KY 1065 (Outer Loop) Corridor Study

3rd Street Road to National Turnpike

Traffic Forecast Report and Model Amendment Report

Jefferson County

Prepared for:

Kentucky Transportation Cabinet

Prepared by:

Qk4, Inc.

December 4, 2018

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Tables

Figures

1.0 Introduction

As part of Qk4's Statewide Planning Services Agreement, the Kentucky Transportation Cabinet (KYTC) requested Qk4 coordinate the travel demand modeling and perform traffic analysis as part of the KY 1065 (Outer Loop) Corridor Study in Jefferson County, Kentucky. The purpose of the study is to improve safety, access, drainage, freight movement, and mobility for all modes of travel on Outer Loop. Improvements to Outer Loop between KY 907 (3rd Street Road) and KY 1020 (National Turnpike) are not funded in the current Highway Plan.

In the study area, Outer Loop begins at 3rd Street Road at MP 0.000 east to National Turnpike (MP 2.514). The KYTC Modal Branch requested any traffic simulations extend east of National Turnpike to encompass Grade Lane. In addition, further east, Air Commerce Drive intersection was assessed for existing, no build, and build traffic; however, improvements at either location were outside the scope of this study.

Outer Loop is classified as a Minor Arterial (Urban). The corridor includes major intersections with 3rd Street Road, New Cut Road, and National Turnpike and a CSX rail crossing at the western end of the study area. **Figure 1** shows the study corridor.

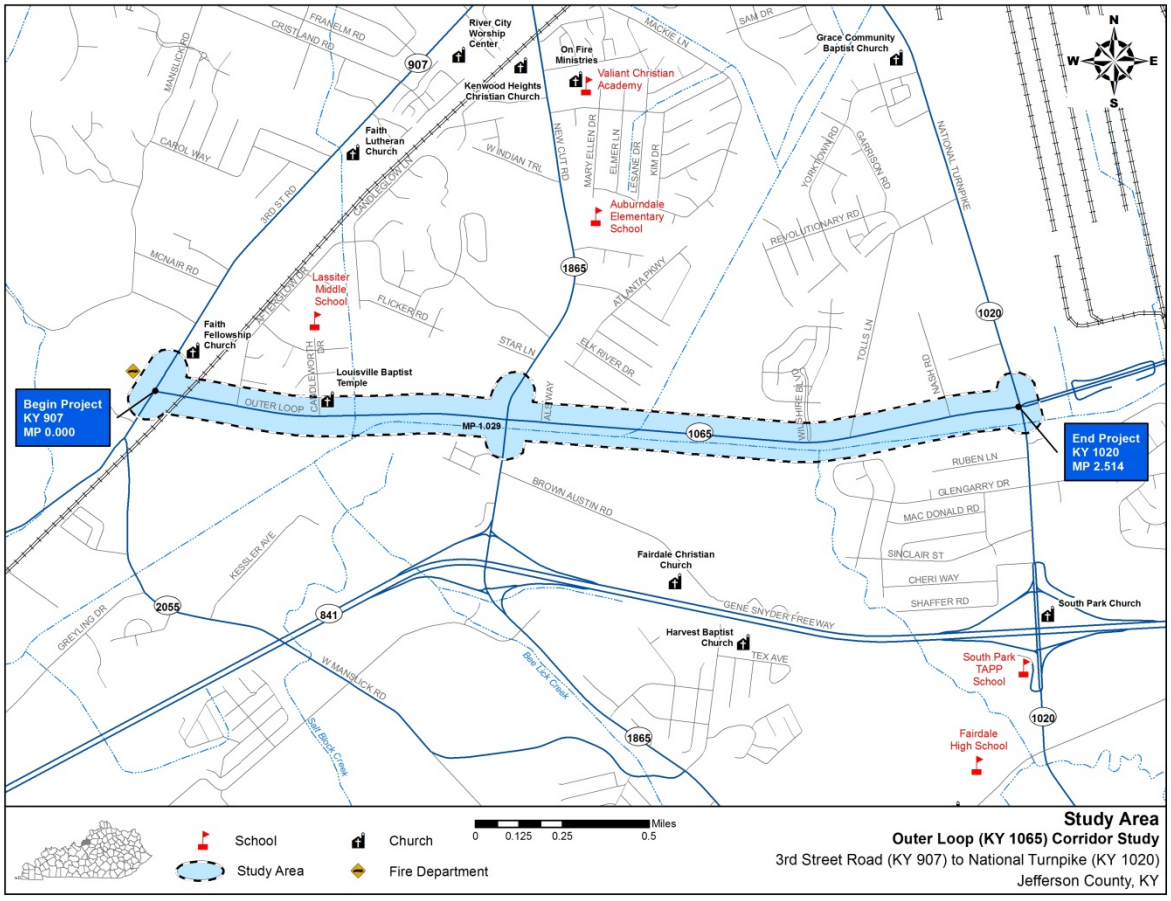


Figure 1: Study Area

Outer Loop is two lanes wide with no bicycle facilities and limited pedestrian facilities. 3rd Street Road, Walmart west entrance, New Cut Road, and National Turnpike are signalized intersections. All minor approaches are stop controlled.

2.0 Traffic Data

Traffic counts were collected on August 17, 2017 using Miovision cameras stationed at various locations along the corridor.

2.1 Turning Movements and Tube Counts

Five 24-hour turning movement (TM) counts (via video recording software Miovision) were conducted for the following intersections **(Figure 2)**. Prior Outer Loop Miovision counts were used for Grade Lane (TM 2 March 23, 2017), National Turnpike (TM 3 April 21, 2016), and New Cut Road (TM 4 January 28, 2016). These locations have been renumbered since the original Scope of Work document.

- Outer Loop/Air Commerce Drive (TM 1)
- Outer Loop/ Walmart East Entrance (TM 5)
- Outer Loop/ Walmart West Entrance (TM 6)
- Outer Loop/3rd Street Road (KY 907) (TM 7)
- New Cut Road/Walmart/Kmart Entrance (TM 8)

Figure 2: Turn Movement Count Locations

Counts were collected in 15-minute increments and include cars, trucks, bicycles, and pedestrians. Within these time periods, the highest consecutive 60-minute periods were identified during the AM and PM peak hours. Directional counts were used to establish average daily traffic (ADT) volumes along the corridor and identify the AM and PM peak hours. The AM peak hour was found to be 7:00-8:00 AM, and the PM peak hour was 5:00-6:00 PM. Prior counts were forecasted to 2017 using prior count history. The 2017 TMs are included in **Appendix A**. **Figure 3** presents 2017 traffic volumes associated turn movements and traffic operations.

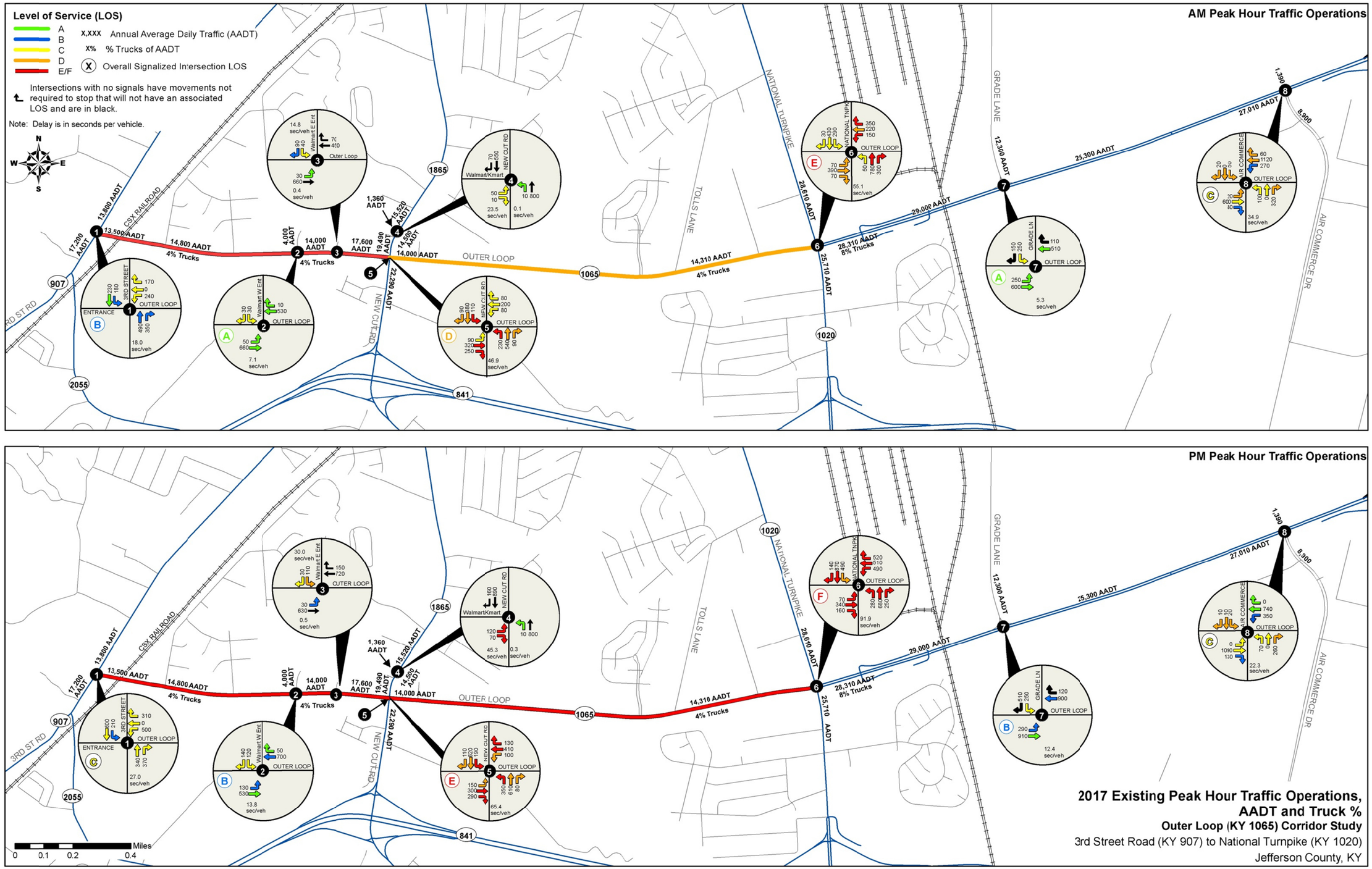


Figure 3: 2017 Traffic and Levels of Service

2.2 Train Counts

Trains were not counted as part of this corridor study. According to data from the U.S. Department of Transportation Crossing Inventory Form, as of June 22, 2017, from 6:00 AM to 6:00 PM, one train uses the crossing of Outer Loop just west of 3rd Street Road. Likewise, from 6:00 PM to 6:00 AM, one train crosses Outer Loop. Both have a maximum speed of 40 mph. One train was observed outside the peak PM peak hour. The westbound backup was observed east of Afterglow Drive on Outer Loop.

3.0 VISSIM Calibration

3.1 Travel Times

Utilizing "Connected" Miovision technology, existing travel times were captured via cell phone and other mobile devices during the 24 hour period at the locations shown in **Figure 4,** from Air Commerce Drive to 3rd Street Road. AM and PM peak hour travel times were extracted from the data, and the traffic simulations were adjusted accordingly. The sample size appears to be nearly 12%. Shown in **Table 1**, travel times were between five and six minutes in the AM in both directions. PM peak hour travel times ranged from over seven to almost nine minutes.

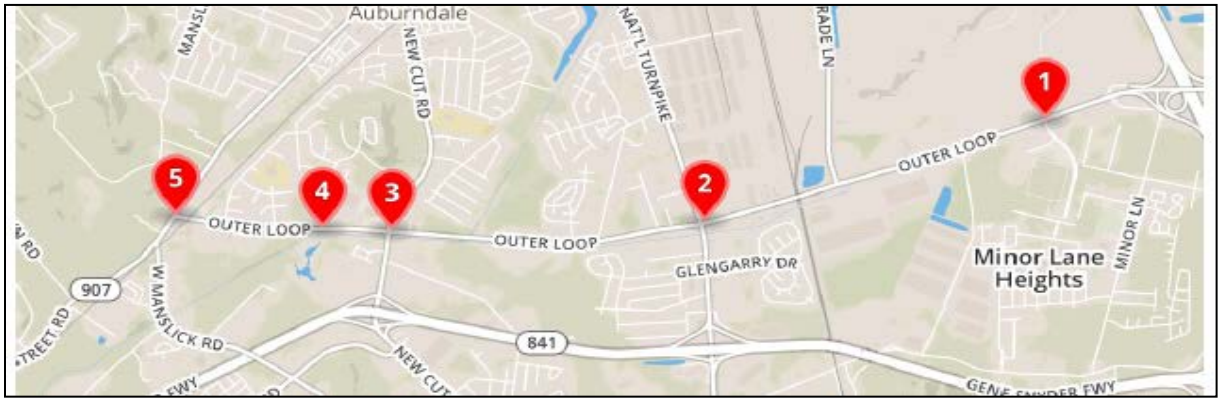


Figure 4: Travel Time Locations

Table 1: AM and PM Peak Hour Median Travel Times for Outer Loop Corridor

Location Matrix — Measurement Travel Time (minutes) - Median

Start / End Location		1	2	3	4	5
1	Outer Loop & Air Commerce Dr	-	3.10	6.73	7.67	9.58
2	801 Outer Loop	3.17	-	3.58	4.62	6.17
3	5929 New Cut Road	6.01	3.03	-	0.73	2.46
4	Outer Loop & Signalized Walmart Entrance	8.03	4.65	1.45	-	1.64
5	Outer Loop & 3rd St Rd	13.03	5.63	2.25	1.02	-

A comparison of field measured travel times to modeled travel times both west and eastbound are shown in **Figures 5 and 6**.

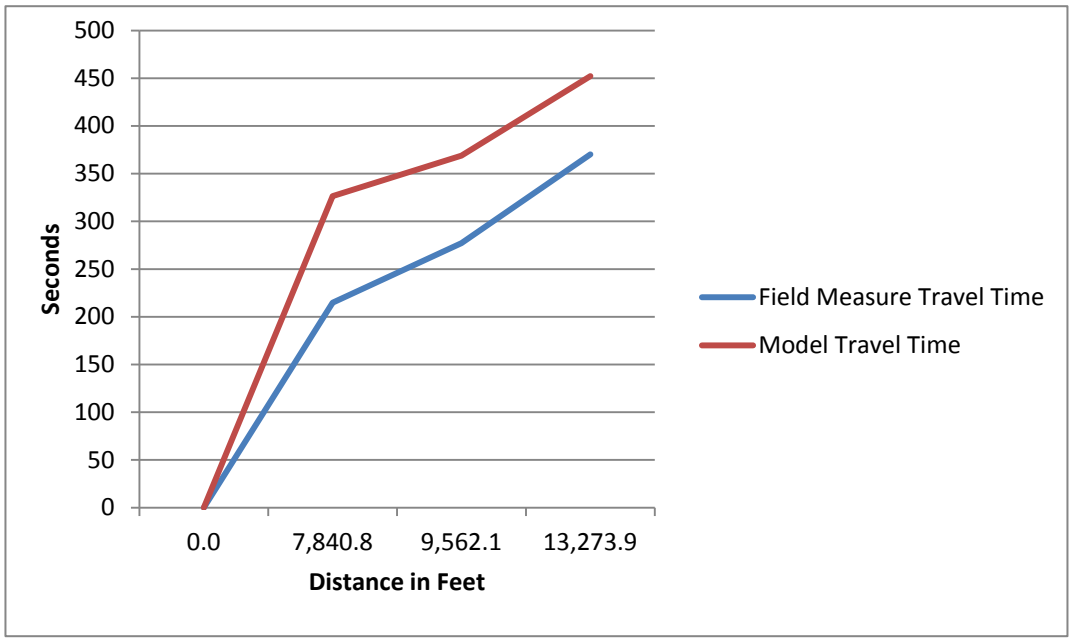


Figure 5: Westbound Travel Times

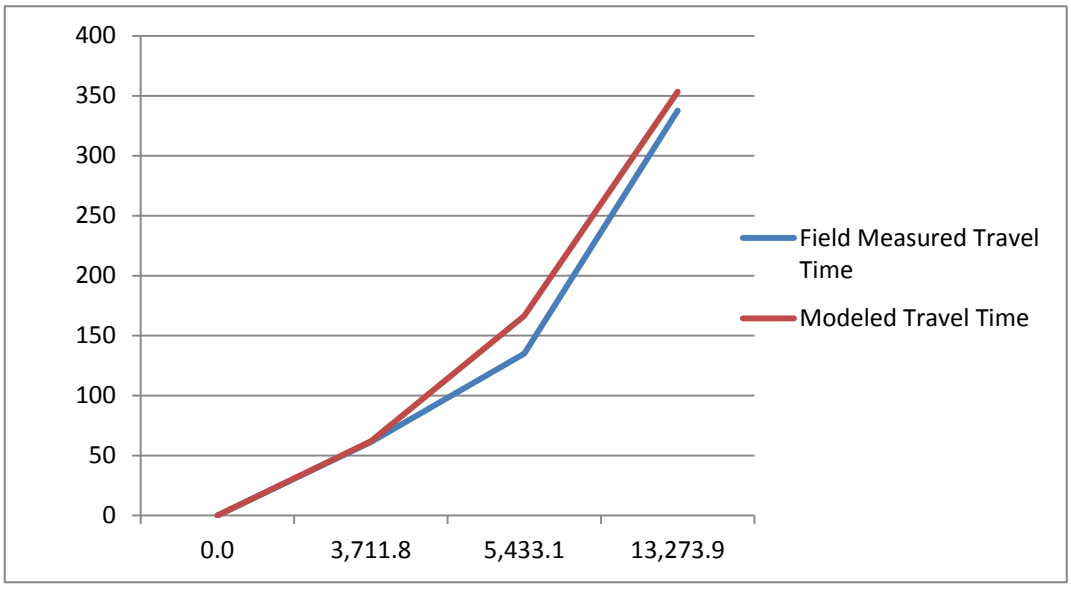


Figure 6: Eastbound Travel Times

3.2 Queues

Existing traffic queues were collected in the field and are shown in **Figures 7 and 8** and summarized in **Table 3 as compared to queue length data from the microsimulation model**.

Table 2: Measured Queues

Location	Field Measured (feet)	Modeled (feet)	Difference
WB National Turnpike Approach	2,190	1,975	9.8%
WB New Cut Approach	1,650	1,559	5.5%

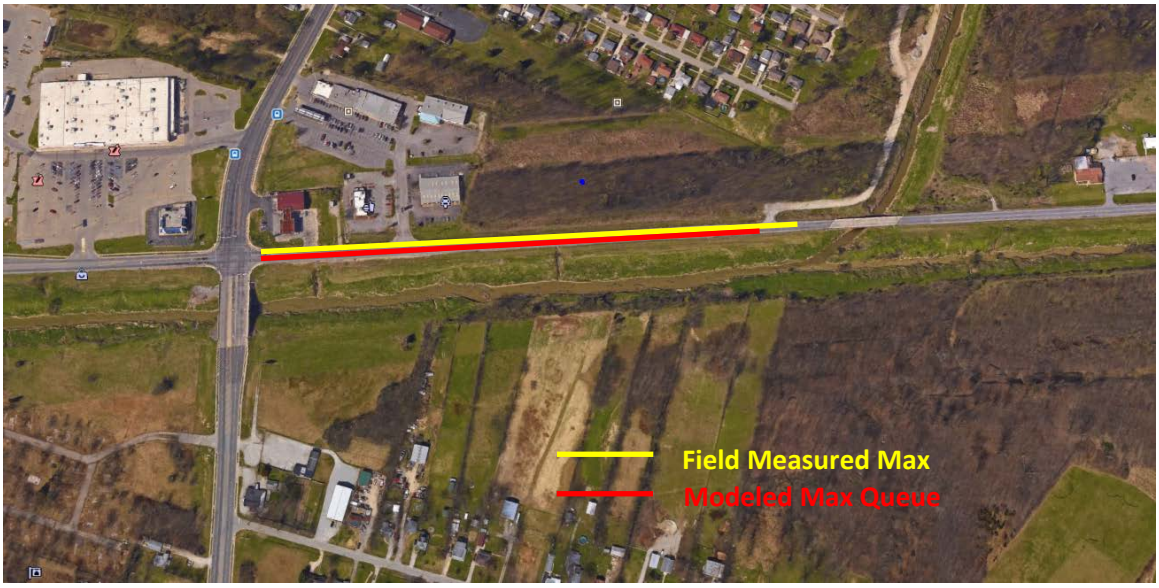


Figure 7: Outer Loop Queues at New Cut Road

Figure 8: Outer Loop Queues at National Turnpike

3.3 Percent Root Mean Square Error

The percent root mean square error (%RMSE) based on the average of 10 model runs comparing the counted volume for all legs of each study area intersection to the modeled volumes for each intersection leg. The results of this analysis were a %RMSE of 9%.

3.4 Calibration Adjustments

Final adjustments to calibrate the VISSIM existing simulation model to replicate today's current traffic conditions, the following urban driving behavior adjustments to the Weidemann 74 model were made **(Figure 9)**. These same values were used in both the future year no build and build model runs.

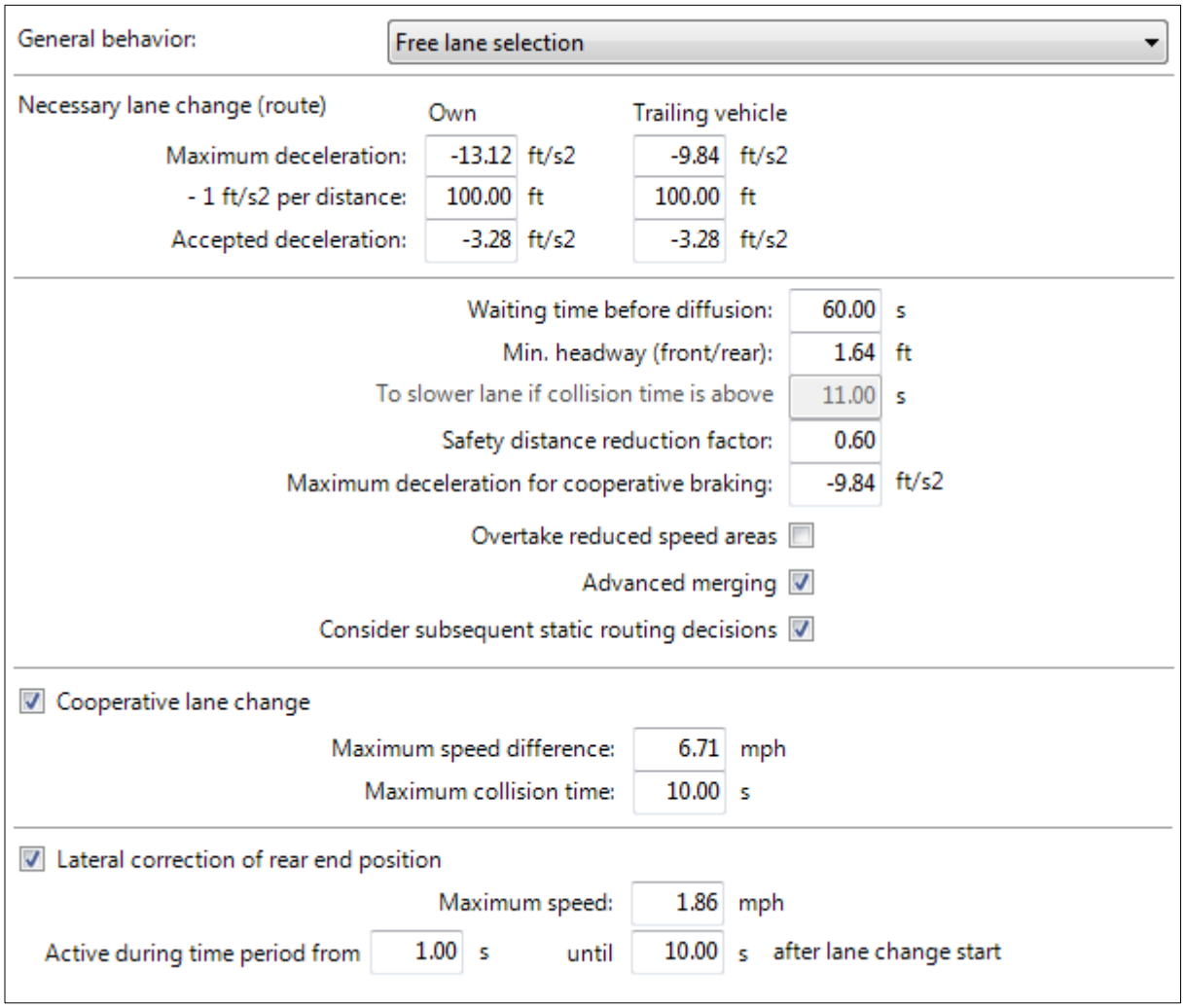


Figure 9: VISSIM Urban Driving Behavior Adjustments

4.0 Travel Demand Modeling

KIPDA's Base Year 2007 Regional Travel Demand Model (KIPDA's RTDM) was used to forecast future year average daily traffic for the study area. The following describes adjustments to KIPDA's RTDM along with scenarios.

4.1 Committed Projects

In or near the study area, a list of projects was provided to the KYTC. District 5 staff identified those that should not be considered committed, and excluded from KIDPA's Base Year 2007 Regional Travel Demand Model (KIPDA's RTDM) **(Figure 10)**. Excluded projects are:

(1) a future five-lane 3rd Street Road, recommended in a planning study, but is not in the current Highway Plan and unlikely to be realized;

(2) road diet for New Cut Road; and

(3) KIPDA #1938, National Turnpike road diet.

The model will include a scenario with and without a new interchange with KY 841 (Gene Snyder Freeway) in the vicinity of Air Commerce Drive, located between the I-65 and New Cut Road interchanges. KIPDA's traffic modeler modified the model to include only committed projects. These committed projects are shown in Figure 9.

The following projects described in **(Figure 10)** were considered committed and included in KIPDA's model.

1. **KIPDA ID 1650** – Louisville Metro project. The estimated open to traffic date is 2020. KYTC D5 would assume this project should be open to the public by at least 2025.
2. **KIPDA ID 2036** – KYTC project. Letting scheduled for February 2018**.**
3. **KIPDA ID 2281** – KYTC project. **Completed.**
4. **KIPDA ID 2367** – Louisville Metro project that utilizes Safe Routes to School funding. KYTC D5 would assume that this project should be open to the public by 2023.
5. **KIPDA ID 2473** – KYTC project. KYTC D5 is working on securing funding to repair this section of roadway.

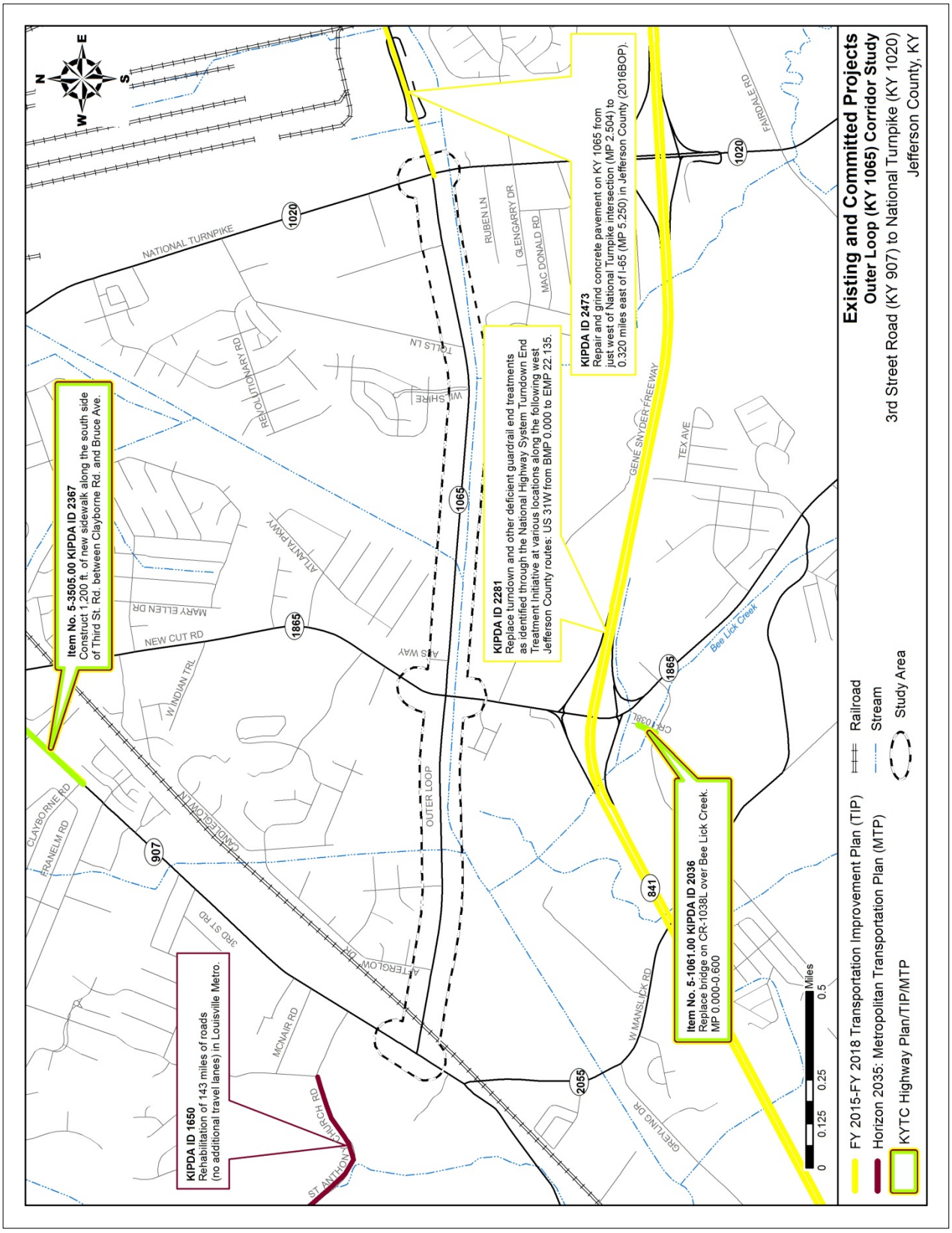


Figure 10: Existing Plus Committed Projects

4.2 Traffic Analysis Zones (TAZ)

KIPDA's RTDM has nine TAZs within the study area. **Figure 11** shows the TAZs outlined in green and denoted with stars.

Figure 11: Traffic Analysis Zones

Members of the project team met with the Louisville International Airport Authority (LIA) and Louisville Metro Planning (LMP) personnel to gain a better understanding of their needs and possible future growth as it related to the study area. A Tax Increment Finance (TIF) District in the Renaissance Zone area (TAZ 315) south of Outer Loop has been very successful. In the last 18 months 3,000,000 square feet of warehousing has been built in the Renaissance Zone. The anticipated job numbers were modified in TAZ 315 due to the Renaissance Park South growth.

Warehouses are being built in the northwest quadrant of the KY 841 and New Cut Road interchange (TAZ 311) south of Outer Loop. This TAZ will have access to Outer Loop only via New Cut Road.

According to the permit application, a large tract of land south of Outer Loop and east of New Cut Road, is owned by Waste Management and will be used as an environmental mitigation Therefore, this site will not generate additional traffic.

4.3 Traffic Analysis Zones (TAZ) Adjustments

Following the aforementioned meetings, adjustments made to KIPDA's RTDM included:

- TAZ 315—2035 employment was increased from 3300 to 3630.
- TAZ 311—Outer Loop/New Cut Road southwest corner does not and will not connect to

Outer Loop in the 2035 model runs.

- TAZ 312 (zoned single family)—does not and will not connect to Outer Loop. This TAZ has a new construction site shown with a white star in **Figure 12** in the southwest corner of Outer Loop and New Cut Road just north of Gene Snyder/KY 841. Warehouses are currently being constructed on this site and because of the Southern Ditch access will be provided via New Cut Road. The model was adjusted to consider this development. Only projects listed in **Section 4.0** were considered committed and included in model runs.

Including the mitigation site, the study area has four conservation/mitigation sites (top half of exhibit shown in red) that will not create future jobs or households. These areas were not assigned additional jobs or households.

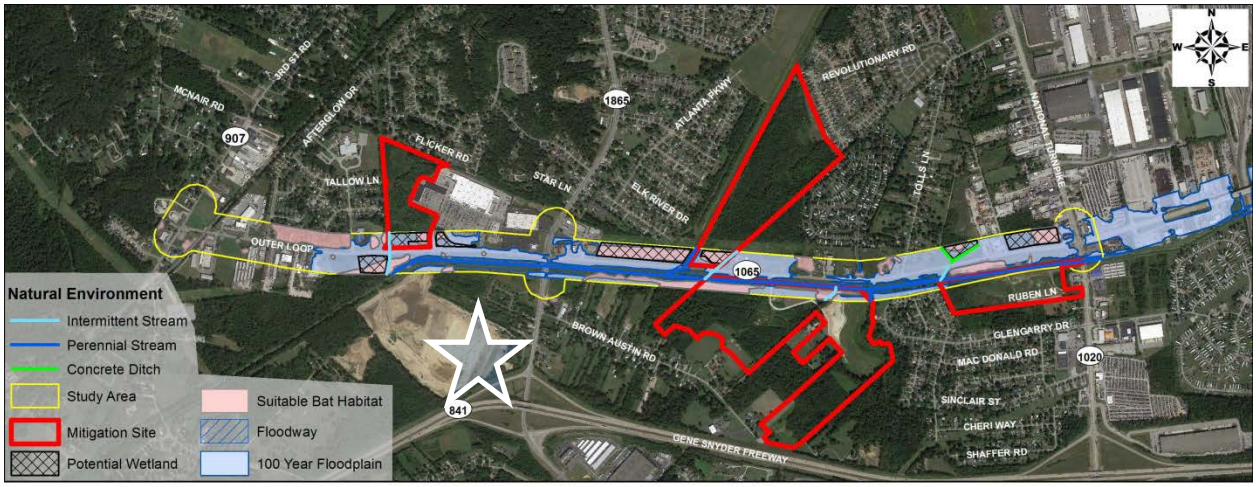


Figure 12: Environmental Overview with Four Conservation/Mitigation Sites in Red

4.4 KIPDA's RTDM Scenarios

Five scenarios were modeled using KIPDA's travel demand model with and without a new Gene Snyder (KY 841) interchange south of Outer Loop between National Turnpike and I-65. Scenarios modeled were:

- 2035 No Build
- 2035 Build 3-lane with interchange
- 2035 Build 3-lane without interchange
- 2035 Build 5-lane with Interchange
- 2035 Build 5-lane without Interchange

KIPDA's RTDM volumes were adjusted to align with the Average Daily Traffic developed from most recent study area counts using a count/model ratio.

Table 3 represents the effects of each scenario on Outer Loop.

Table 3: Build Scenario Daily Volumes

Route	Recent Count	2035 No Build	2035 Build 3 Lane Interchange	2035 Build 3 Lane No Interchange	2035 Build 5 Lane Interchange	2035 Build 5 Lane No Interchange
3rd Street Road to Walmart	13,500	13,500	16,000	16,100	18,500	18,500
Walmart to New Cut Road	17,600	17,200	20,200	20,300	28,200	28,300
New Cut Road to National Turnpike	14,310	14,800	17,100	17,400	22,500	22,900
National Turnpike to Grade Lane	29,000	31,000	31,800	31,900	32,700	33,100
Grade Lane to Air Commerce Drive	27,010	25,300	25,200	25,600	25,600	26,200
Air Commerce Drive to I-65	32,400	37,200	35,100	37,500	35,500	38,100

Comparing Build versus No Build volumes, **Table** 4 shows a new interchange between National Turnpike and I-65 will have little or no effect on the study area section of Outer Loop.

Table 4: Daily Volumes Comparison

Route	2035 No Build versus Recent Count	2035 Build 3 Lane No Interchange	2035 Build 3 Lane Interchange	2035 Build 5 Lane No Interchange	2035 Build 5 Lane Interchange
3rd Street Road to Walmart	0	2600	2500	5000	5000
Walmart to New Cut Road	(400)	3100	3000	11100	11000
New Cut Road to National Turnpike	490	2600	2300	8100	7700
National Turnpike to Grade Lane	2000	900	800	2100	1700
Grade Lane to Air Commerce Drive	(1710)	300	(100)	900	300
Air Commerce Drive to I-65	4800	300	(2100)	900	(1700)

5.0 Turning Movement Variations

KIPDA provided daily volumes for each movement from Outer Loop south including the Gene Snyder interchanges and east to I-65. These volumes were input into the appropriate turning movement spreadsheets to develop 2035 turning volumes at each intersection. The remaining volumes can be found in **Appendix B**. Several Design Hour Volumes (DHV) were lower than normal for similar type roadways in Kentucky especially at the Outer Loop/National Turnpike and Outer Loop/Grade Lane intersections. As shown in **Figure 13**, the PM peak hour volumes along Outer Loop are much higher than the AM peak hour volumes. Below is a graph showing the raw traffic counts going through the Outer Loop at National Turnpike intersection. PM design hour turning movements are between 9-11% of the ADT. However, AM peak hours percentages (4-7%) are much lower. The same applies for Outer Loop at Grade Lane.

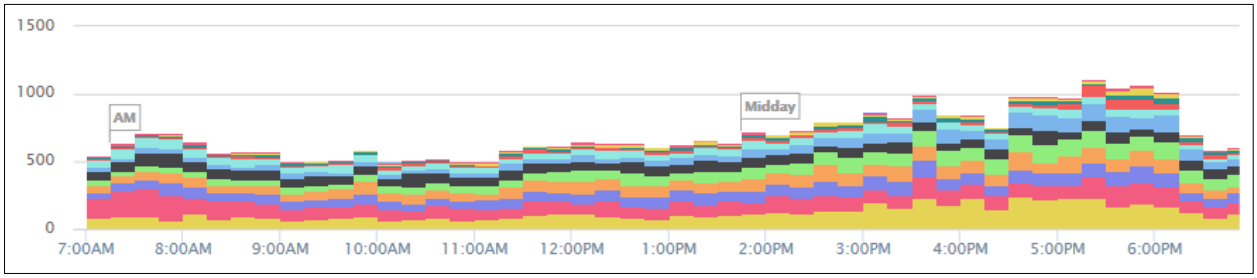


Figure 13: Outer Loop at National Turnpike

6.0 Signal Warrant

Signal warrants were not included in the scope of work.

7.0 Alternatives Analysis

Because a new Gene Snyder Freeway interchange had little to no effect on the Outer Loop corridor. The build scenarios with a new interchange were dropped from consideration. In discussions with the KYTC District 5 staff, a four-lane alternative with a median was also considered in the study; however, KIDPA's RTDM does not distinguish between a four-lane and five-lane alternative. They were considered to have the same traffic.

2035 No Build **(Appendix C)** and two Build scenarios were examined.

- Alternative 1—A three-lane alternative (either using TWLTL or left turn lanes) in developed areas and two lanes in the undeveloped portion of Outer Loop between National Turnpike and New Cut Road.
- Alternative 2—A five-lane alternative (a combination of TWLTL or left lanes) with four lanes between the undeveloped section between National Turnpike and New Cut Road.

The resulting turning movements utilizing KIPDAs projected traffic volumes are shown in **Appendix D** and **E**, respectively.

8.0 Travel Times

The Build versus No Build peak hour travel times are shown in **Table 5**.

Table 5: Travel Times

	Peak Hour Travel Times (seconds/vehicle)	
	EB	WB
Collected	442	584
Existing Modeled	434	536
No Build Modeled	352	707
Alt 1: 3/2/3 Lane Alternative	333	596
Alt 2: 3/5/4/5 Lane Alternative	336	357

*Includes only those vehicles traveling the entire corridor.

9.0 Volume to Capacity Ratios

Volume to capacity ratios were calculated for Outer Loop using HCM for 2017, No Build and Build scenarios and are shown in **Table 6.**

Table 6: Traffic Operations

STUDY MAINLINE

	2017 EXISTING	2035 NO BUILD	2035 BUILD Alternative 1: 3-2-3	2035 BUILD Alternative 2: 3-5-4-5	2017 EXISTING	2035 NO BUILD	2035 BUILD Alternative 1: 3-2-3	2035 BUILD Alternative 2: 3-5-4-5	2017 EXISTING	2035 NO BUILD	2035 BUILD Alternative 1: 3-2-3	2035 BUILD Alternative 2: 3-5-4-5	2017 EXISTING	2035 NO BUILD	2035 BUILD Alternative 1: 3-2-3	2035 BUILD Alternative 2: 3-5-4-5
Description	3rd Street Road to Walmart Signalized West Entrance	3rd Street Road to Walmart Signalized West Entrance	3rd Street Road to Walmart Signalized West Entrance	3rd Street Road to Walmart Signalized West Entrance	Walmart Signalized West Entrance to New Cut Road	Walmart Signalized West Entrance to New Cut Road	Walmart Signalized West Entrance to New Cut Road	Walmart Signalized West Entrance to New Cut Road	New Cut Road to National Tumpike	New Cut Road to National Tumpike	New Cut Road to National Tumpike	New Cut Road to National Tumpike	National Tumpike to Grade Lane	National Tumpike to Grade Lane	National Tumpike to Grade Lane	National Tumpike to Grade Lane
AM LOS	E	E	E	E	E	E	E	B	D	D	D	A	B	B	B	B
PM LOS	E	E	E	E	E	E	E	B	E	E	E	B	B	B	C	C
AM PTSF or Density	81.2	81.9	82.2	82.2	80.8	80.8	84.0	9.0	74.9	74.9	79.9	8.7	11.4	11.4	13.2	13.4
PM PTSF or Density	85.8	85.8	89.5	89.5	86.0	86.0	89.4	16.3	88.5	88.5	91.8	16.1	17.7	17.7	20.4	20.4
AM ATS	32.2	31.6	30.8	28.7	34.9	34.9	33.9	-	37.1	46.9	45.5	-	-	-	-	-
PM ATS	30.5	30.5	28.7	28.7	33.7	33.7	31.8	-	32.7	42.5	39.7	-	-	-	-	-
AM V/C Ratio	0.47	0.47	0.49	0.48	0.45	0.45	0.50	0.23	0.34	0.34	0.42	0.22	0.30	0.29	0.33	0.34
PM V/C Ratio	0.55	0.55	0.67	0.73	0.57	0.57	0.66	0.41	0.61	0.61	0.76	0.41	0.47	0.45	0.52	0.52

APPENDIX A:
2017 TURNING MOVEMENTS

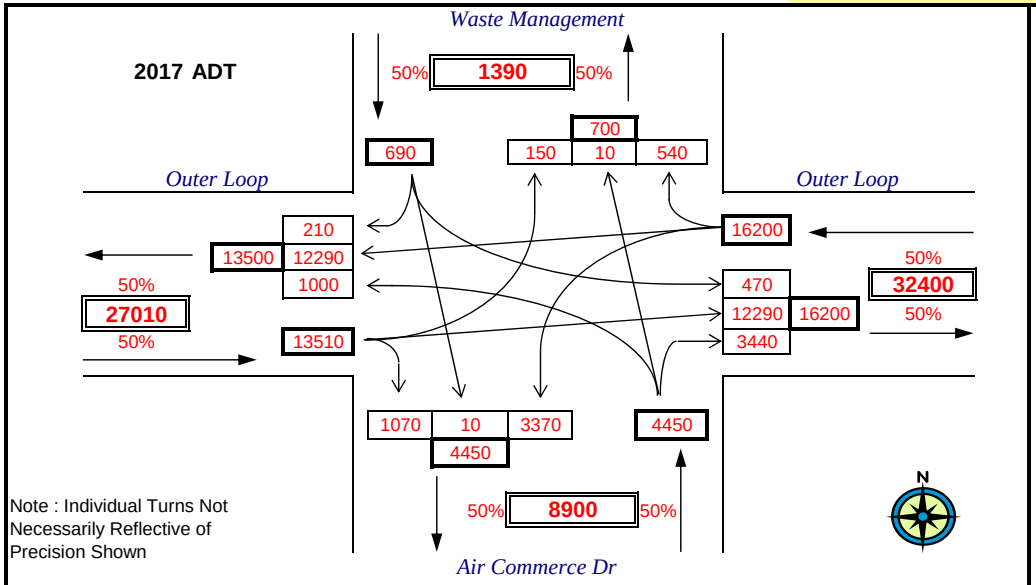
#439112 MP 3.80

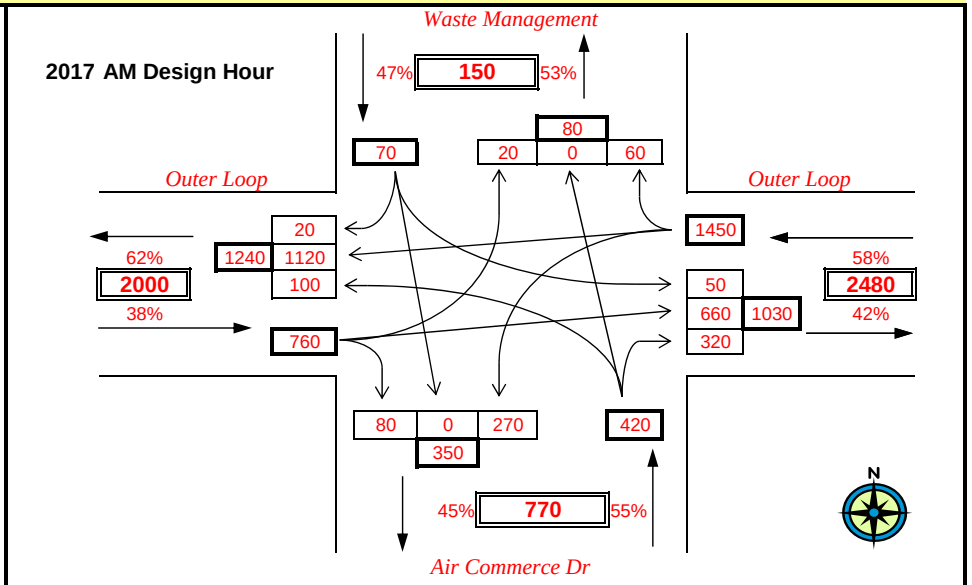
PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE: 0
ANALYST: 0
YEAR: 2017 **ADT and Design Hour Volumes**
INTERSECTION: KY 1065 & Air Commerce Dr

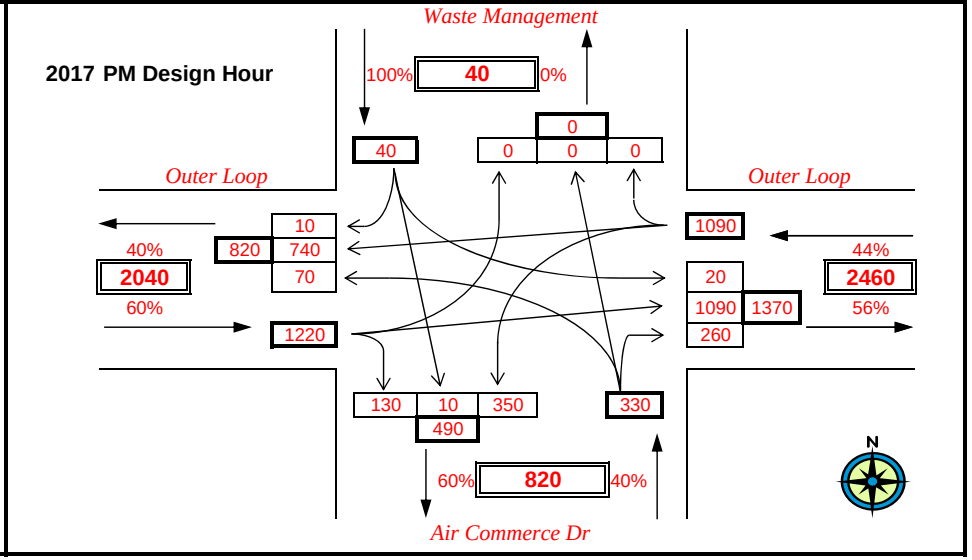
NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2017 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

TURN MOVEMENT 1 (2017)

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







#393380 MP 3.20

PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE: 0
ANALYST: 0
YEAR: 2017 **ADT and Design Hour Volumes**
INTERSECTION: KY 1065 & Grade Ln

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 2 (2017)

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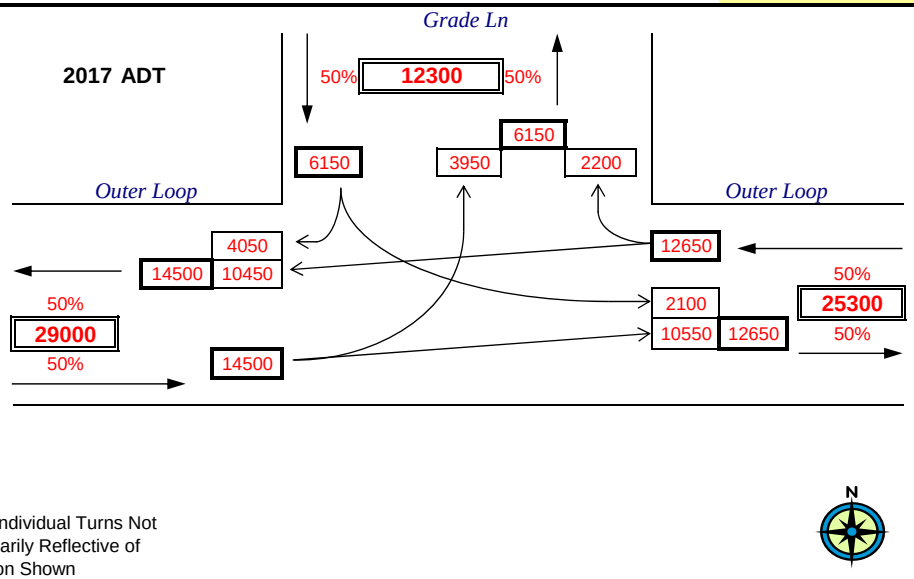
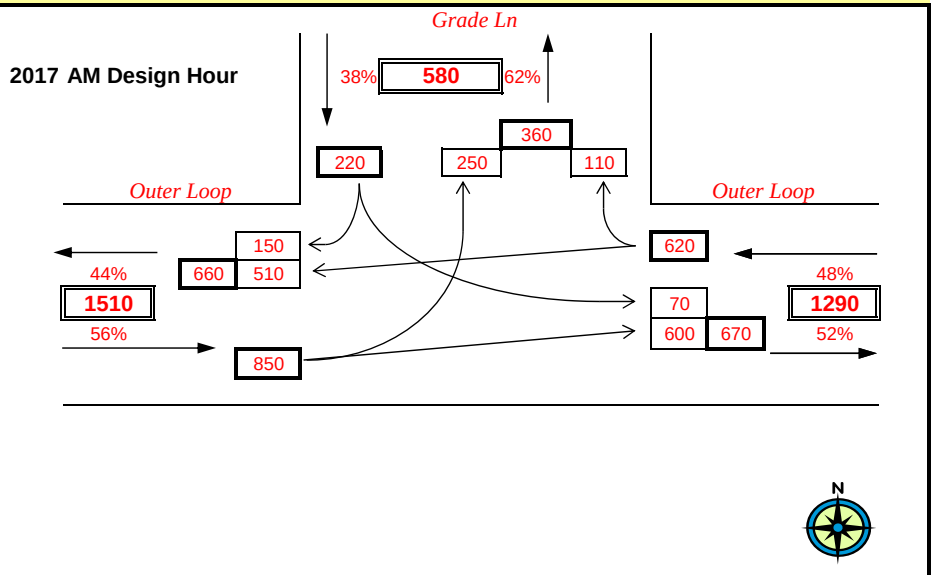
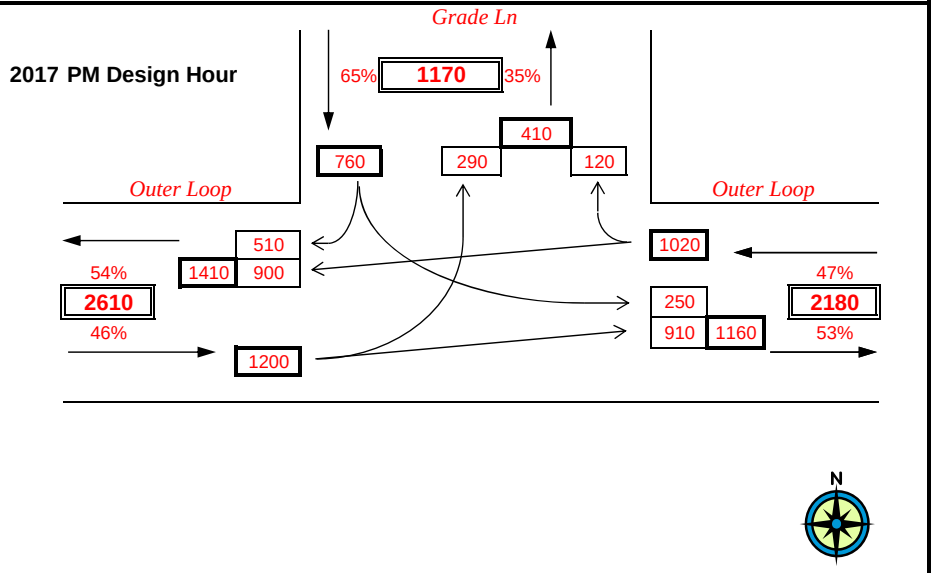


Note : Individual Turns Not Necessarily Reflective of Precision Shown





#308096 MP 2.514

PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE: 0
ANALYST: 0
YEAR: 2017 **ADT and Design Hour Volumes**
INTERSECTION: KY 1065 & National Turnpike

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 3 (2017)

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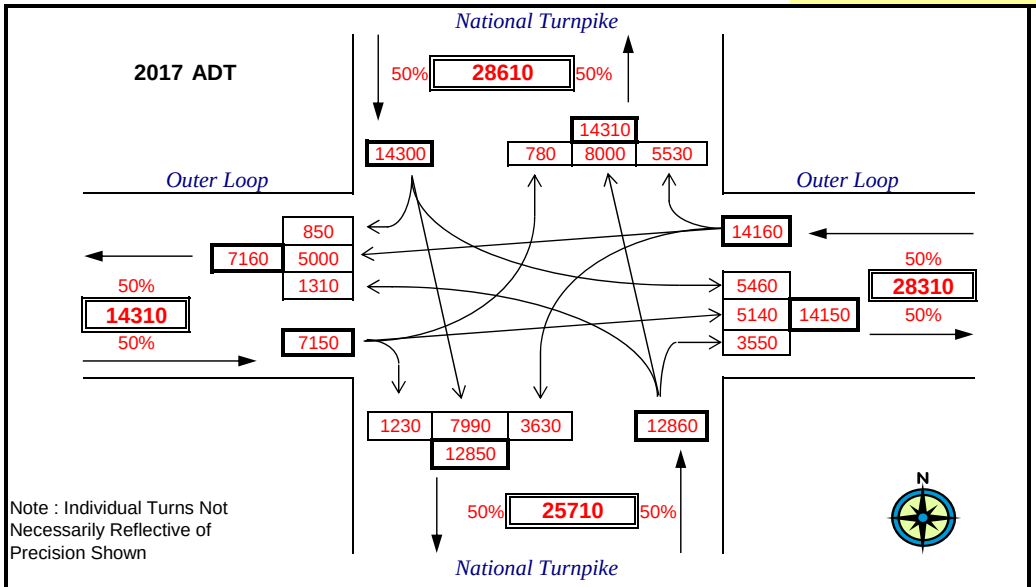

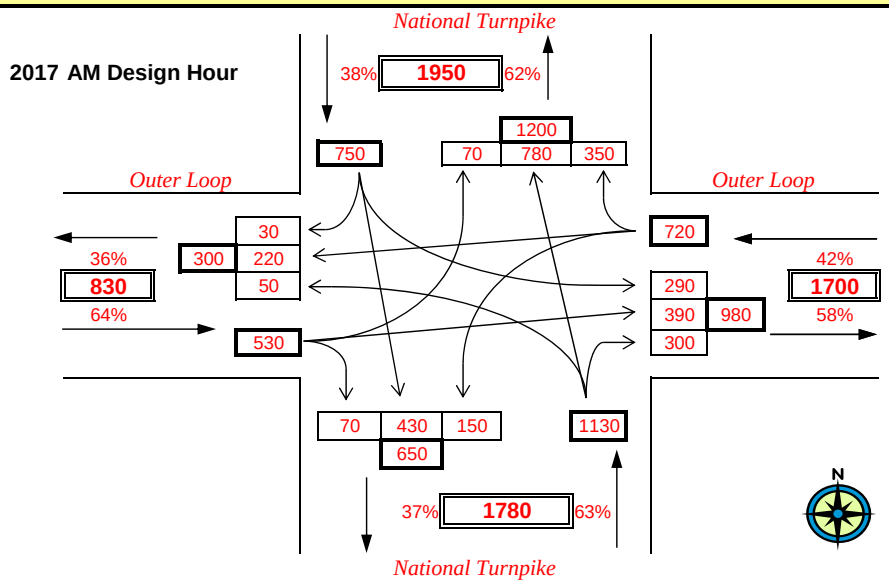

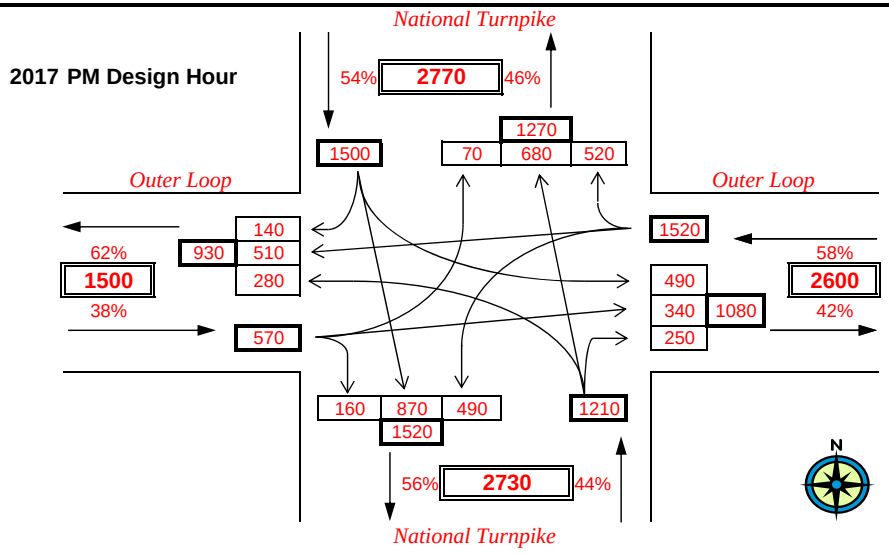

#288509 MP 1.03

PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE: 0
ANALYST: 0
YEAR: 2017 **ADT and Design Hour Volumes**
INTERSECTION: KY 1065 & New Cut Rd

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 4 (2017)

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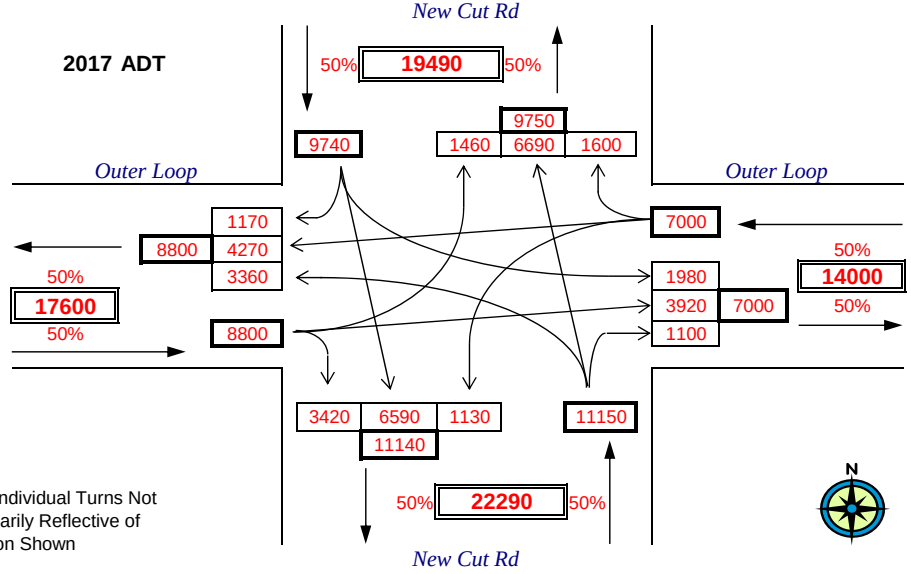
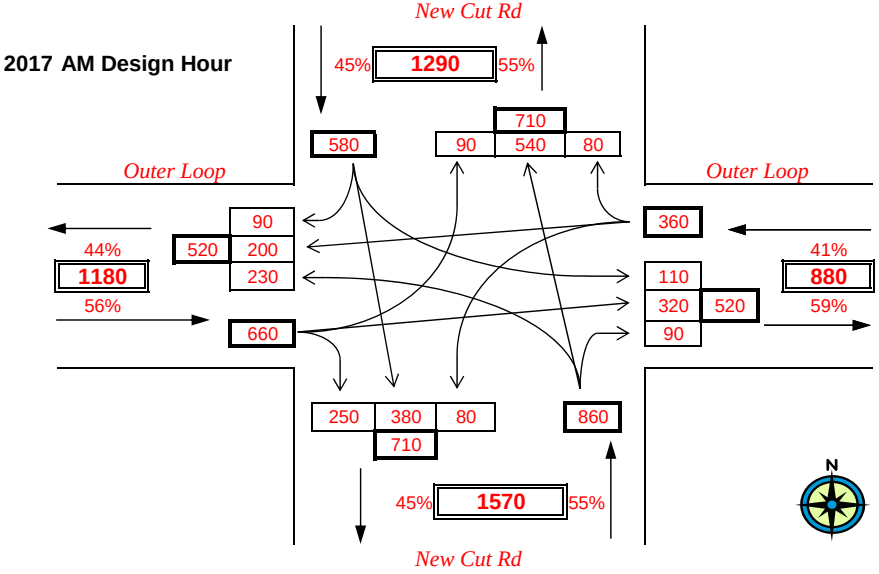
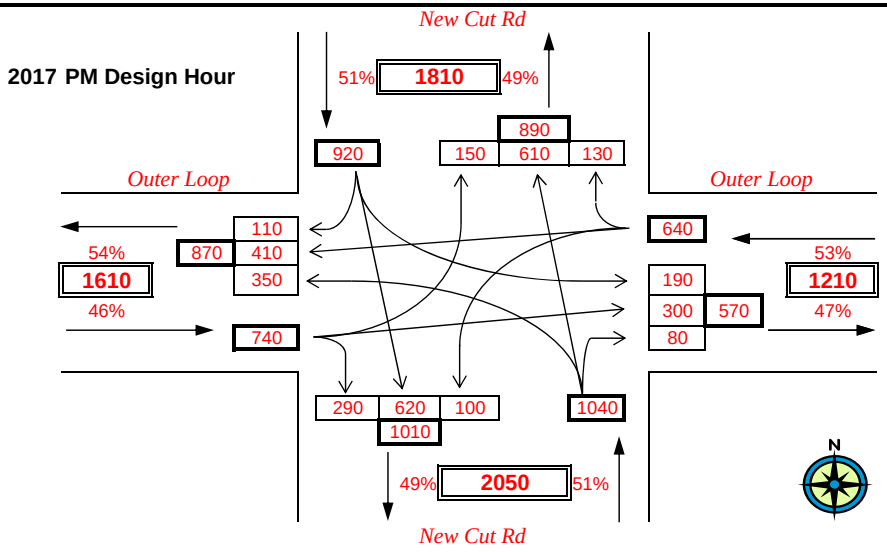






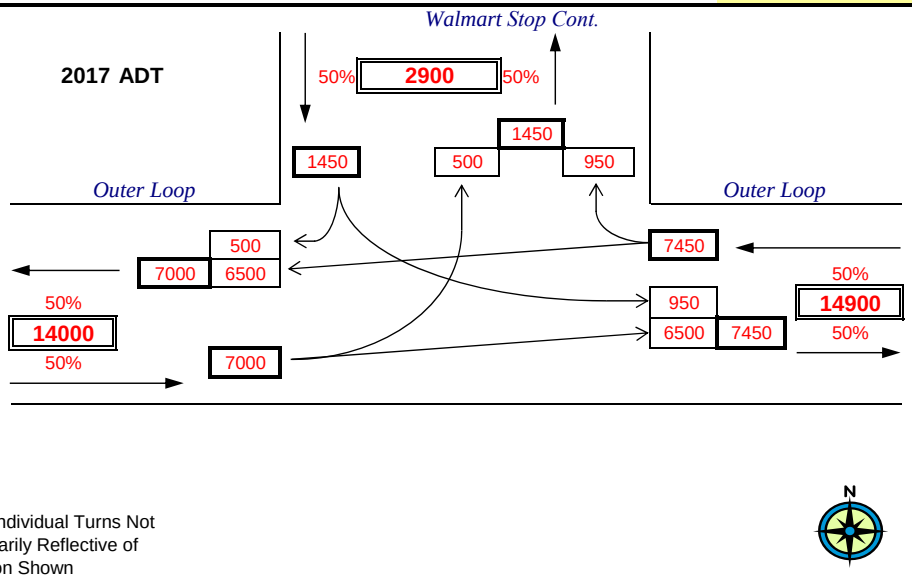
#439103 MP 0.84

PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE: S
ANALYST: 0
YEAR: 2017 **ADT and Design Hour Volumes**
INTERSECTION: KY 1065 & Walmart Stop Controlled Entrance

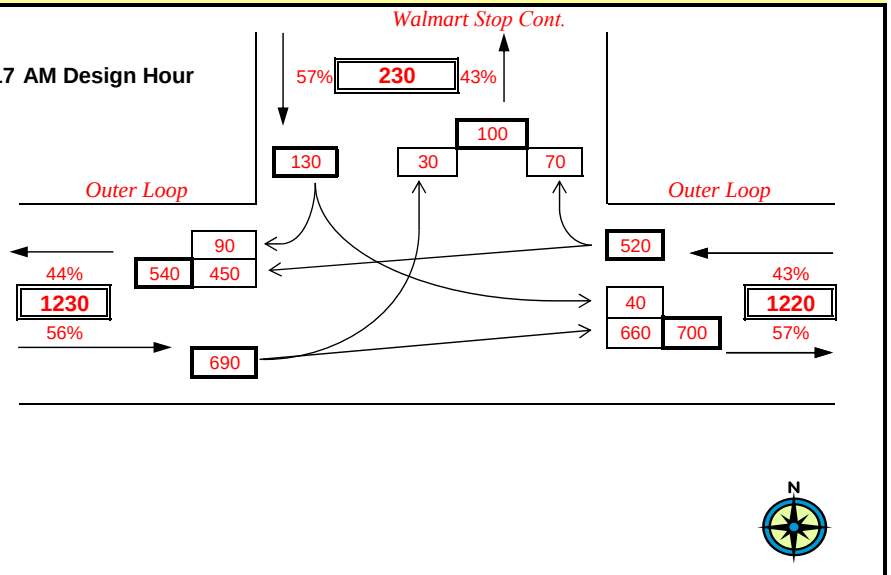
NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2017 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

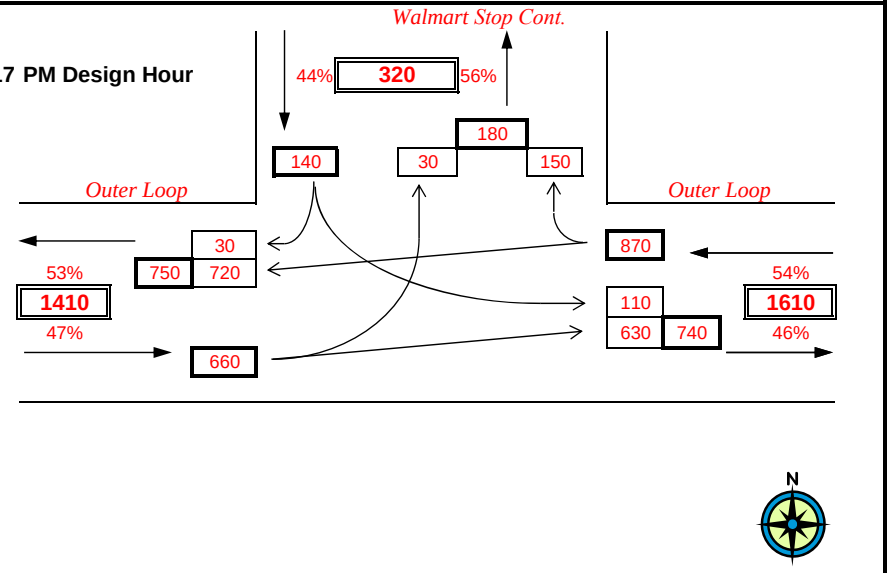
TURN MOVEMENT 5 (2017)

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



Note : Individual Turns Not Necessarily Reflective of Precision Shown





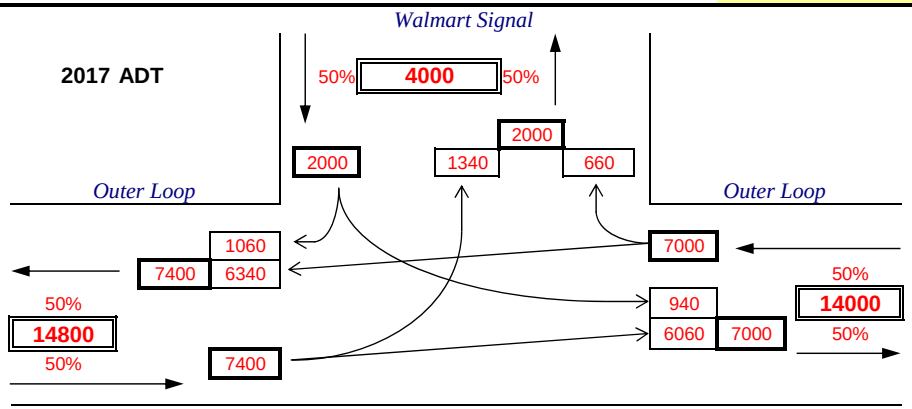
#439099 MP 0.70

PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE: 0
ANALYST: 0
YEAR: 2017 **ADT and Design Hour Volumes**
INTERSECTION: KY 1065 & Signalized Walmart Entrance

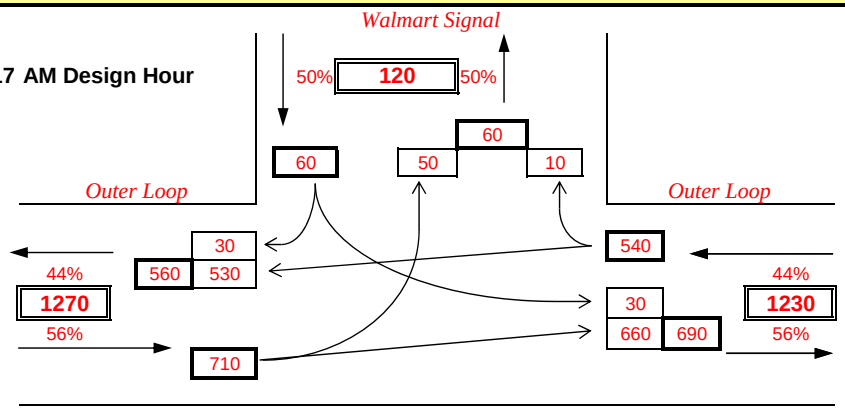
NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2017 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

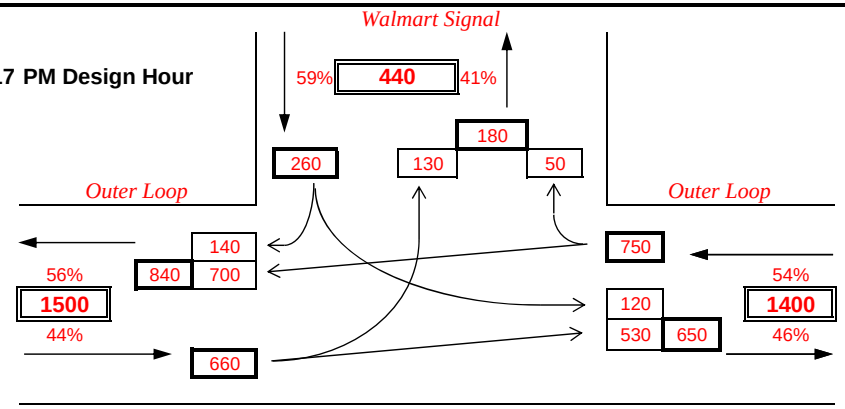
TURN MOVEMENT 6 (2017)

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



Note : Individual Turns Not Necessarily Reflective of Precision Shown





#439109 MP 0.00

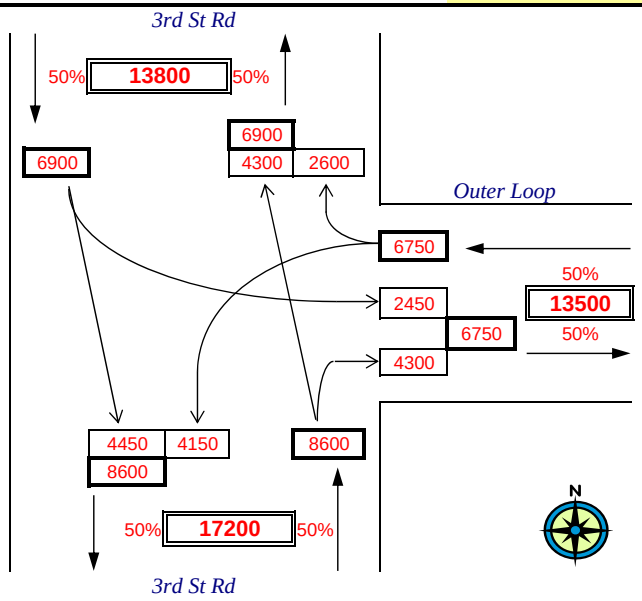
PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE: 0
ANALYST: 0
YEAR: 2017 **ADT and Design Hour Volumes**
INTERSECTION: KY 1065 & 3rd St Rd

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 7 (2017)

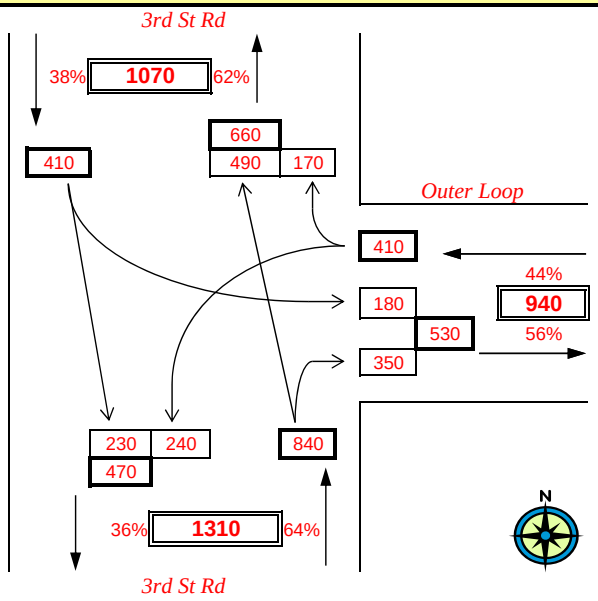
****DHV TURN MOVEMENT FORECASTS SHOULD NOT BE USED FOR SIGNAL TIMING OR WARRANT ANALYSIS**

2017 ADT

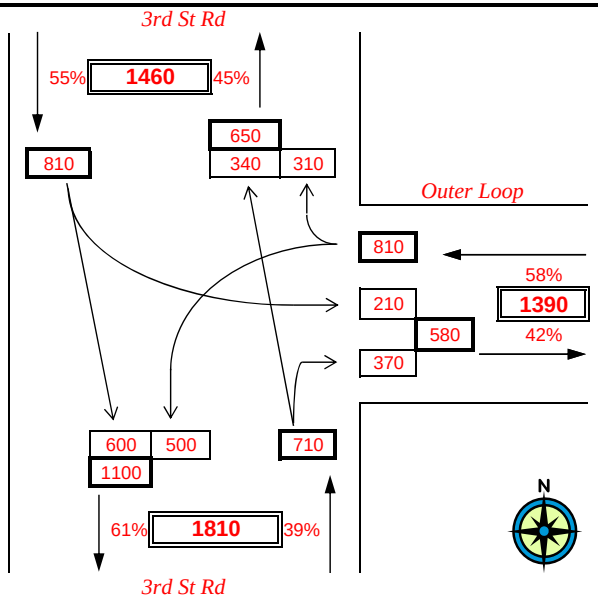


Note : Individual Turns Not Necessarily Reflective of Precision Shown

2017 AM Design Hour



2017 PM Design Hour



#439103 MP 1.30

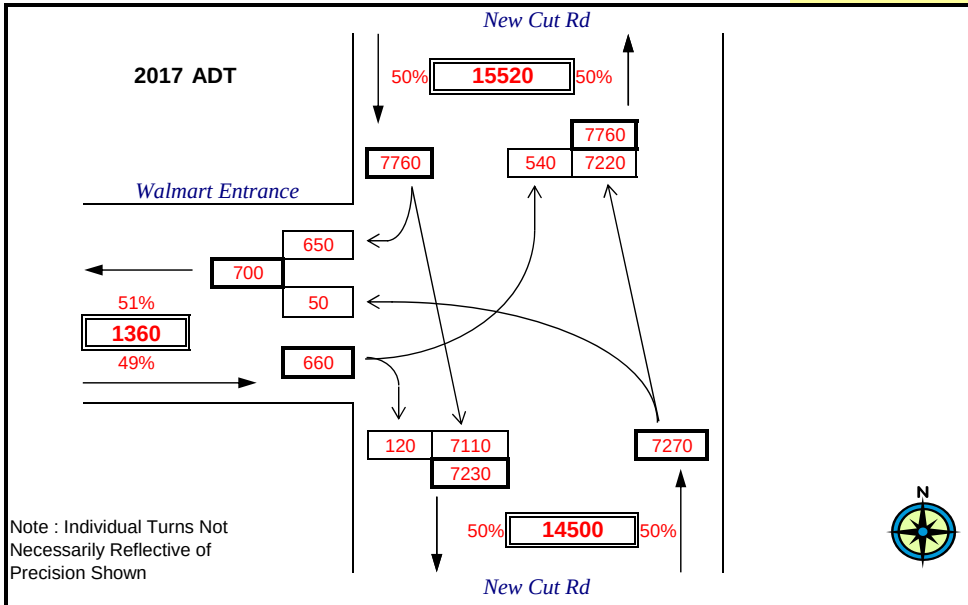
PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0

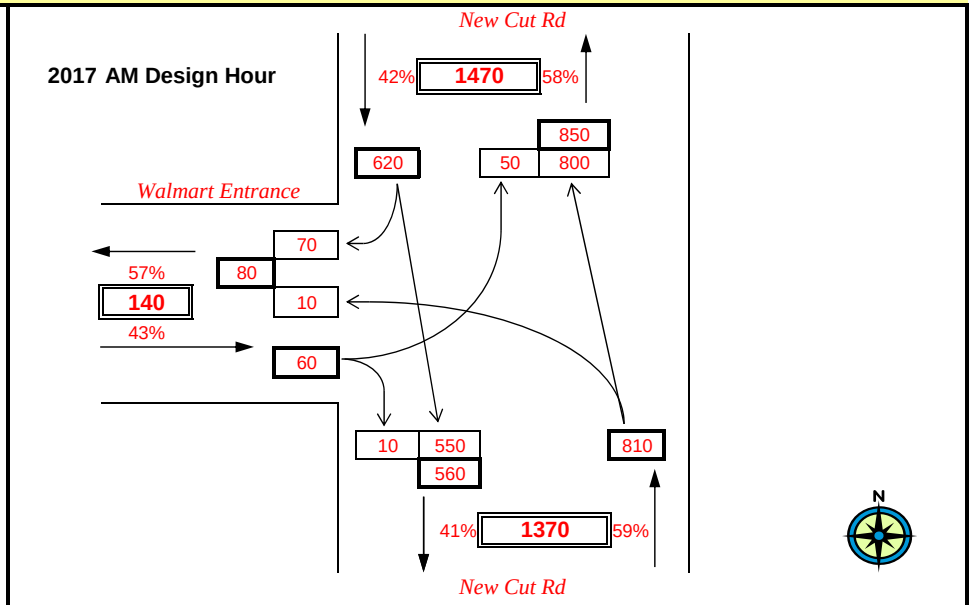
ANALYST: 0
YEAR: 2017 **ADT and Design Hour Volumes**
INTERSECTION: New Cut Rd & Walmart Entrance

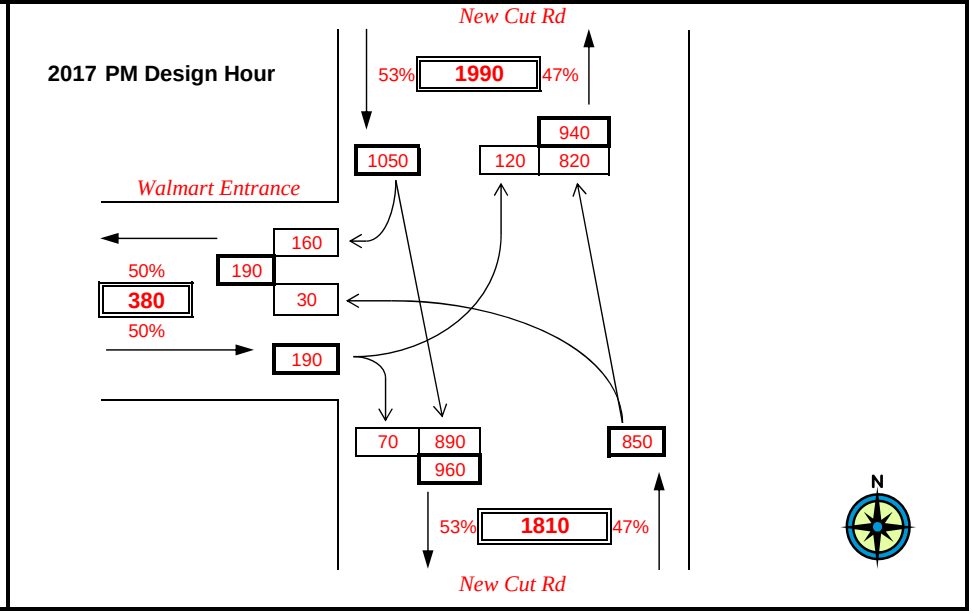
NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2017 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

TURN MOVEMENT 8 (2017)

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







APPENDIX B:
KIPDA DAILY VOLUMES

Outer Loop (KY 1065) Corridor Study: 3rd Street Road (KY 907) to National Turnpike (KY 1020)

Route	Recent Count	2035 Build 5 Lane Interchange	2035 Build 5 Lane No Interchange	2035 Build 3 Lane Interchange	2035 Build 3 Lane No Interchange	2035 No Build
Outer Loop (KY 1065)						
3rd Street Road to Walmart	13,500	18,500	18,500	16,000	16,100	13,500
Walmart to New Cut Road	17,600	28,200	28,300	20,200	20,300	17,200
New Cut Road to National Turnpike	14,310	22,500	22,900	17,100	17,400	14,800
National Turnpike to Grade Lane	29,000	32,700	33,100	31,800	31,900	31,000
Grade Lane to Air Commerce Drive	27,010	25,600	26,200	25,200	25,600	25,300
Air Commerce Drive to I-65	32,400	35,500	38,100	35,100	37,500	37,200
Outer Loop/I-65 Interchange						
I-65 SB to Outer Loop WB/Minor	6,900	5,000	6,300	4,900	6,300	6,300
I-65 SB to Outer Loop EB	7,200	8,500	8,700	8,700	8,500	8,400
Outer Loop to I-65 SB	2,800	5,200	5,600	5,000	5,400	5,500
I-65 NB to Outer Loop	5,800	6,700	7,100	7,300	7,300	7,100
EB Outer Loop to I-65 NB	6,400	4,800	5,600	4,800	5,600	5,600
WB Outer Loop to I-65 NB	7,200*	8,000	8,200	8,400	8,100	7,900
Air Commerce/KY 841 Interchange						
Air Commerce to KY 841 EB		3,400		3,400		
Air Commerce to KY 841 WB		2,800		2,900		
KY 841 EB to Air Commerce		1,900		1,900		
KY 841 WB to Air Commerce		4,100		4,100		
Air Commerce Drive						
KY 841 to South Park		12,200		12,400		
North of South Park		7,100	4,300	7,200	4,300	4,300
South of Outer Loop	8,900	6,000	6,900	6,000	7,000	7,000
KY 841/National Trpk. Interchange						
KY 841 EB to National Trpk.	4,000#	4,300	4,600	5,200	5,600	6,000
KY 841 WB to National Trpk.	7,100	7,400	8,400	7,300	8,400	8,400
National Trpk. to KY 841 WB	4,000	4,100	4,800	5,700	6,000	6,700
National Trpk. to KY 841 EB	7,100#	9,200	9,100	9,000	9,200	9,000
National Turnpike (KY 1020)						
South of KY 841	11,300	17,300	18,700	16,700	18,100	18,000
KY 841 to Outer Loop	25,710	32,300	32,100	34,500	34,000	34,800
North of Outer Loop	28,610	33,200	33,500	33,000	33,100	33,000
New Cut Road (KY 1865)						
South of KY 841	12,700	14,300	14,200	14,600	14,300	14,300
KY 841 to Outer Loop	22,290	30,900	30,900	28,800	29,100	27,700
North of Outer Loop	19,490	19,700	19,800	24,000	24,300	24,600
KY 841/New Cut Road Interchange						
KY 841 EB to New Cut Road	3,000#	4,700	4,700	4,000	4,100	4,100
KY 841 WB to New Cut Road	7,300	8,300	8,200	8,200	8,100	7,900
New Cut Road to KY 841 WB	3,000	5,800	5,700	4,600	4,800	4,100
New Cut Road to KY 841 EB	7,300#	7,300	7,400	7,500	7,400	7,600
3rd Street Road (KY 907)						
South of Outer Loop	17,200	18,700	18,900	18,100	17,900	17,700
North of Outer Loop	13,800	13,600	13,600	13,700	13,600	13,700
Grade Lane						
North of Outer Loop	12,300	22,300	22,400	21,700	21,600	20,800
KY 841						
Stonestreet to New Cut	51,100	57,300	57,200	57,900	58,000	58,400
New Cut to National Turnpike	51,000	52,500	52,300	55,400	54,900	56,200
National Turnpike to Air Commerce Dr.	65,200	72,900	72,200	72,800	72,300	72,300
Air Commerce Dr. to I-65	65,200	76,100	72,200	76,000	72,300	72,300
I-65						
KY 841/I-265 to Outer Loop	128,000	155,600	155,400	155,700	155,800	155,800

** estimated by assuming the same count as SB to EB Ramp*

 # estimated by assuming the same count as complementary ramp movement

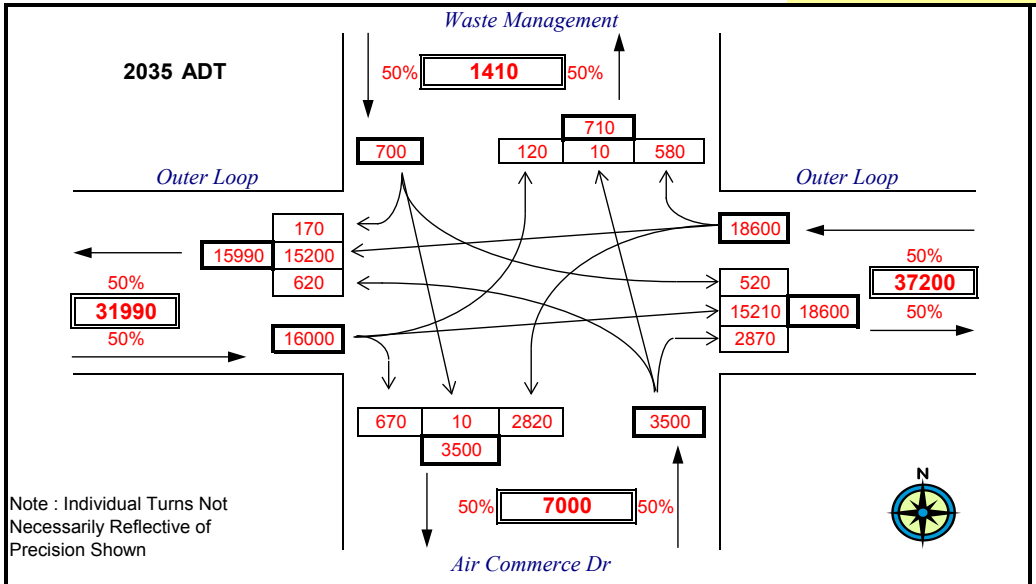
APPENDIX C:
2035 NO BUILD TURNING MOVEMENTS

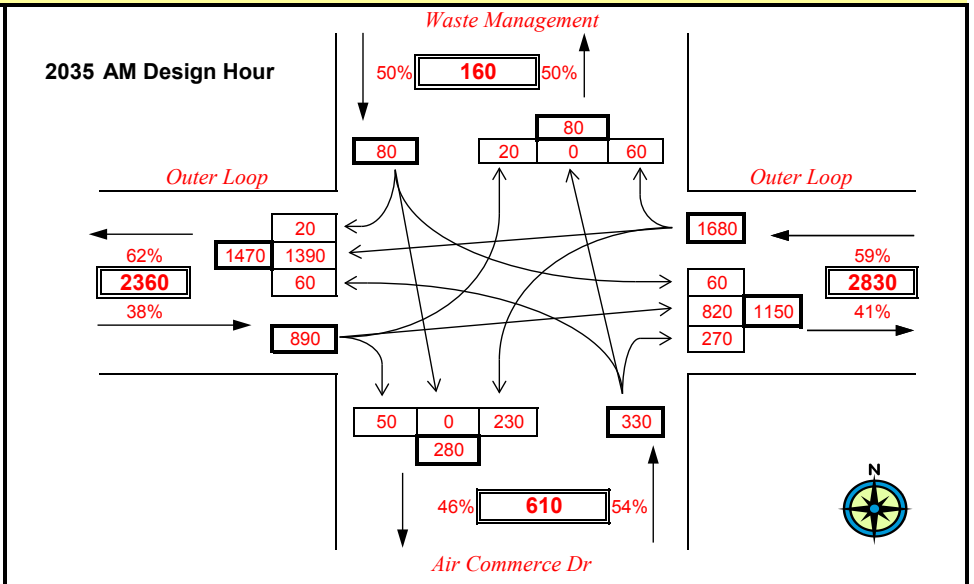
PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE:
ANALYST: 0
YEAR: **2035** **ADT and Design Hour Volumes**
INTERSECTION: KY 1065 & Air Commerce Dr

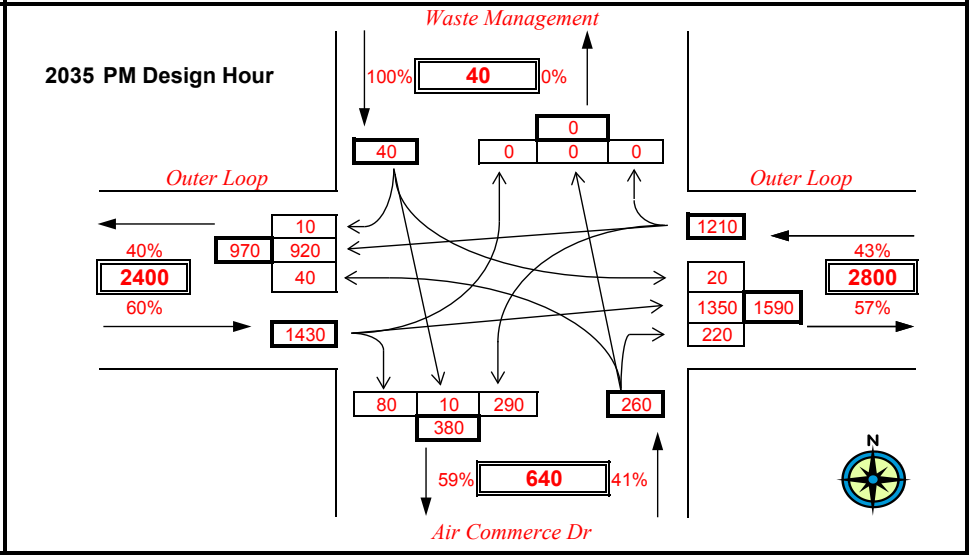
NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2035 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

TURN MOVEMENT 1 (2035)

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







393380 MP 3.20

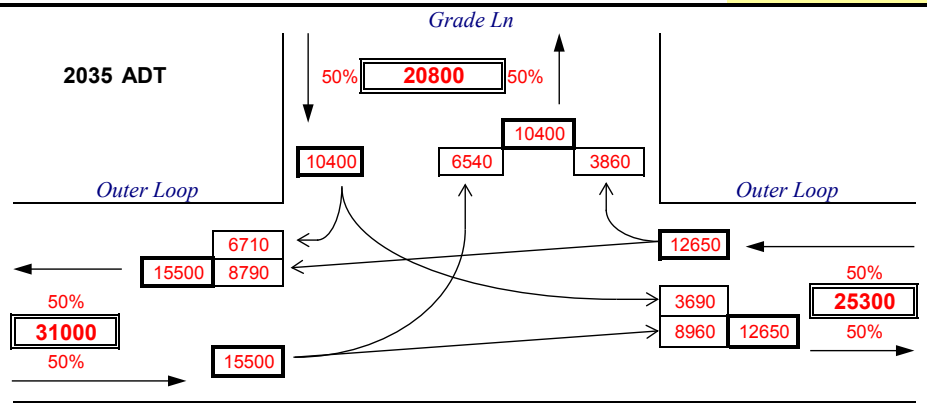
PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE:
ANALYST: 0
YEAR: 2035 **ADT and Design Hour Volumes**
INTERSECTION: KY 1065 & Grade Ln

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2035 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

TURN MOVEMENT 2 (2035)

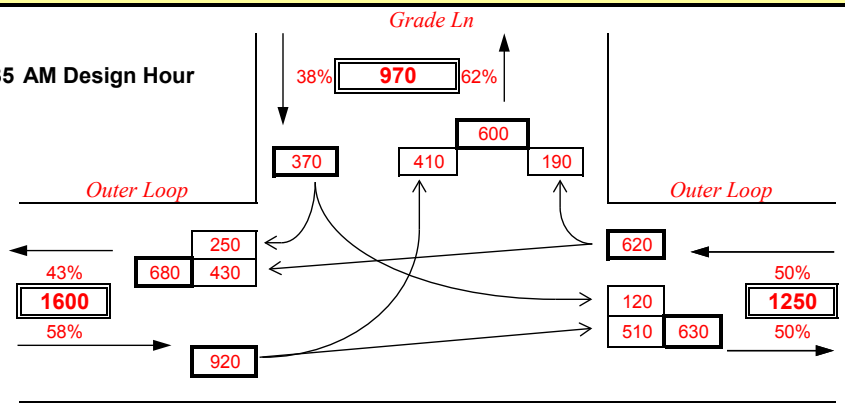
****DHV TURN MOVEMENT FORECASTS SHOULD NOT BE USED FOR SIGNAL TIMING OR WARRANT ANALYSIS**

2035 ADT

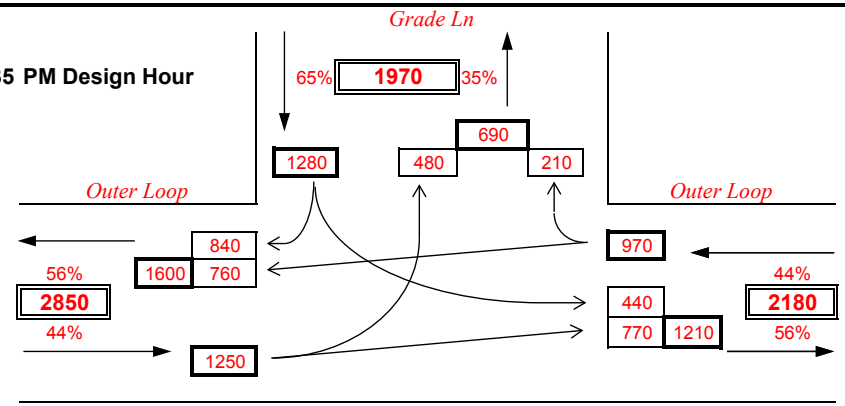


Note : Individual Turns Not Necessarily Reflective of Precision Shown

2035 AM Design Hour



2035 PM Design Hour



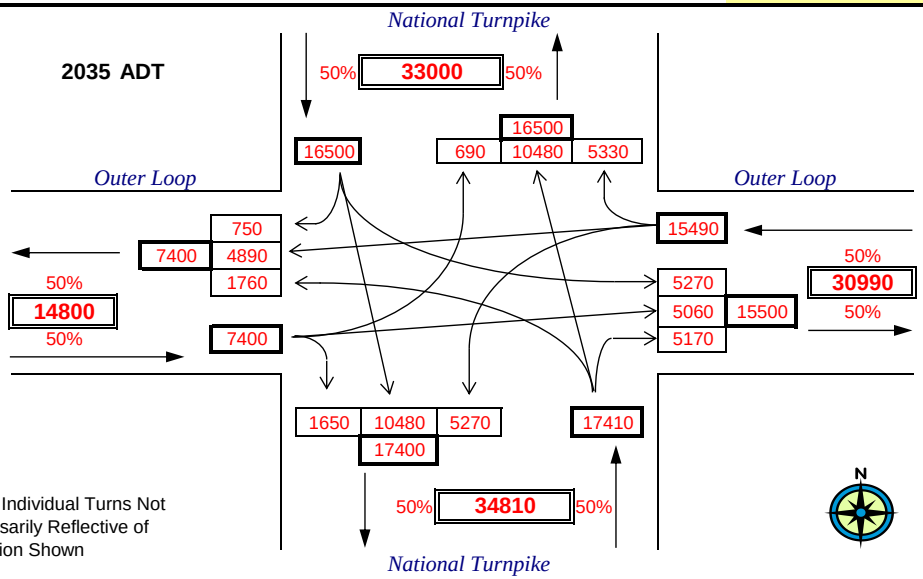
#308096 MP 2.51

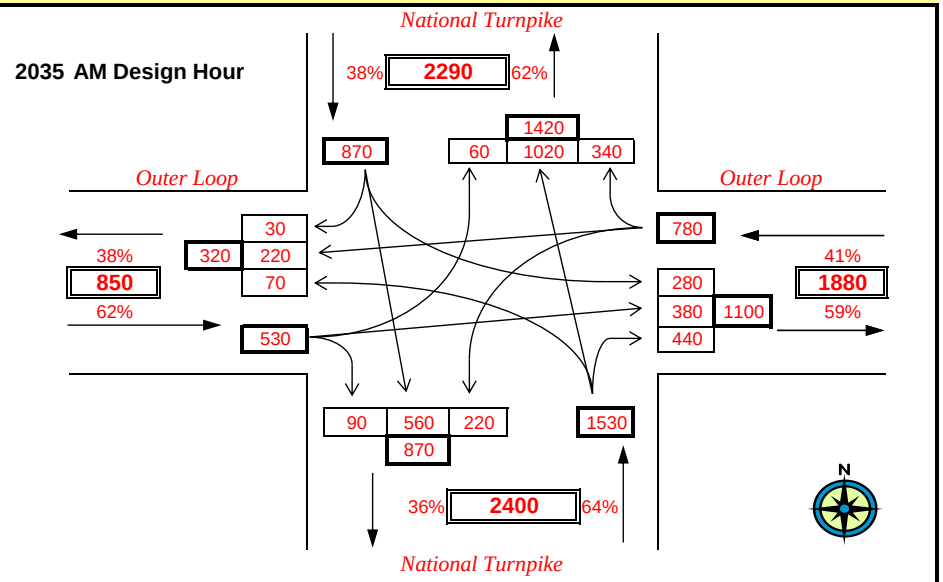
PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE:
ANALYST: 0
YEAR: **2035** **ADT and Design Hour Volumes**
INTERSECTION: KY 1065 & National Turnpike

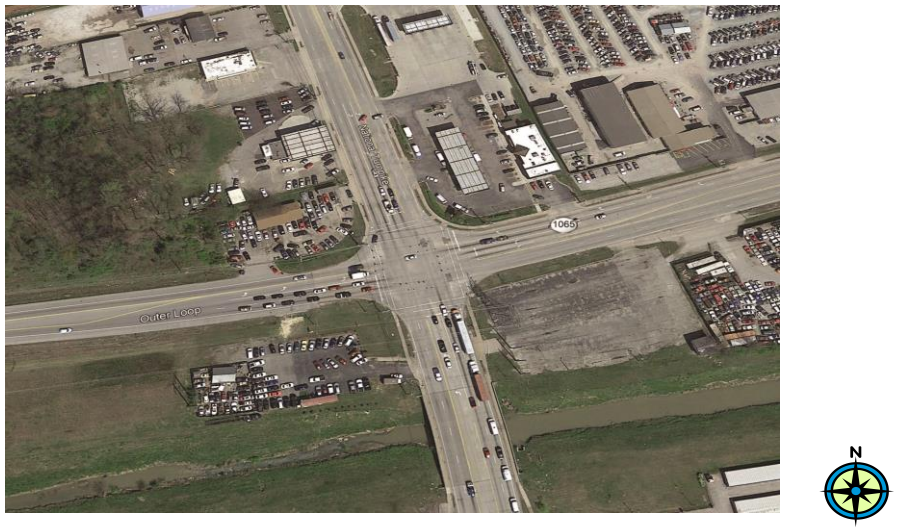
NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2035 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

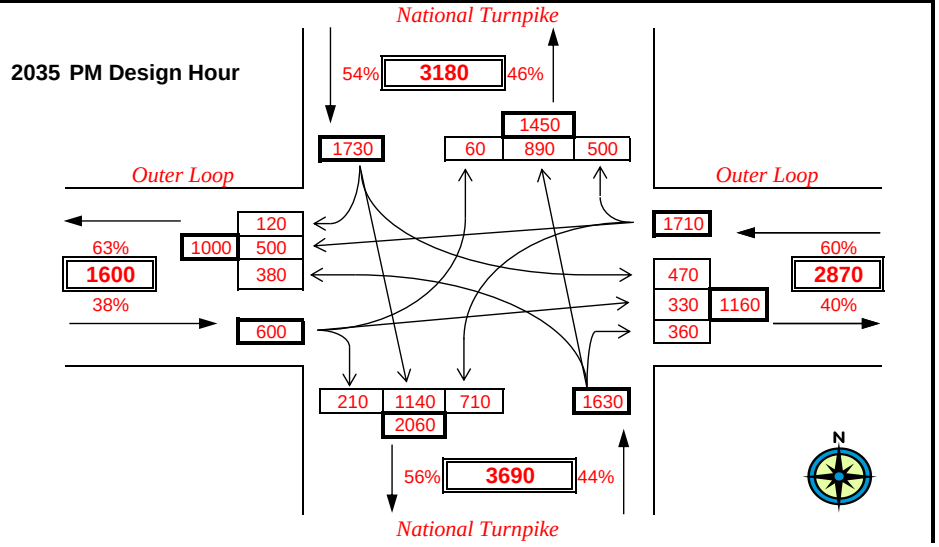
TURN MOVEMENT 3 (2035)

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









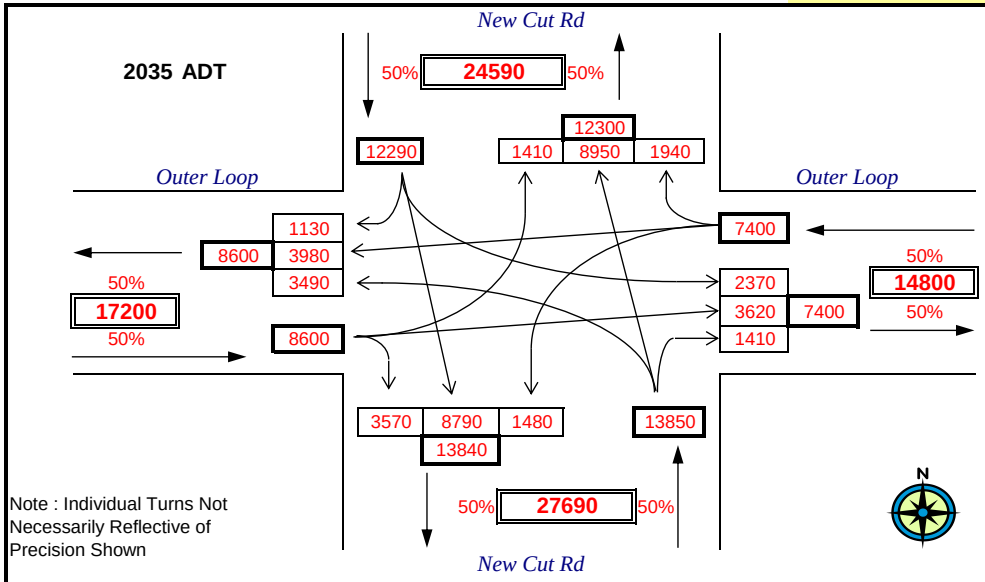
#288509 MP 1.03

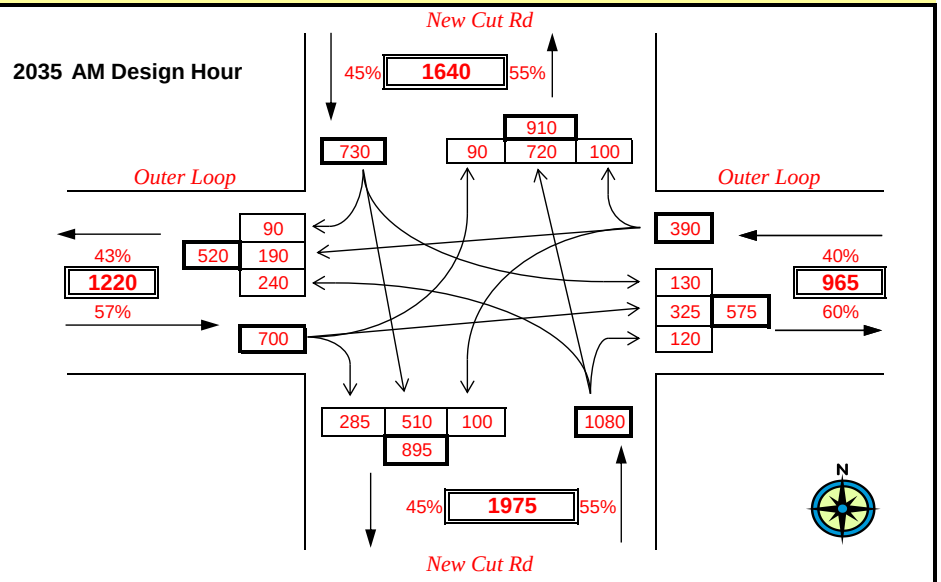
PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE:
ANALYST: 0
YEAR: **2035** **ADT and Design Hour Volumes**
INTERSECTION: KY 1065 & New Cut Rd

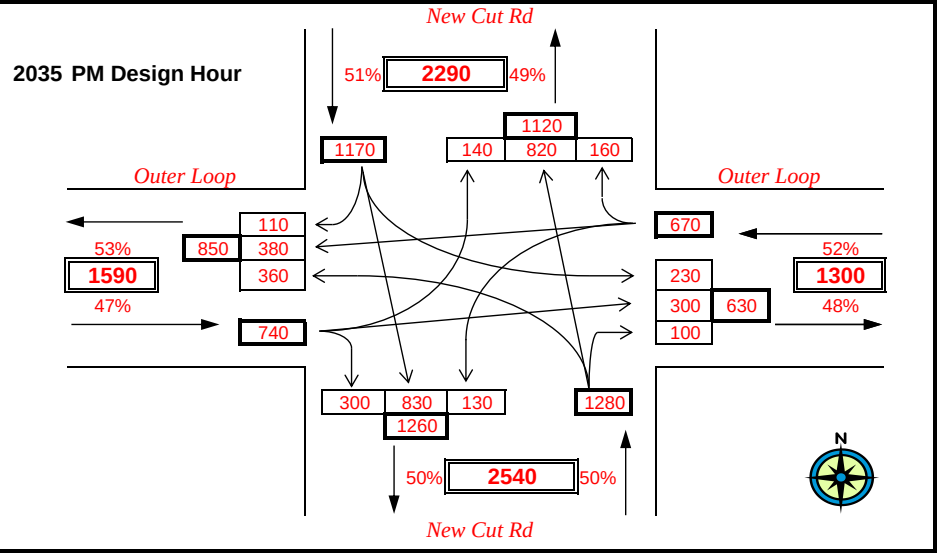
NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2035 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

TURN MOVEMENT 4 (2035)

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







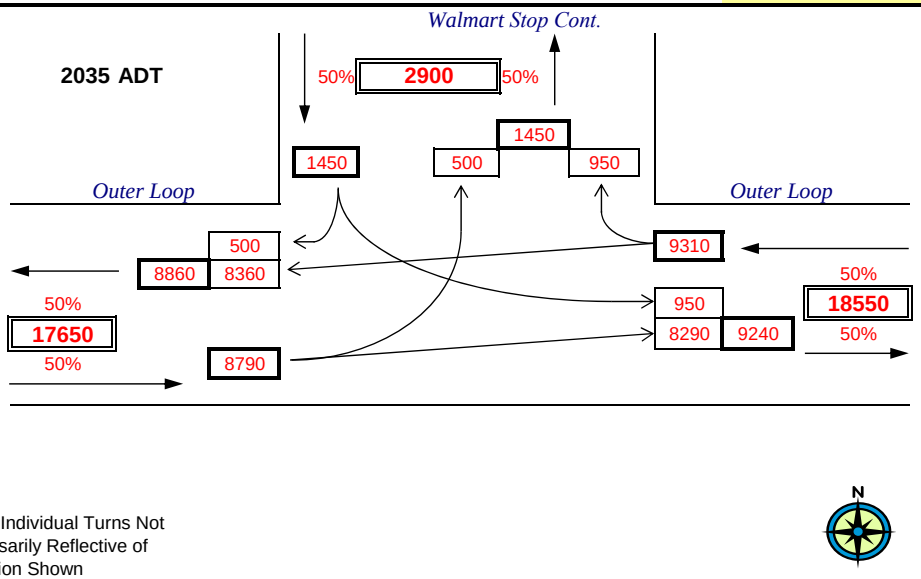
#439103 MP 0.84

PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE:
ANALYST: 0
YEAR: 2035 **ADT and Design Hour Volumes**
INTERSECTION: KY 1065 & Walmart Stop Controlled Entrance

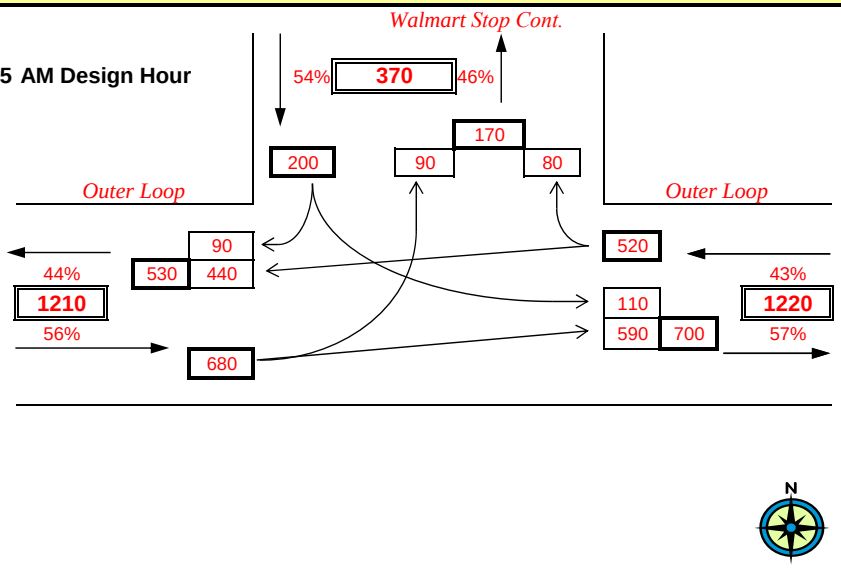
NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2035 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

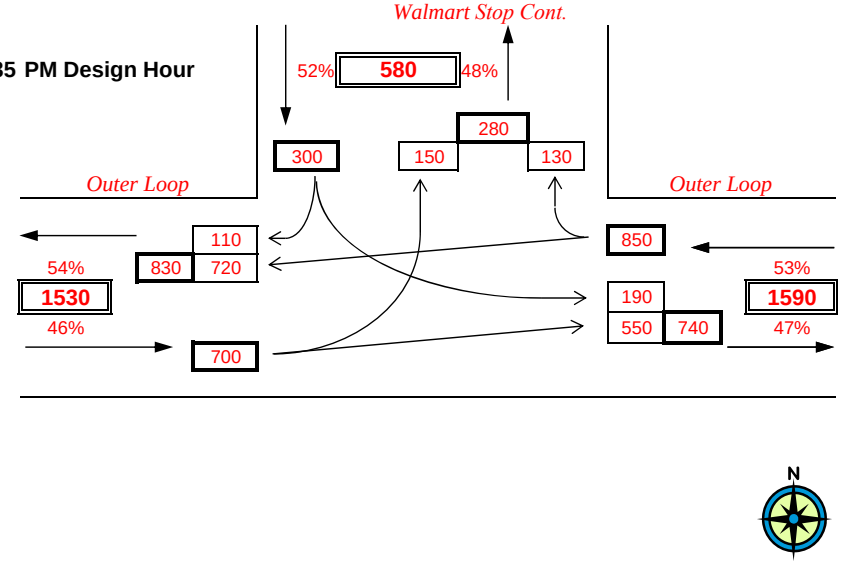
TURN MOVEMENT 5 (2035)

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



Note : Individual Turns Not Necessarily Reflective of Precision Shown





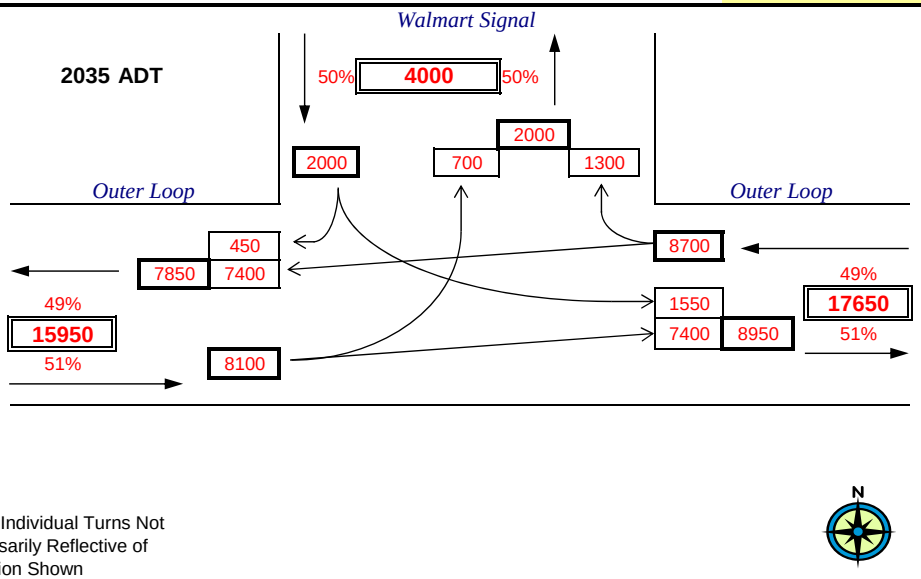
#439099 MP 0.70

PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE:
ANALYST: 0
YEAR: **2035** **ADT and Design Hour Volumes**
INTERSECTION: KY 1065 & Signalized Walmart Entrance

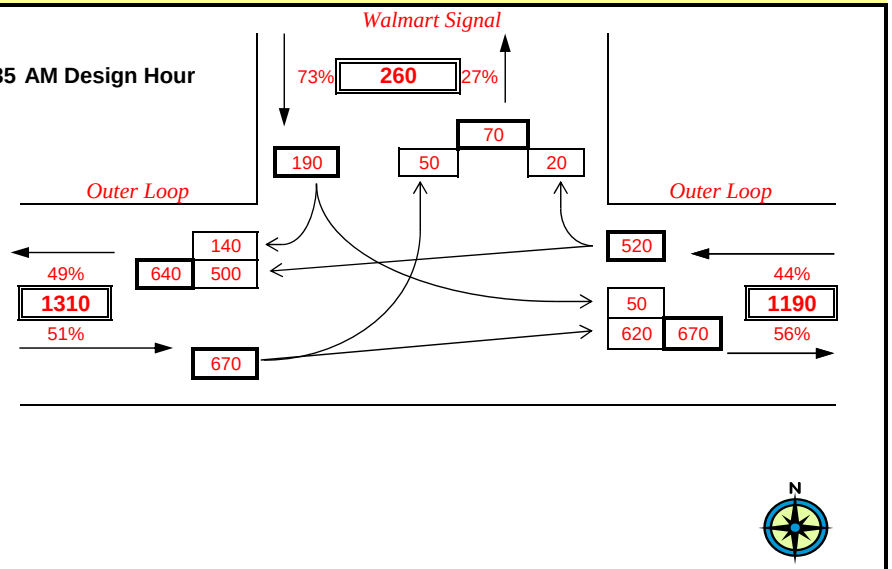
NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2035 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

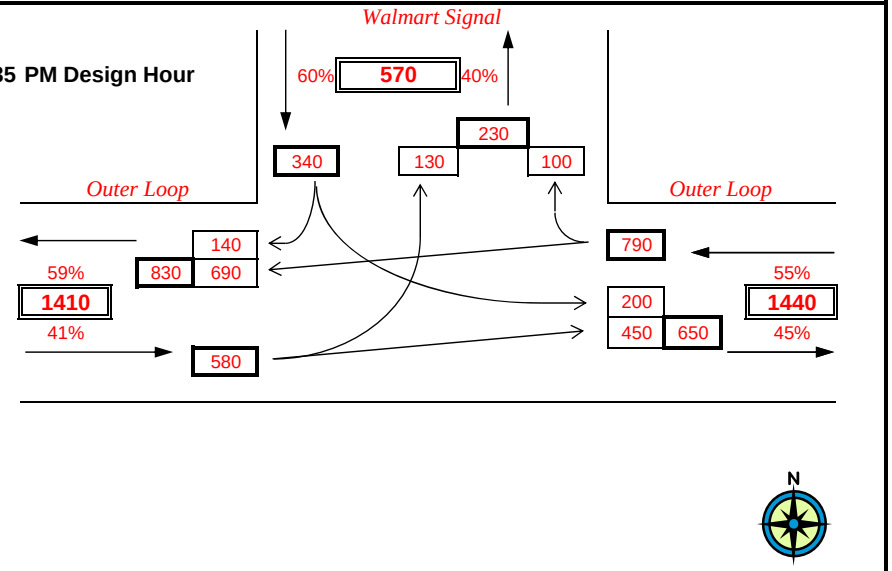
TURN MOVEMENT 6 (2035)

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



Note : Individual Turns Not Necessarily Reflective of Precision Shown





#439109 MP 0.0

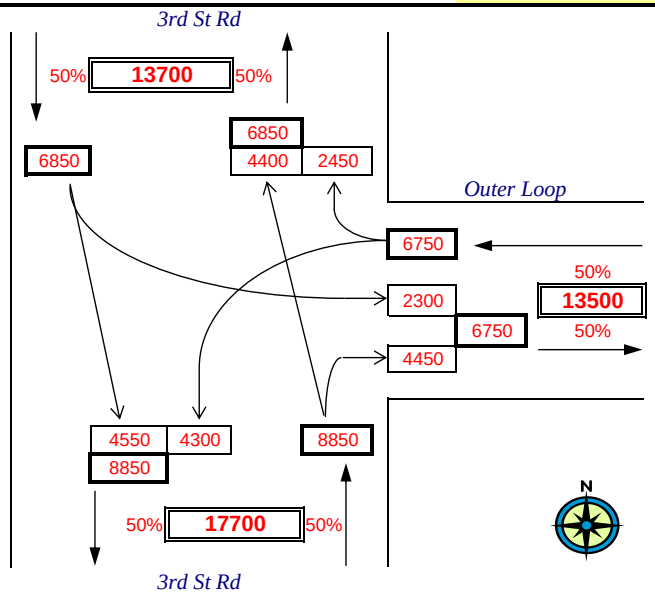
PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE:
ANALYST: 0
YEAR: **2035** **ADT and Design Hour Volumes**
INTERSECTION: KY 1065 & 3rd St Rd

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2035 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

TURN MOVEMENT 7 (2035)

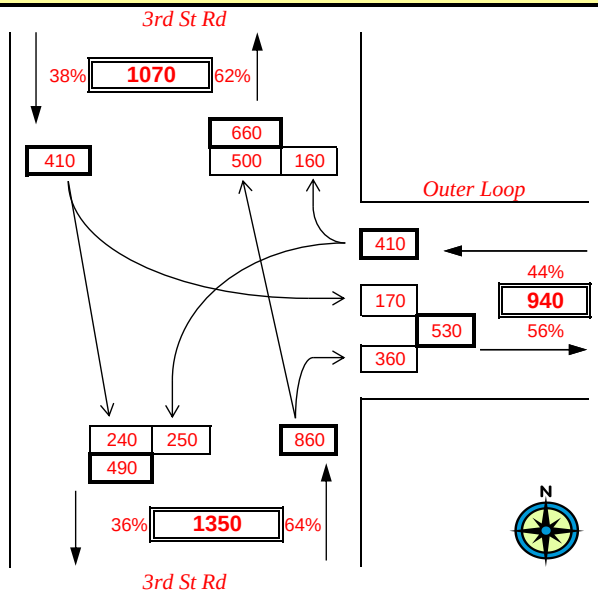
****DHV TURN MOVEMENT FORECASTS SHOULD NOT BE USED FOR SIGNAL TIMING OR WARRANT ANALYSIS**

2035 ADT

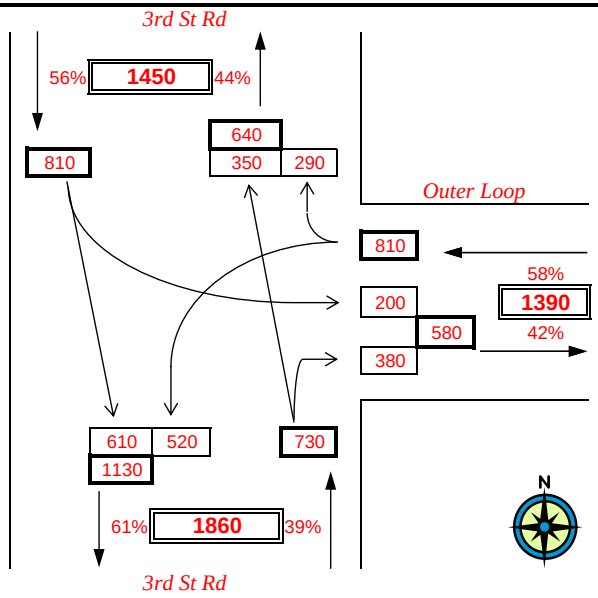


Note : Individual Turns Not Necessarily Reflective of Precision Shown

2035 AM Design Hour



2035 PM Design Hour



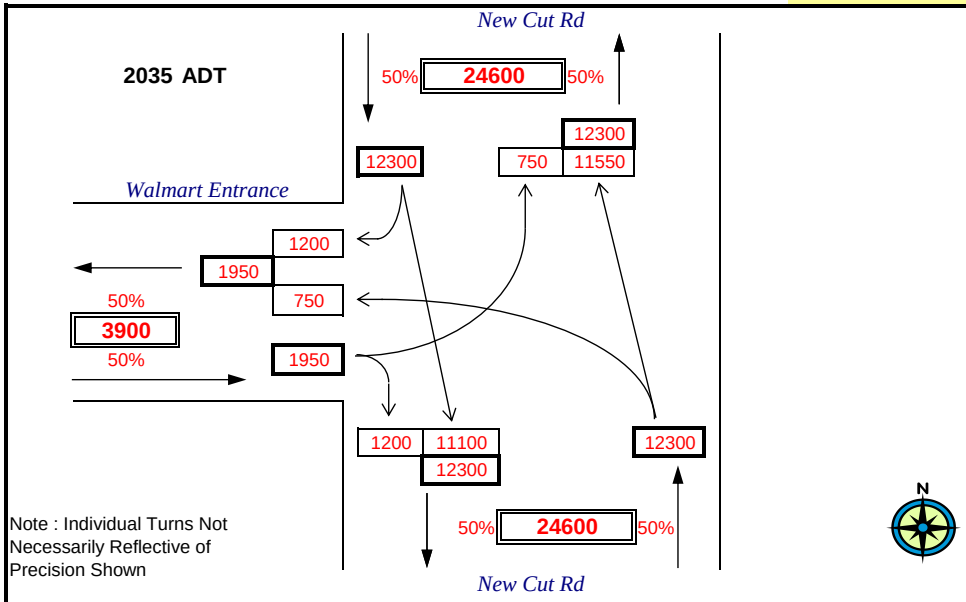
#439103 MP 1.30

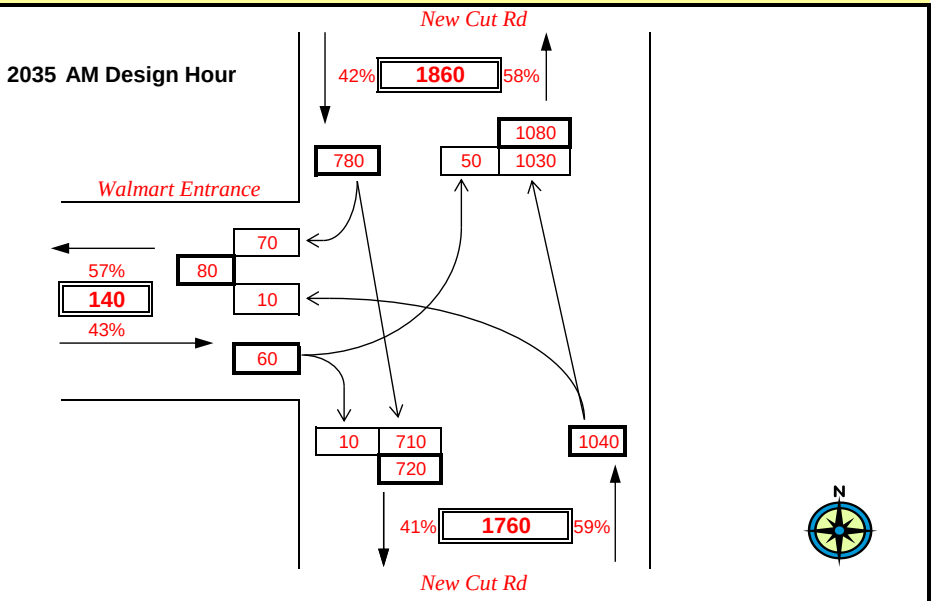
PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE:
ANALYST: 0
YEAR: **2035** **ADT and Design Hour Volumes**
INTERSECTION: New Cut Rd & Walmart Entrance

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2035 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

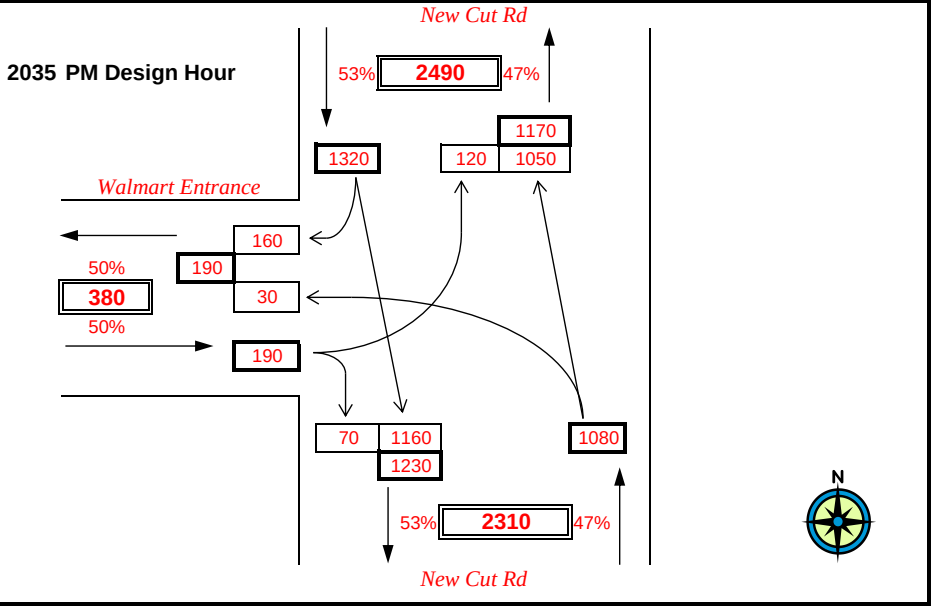
TURN MOVEMENT 8 (2035)

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





Location Map



APPENDIX D:
2035 BUILD TURNING MOVEMENTS
Alternative 1

Alternative 1 (widens Outer Loop to three-lanes—two lanes plus a center TWLTL TWLTL—from 3rd Street Road (MP 0.000) to the existing three-lane section east of Candleworth Drive (MP 0.587). Three lanes continue east to Als Way (MP 1.139). The 0.517-mile section, from Als Way across Outer Loop Bridge to east of F.O.E Derby City, remains two lanes due to limited access points and no expected future development. Outer Loop widens to three-lanes again east of F.O.E Derby City (MP 1.657) to National Turnpike (MP 2.445).

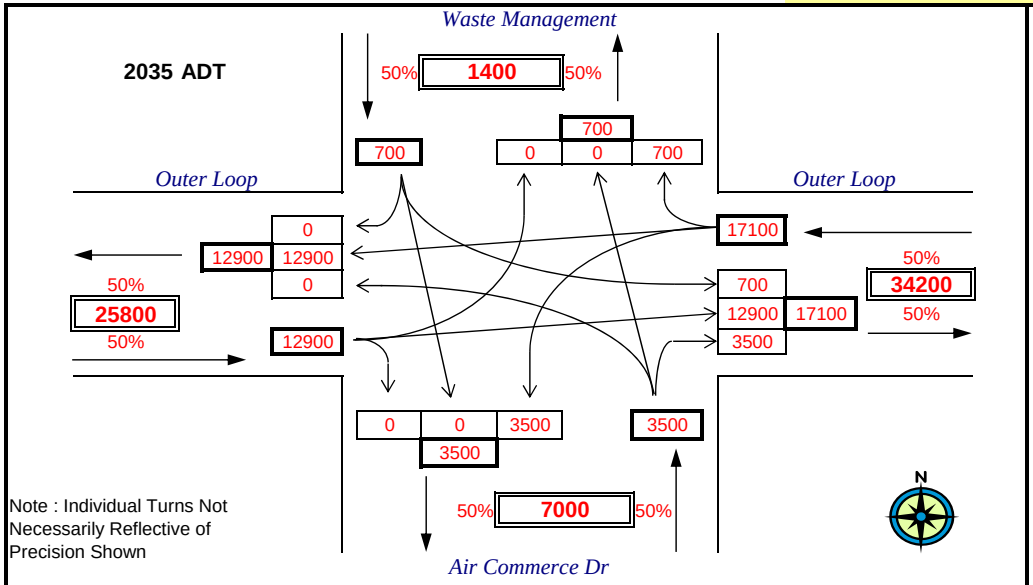
#439112 MP 3.80 ALT 1

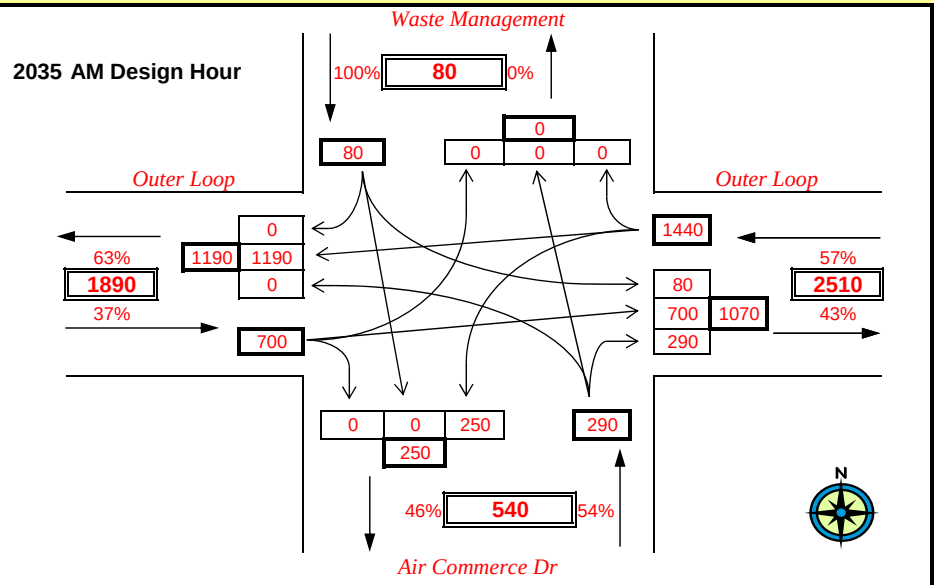
PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE:
ANALYST: 0
YEAR: **2035** **ADT and Design Hour Volumes**
INTERSECTION: KY 1065 & Air Commerce Dr

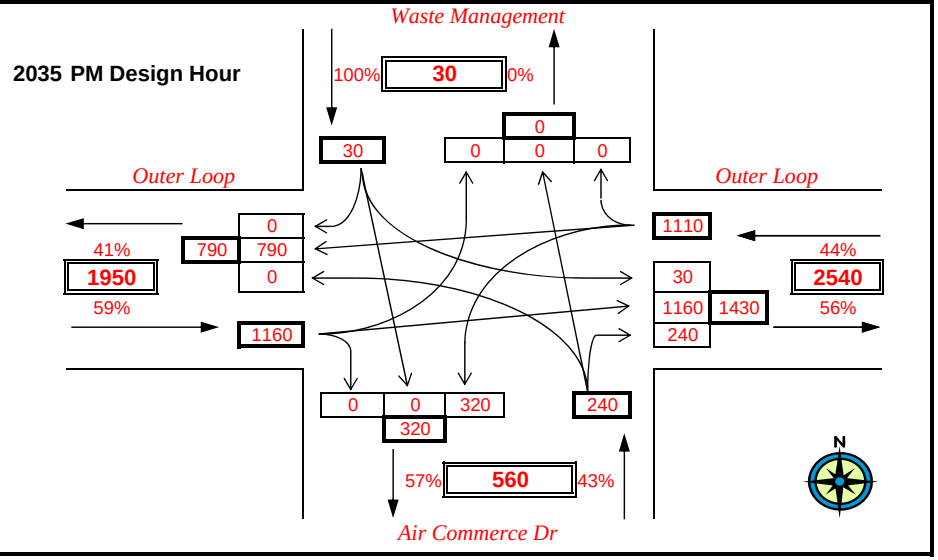
NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2035 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

TURN MOVEMENT 1 (2035)

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







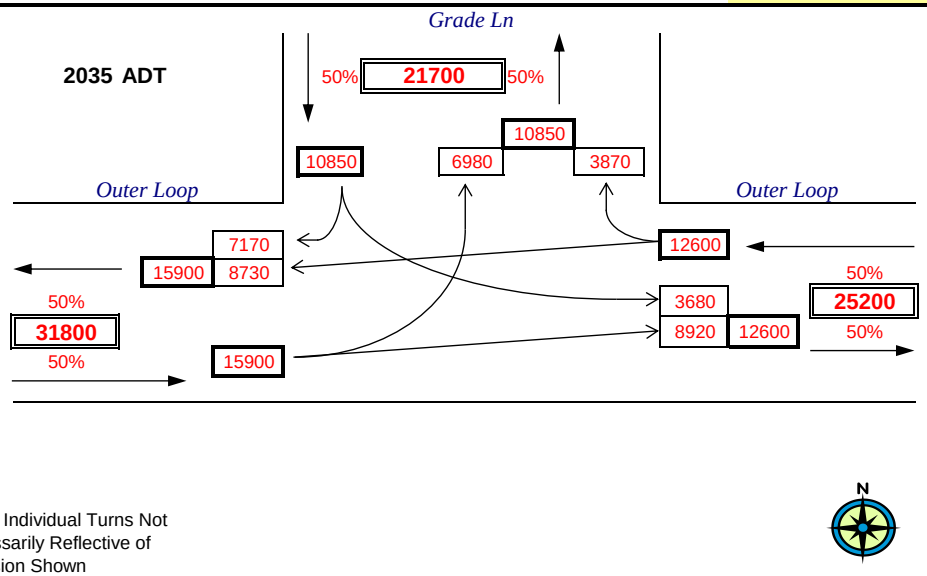
#393380 MP 3.20 ALT 1

PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE:
ANALYST: 0
YEAR: 2035 **ADT and Design Hour Volumes**
INTERSECTION: KY 1065 & Grade Ln

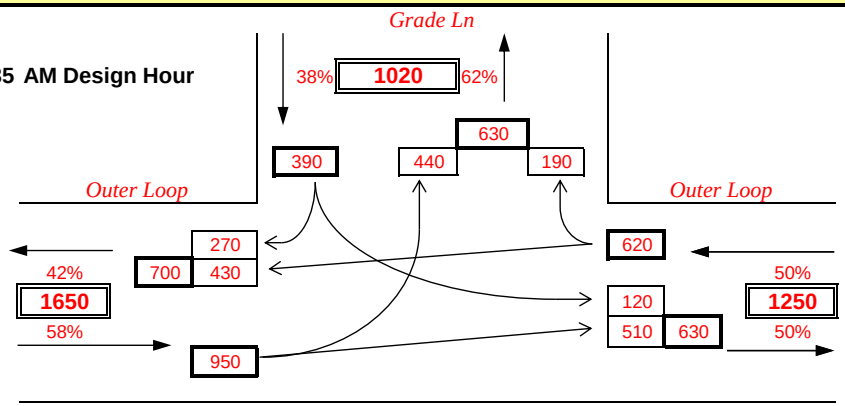
NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2035 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

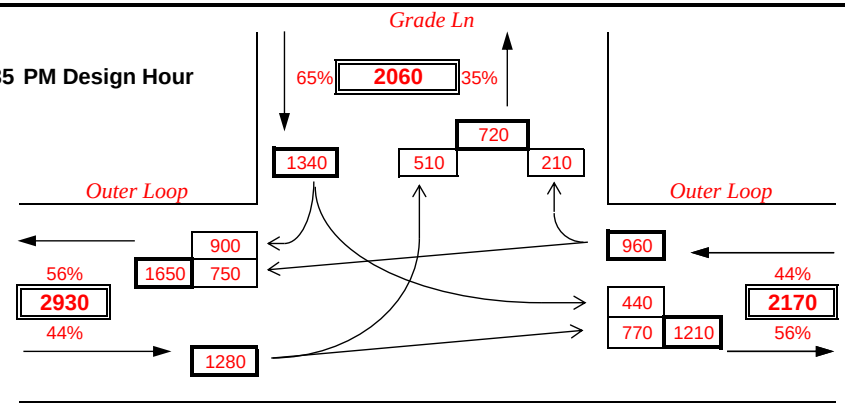
TURN MOVEMENT 2 (2035)

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



Note : Individual Turns Not Necessarily Reflective of Precision Shown





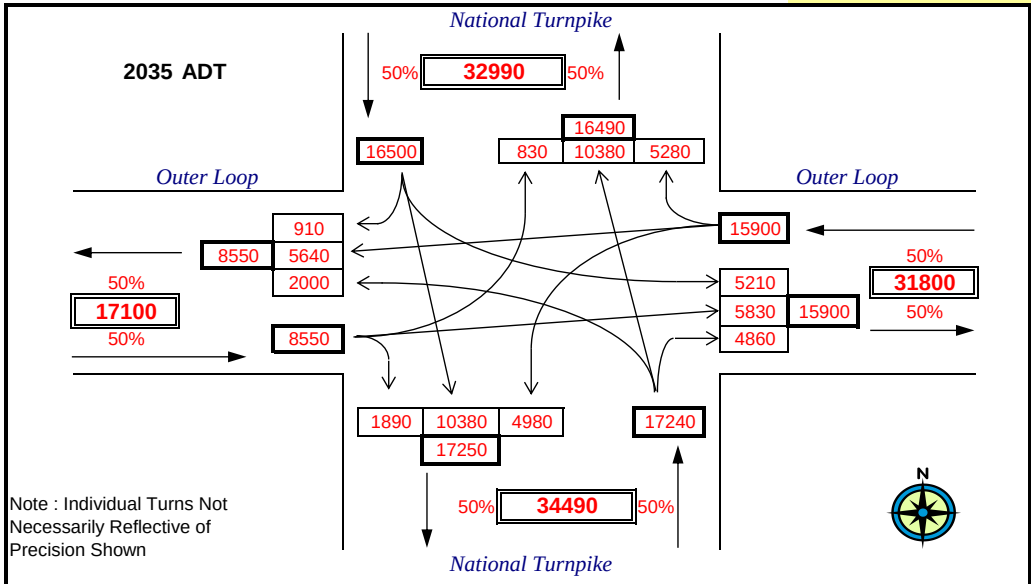
#308096 MP 2.51 ALT 1

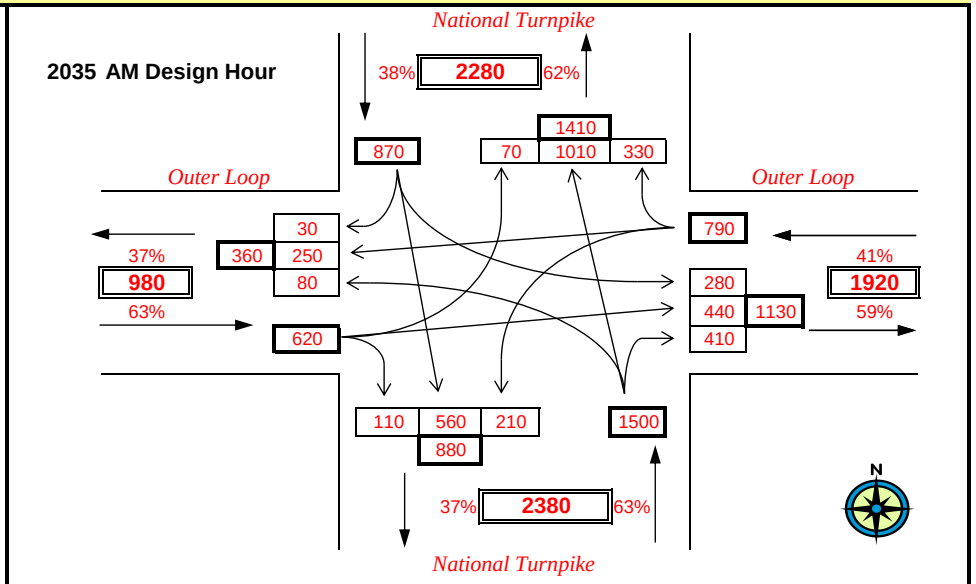
PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE:
ANALYST: 0
YEAR: **2035** **ADT and Design Hour Volumes**
INTERSECTION: KY 1065 & National Turnpike

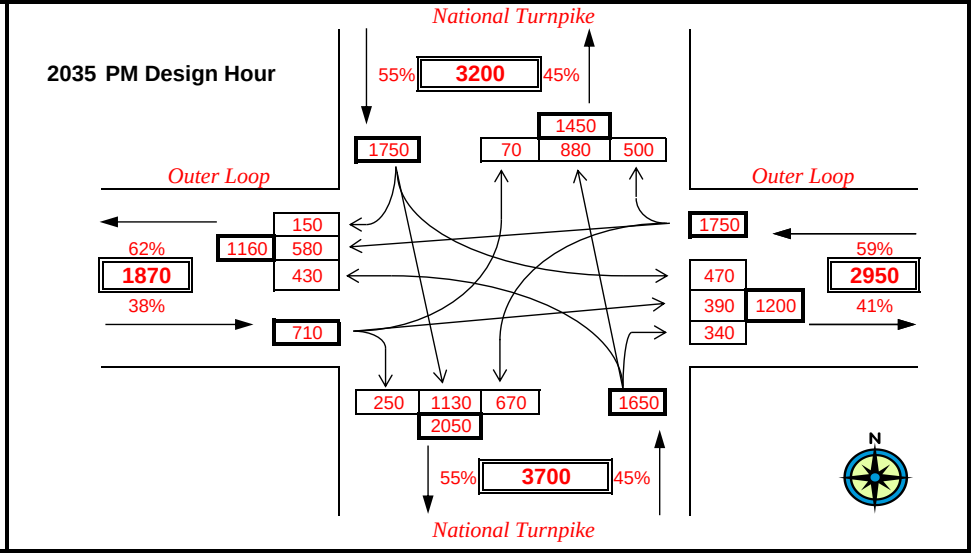
NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2035 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

TURN MOVEMENT 3 (2035)

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







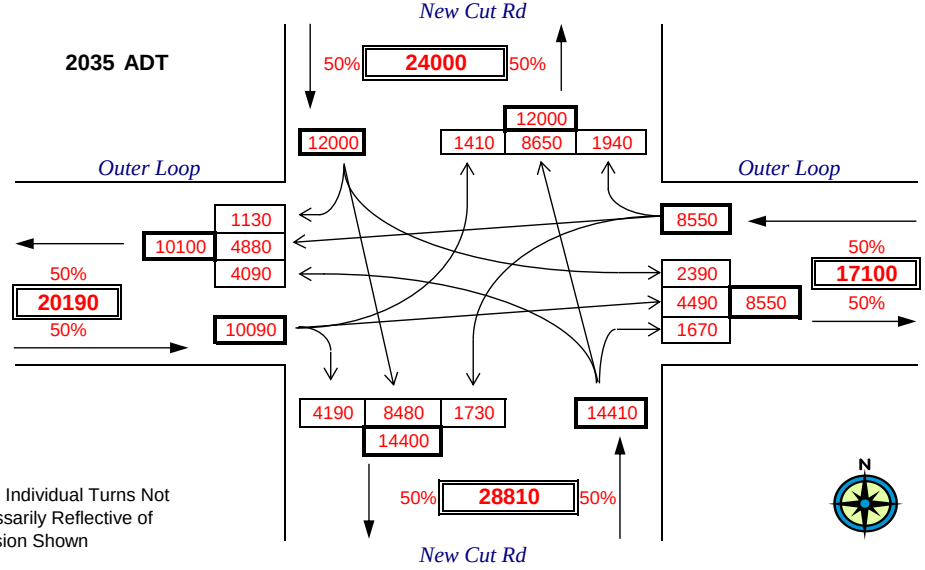
#288509 MP 1.03 ALT 1

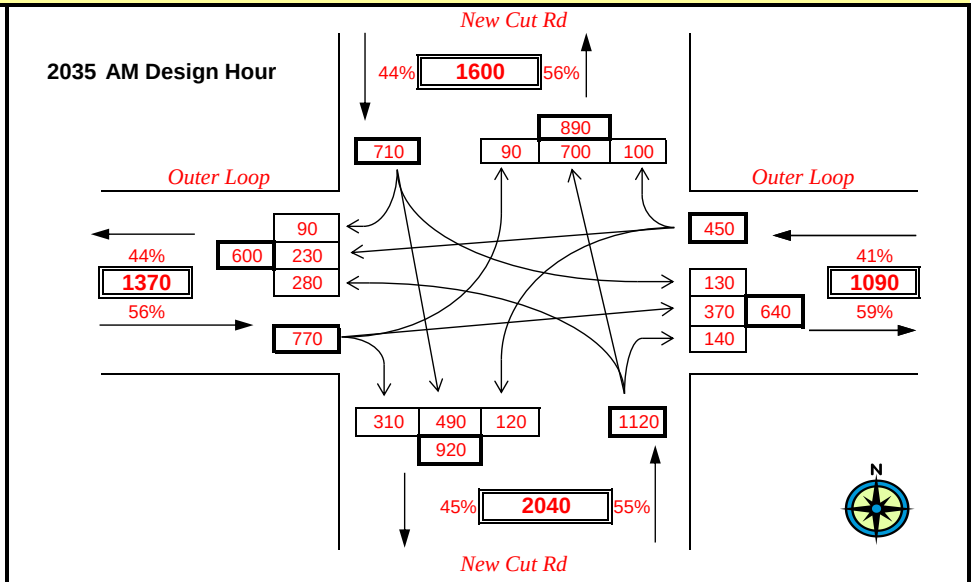
PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE:
ANALYST: 0
YEAR: **2035** **ADT and Design Hour Volumes**
INTERSECTION: KY 1065 & New Cut Rd

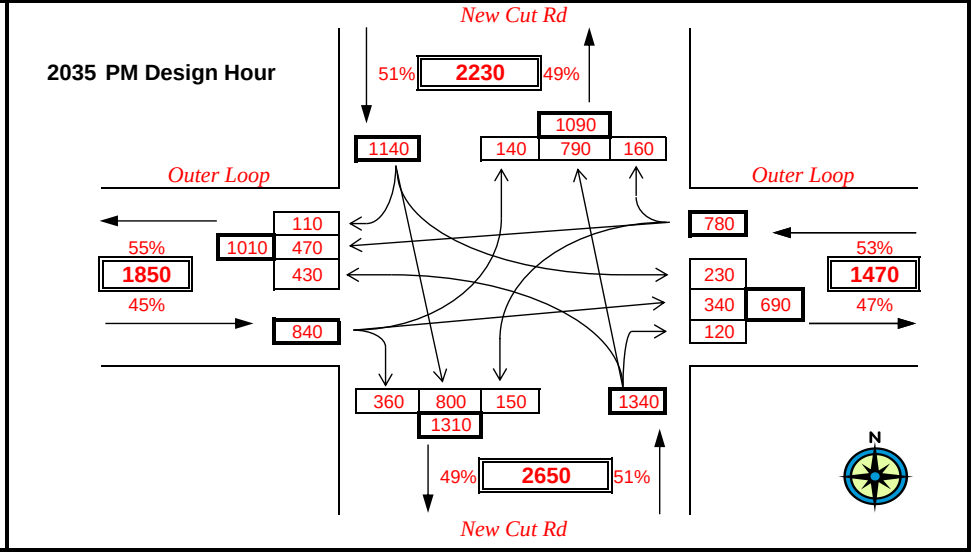
NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2035 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

TURN MOVEMENT 4 (2035)

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







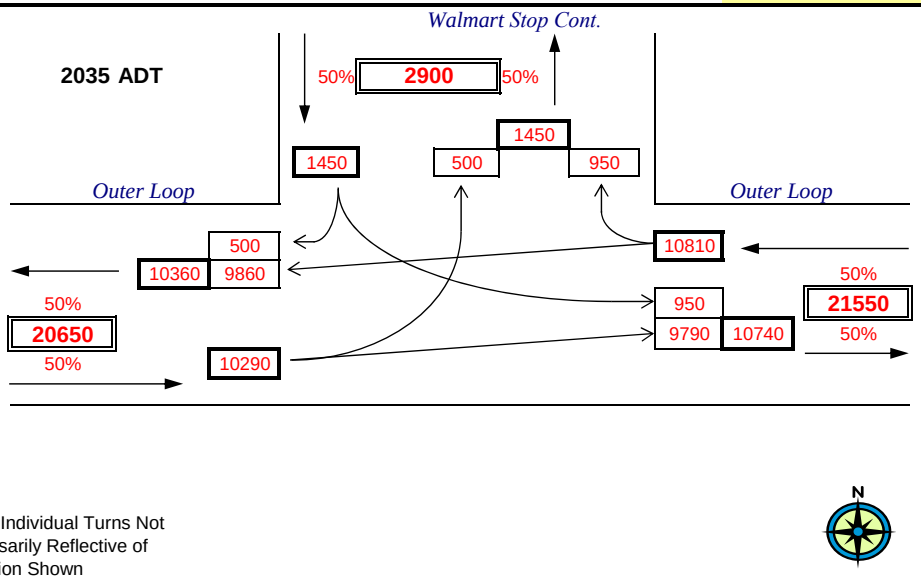
#439103 MP 0.84 ALT 1

PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE:
ANALYST: 0
YEAR: **2035** **ADT and Design Hour Volumes**
INTERSECTION: KY 1065 & Walmart Stop Controlled Entrance

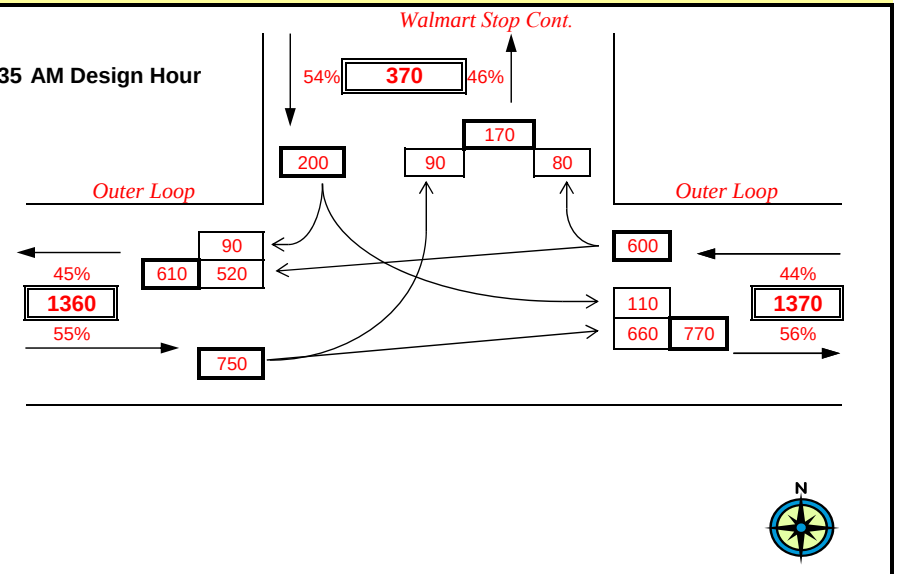
NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2035 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

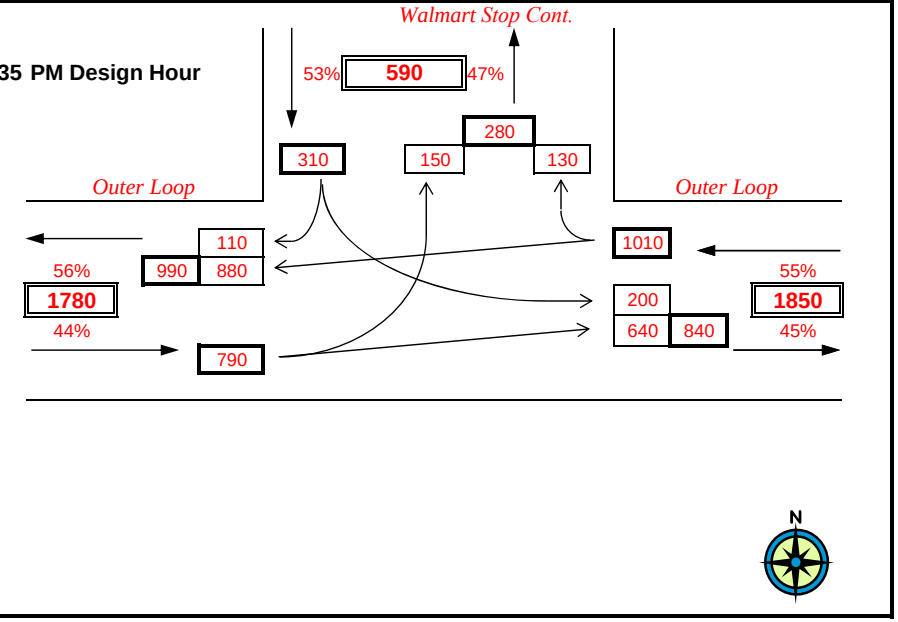
TURN MOVEMENT 5 (2035)

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



Note : Individual Turns Not Necessarily Reflective of Precision Shown





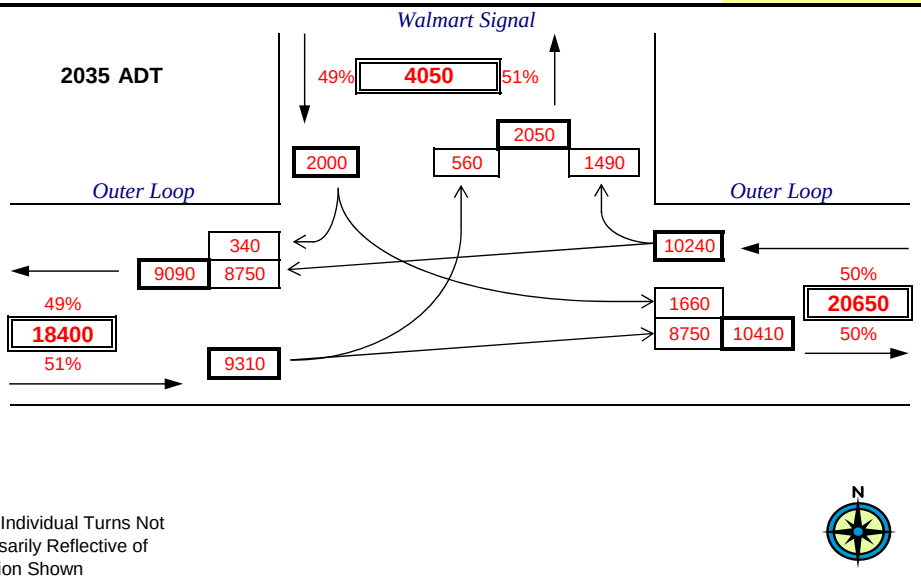
#439099 MP 0.70 ALT 1

PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE:
ANALYST: 0
YEAR: **2035** **ADT and Design Hour Volumes**
INTERSECTION: KY 1065 & Signalized Walmart Entrance

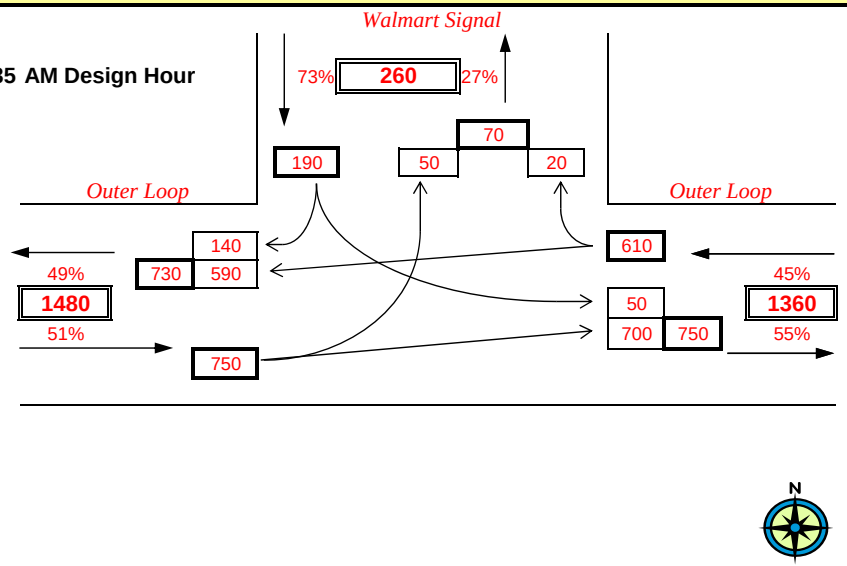
NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2035 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

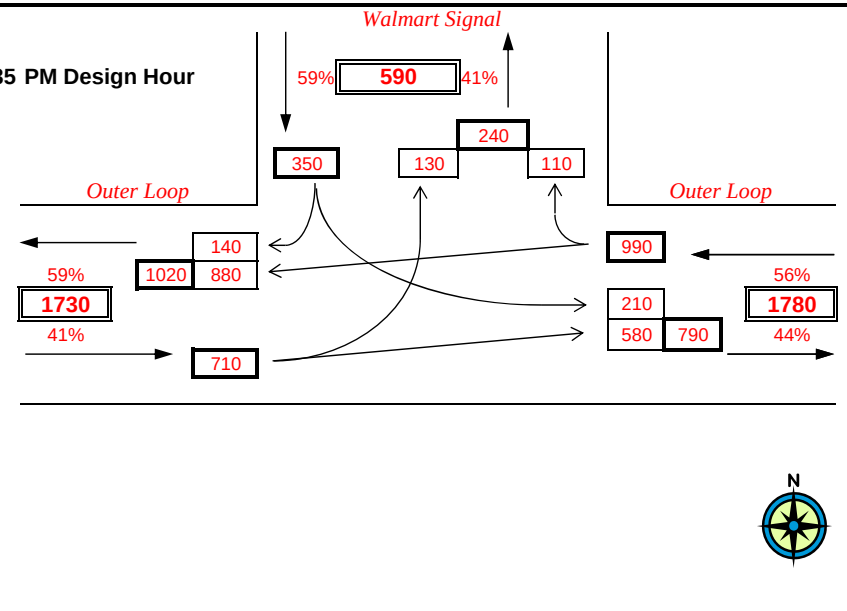
TURN MOVEMENT 6 (2035)

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



Note : Individual Turns Not Necessarily Reflective of Precision Shown





#439109 MP 0.00 ALT 1

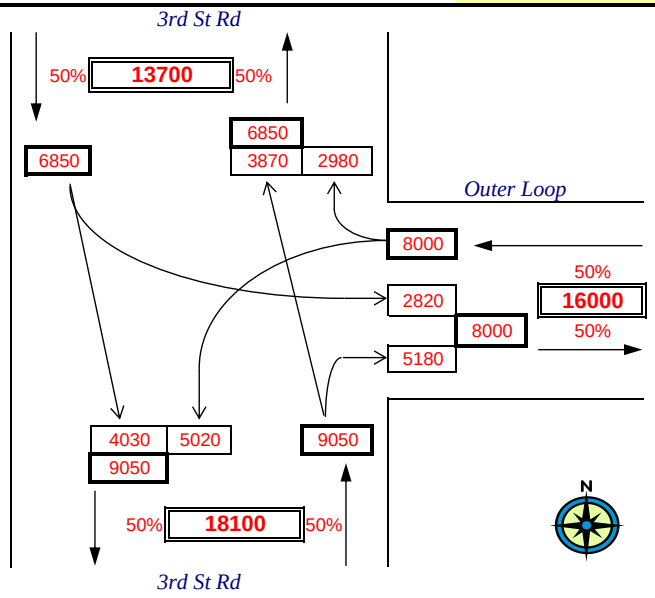
PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE:
ANALYST: 0
YEAR: **2035** **ADT and Design Hour Volumes**
INTERSECTION: KY 1065 & 3rd St Rd

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2035 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

TURN MOVEMENT 7 (2035)

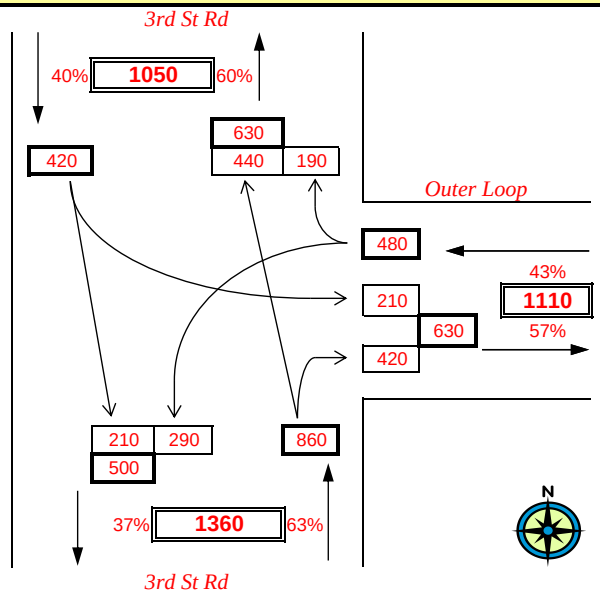
****DHV TURN MOVEMENT FORECASTS SHOULD NOT BE USED FOR SIGNAL TIMING OR WARRANT ANALYSIS**

2035 ADT

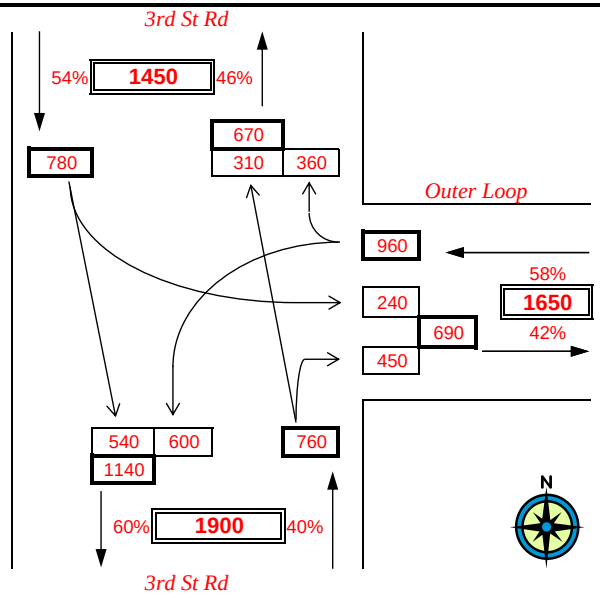


Note : Individual Turns Not Necessarily Reflective of Precision Shown

2035 AM Design Hour



2035 PM Design Hour



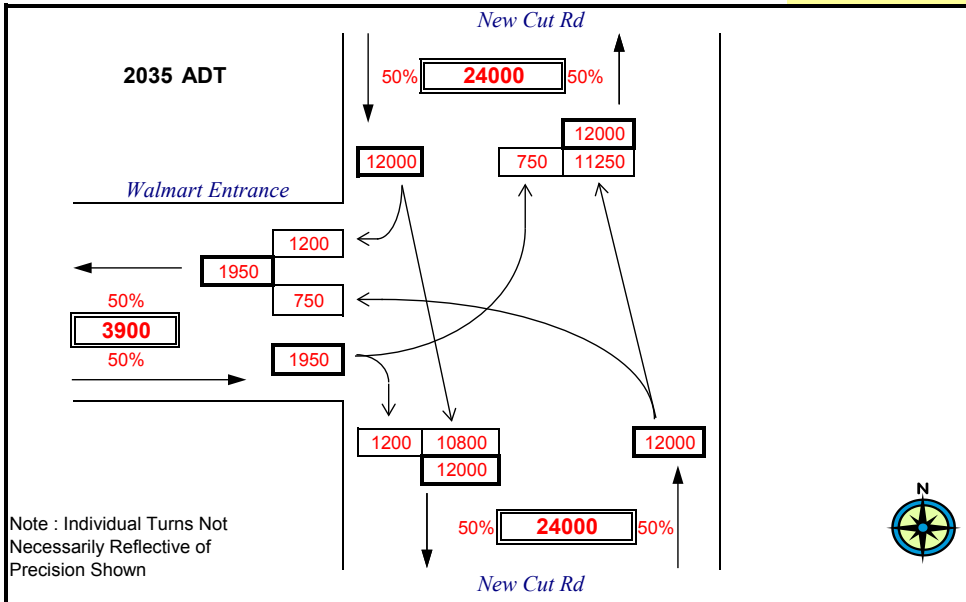
#439103 MP 1.30 ALT 1

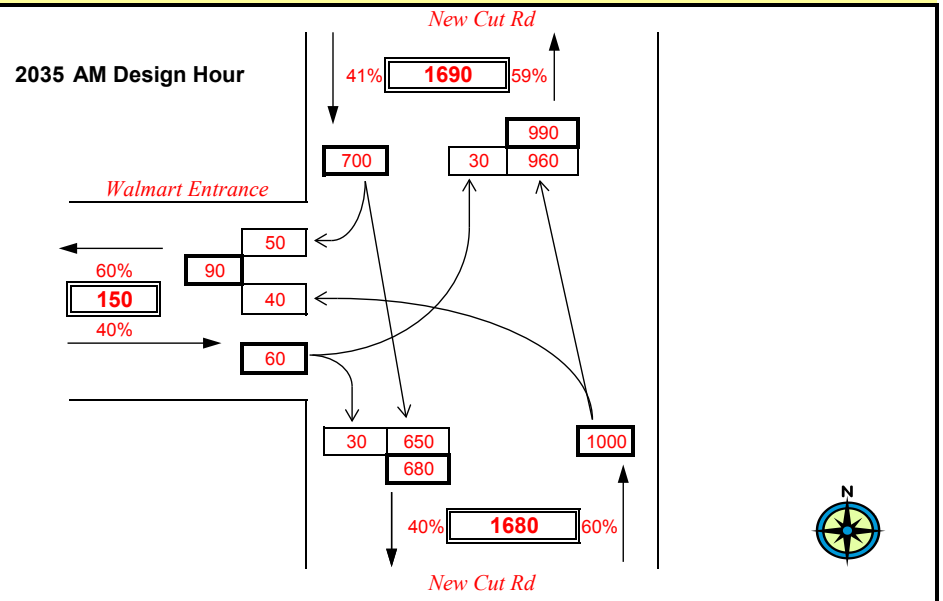
PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE:
ANALYST: 0
YEAR: 2035 **ADT and Design Hour Volumes**
INTERSECTION: New Cut Rd & Walmart Entrance

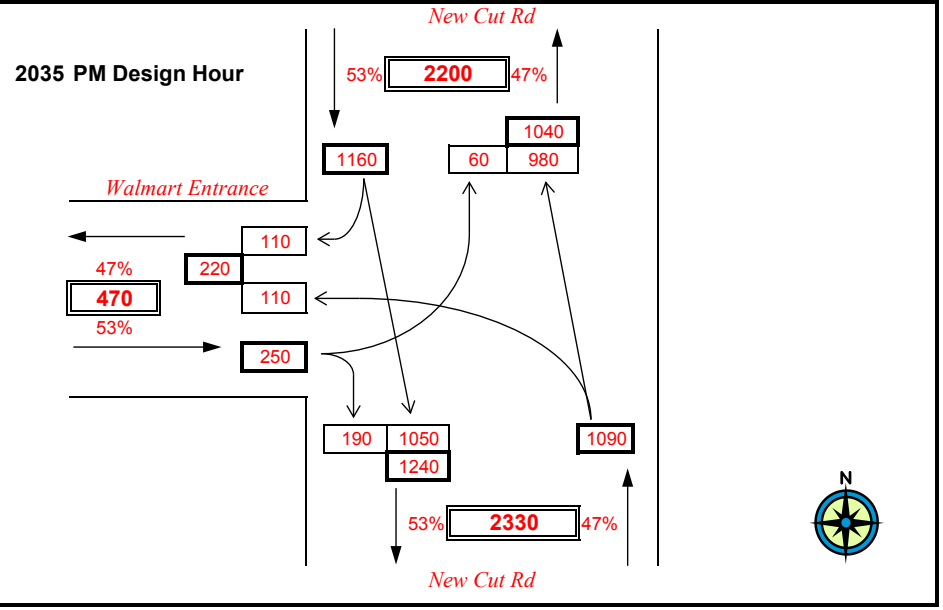
NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2035 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

TURN MOVEMENT 8 (2035)

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







APPENDIX E:
2035 BUILD TURNING MOVEMENTS

ALTERNATIVE 2

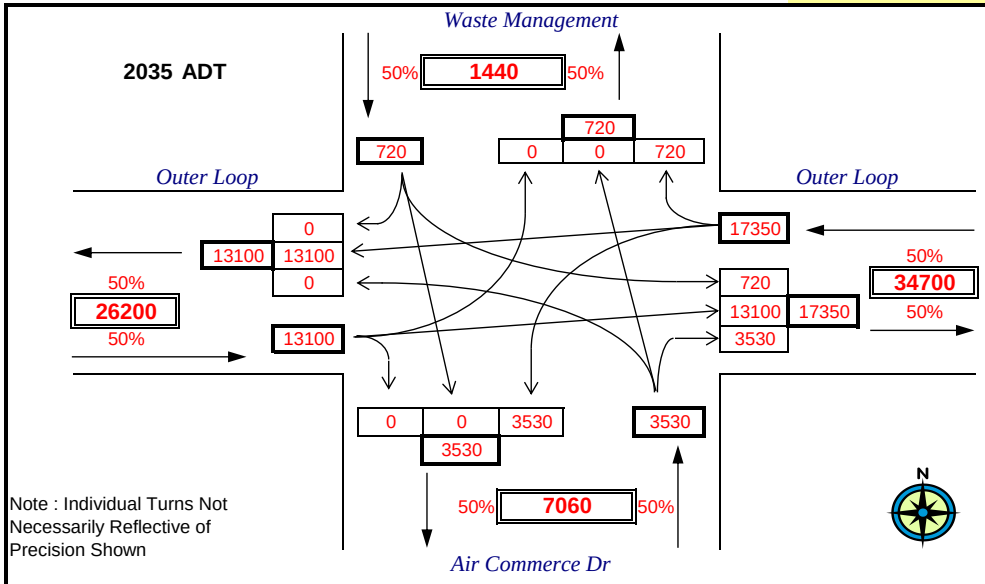
Alternative 2 (widens Outer Loop to three-lanes—two lanes plus a center TWLTL—from 3rd Street Road (MP 0.000) to Candleworth Drive (MP 0.481). A five-lane typical section—four lanes plus a center TWLTL— begins at Candleworth Drive and continues to Als Way (MP 1.151). The TWLTL is replaced with a median creating a four-lane typical section from Als Way across the Outer Loop Bridge to east of F.O.E. Derby City (MP 1.521) then transitioning to the five-lane typical section east to National Turnpike (MP 2.436)

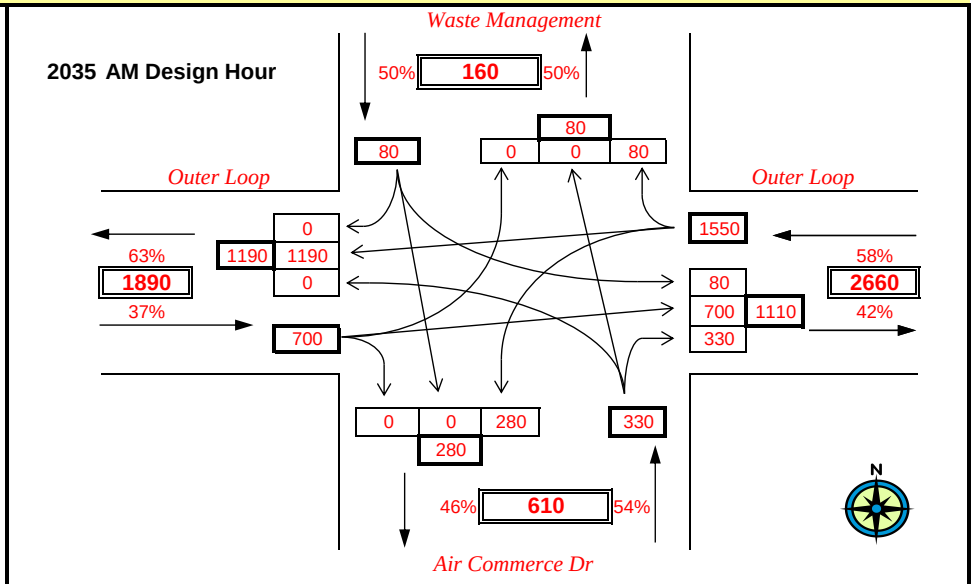
PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE:
ANALYST: 0
YEAR: **2035** **ADT and Design Hour Volumes** ALT 2
INTERSECTION: KY 1065 & Air Commerce Dr

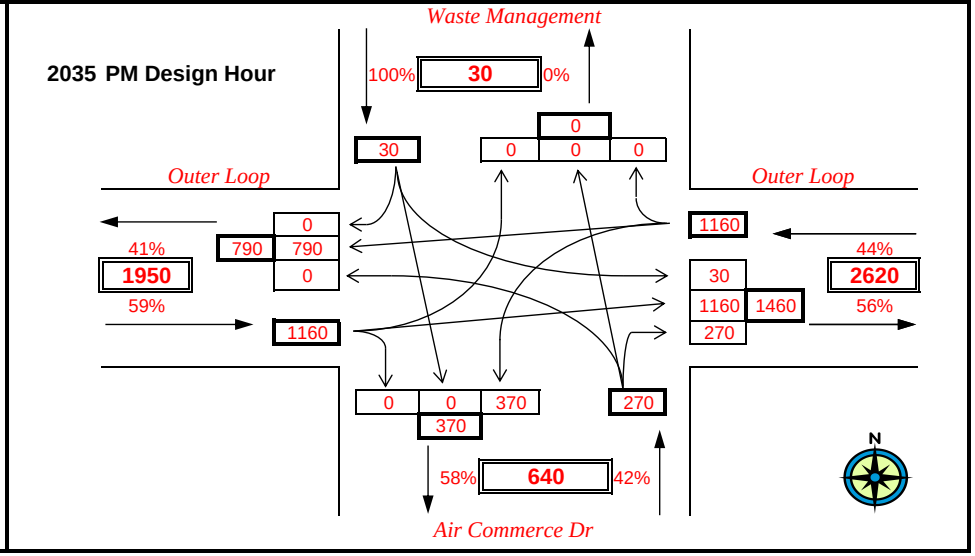
NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2035 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

TURN MOVEMENT 1 (2035)

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





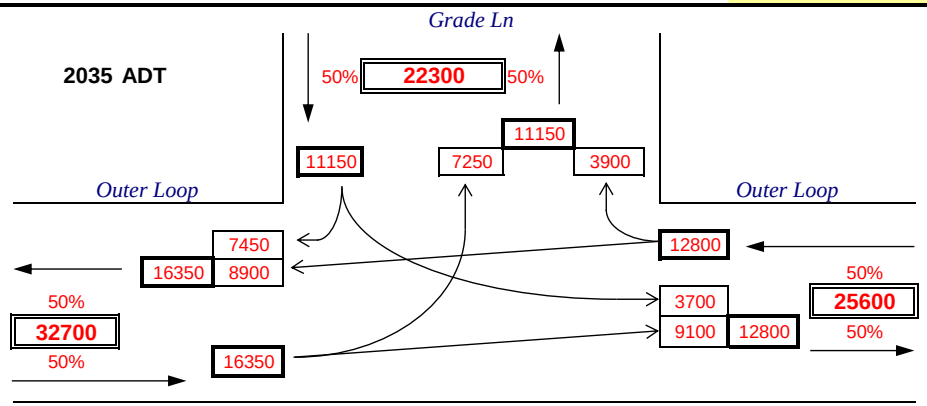


PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE:
ANALYST: 0
YEAR: 2035 **ADT and Design Hour Volumes ALT 2**
INTERSECTION: KY 1065 & Grade Ln

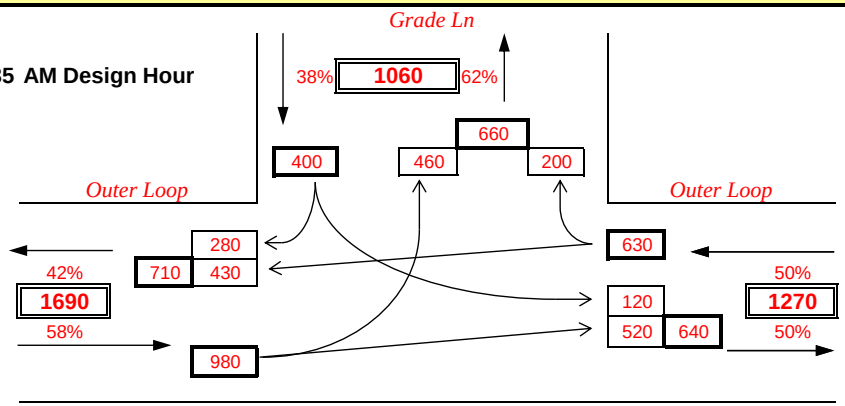
NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2035 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

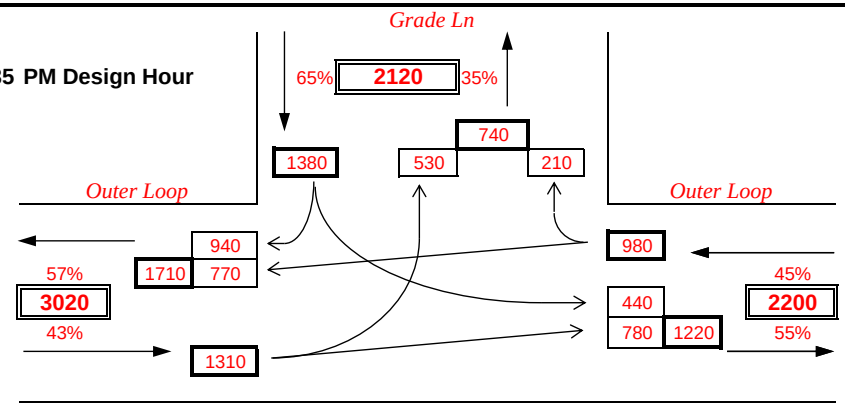
TURN MOVEMENT 2 (2035)

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



Note : Individual Turns Not Necessarily Reflective of Precision Shown





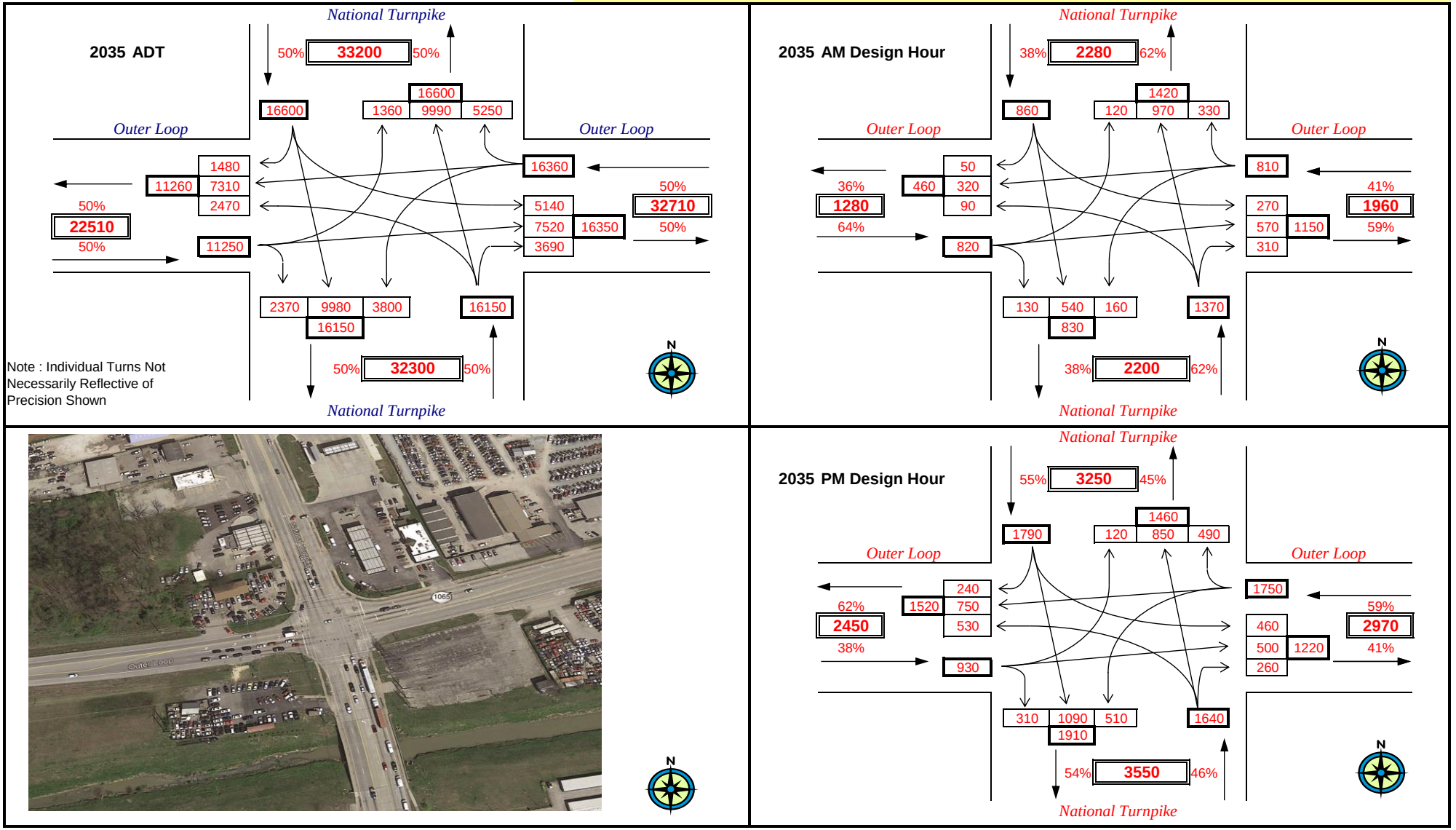
#308096 MP 2.51 ALT 2

PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE:
ANALYST: 0
YEAR: **2035** **ADT and Design Hour Volumes ALT 2**
INTERSECTION: KY 1065 & National Turnpike

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2035 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

TURN MOVEMENT 3 (2035)

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



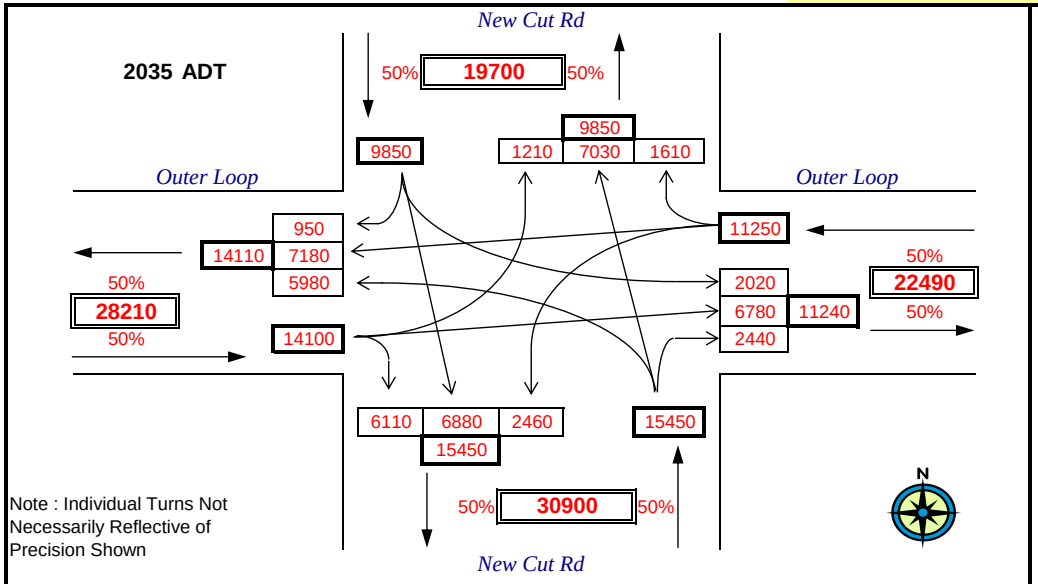
#288509 MP 1.03 ALT
2

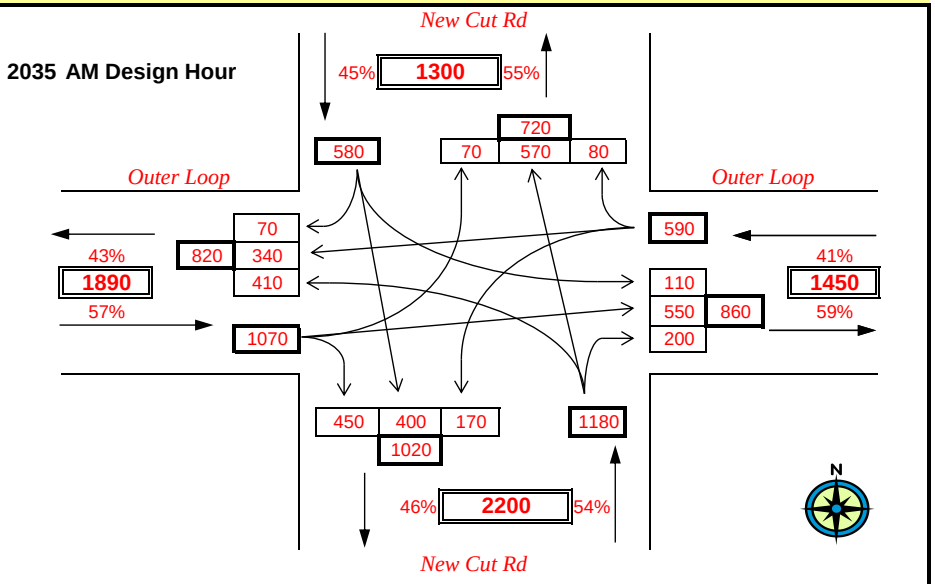
PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE:
ANALYST: 0
YEAR: **2035** **ADT and Design Hour Volumes Alt 2**
INTERSECTION: KY 1065 & New Cut Rd

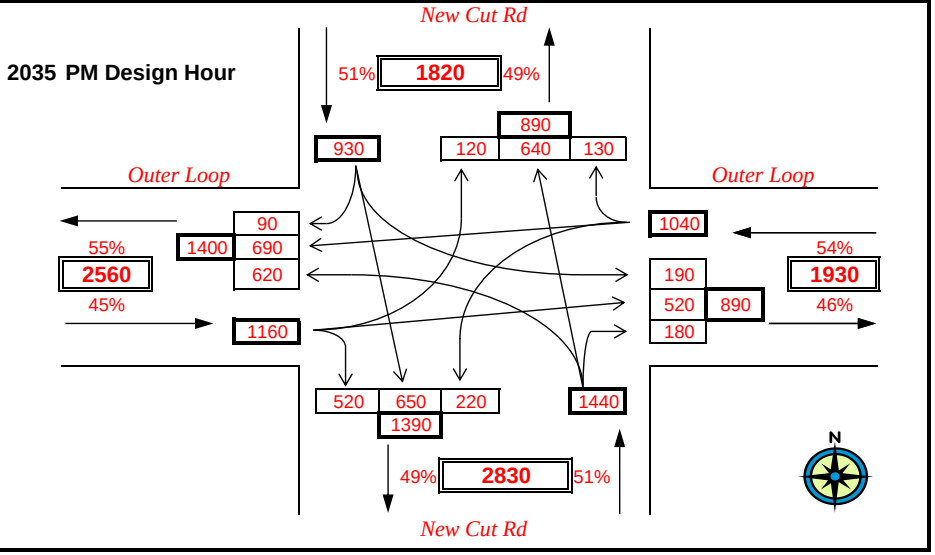
NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2035 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

TURN MOVEMENT 4 (2035)

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







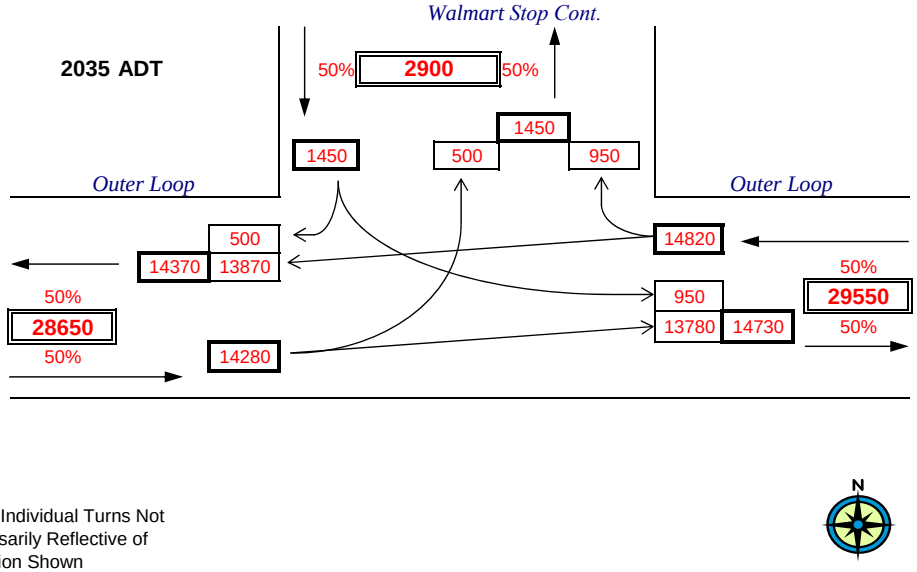
#439103 MP 0.84 ALT 2

PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE:
ANALYST: 0
YEAR: 2035 **ADT and Design Hour Volumes**
INTERSECTION: KY 1065 & Walmart Stop Controlled Entrance

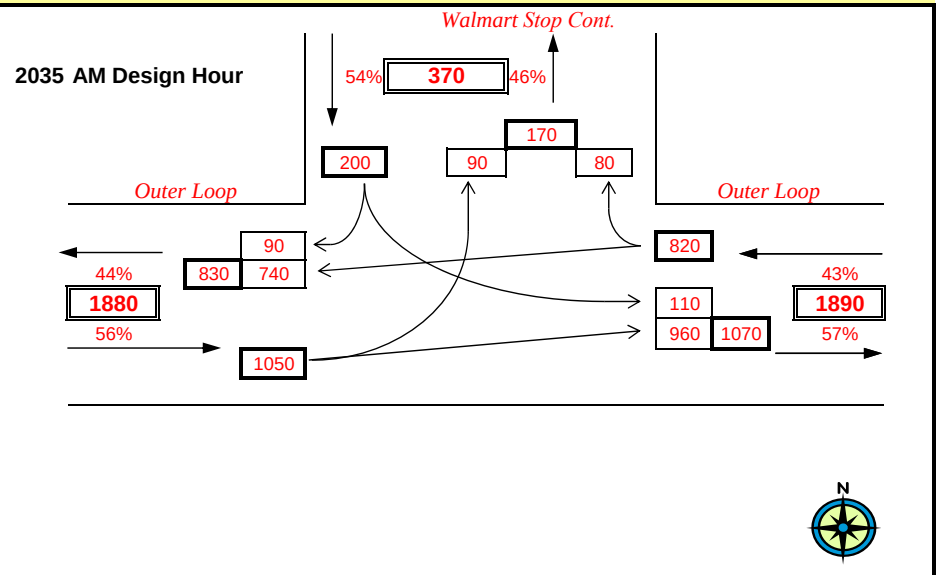
NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2035 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

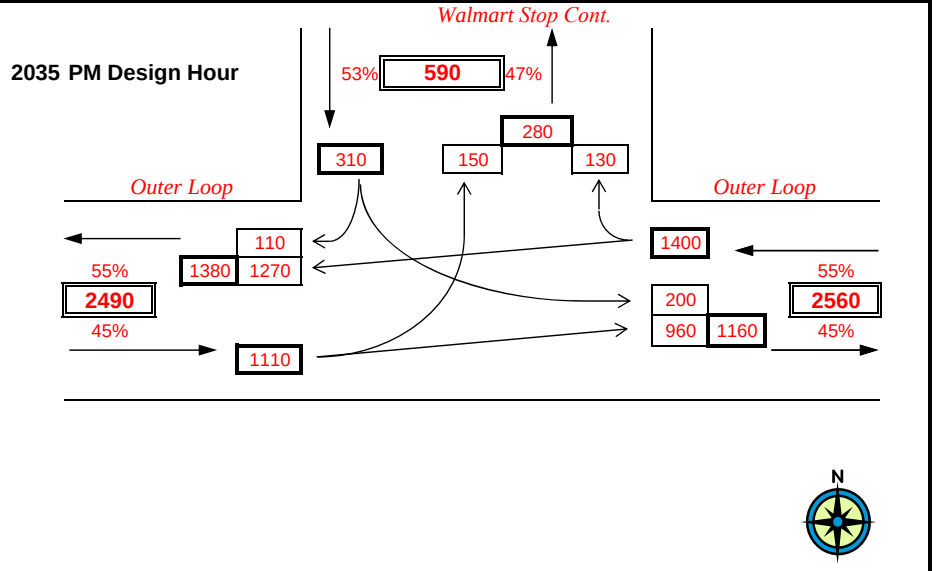
TURN MOVEMENT 5 (2035)

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



Note : Individual Turns Not Necessarily Reflective of Precision Shown



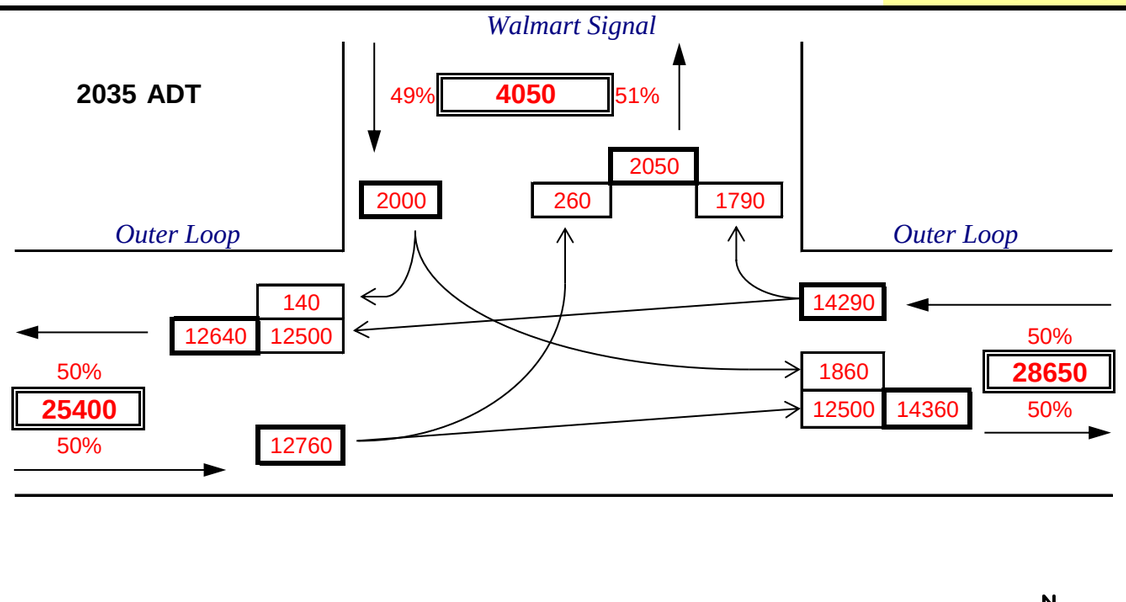


PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE:
ANALYST: 0
YEAR: **2035** **ADT and Design Hour Volumes**
INTERSECTION: KY 1065 & Signalized Walmart Entrance

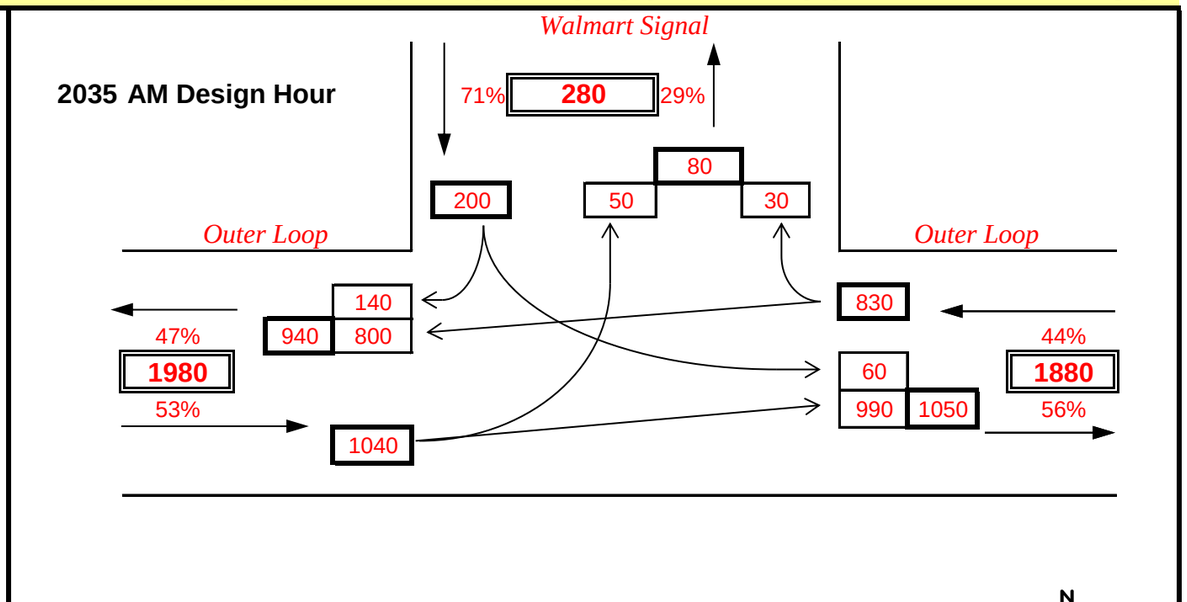
NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2035 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

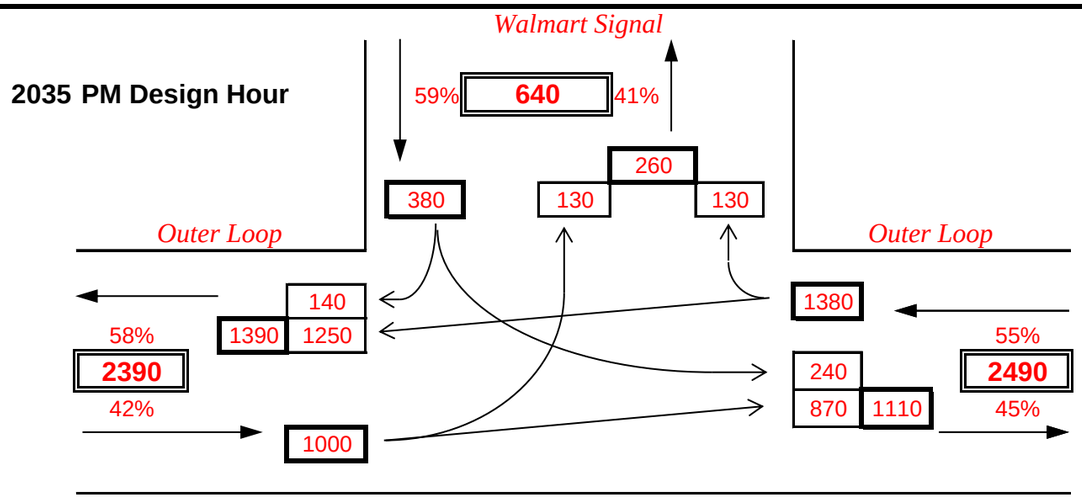
TURN MOVEMENT 6 (2035)

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



Note : Individual Turns Not Necessarily Reflective of Precision Shown





#439109 MP 0.00 ALT 2

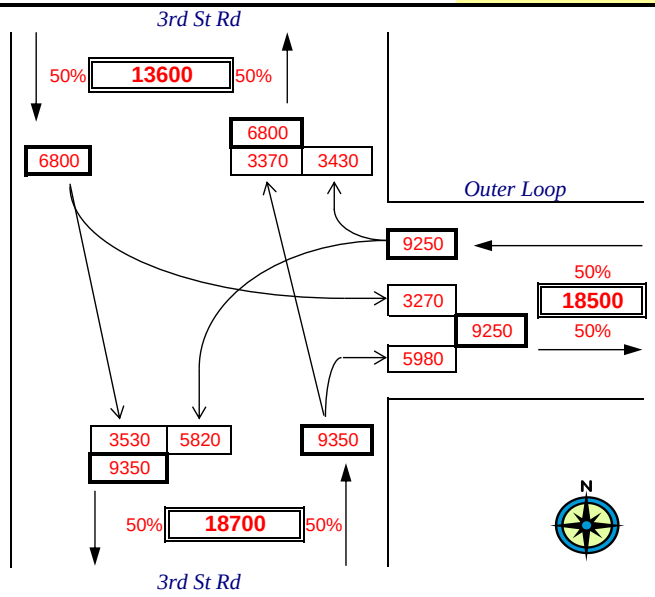
PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE:
ANALYST: 0
YEAR: 2035 ADT and Design Hour Volumes ALT 2
INTERSECTION: KY 1065 & 3rd St Rd

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2035 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

TURN MOVEMENT 7 (2035)

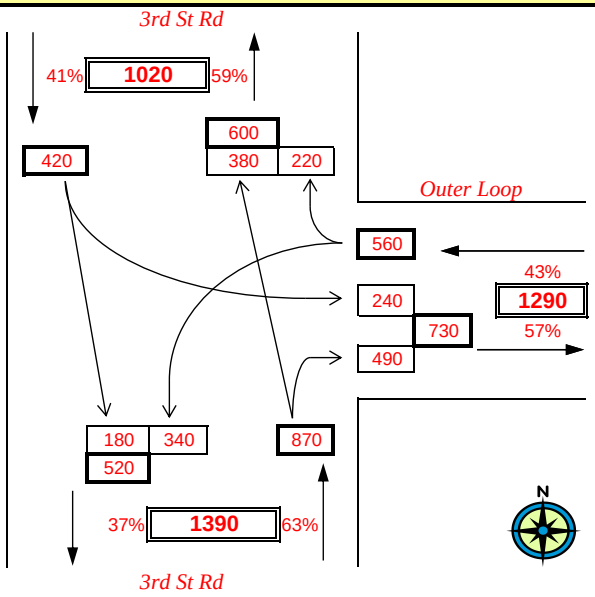
****DHV TURN MOVEMENT FORECASTS SHOULD NOT BE USED FOR SIGNAL TIMING OR WARRANT ANALYSIS**

2035 ADT

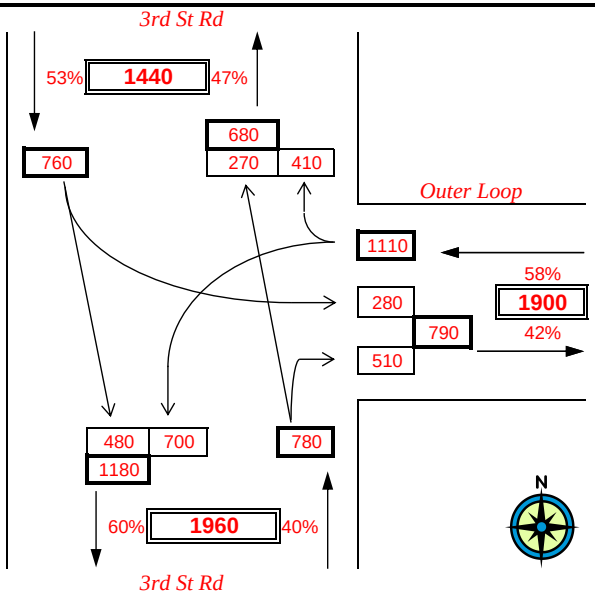


Note : Individual Turns Not Necessarily Reflective of Precision Shown

2035 AM Design Hour



2035 PM Design Hour



#439103 MP 1.30 ALT 2

PROJECT: Outer Loop Planning Study
ITEM NUMBER: 0
MARS NUMBER: 0
REQUEST DATE:
ANALYST: 0
YEAR: 2035 ADT and Design Hour Volumes ALT 2
INTERSECTION: New Cut Rd & Walmart Entrance

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2035 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

TURN MOVEMENT 8 (2035)

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