY 245	US 62	US 31E	29,920	7.7%	2304	8.6%	10.6%	2,560	3,160	5.1%	161	33700	8.7%	2923	8.6%	10.5%	2900	3550	5.8%	206	42,130	10.8%	4569	8.5%	10.5%	3,590	4,440	6.4%	284
N	US 31E	KY 332	KY 245	17,440	6.9%	1203	9.0%	10.0%	1,570	1,740	1.8%	31	18160	7.2%	1304	9.0%	10.0%	1630	1810	1.9%	34	19,560	7.7%	1514	9.5%	10.7%	1,860	2,100	2.5%	53
S	US 31E	E Beall Ave	KY 245	18,840	7.5%	1413	9.6%	9.8%	1,800	1,850	2.2%	41	18840	7.5%	1413	9.6%	9.8%	1800	1850	2.2%	41	18,860	7.5%	1415	10.6%	11.0%	2,000	2,080	2.2%	46
W	US 62	N Elm Grove St	US 31E	9,630	8.7%	838	9.7%	11.4%	930	1,100	2.5%	28	9640	8.7%	839	9.6%	11.4%	930	1100	2.5%	28	9,640	8.7%	839	9.6%	11.4%	930	1,100	2.5%	28
E	US 31E	S 3rd St	US 62	18,100	6.1%	1104	9.8%	11.3%	1,770	2,040	2.9%	59	19600	6.6%	1295	9.7%	11.2%	1910	2200	3.1%	68	22,750	7.7%	1745	9.8%	11.3%	2,230	2,560	3.2%	82
S	US 31E	Bluegrass Pkwy	US 62	11,030	8.4%	927	10.0%	11.2%	1,100	1,240	2.8%	35	12420	9.5%	1175	10.0%	11.3%	1240	1400	3.2%	45	15,500	11.8%	1834	10.1%	11.4%	1,560	1,760	3.9%	69
3	Long Outer Bypass	US 62	KY 245	-	-	-	-	-	-	-	-	-	3100	14.4%	446	15.4%	23.2%	480	720	2.3%	17	4,220	14.2%	600	15.4%	23.2%	650	980	3.8%	37

Figure 2: No-Build Forecast Summary

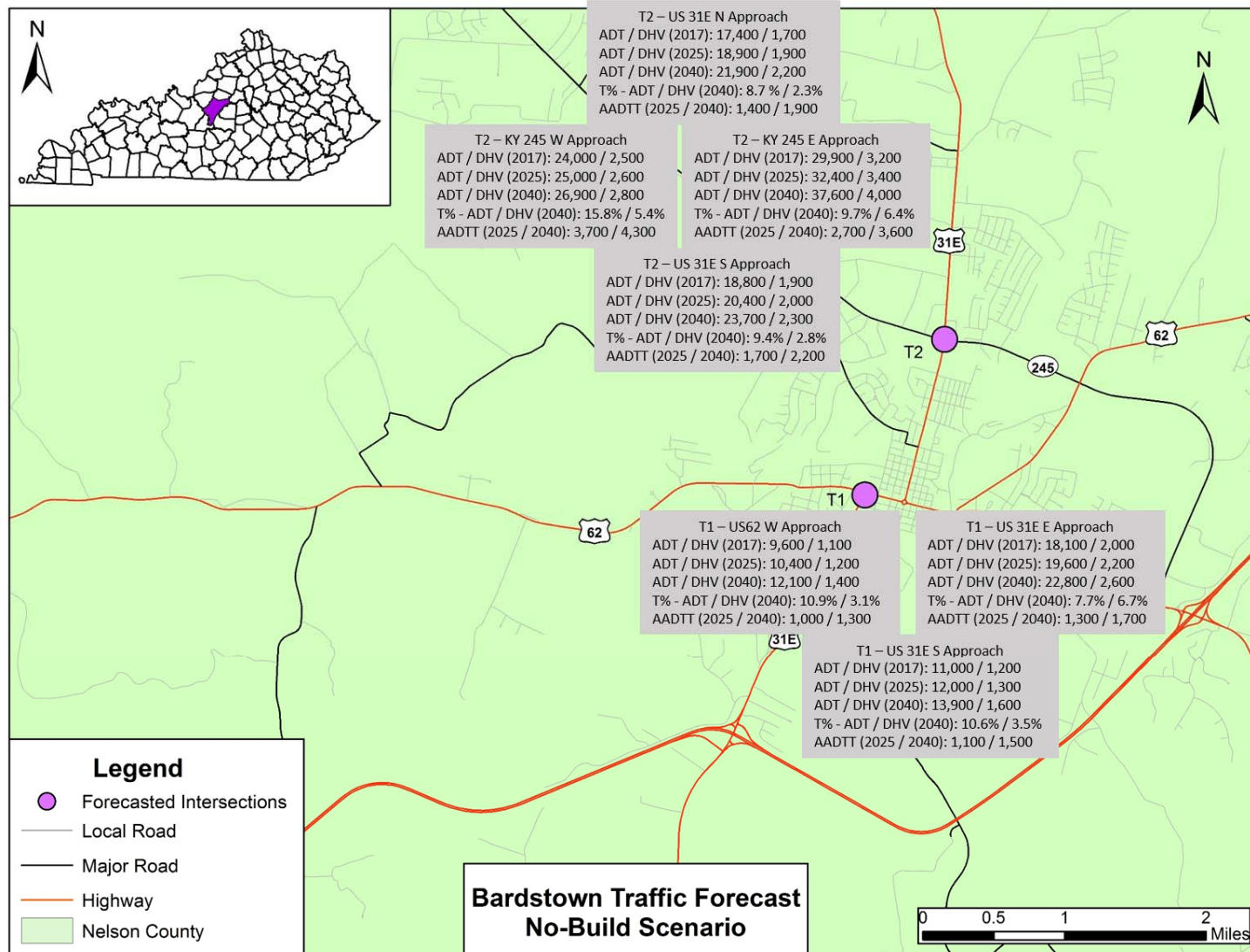


Figure 3: Inner Bypass Forecast Summary

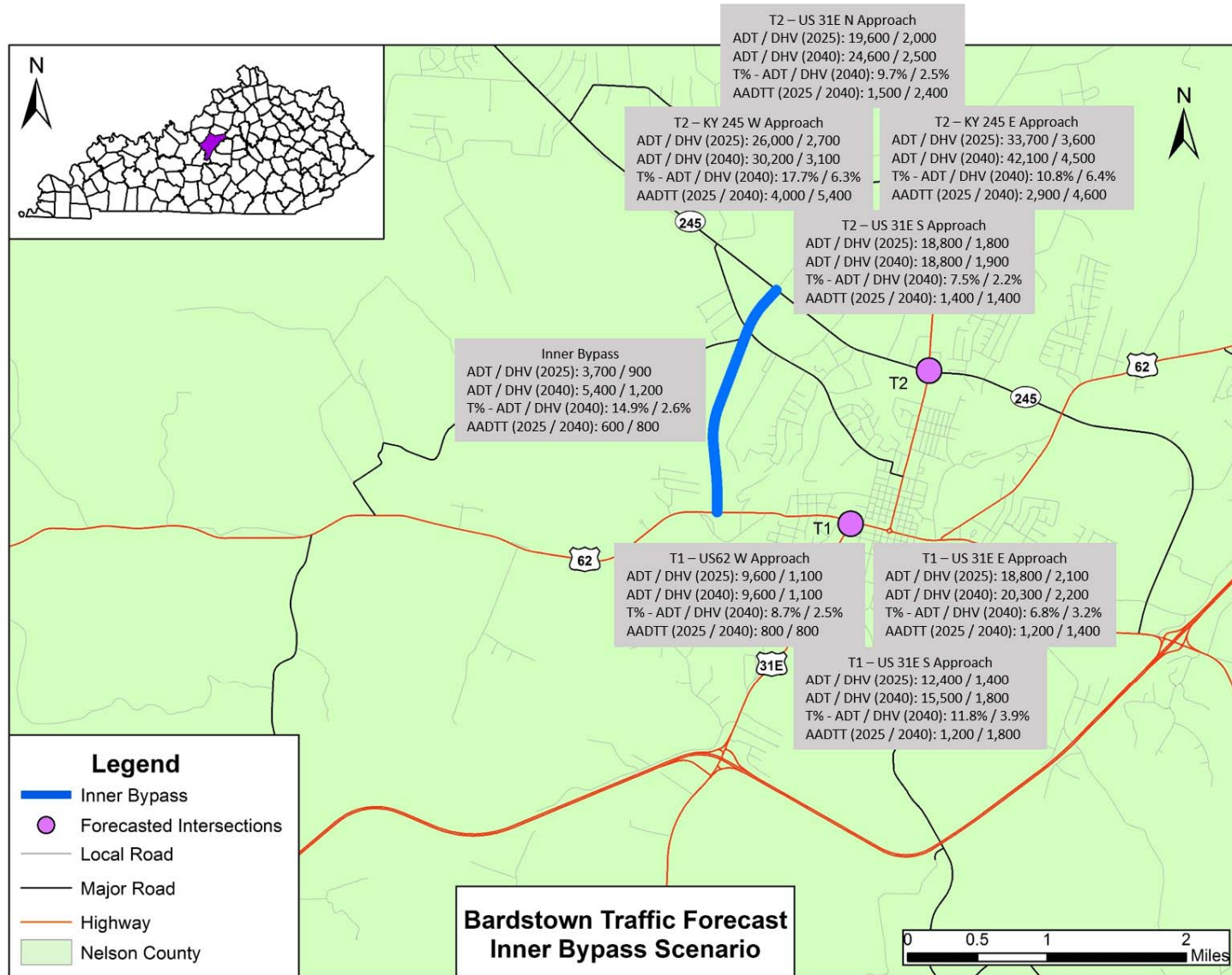


Figure 4: Short Outer Bypass Forecast Summary

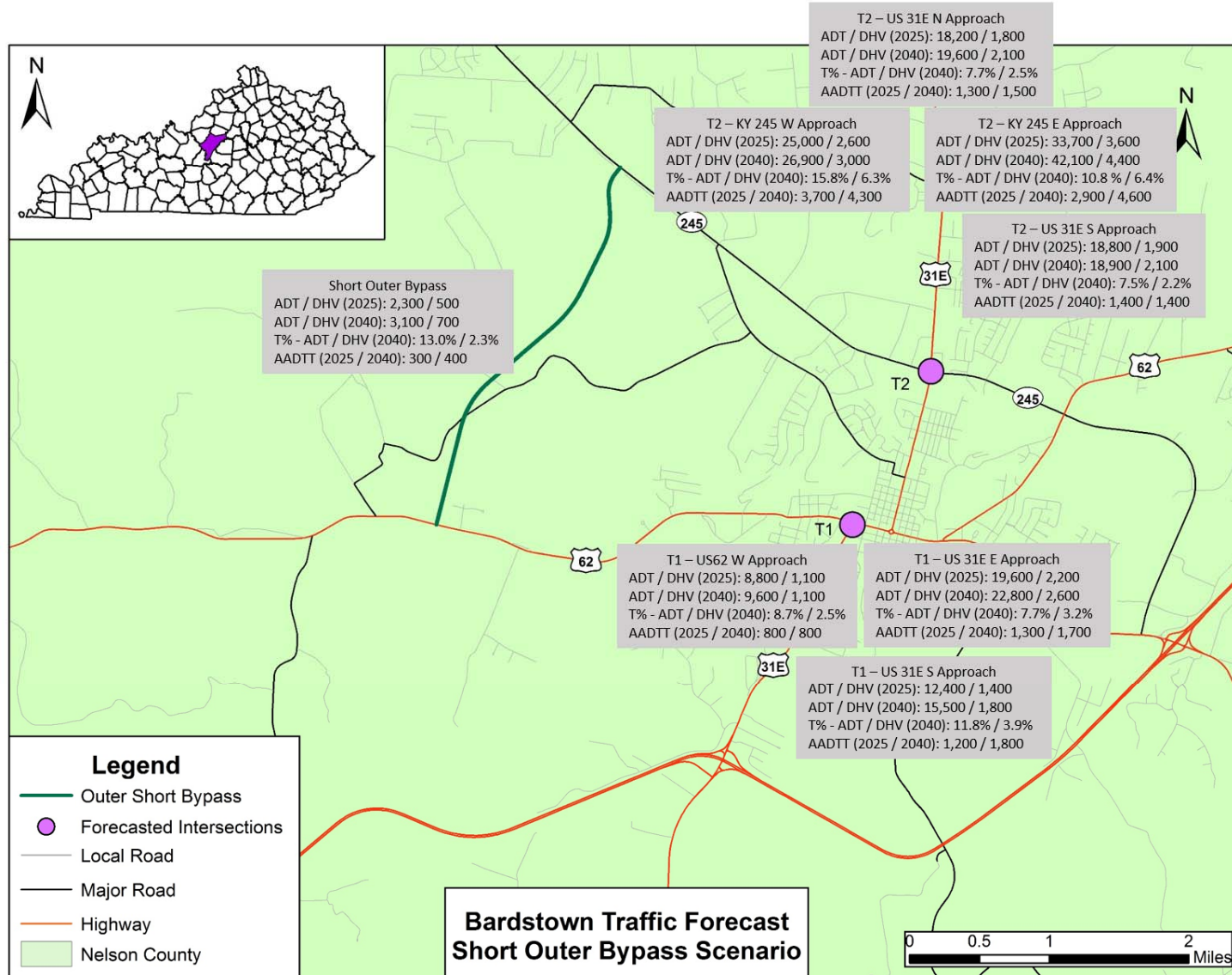
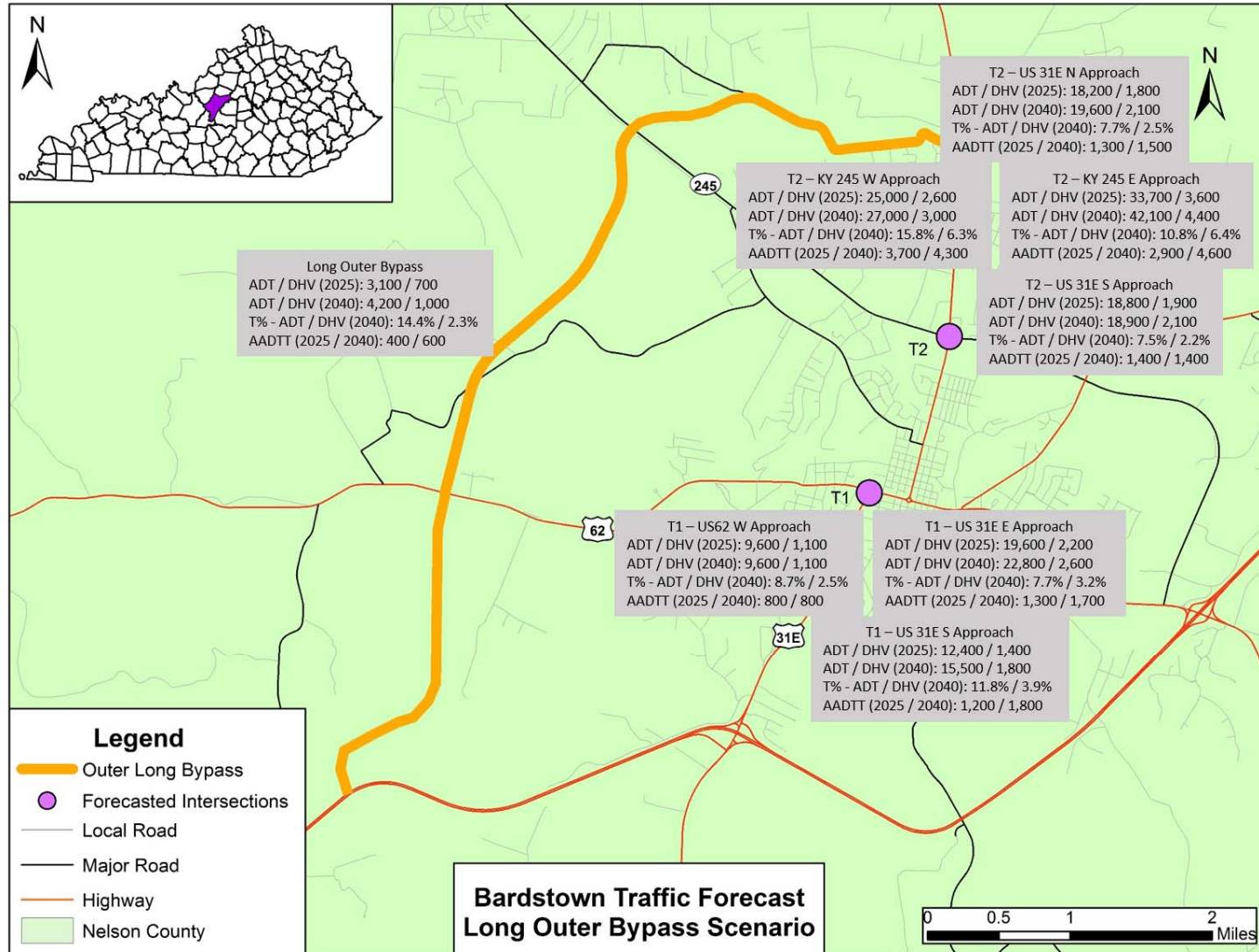


Figure 5: Long Outer Bypass Forecast Summary



5.0 K FACTOR

Hourly factors (K factors) were calculated by using the hourly count data from the KYTC count stations. The summary of raw hourly factors is provided in the Traffic Forecast Methodology Report.

The hourly factors were then adjusted by factors provided by KYTC. These factors were derived from Automatic Traffic Recorder (ATR) data by functional classification, day of week, and month of year.

The final K factors were adjusted slightly to account for volume balancing. Final K factors for each segment and ramp are included in **Tables 2** and **3**.

6.0 PHF

Peak hour factors (PHF) were calculated from the turning movement counts. A general analysis of the PHF indicates a range of 0.62 to 0.95.

7.0 TRUCK PERCENTAGES

Vehicle classification data in the study area was obtained from the Statewide Vehicle Classification Database maintained by KYTC, as shown in **Table 6** below, and also from classifications counts performed during the turning movement data collection. The Statewide Vehicle Classification Database was used to derive ADT truck percentages. Classification data from the turning movement counts was used to derive DHV truck percentages.

Table 6: Truck Percentages

Route	Date	Count Station	Direction	Mile Point	Daily Truck %	AADTT
US 31E	2016	A02	Both	15.1	7.5%	1,200
US 31E	2014	A79	Both	14.0	6.1%	1,100
US 31E	2016	A99	Both	16.0	6.9%	1,100
US 31E	2014	B07	Both	13.0	8.4%	800
US 62	2016	A78	Both	14.0	8.7%	700
KY 245	2016	A89	Both	3.7	14.1%	3,400
KY 245	2015	B06	Both	2.9	7.7%	2,200

8.0 POPULATION

Population data was obtained from the Kentucky State Data Center for Nelson County and Kentucky. **Table 7** displays the historical population growth while **Table 8** displays population projections.

Table 7: Historical Population Growth

Area	1980	1990	2000	2010	% Growth (2000-2010)
Kentucky	3,660,777	3,685,296	4,041,769	4,339,367	7.4%
Nelson County	27,584	29,710	37,477	43,437	15.9%

Source: Kentucky State Data Center

Table 8: Population Forecasts

Area	2010	2020	2030	2040	% Growth (2010-2040)
Kentucky	4,339,367	4,672,754	4,951,178	5,162,292	19.0%
Nelson County	43,437	47,473	51,695	54,752	26.0%

Source: Kentucky State Data Center

As shown in **Table 7**, the population of Nelson County increased 15.9% from 2000 to 2010 compared to only 7.4% for Kentucky during the same time period. Similarly, **Table 8** shows the population of Nelson County to be greater than what is expected by the state forecast. Nelson County is expected to increase by 26.0%, at a rate of 0.87% between the years 2010 and 2040, while a growth of 19.0% in Kentucky is expected between 2010 and 2040 at a rate of 0.63% per year.

9.0 OTHER INFORMATION

Additional information has been provided for reference in subsequent appendices. The information includes:

- **Appendix D: Traffic Data for Pavement Design**
- **Appendix E: Additional Figures**
- **Appendix F: Historical Growth Rates**

Appendix A:

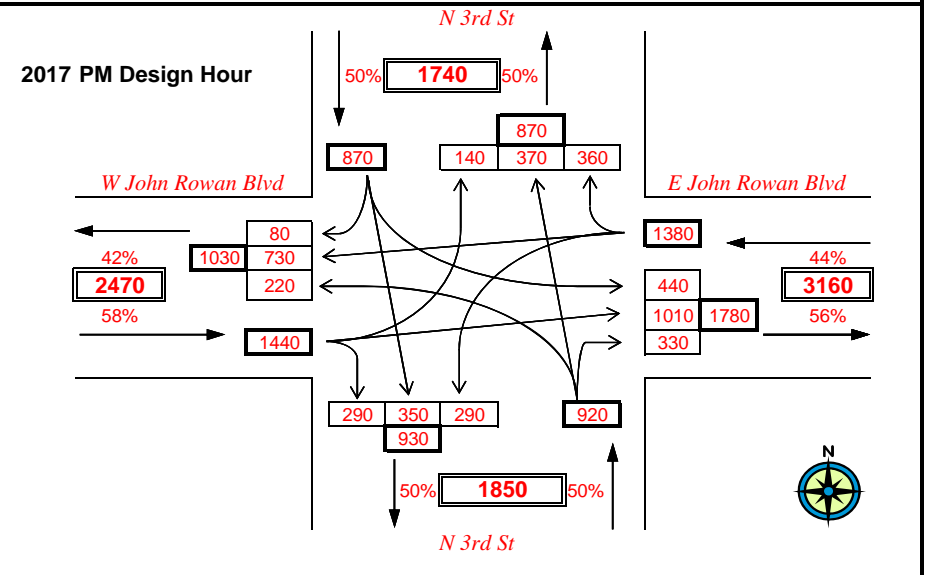
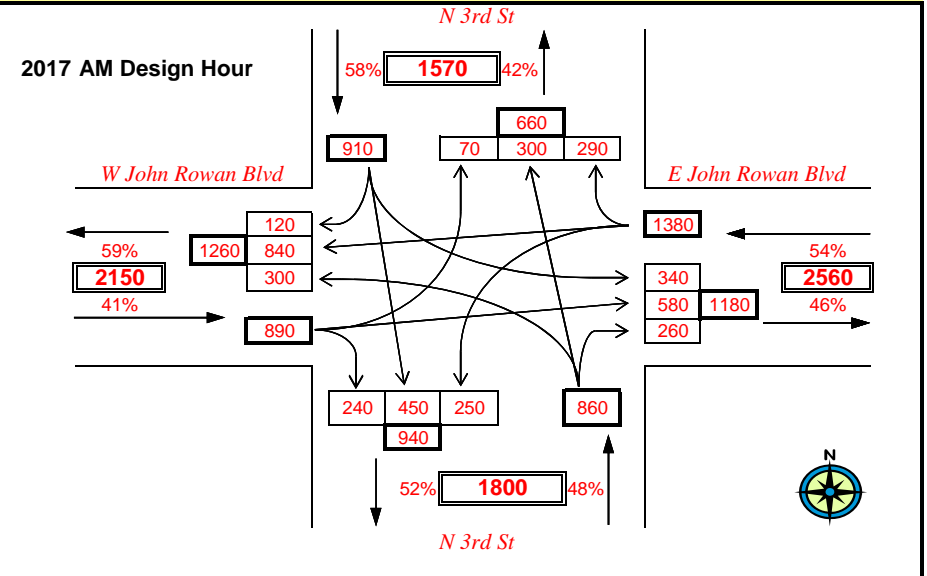
2017 Turning Movement Forecasts

PROJECT: Bardstown Traffic Forecast
 ITEM NUMBER: 4-8809.00
 MARS NUMBER: 0
 REQUEST DATE: 42825
 ANALYST: Cameron Manley
 YEAR: 2017 Design Hour Volumes
 INTERSECTION: US 31E & KY 245

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2017 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

TURN MOVEMENT T2 (2017 No-Build)

***DHV TURN MOVEMENT FORECASTS SHOULD NOT BE USED FOR SIGNAL TIMING OR WARRANT ANALYSIS**



Location Map



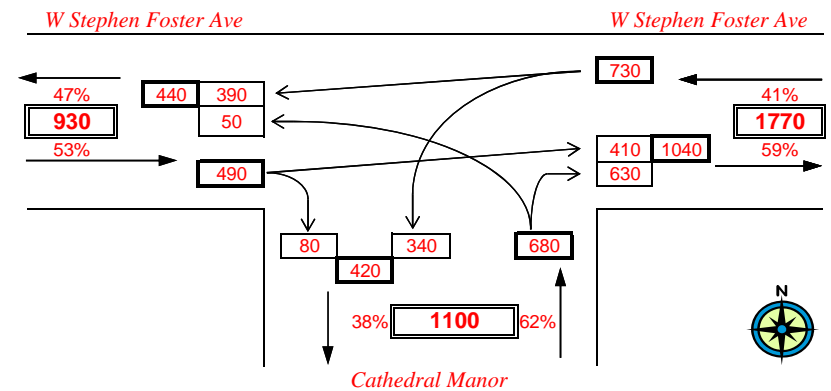
PROJECT: US 31E & KY 245
 ITEM NUMBER: 4-8809.00
 MARS NUMBER: 0
 REQUEST DATE: Friday, March 31, 2017
 ANALYST: Cameron Manley
 YEAR: 2017 Design Hour Volumes
 INTERSECTION: US 31E & US 62

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2017 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

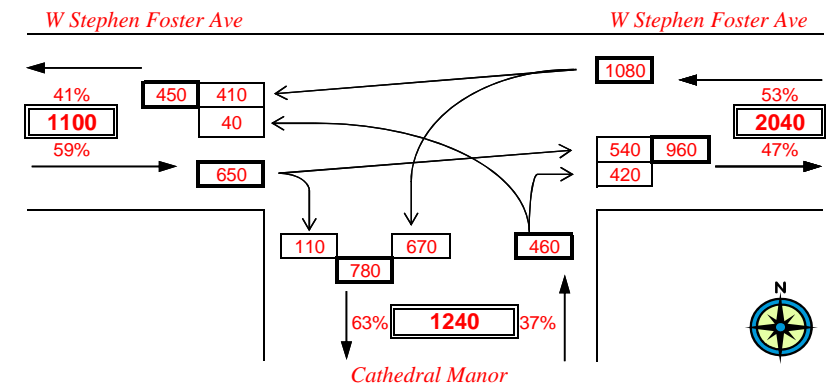
TURN MOVEMENT T1 (2017 No-Build)

***DHV TURN MOVEMENT FORECASTS SHOULD NOT BE USED FOR SIGNAL TIMING OR WARRANT ANALYSIS**

2017 AM Design Hour



2017 PM Design Hour



Location Map



Appendix B:

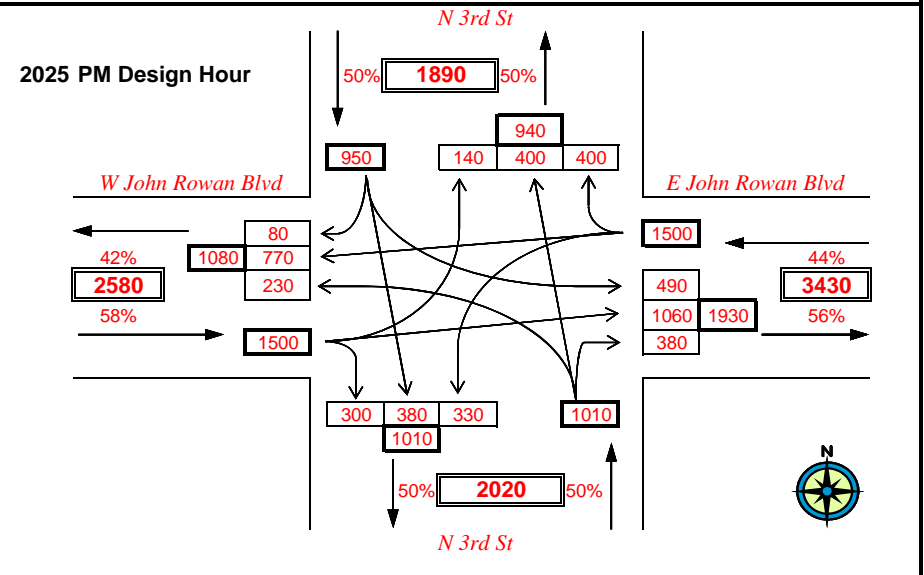
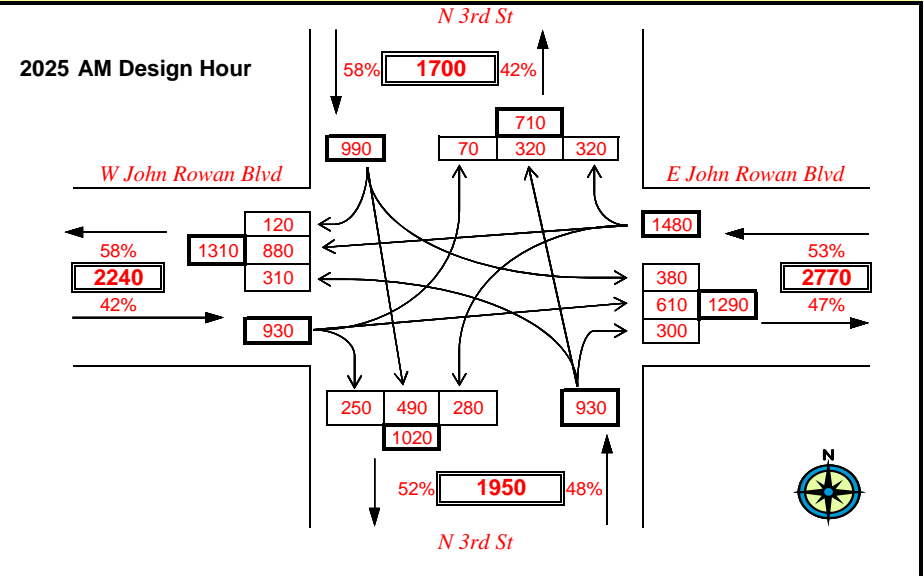
2025 Turning Movement Forecasts

PROJECT: Bardstown Traffic Forecast
 ITEM NUMBER: 4-8809.00
 MARS NUMBER: 0
 REQUEST DATE: 42825
 ANALYST: Cameron Manley
 YEAR: 2025 Design Hour Volumes
 INTERSECTION: US 31E & KY 245

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2025 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

TURN MOVEMENT T2 (2025 No-Build)

****DHV TURN MOVEMENT FORECASTS SHOULD NOT BE USED FOR SIGNAL TIMING OR WARRANT ANALYSIS**



Location Map



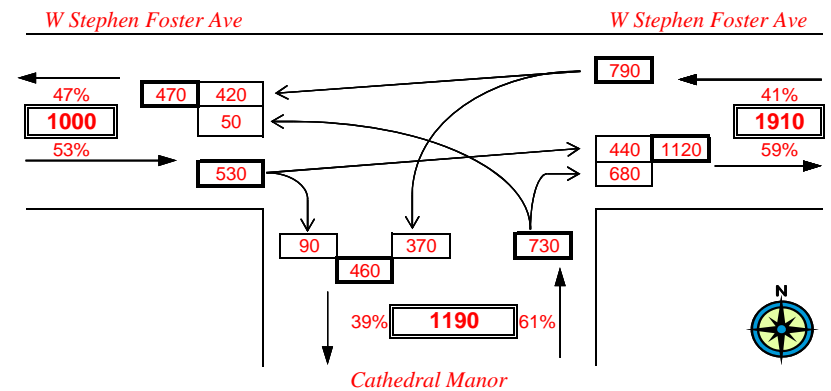
PROJECT: Bardstown Traffic Forecast
 ITEM NUMBER: 4-8809.00
 MARS NUMBER: 0
 REQUEST DATE: 42825
 ANALYST: Cameron Manley
 YEAR: 2025 Design Hour Volumes
 INTERSECTION: US 31E & KY 245

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2025 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

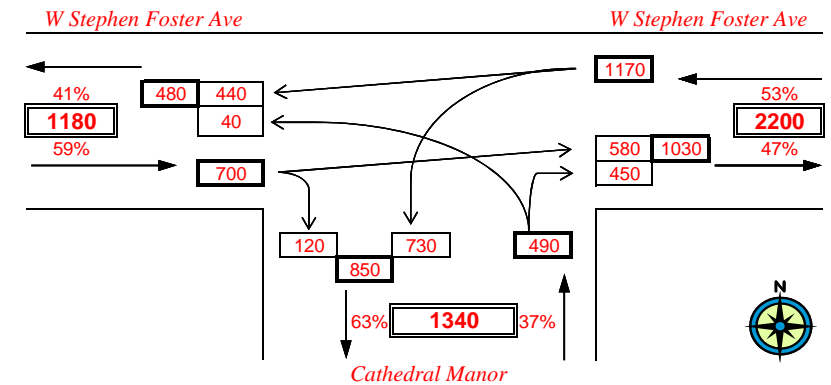
TURN MOVEMENT T1 (2025 No-Build)

****DHV TURN MOVEMENT FORECASTS SHOULD NOT BE USED FOR SIGNAL TIMING OR WARRANT ANALYSIS****

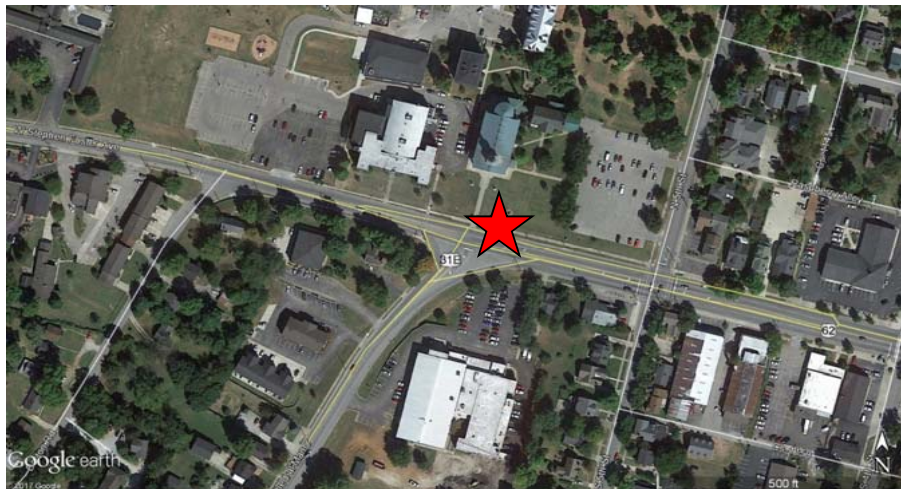
2025 AM Design Hour



2025 PM Design Hour



Location Map

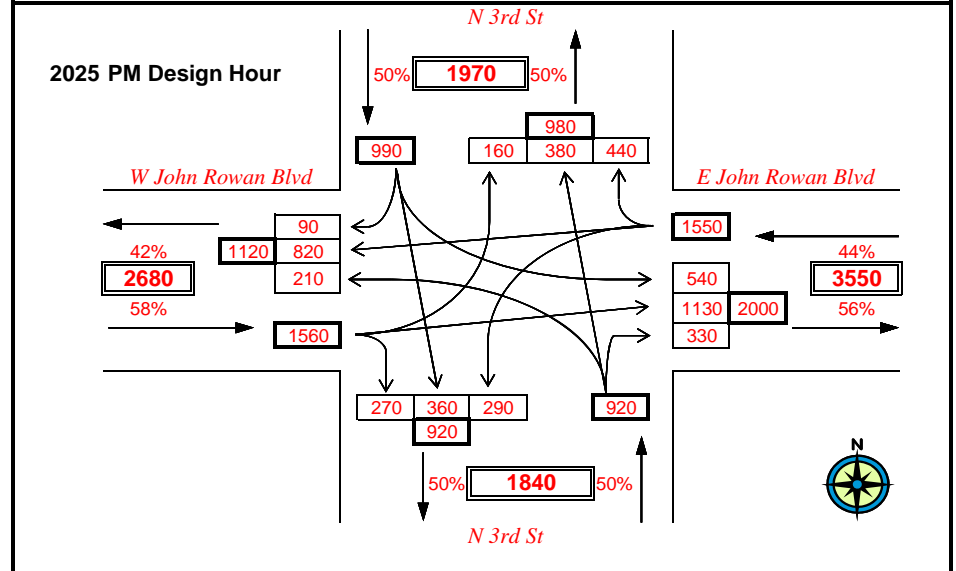
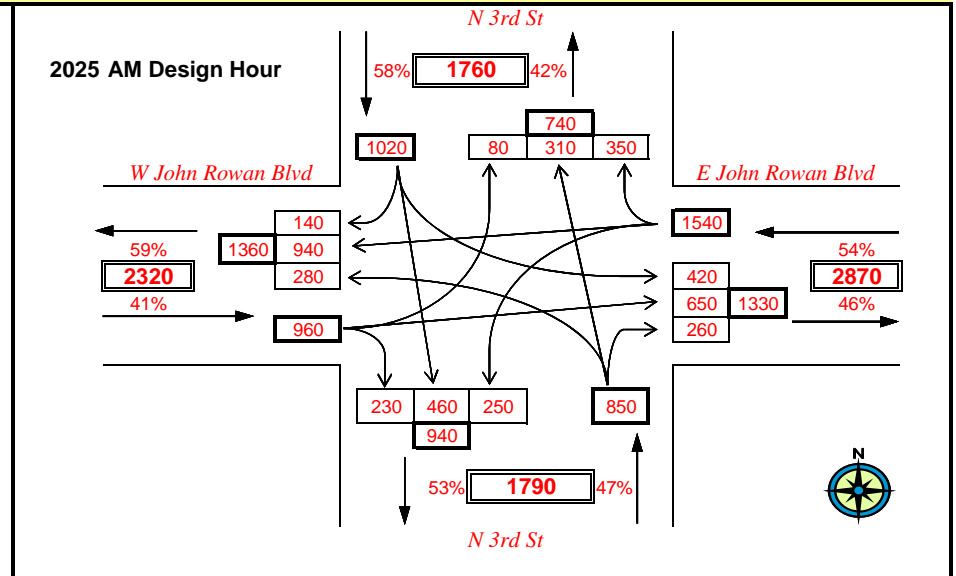
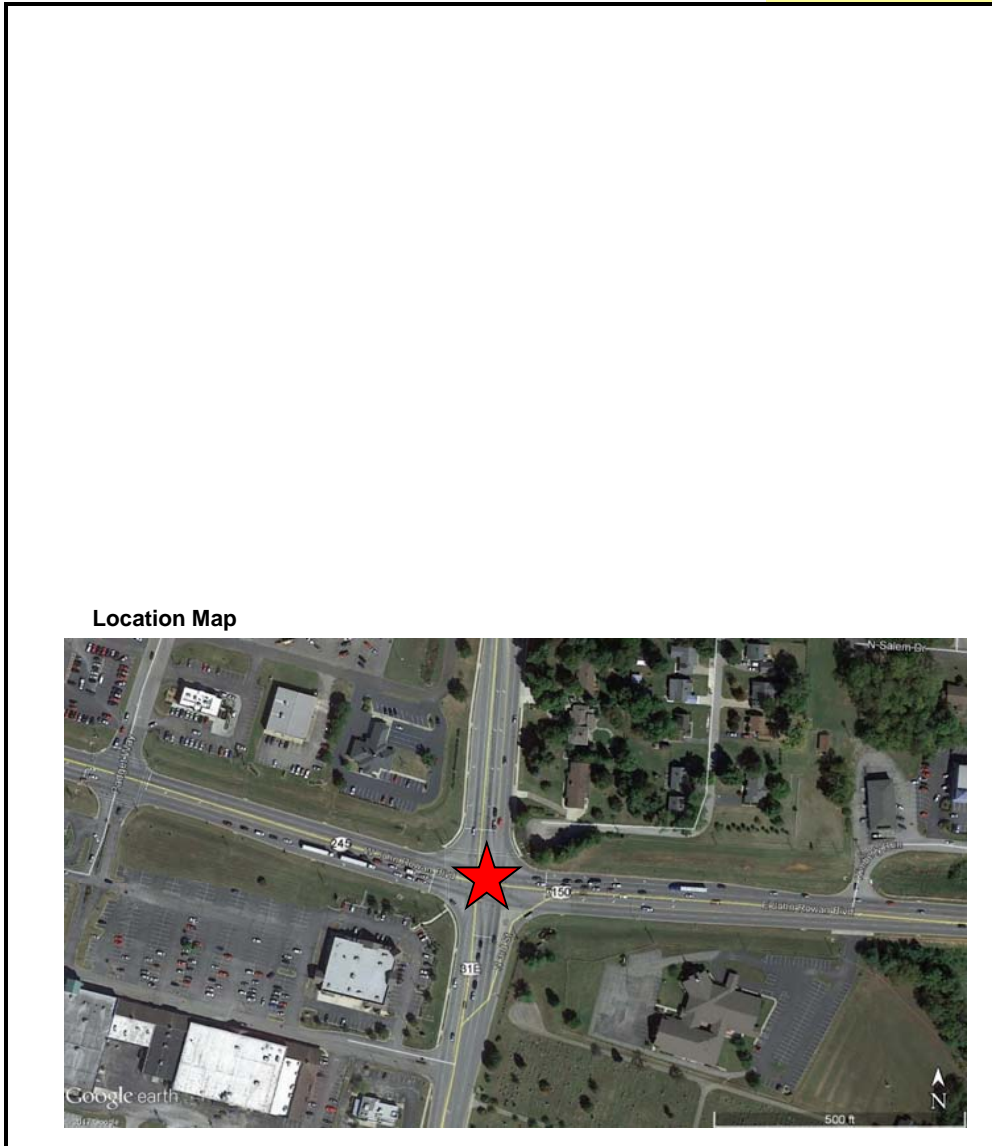


PROJECT: Bardstown Traffic Forecast
 ITEM NUMBER: 4-8809.00
 MARS NUMBER: 0
 REQUEST DATE: 42825
 ANALYST: Cameron Manley
 YEAR: 2025 Design Hour Volumes
 INTERSECTION: US 31E & KY 245

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2025 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

TURN MOVEMENT T2 (2025 Inner Bypass)

***DHV TURN MOVEMENT FORECASTS SHOULD NOT BE USED FOR SIGNAL TIMING OR WARRANT ANALYSIS**



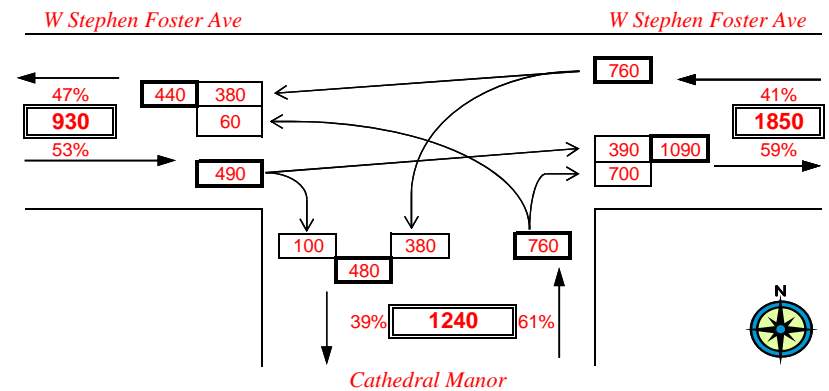
PROJECT: Bardstown Traffic Forecast
 ITEM NUMBER: 4-8809.00
 MARS NUMBER: 0
 REQUEST DATE: 42825
 ANALYST: Cameron Manley
 YEAR: 2025 Design Hour Volumes
 INTERSECTION: US 31E & KY 245

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2017 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

TURN MOVEMENT T1 (2025 Inner Bypass)

***DHV TURN MOVEMENT FORECASTS SHOULD NOT BE USED FOR SIGNAL TIMING OR WARRANT ANALYSIS**

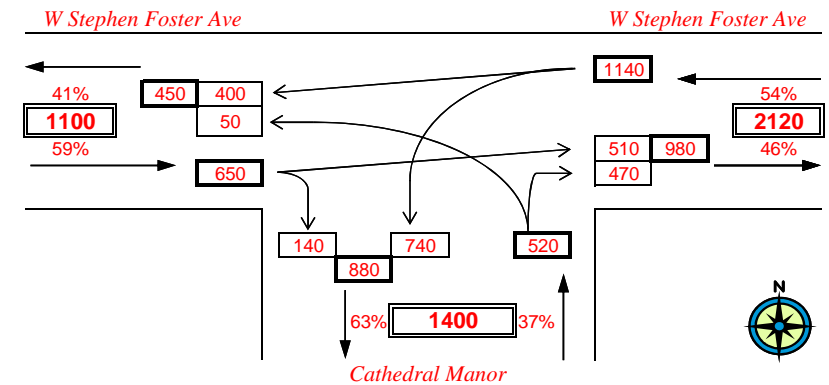
2025 AM Design Hour



Location Map



2025 PM Design Hour

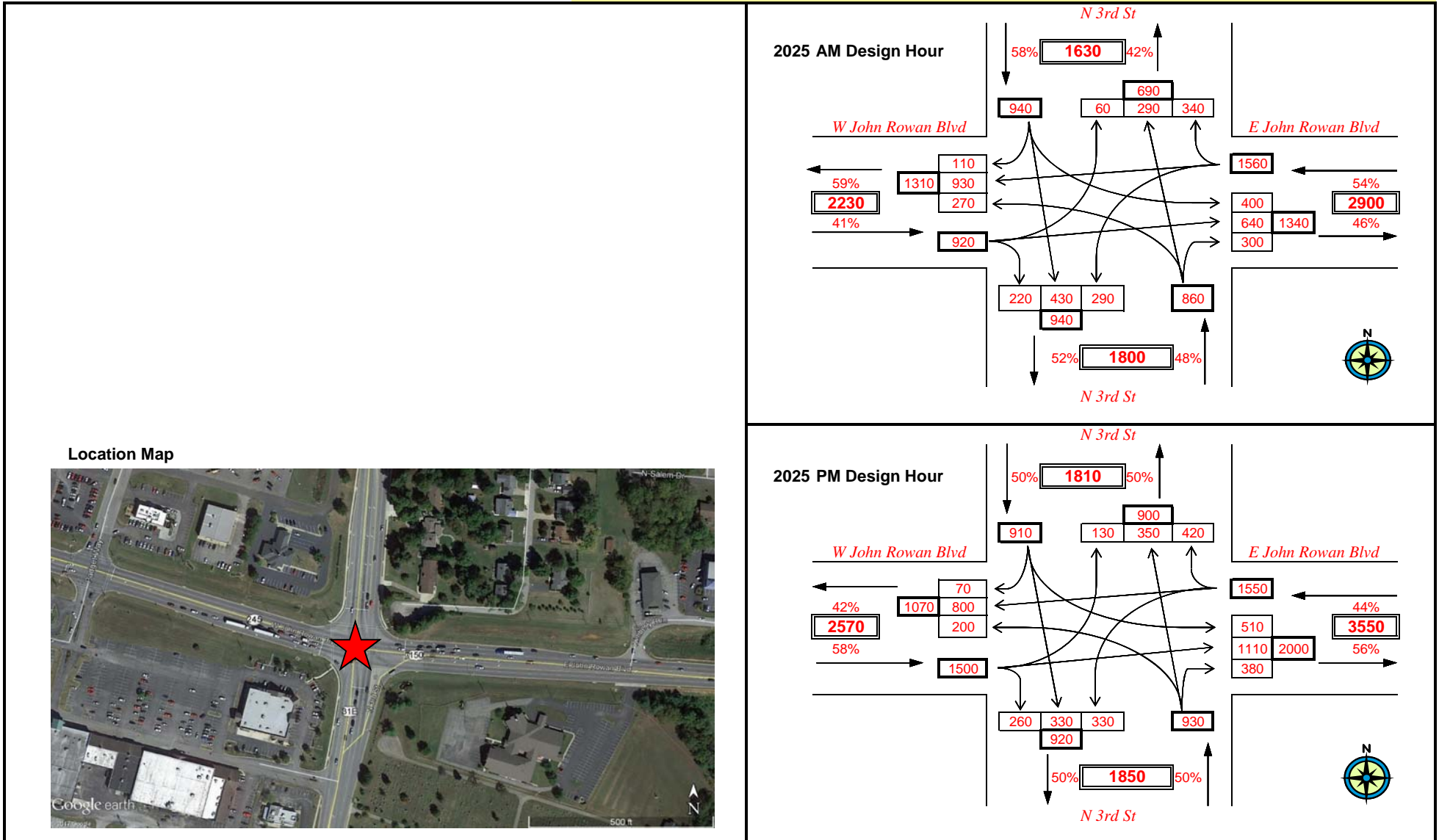


PROJECT: Bardstown Traffic Forecast
 ITEM NUMBER: 4-8809.00
 MARS NUMBER: 0
 REQUEST DATE: 42825
 ANALYST: Cameron Manley
 YEAR: 2025 Design Hour Volumes
 INTERSECTION: US 31E & KY 245

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2025 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

TURN MOVEMENT T2 (2025 Short Outer Bypass)

***DHV TURN MOVEMENT FORECASTS SHOULD NOT BE USED FOR SIGNAL TIMING OR WARRANT ANALYSIS**



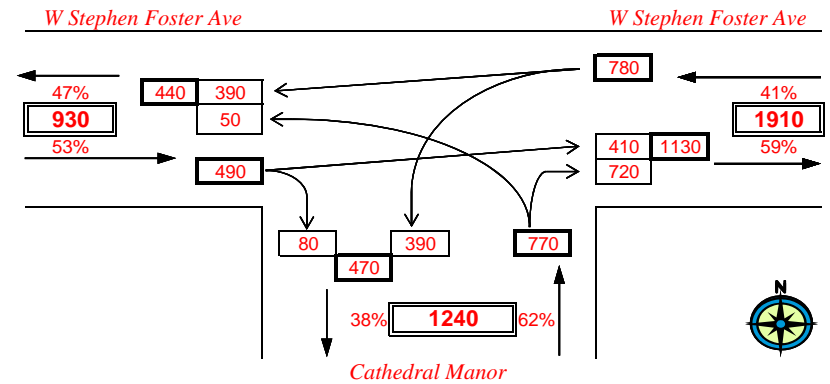
PROJECT: Bardstown Traffic Forecast
 ITEM NUMBER: 4-8809.00
 MARS NUMBER: 0
 REQUEST DATE: 42825
 ANALYST: Cameron Manley
 YEAR: 2025 Design Hour Volumes
 INTERSECTION: US 31E & KY 245

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2025 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

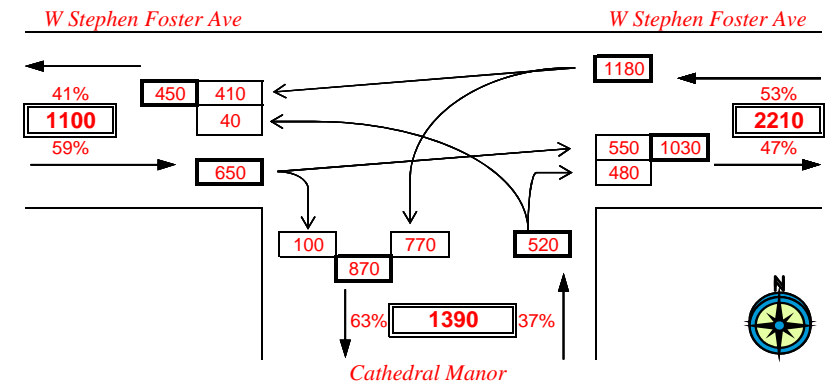
TURN MOVEMENT T1 (2025 Short Outer Bypass)

***DHV TURN MOVEMENT FORECASTS SHOULD NOT BE USED FOR SIGNAL TIMING OR WARRANT ANALYSIS**

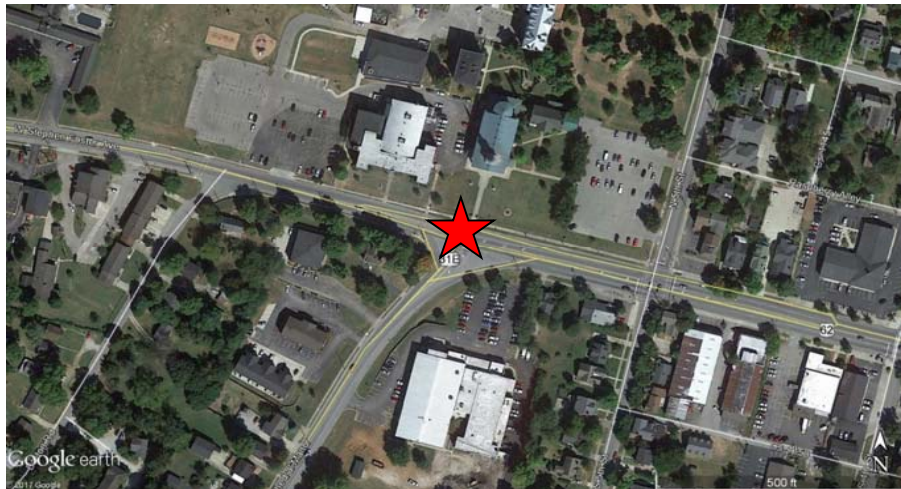
2025 AM Design Hour



2025 PM Design Hour



Location Map

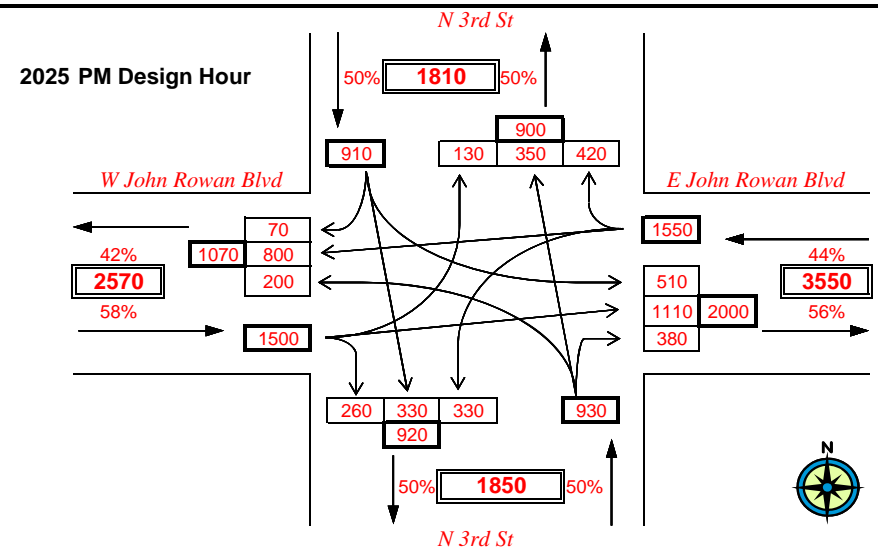
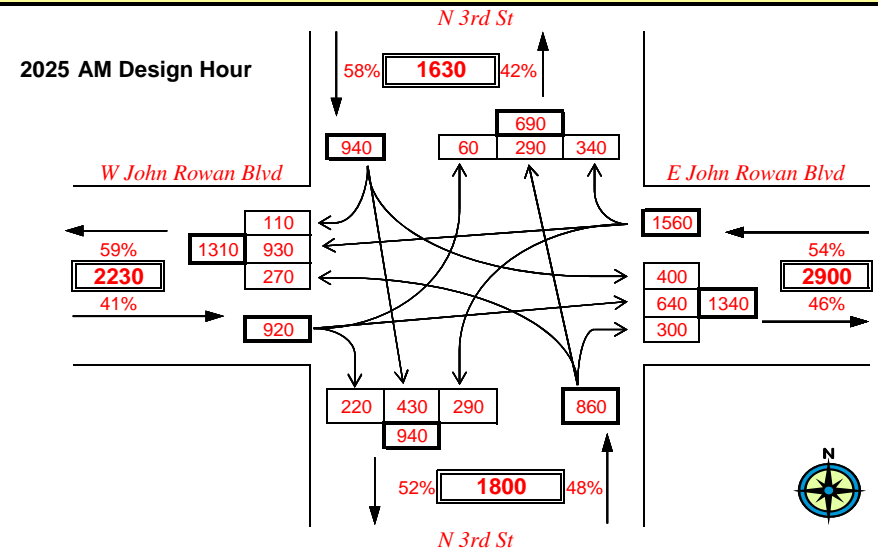


PROJECT: Bardstown Traffic Forecast
 ITEM NUMBER: 4-8809.00
 MARS NUMBER: 0
 REQUEST DATE: 42825
 ANALYST: Cameron Manley
 YEAR: 2025 Design Hour Volumes
 INTERSECTION: US 31E & KY 245

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2025 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

TURN MOVEMENT T2 (2025 Long Outer Bypass)

***DHV TURN MOVEMENT FORECASTS SHOULD NOT BE USED FOR SIGNAL TIMING OR WARRANT ANALYSIS**



Location Map



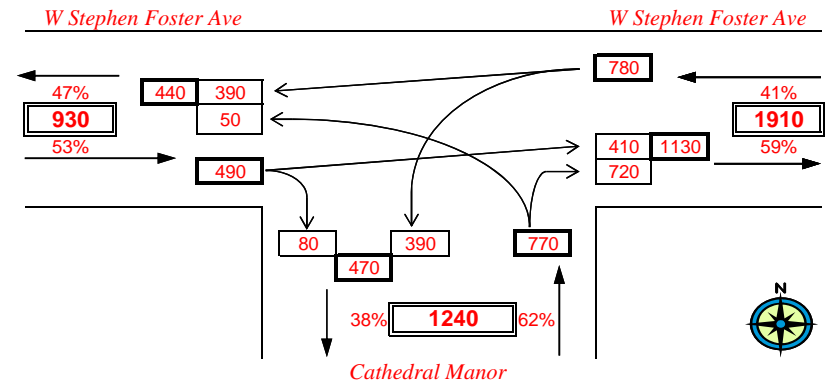
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 ITEM NUMBER: 4-8809.00
 MARS NUMBER: 0
 REQUEST DATE: 42825
 ANALYST: Cameron Manley
 YEAR: 2025 Design Hour Volumes
 INTERSECTION: US 31E & KY 245

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2025 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

TURN MOVEMENT T1 (2025 Long Outer Bypass)

***DHV TURN MOVEMENT FORECASTS SHOULD NOT BE USED FOR SIGNAL TIMING OR WARRANT ANALYSIS**

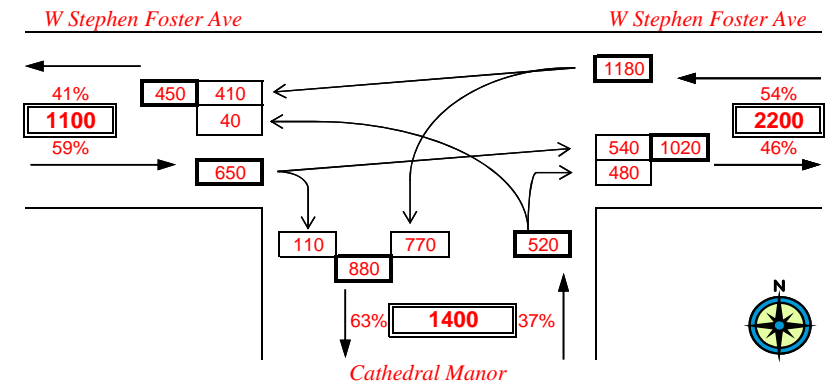
2025 AM Design Hour



Location Map



2025 PM Design Hour



Appendix C:

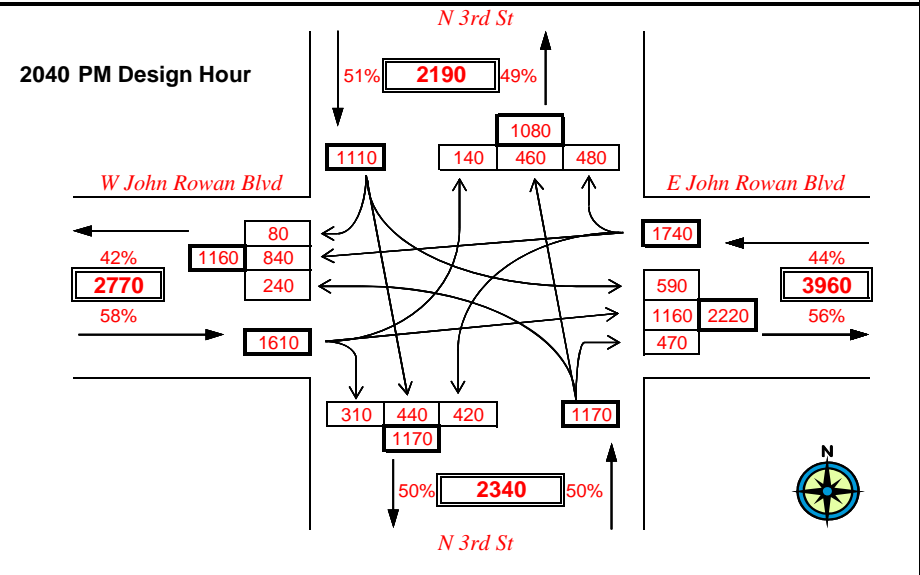
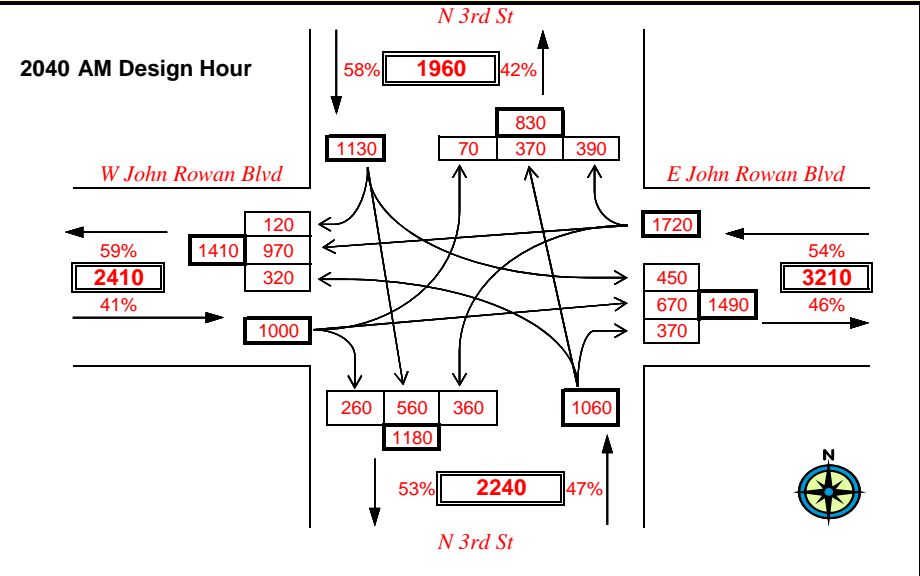
2040 Turning Movement Forecasts

PROJECT: Bardstown Traffic Forecast
 ITEM NUMBER: 4-8809.00
 MARS NUMBER: 0
 REQUEST DATE: 42825
 ANALYST: Cameron Manley
 YEAR: 2040 Design Hour Volumes
 INTERSECTION: US 31E & KY 245

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2040 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

TURN MOVEMENT T2 (2040 No-Build)

***DHV TURN MOVEMENT FORECASTS SHOULD NOT BE USED FOR SIGNAL TIMING OR WARRANT ANALYSIS**



Location Map



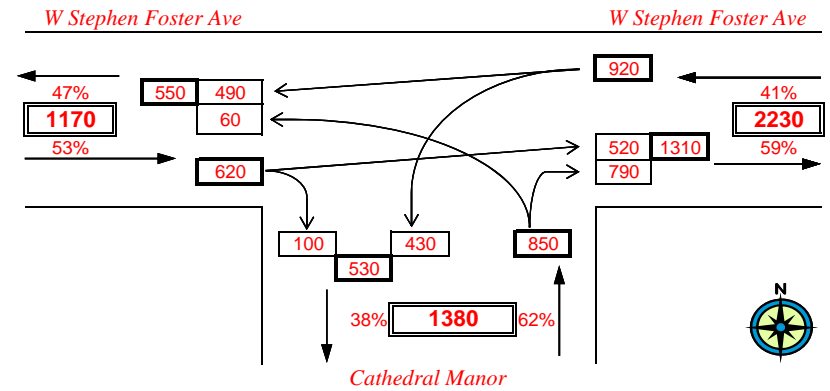
PROJECT: Bardstown Traffic Forecast
 ITEM NUMBER: 4-8809.00
 MARS NUMBER: 0
 REQUEST DATE: 42825
 ANALYST: Cameron Manley
 YEAR: 2040 Design Hour Volumes
 INTERSECTION: US 31E & KY 245

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2025 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

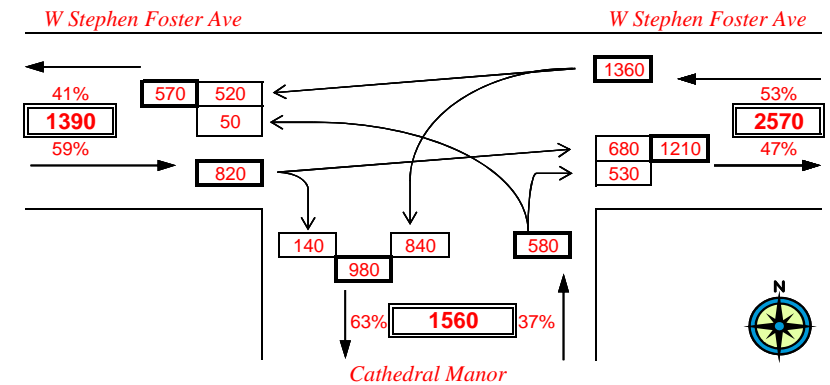
TURN MOVEMENT T1 (2040 No-Build)

***DHV TURN MOVEMENT FORECASTS SHOULD NOT BE USED FOR SIGNAL TIMING OR WARRANT ANALYSIS**

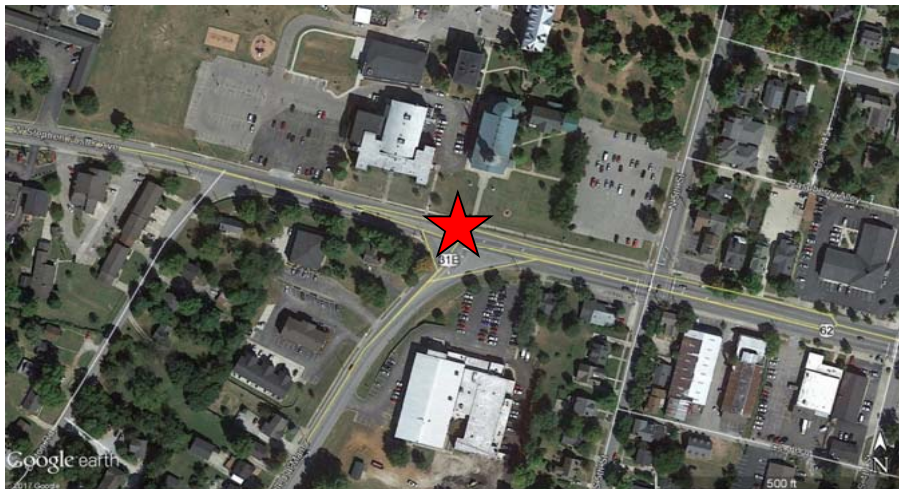
2040 AM Design Hour



2040 PM Design Hour



Location Map

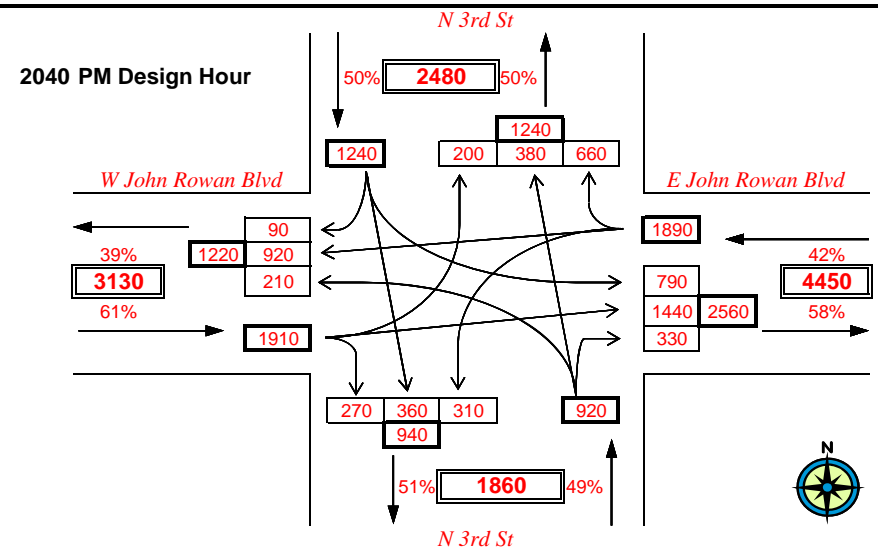
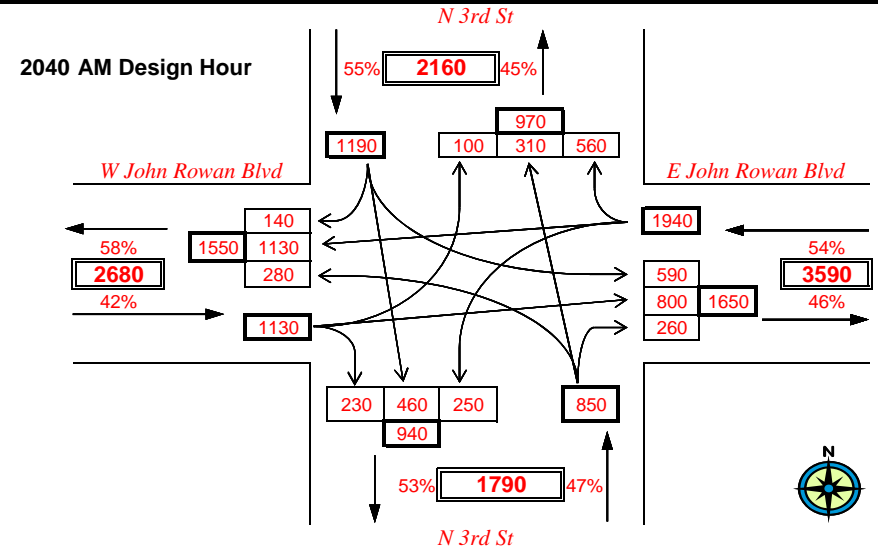


PROJECT: Bardstown Traffic Forecast
 ITEM NUMBER: 4-8809.00
 MARS NUMBER: 0
 REQUEST DATE: 42825
 ANALYST: Cameron Manley
 YEAR: 2040 Design Hour Volumes
 INTERSECTION: US 31E & KY 245

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2040 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

TURN MOVEMENT T2 (2040 Inner Bypass)

***DHV TURN MOVEMENT FORECASTS SHOULD NOT BE USED FOR SIGNAL TIMING OR WARRANT ANALYSIS**



Location Map



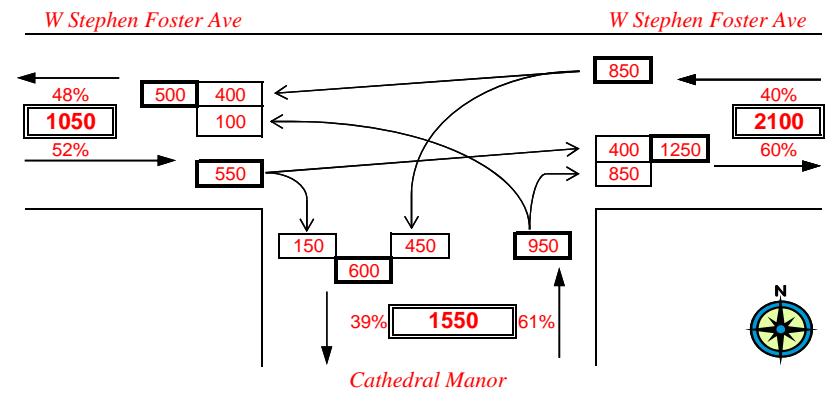
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 ITEM NUMBER: 4-8809.00
 MARS NUMBER: 0
 REQUEST DATE: 42825
 ANALYST: Cameron Manley
 YEAR: 2040 Design Hour Volumes
 INTERSECTION: US 31E & KY 245

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2025 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

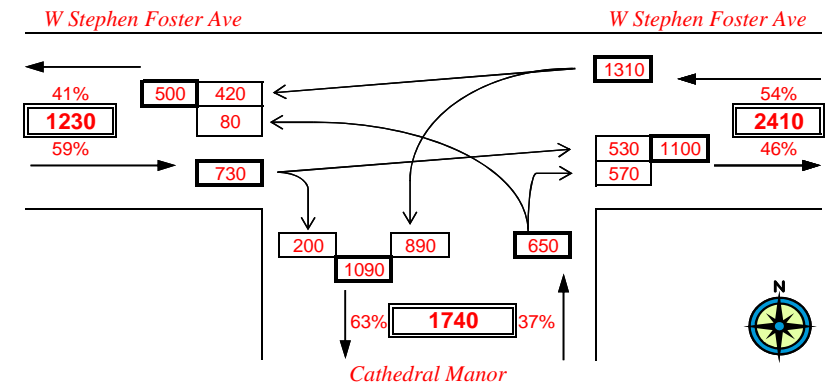
TURN MOVEMENT T1 (2040 Inner Bypass)

***DHV TURN MOVEMENT FORECASTS SHOULD NOT BE USED FOR SIGNAL TIMING OR WARRANT ANALYSIS**

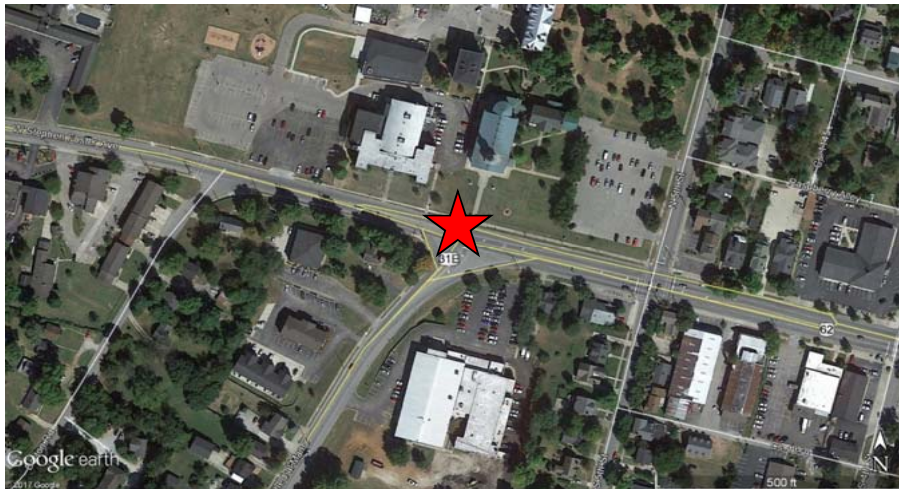
2040 AM Design Hour



2040 PM Design Hour



Location Map

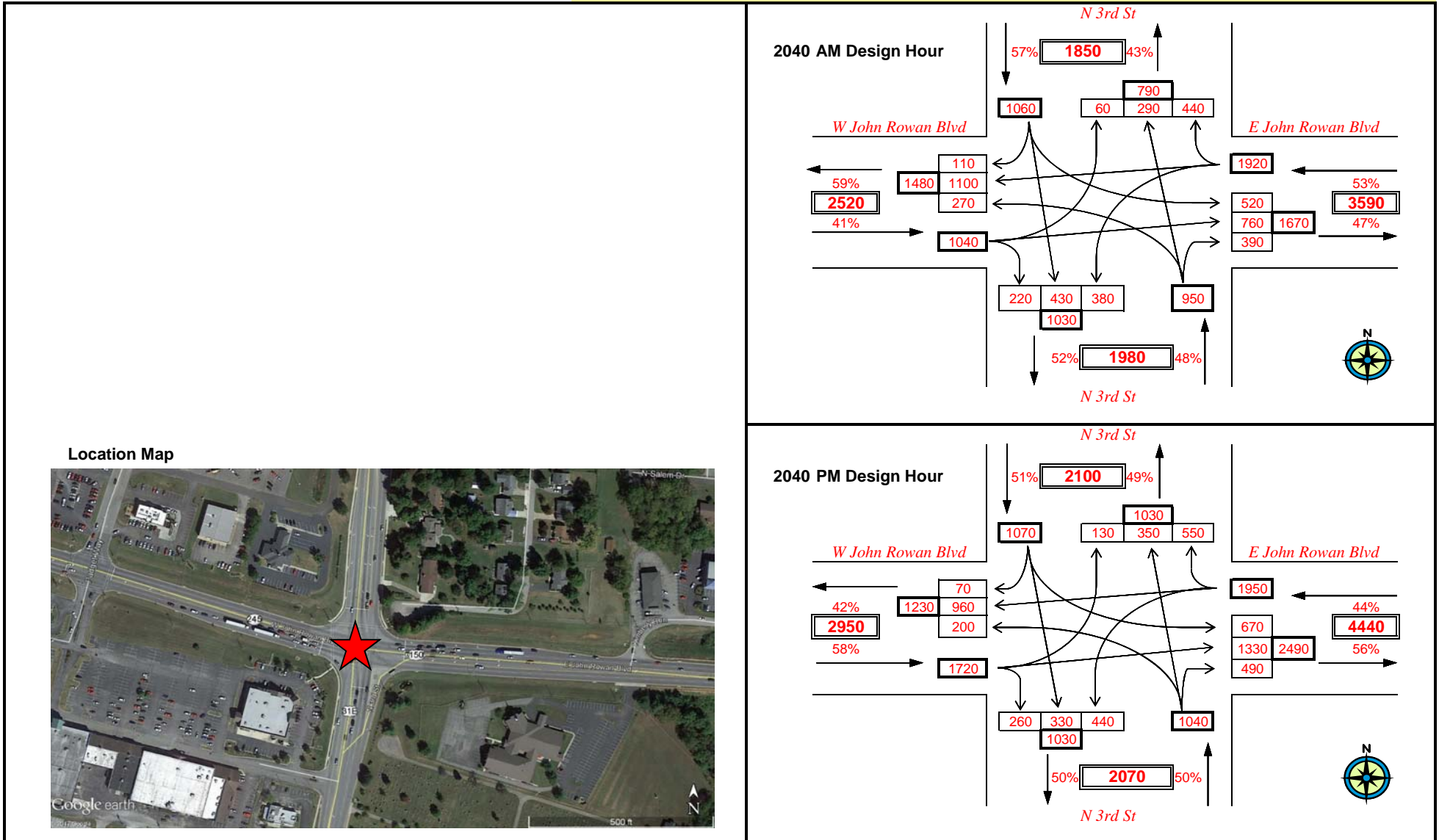


PROJECT: Bardstown Traffic Forecast
 ITEM NUMBER: 4-8809.00
 MARS NUMBER: 0
 REQUEST DATE: 42825
 ANALYST: Cameron Manley
 YEAR: 2040 Design Hour Volumes
 INTERSECTION: US 31E & KY 245

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2040 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

TURN MOVEMENT T2 (2040 Short Outer Bypass)

***DHV TURN MOVEMENT FORECASTS SHOULD NOT BE USED FOR SIGNAL TIMING OR WARRANT ANALYSIS**



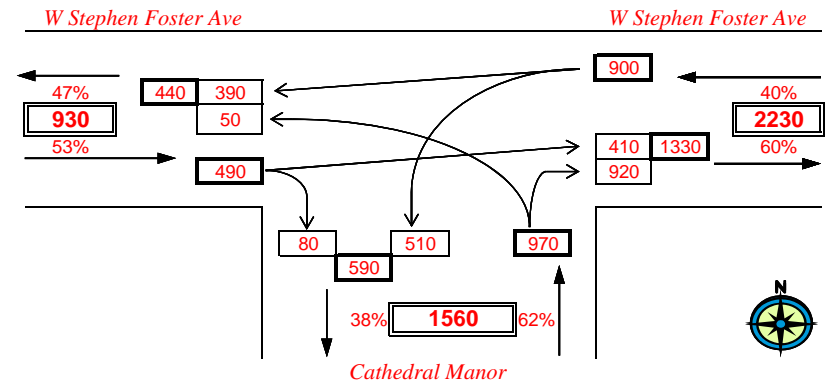
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 ITEM NUMBER: 4-8809.00
 MARS NUMBER: 0
 REQUEST DATE: 42825
 ANALYST: Cameron Manley
 YEAR: 2040 Design Hour Volumes
 INTERSECTION: US 31E & KY 245

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2025 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

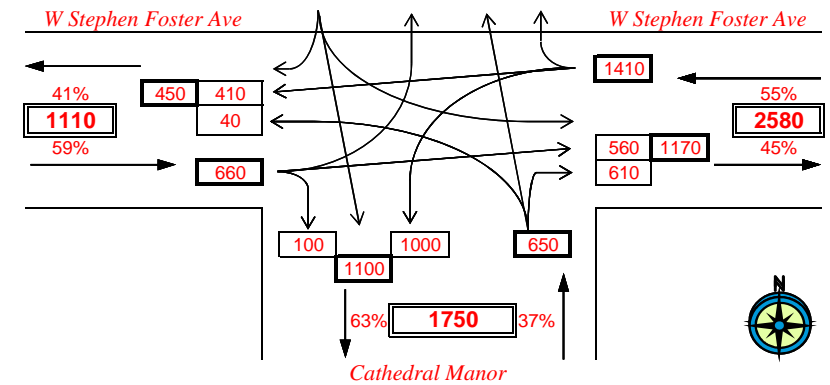
TURN MOVEMENT T1 (2040 Short Outer Bypass)

***DHV TURN MOVEMENT FORECASTS SHOULD NOT BE USED FOR SIGNAL TIMING OR WARRANT ANALYSIS**

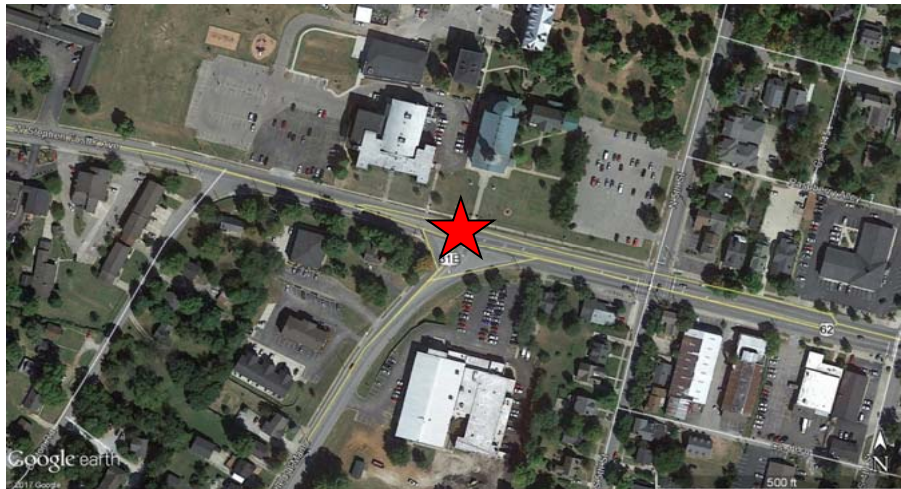
2040 AM Design Hour



2040 PM Design Hour



Location Map

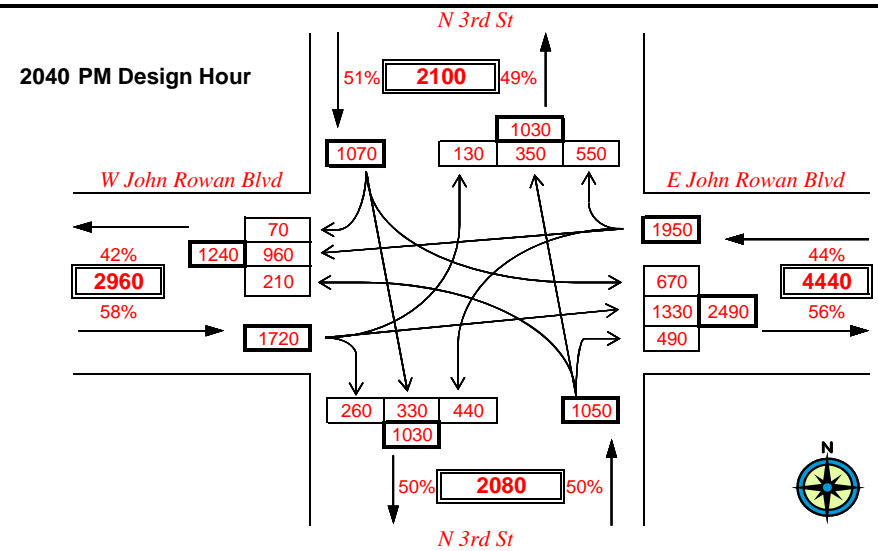
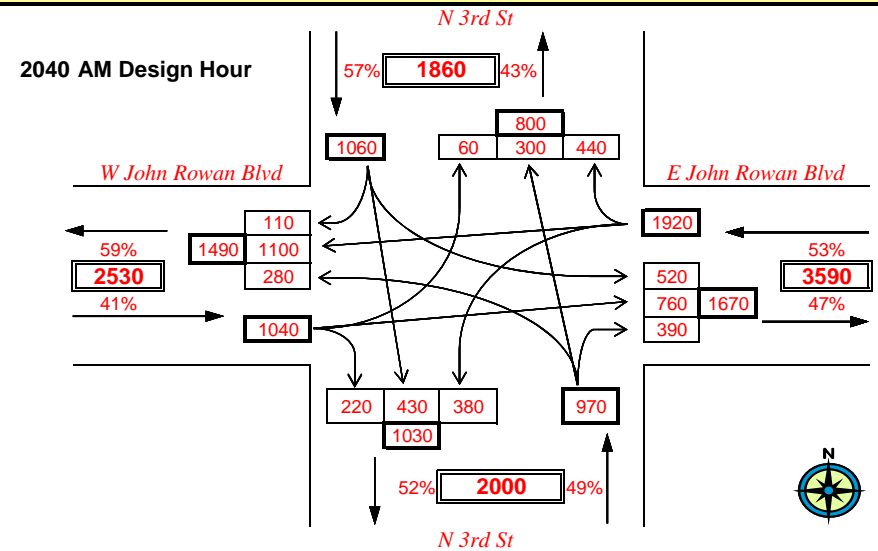


PROJECT: Bardstown Traffic Forecast
 ITEM NUMBER: 4-8809.00
 MARS NUMBER: 0
 REQUEST DATE: 42825
 ANALYST: Cameron Manley
 YEAR: 2040 Design Hour Volumes
 INTERSECTION: US 31E & KY 245

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2040 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

TURN MOVEMENT T2 (2040 Long Outer Bypass)

***DHV TURN MOVEMENT FORECASTS SHOULD NOT BE USED FOR SIGNAL TIMING OR WARRANT ANALYSIS**



Location Map



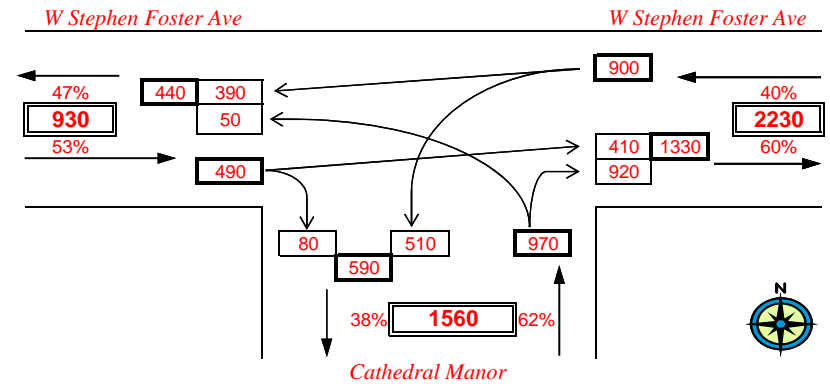
PROJECT: Bardstown Traffic Forecast
 ITEM NUMBER: 4-8809.00
 MARS NUMBER: 0
 REQUEST DATE: 42825
 ANALYST: Cameron Manley
 YEAR: 2040 Design Hour Volumes
 INTERSECTION: US 31E & KY 245

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2025 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

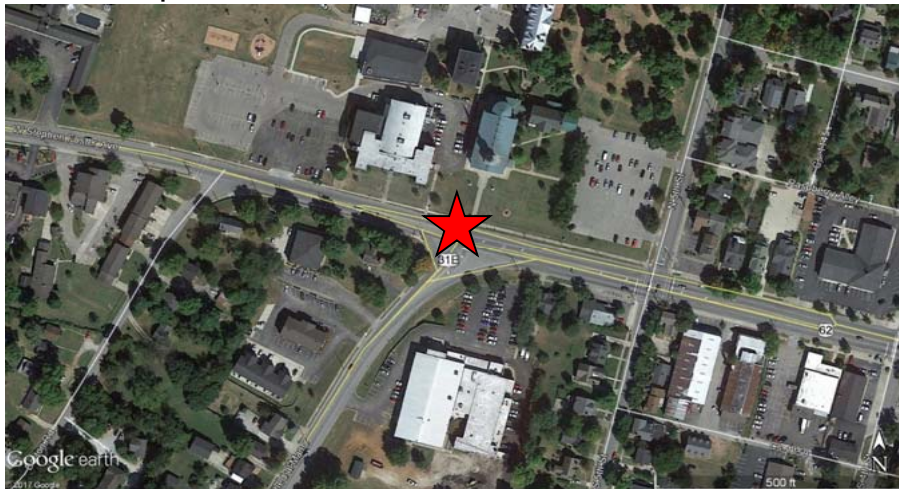
TURN MOVEMENT T1 (2040 Long Outer Bypass)

***DHV TURN MOVEMENT FORECASTS SHOULD NOT BE USED FOR SIGNAL TIMING OR WARRANT ANALYSIS**

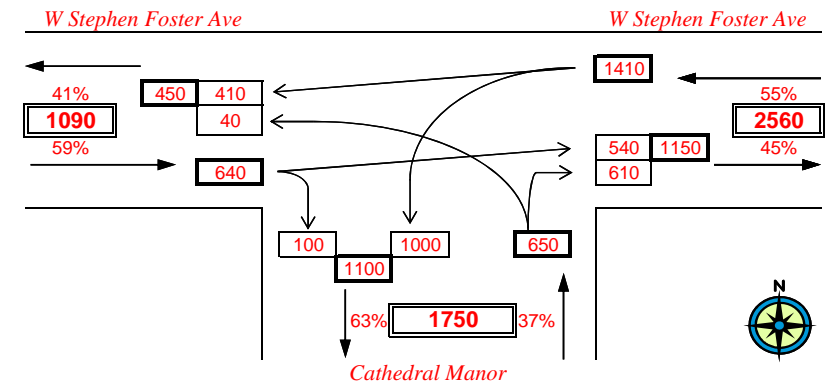
2040 AM Design Hour



Location Map



2040 PM Design Hour



Appendix D:

Traffic Data for Pavement Design

TRAFFIC DATA REQUEST FORM

FOR PAVEMENT DESIGN

DESIGNER INPUTS

County: Nelson Project Item Number: 4-8809.00
Funding Code(s): _____
Route: Bardstown Bypass Construction Year: 2025
Begin Milepoint: _____ End Milepoint: _____
Total Number of Lanes: 2 Letting Date: _____
Project Description: Inner Bypass for Bardstown
Designer Comments: _____

Date Needed: _____ Priority: _____
Submitted By: _____ Date: _____

TRAFFIC FORECASTER INPUTS

Functional Class: _____
2-Way Avg. Annual Daily Traffic: 3700
2-Way Avg. Annual Daily Truck Traffic: 600
Construction Year Truck Percentage: 14.90%
20 Year ESALs: _____
Truck Traffic Growth Rate (Linear): 2.50%
% Trucks in Design Direction: 50.40%
% Trucks in Des Lane of Des Direction: 100%
Forecaster Comments: The 2-Way AADT is for the future year of 2025, as is the 2-Way AADT for trucks. The construction year truck percentage is 2025.
Forecast Done By: Anne Warnick, PE Date: 7/26/2017

TRAFFIC DATA REQUEST FORM

FOR PAVEMENT DESIGN

DESIGNER INPUTS

County: Nelson Project Item Number: 4-8809.00
Funding Code(s): _____
Route: Bardstown Bypass Construction Year: 2025
Begin Milepoint: _____ End Milepoint: _____
Total Number of Lanes: 2 Letting Date: _____
Project Description: Short Outer Bypass for Bardstown
Designer Comments: _____

Date Needed: _____ Priority: _____
Submitted By: _____ Date: _____

TRAFFIC FORECASTER INPUTS

Functional Class: _____
2-Way Avg. Annual Daily Traffic: 2300
2-Way Avg. Annual Daily Truck Traffic: 300
Construction Year Truck Percentage: 13.00%
20 Year ESALs: _____
Truck Traffic Growth Rate (Linear): 2.00%
% Trucks in Design Direction: 49.90%
% Trucks in Des Lane of Des Direction: 100%
Forecaster Comments: The 2-Way AADT is for the future year of 2040, as is the 2-Way AADT for trucks. The construction year truck percentage is 2025.
Forecast Done By: Anne Warnick, PE Date: 7/26/2017

TRAFFIC DATA REQUEST FORM

FOR PAVEMENT DESIGN

DESIGNER INPUTS

County: Nelson Project Item Number: 4-8809.00
Funding Code(s): _____
Route: Bardstown Bypass Construction Year: 2025
Begin Milepoint: _____ End Milepoint: _____
Total Number of Lanes: 2 Letting Date: _____
Project Description: Long Outer Bypass for Bardstown
Designer Comments: _____

Date Needed: _____ Priority: _____
Submitted By: _____ Date: _____

TRAFFIC FORECASTER INPUTS

Functional Class: _____
2-Way Avg. Annual Daily Traffic: 3100
2-Way Avg. Annual Daily Truck Traffic: 400
Construction Year Truck Percentage: 14.40%
20 Year ESALs: _____
Truck Traffic Growth Rate (Linear): 2.00%
% Trucks in Design Direction: 50.10%
% Trucks in Des Lane of Des Direction: 100%
Forecaster Comments: The 2-Way AADT is for the future year of 2025, as is the 2-Way AADT for trucks. The construction year truck percentage is 2025.
Forecast Done By: Anne Warnick, PE Date: 7/26/2017

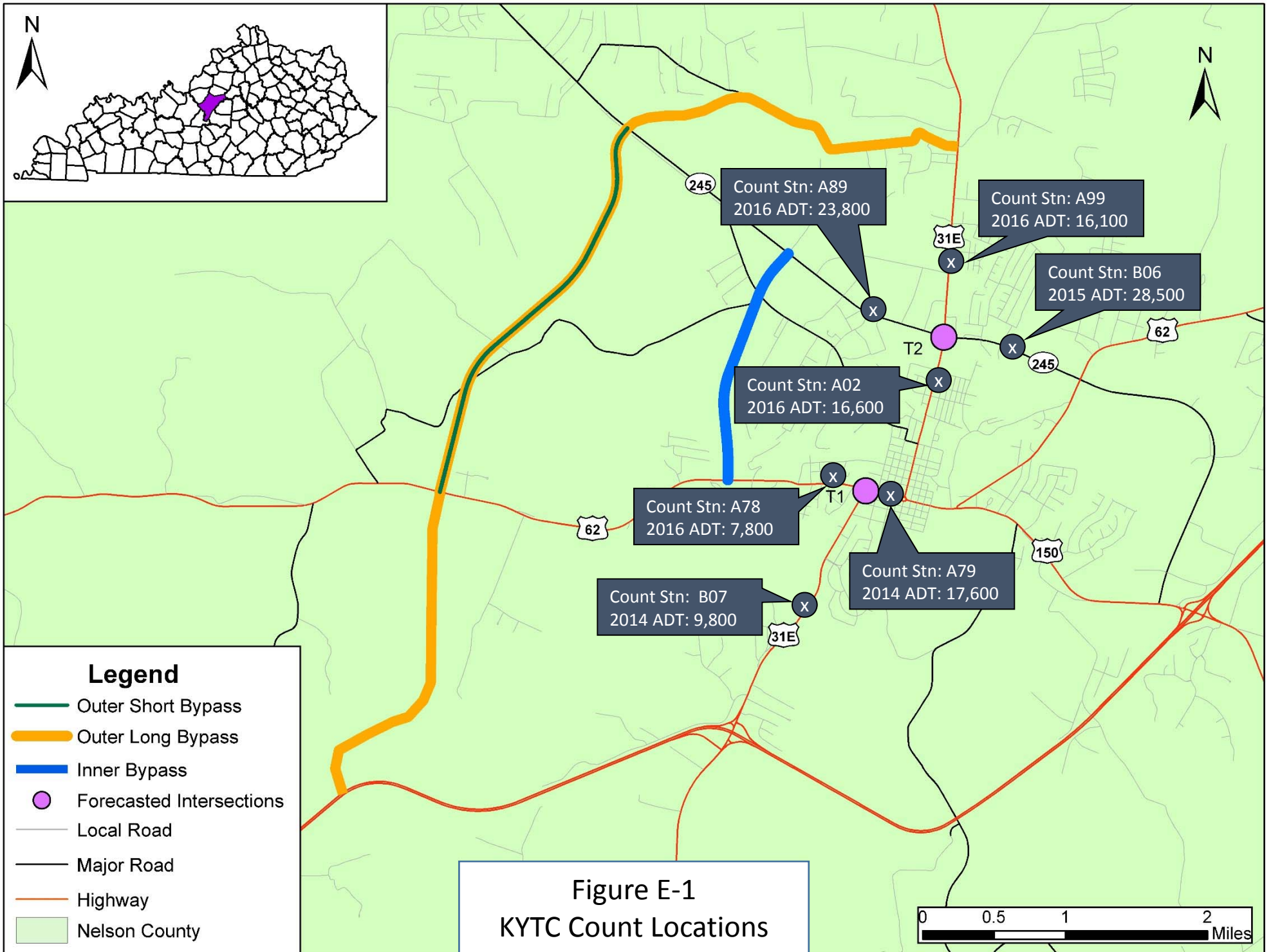
Appendix E:

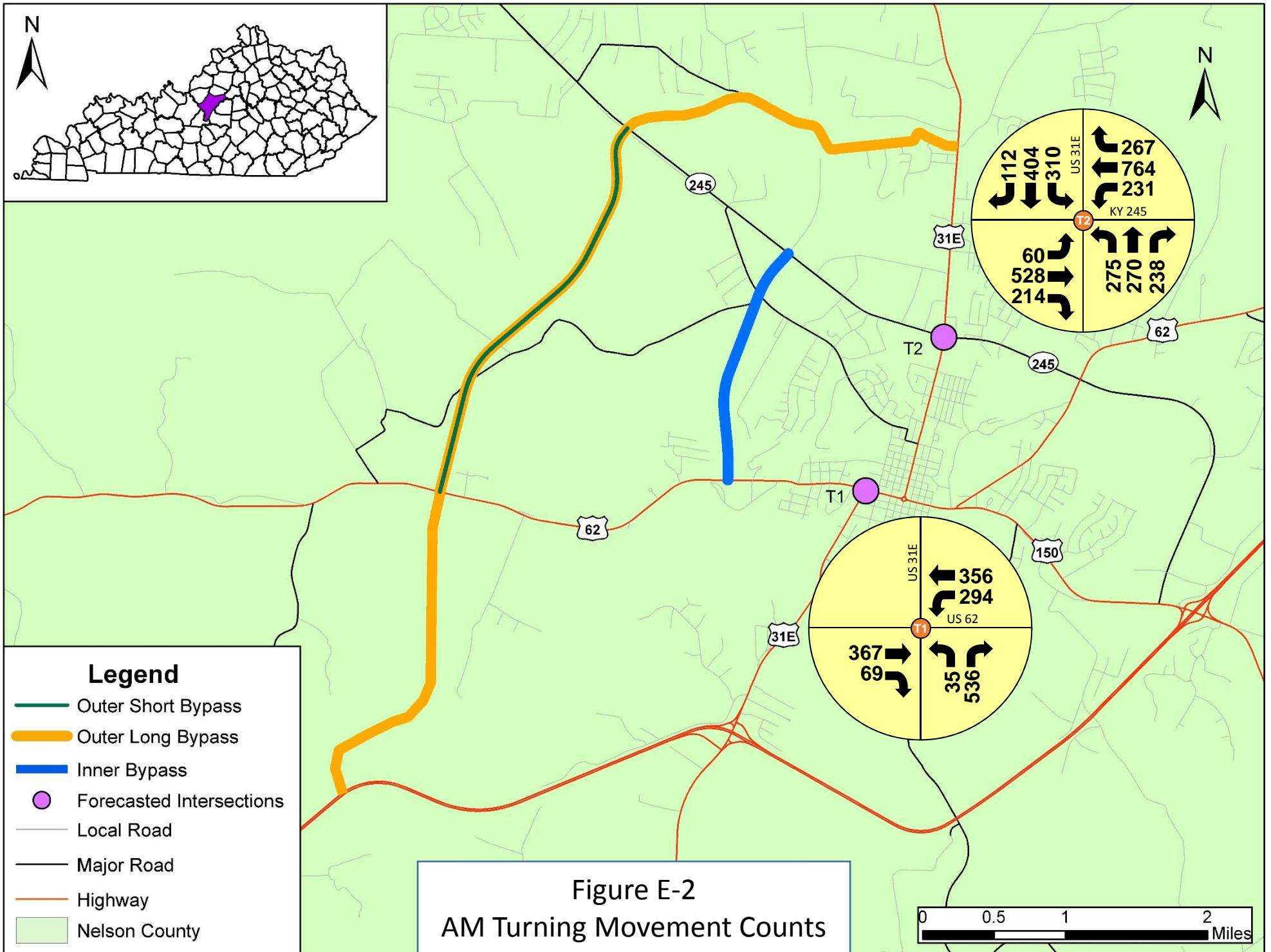
Additional Figures

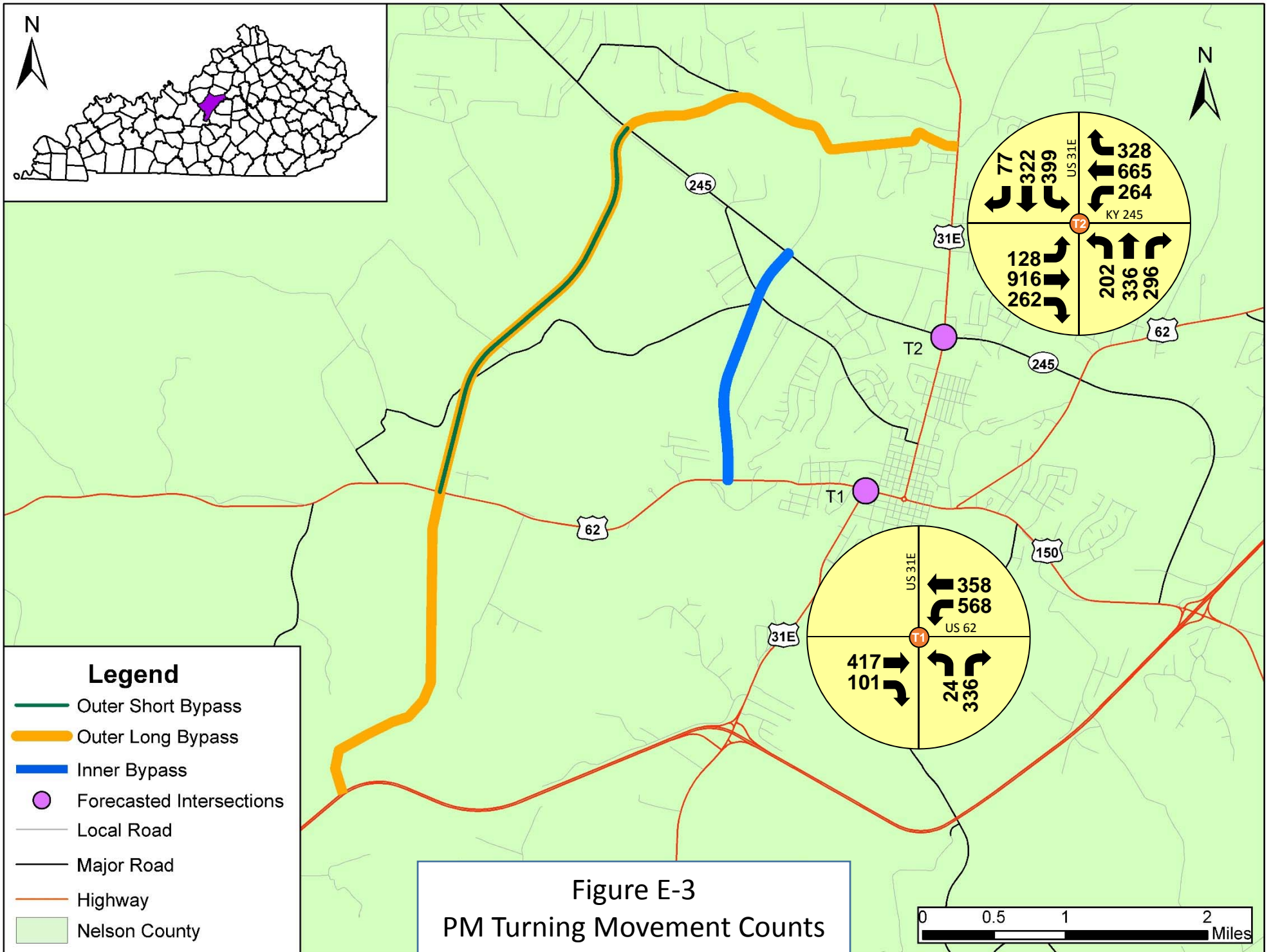
Figure E-1: KYTC Count Locations

Figure E-2: AM Turning Movement Counts

Figure E-3: PM Turning Movement Counts







Appendix F:

Growth Rates

Appendix F: CTS Data, Trend Line Projections & Growth Rates

base year	future year
2017	2040

County	Route	Station	Beginning Intersection	Ending Intersection	BEG MP	END MP	MID MP	LENGTH	FC	Year	Count	2017 trends	2040 trends	TLA GR/	2030 TLA GR	Counts GR	
														LAST CY GR	ADT / Last CY		
Nelson	US 31E	A02	Beall Avenue	Bardstown Bypass	14.612	15.4	15.006	0.788	16	2016	16650	2 yr	15600	3400	-6.41%		-6.46%
										2015	17800	3 yr	16400	8400	-2.87%		0.85%
										2014	17650	4 yr	17100	15800	-0.34%		1.46%
										2012	17146	5 yr	17600	21400	0.85%		1.39%
										2007	16000	6 yr	17300	17300	0.00%		-12.57%
										2006	18300	7 yr	16900	14200	-0.75%		-10.29%
										2005	20400	8 yr	16500	12300	-1.27%		-5.56%
										2004	21600	9 yr	16400	11800	-1.42%		0.47%
										2001	21300	10 yr	17000	13900	-0.87%		2.97%
										1996	18400	11 yr	17300	15200	-0.56%		2.79%
										1995	17900	12 yr	17400	15400	-0.53%		-2.65%
										1992	19400	13 yr	17500	16000	-0.39%		1.23%
										1989	18700		16900	13800	-1.21%	12900	-2.20%
													-1.18%	-0.88%	-0.43%	15300	10100
Nelson	US 62	A48	US 31E	US 150	14.274	14.633	14.4535	0.359	16	2014	15763	2 yr	15800	16300	0.14%		0.13%
										2011	15700	3 yr	16600	22900	1.41%		2.69%
										2008	14500	4 yr	17200	27500	2.06%		3.18%
										2005	13200	5 yr	16300	21500	1.21%		-1.64%
										2001	14100	6 yr	14800	14400	-0.12%		-6.95%
										1998	17500	7 yr	14900	14500	-0.12%		4.81%
										1995	15200	8 yr	15200	15500	0.09%		2.54%
										1992	14100	9 yr	15000	15100	0.03%		-2.69%
										1989	15300		15700	18500	0.59%	17300	0.26%
													0.42%	0.72%	0.12%	16100	16700
Nelson	US 62	A78	Elm Grove St	US 31E	13.921	14.274	14.0975	0.353	7	2016	7808	2 yr	7700	6100	-1.01%		-1.01%
										2013	8049	3 yr	7800	6800	-0.59%		-0.13%
										2010	8080	4 yr	8300	11400	1.39%		6.02%
										2007	6780	5 yr	8000	8800	0.42%		-5.29%
										2004	7980	6 yr	7600	6700	-0.55%		-4.18%
										2001	9070	7 yr	7400	5800	-1.05%		-1.49%
										1997	9630	8 yr	7400	5800	-1.05%		0.21%
										1992	9530		7700	7300	-0.35%	6800	-0.84%
													-0.56%	-0.23%	-0.83%	6400	6300
										Nelson	US 31E	A79	US 62W	US 62E	13.972	14.195	14.0835
2013	17055	3 yr	18600	28500	1.87%		0.47%										
2012	16976	4 yr	17300	16900	-0.10%		-4.09%										
2011	17700	5 yr	16200	11100	-1.63%		-5.85%										
2010	18800	6 yr	16100	10600	-1.80%		0.53%										
2009	18700	7 yr	17300	16100	-0.31%		13.33%										
2008	16500	8 yr	17700	18400	0.17%		-1.79%										
2007	16800	9 yr	17400	17000	-0.10%		-7.18%										
2006	18100		17500	20000	0.18%	17800	-0.16%										
			0.07%	0.58%	-0.33%	16200	16900										

