



## TRANSPORTATION CABINET

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

**Steven L. Beshear**  
Governor

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

---

### MEMORANUM

---

**TO:** James Lefevre, P.E.  
Chief District Engineer  
District 1 - Paducah

**ATTN:** Michael P. McGregor, P.E.

**FROM:** Keith Damron, P.E.  
Director  
Division of Planning *Keith R. Damron*

**DATE:** June 27, 2012

**SUBJECT:** Calloway County Traffic Forecast  
US 641 Reconstruction and Relocation from TN to Murray  
Item No. 01-0314.20

In response to your January 23, 2012 request, we are providing the following forecasts on the attached report:

- 2012 and 2035 Average Daily Traffic
- 2012 and 2035 Daily and Design Hour Turning Movements
- Truck Percentages and 20 year ESALs

If you have any questions, please contact Daniel Hulker of this Division at (502) 564-7183.

KD/DAH/BC

Attachments

c/att: David martin  
Paul Looney  
Jessica Herring  
Dan Hite



An Equal Opportunity Employer M/F/D

# *Executive Summary*

## **Traffic Forecast Report Calloway County US 641 Reconstruction from the TN state line to Murray Item No. 01-0314.20**

Prepared for:



Prepared by:  
**Daniel Hulker**  
Division of Planning  
Kentucky Transportation Cabinet  
June 27, 2012

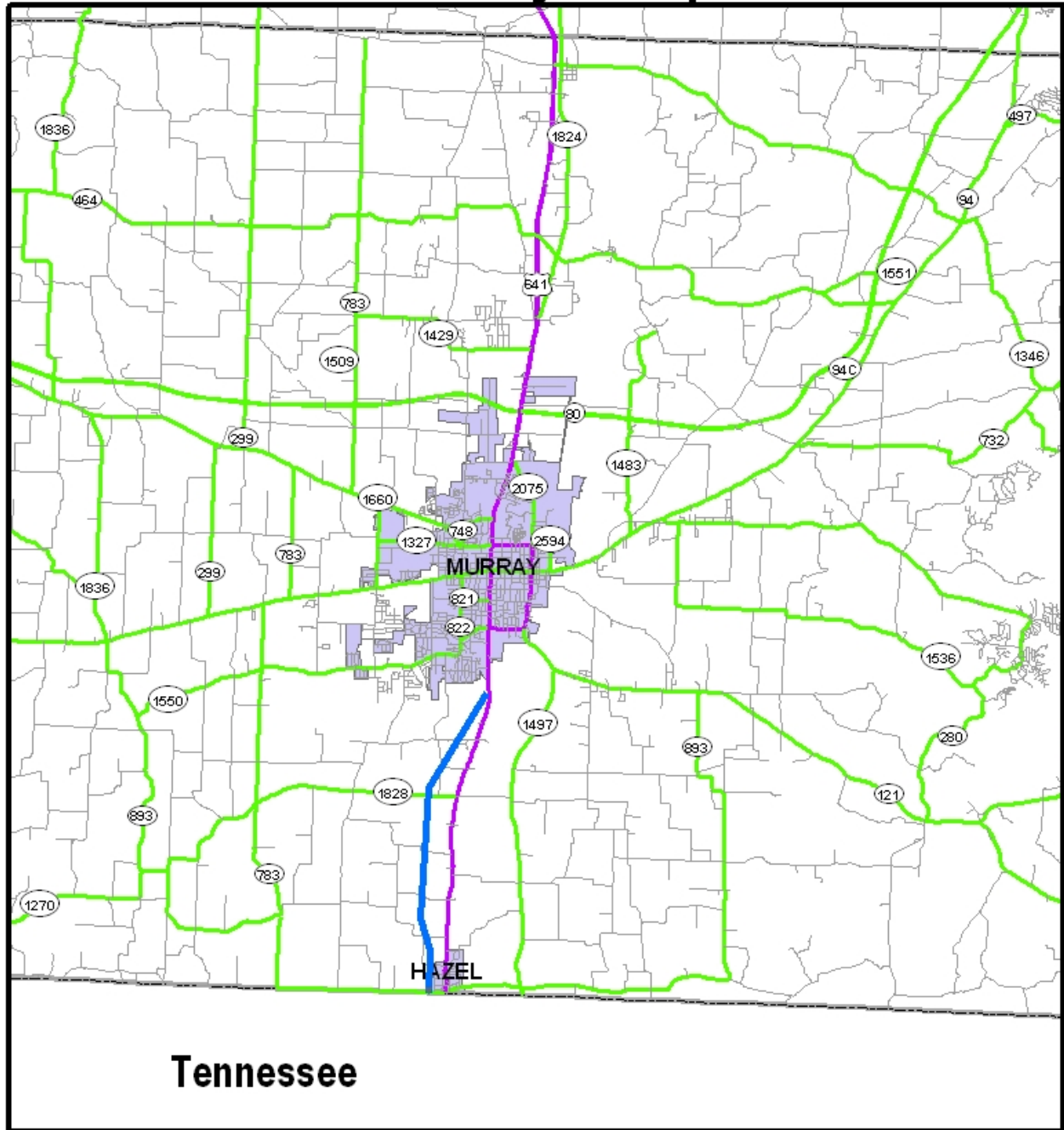
## **Table of Contents**

Figure 1: Vicinity Map..... Page 2  
 Executive Summary ..... Page 3  
 Summary Maps ..... Page 5  
 20 Year ESAL Spreadsheets ..... Page 7  
 Population Summary..... Page 11  
 Turn Movements ..... Page 12

## **Commonly Used Abbreviations and their Descriptions**

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

# Vicinity Map



<p>N</p> <p><b>LEGEND</b></p> <p>Project Site Location: Reconstruction &amp; Relocation</p>	<p>Calloway County US 641 Reconstruction and Relocation Item # 01-0314.20</p>	<p><b>KENTUCKY TRANSPORTATION CABINET</b></p>
---	---	---

**Traffic Forecast Executive Summary  
Calloway County: US 641 Reconstruction  
from the TN state line to Murray  
Item No. 01-0314.20**

**FORECAST SUMMARY**

This forecast calls for the reconstruction of US 641 in Calloway County from the Tennessee state line to Murray. US 641 will also be relocated and run parallel and to the west of the current route.

**FORECAST TYPE**

The following types of forecasts were developed:

- 2012 and 2035 ADT and DHV values
- 2012 and 2035 Daily and Design Hour Build Turn Movements
- 2012 and 2035 Truck Percentages
- 20-year ESALs

**CURRENT-YEAR VOLUMES**

The current year volumes were based upon the special class count Z01 on US 641 at MP 0.1, class counts at stations 018617 and 018B33, as well as the KY statewide traffic model.

**DESIGN-YEAR/GROWTH FACTORS**

The growth rate was based upon the Census projections of Calloway County as well as the historic growth rates of class counts 018617 and 018B33. Since the average traffic growth rate of existing traffic stations is 1% annually, a 1% growth rate was used.

**DESIGN HOUR FACTORS**

The design hour factor was based upon the highest hourly count of the special count Z01.

**TRUCK PERCENTAGE**

The truck percentage was calculated from the truck volume of the special class count Z01 compared to the estimated ADT of the new route.

**ESALs**

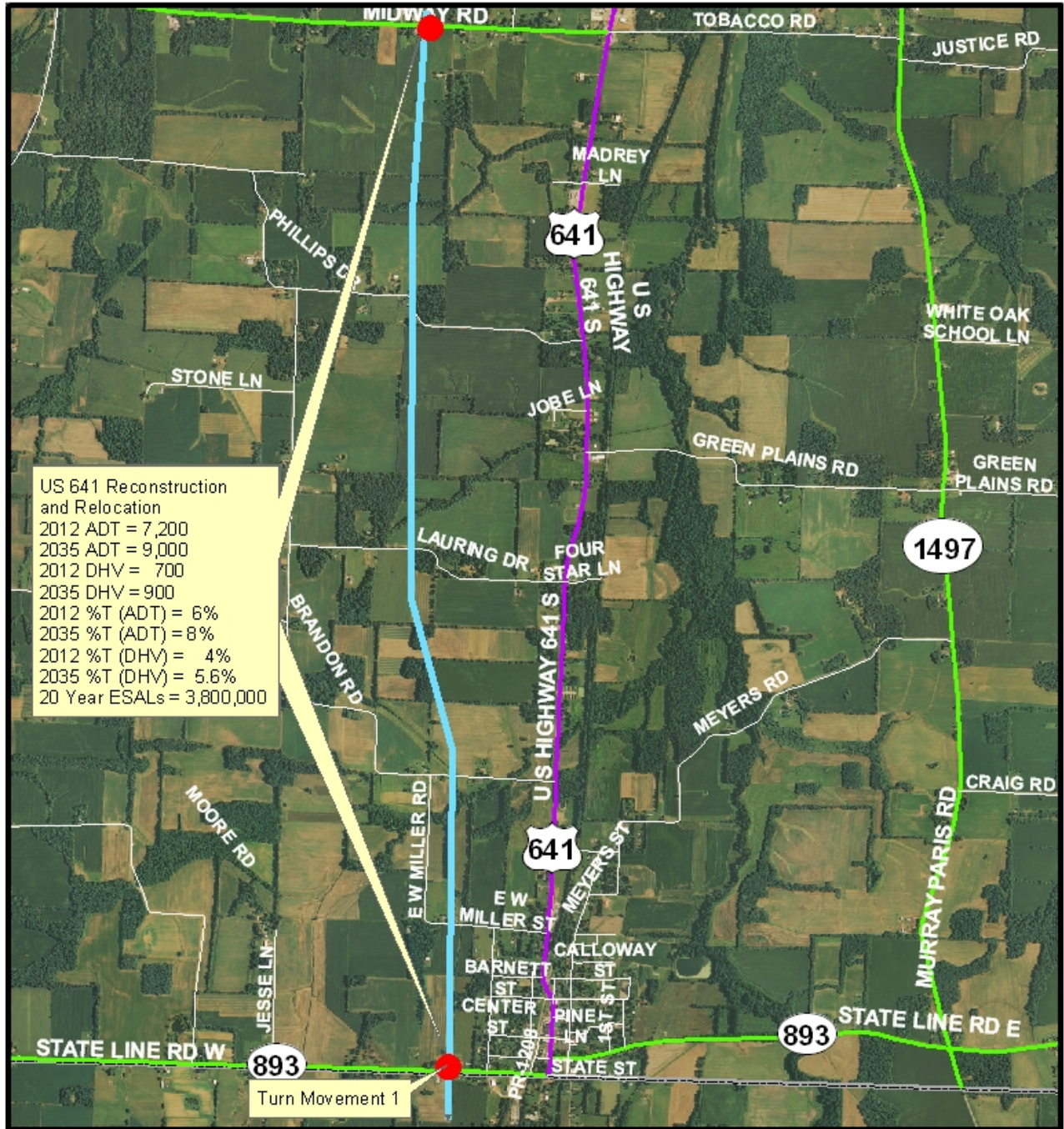
ESAL values were calculated through the ESAL spreadsheet. FC averages were calculated from the 2007 aggregated ESAL report generated by the Kentucky Transportation Center in collaboration with the Transportation Cabinet and were used to estimate the 20-yr ESALs.

## **TURN MOVEMENTS**

Four turn movements were counted on US 641 at milepoints 0.0, 0.069, 0.267, and 3.556. These turn movements, the statewide traffic model, and existing traffic counts were used to estimate the two turn movements included in this report.



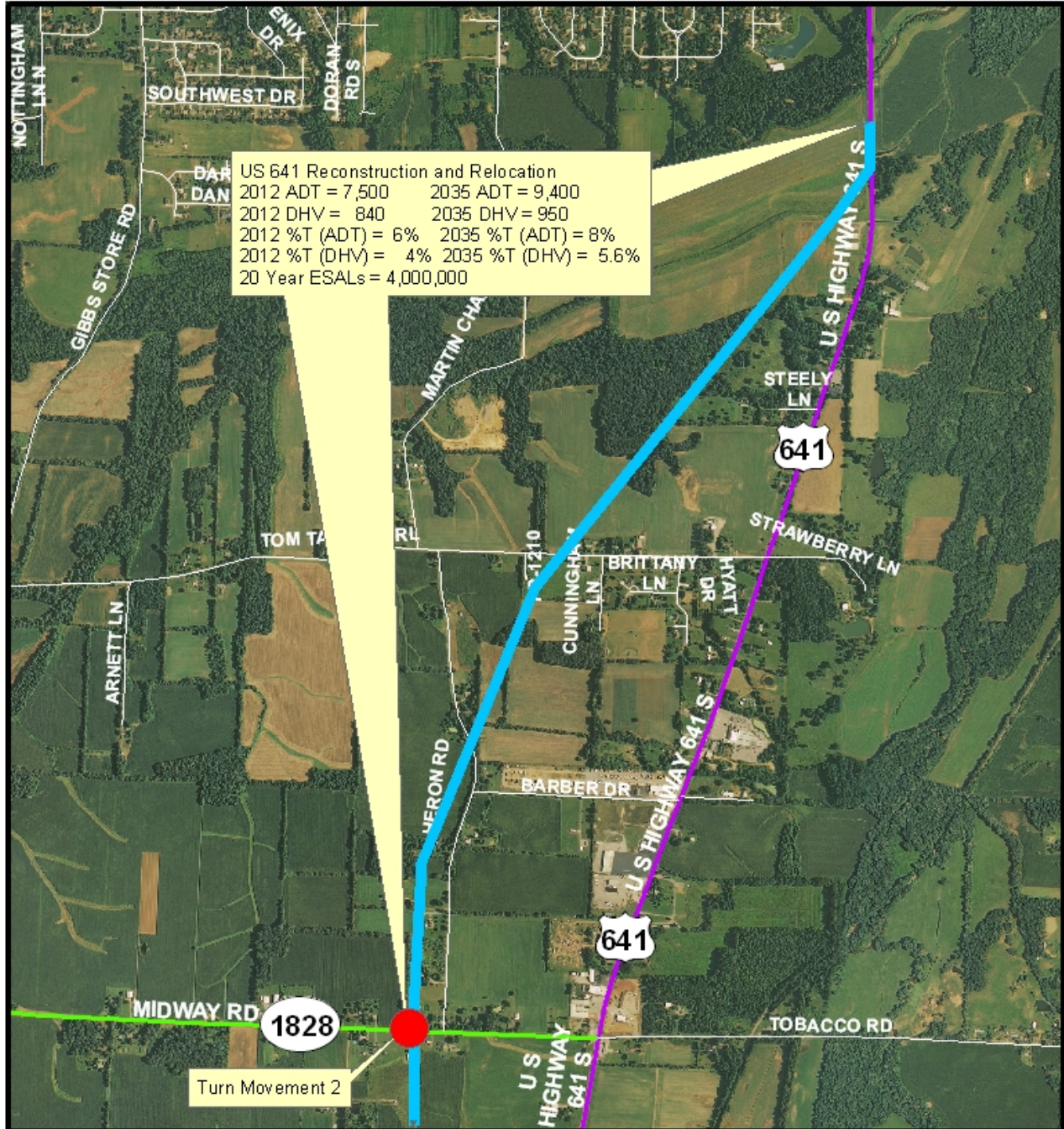
# Summary Map 1 (TN to KY 1828)



<p>N</p>	<p><b>LEGEND</b></p>	<p>Calloway County                  US 641 Reconstruction and Relocation                  Item # 01-0314.20</p>			<p>0 0.25 0.5 1 Miles</p>
	<p> US 641 Relocation and Reconstruction</p> <p> Turn Movement</p>				



# Summary Map 2 (KY 1828 to Murray)



<p>N</p>	<p><b>LEGEND</b></p> <ul style="list-style-type: none"> <li> US 641 Relocation and Reconstruction</li> <li> Turn Movement</li> </ul>	<p>Calloway County                  US 641 Reconstruction and Relocation                  Item # 01-0314.20</p>		<p>0 0.15 0.3 0.6 Miles</p>
----------	--	---	--	-----------------------------



*Traffic Forecast Technical Report*  
*Calloway County: US 641 Reconstruction from the TN state line to Murray*  
*Item No. 01-0314.20*

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

**ROUTE ID:**

County	Calloway	Date	06/27/12
Road Name	US 641	Forecaster	Daniel Hulker
Functional Class	14 - Urban Principal Arterial	MARS No.	6879003D
Project Description	Reconstruction/Relocation of US 641	Item No.	01-0314.20
Scenario	Build	Route No.	US 641
Segment Description	From the TN state line to KY 1828	Beg. MP	N/A
		End MP	N/A
		T.F. No.	TF 12-002
		No. of Lanes	2
		1 or 2 way	2

**REFERENCES:**

Previous Forecasts	TF 07.053	K- Factor Value	9.0%
Traffic Volume	Z01	K-Factor Source	0
Milepoint	0.1	PHF	0.9
Truck Percent	Z01	Full Route Unique Identifier	018-US-0641 -000
Milepoint	0.1		
ESAL Information	2007 Aggregated ESALS		
Growth Rate	1.00%		

**TRAFFIC PARAMETERS:**

		Present Year	Growth Rate	Construction Year	Median Year	Design Year
		2012		2015	2025	2035
Volume	(AADT)	7200	1.00%	7400	8200	9000
Percent Trucks	(%T)	6.0%	1.5%	6%	7%	8%
Number of Trucks		430	2.5%	470	570	720
Percent Trucks Hauling Coal	(%CT)	0%	0.0%	0%	0%	0%
<i>Non-Coal Trucks:</i>						
Axles/Truck	(A/T)	3.600	1.50%	3.764	4.369	5.070
ESALs/Axle	(ESAL/A)	0.310	1.60%	0.325	0.381	0.447
<i>Coal Trucks:</i>						
Axles/Truck	(A/CT)	0	0.00%	0.000	0.000	0.000
ESALs/Axle	(ESAL/CA)	0	0.00%	0.000	0.000	0.000

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

Design ESALs in Critical Lane 3,800,000

General Comments: This new segment runs from the Tennessee State Line to KY 1828 (Midway Rd)

Traffic Forecast Technical Report  
 Calloway County: US 641 Reconstruction from the TN state line to Murray  
 Item No. 01-0314.20

Year	ADT	Car %	Truck %	Cars	Trucks	CT%	AXIT	ESAL/AX	AXICT	ESAL/CA	LDL	ESALS
2015	7,418	93.7%	6.3%	6953	465	0.00%	3.76	0.33	0	0	0.500	110,301
2016	7,492	93.6%	6.4%	7015	477	0.00%	3.82	0.33	0	0	0.500	116,302
2017	7,567	93.5%	6.5%	7078	489	0.00%	3.88	0.34	0	0	0.500	122,643
2018	7,643	93.4%	6.6%	7142	501	0.00%	3.94	0.34	0	0	0.500	129,344
2019	7,719	93.3%	6.7%	7205	514	0.00%	4.00	0.35	0	0	0.500	136,425
2020	7,797	93.2%	6.8%	7270	527	0.00%	4.06	0.35	0	0	0.500	143,907
2021	7,875	93.1%	6.9%	7334	540	0.00%	4.12	0.36	0	0	0.500	151,815
2022	7,953	93.0%	7.0%	7399	554	0.00%	4.18	0.36	0	0	0.500	160,172
2023	8,033	92.9%	7.1%	7465	568	0.00%	4.24	0.37	0	0	0.500	169,004
2024	8,113	92.8%	7.2%	7531	582	0.00%	4.30	0.38	0	0	0.500	178,338
2025	8,194	92.7%	7.3%	7598	597	0.00%	4.37	0.38	0	0	0.500	188,202
2026	8,276	92.6%	7.4%	7665	612	0.00%	4.43	0.39	0	0	0.500	198,627
2027	8,359	92.5%	7.5%	7732	627	0.00%	4.50	0.39	0	0	0.500	209,608
2028	8,443	92.4%	7.6%	7800	643	0.00%	4.50	0.40	0	0	0.500	218,086
2029	8,527	92.3%	7.7%	7868	659	0.00%	4.50	0.40	0	0	0.500	223,653
2030	8,612	92.2%	7.8%	7937	676	0.00%	4.50	0.40	0	0	0.500	229,160
2031	8,698	92.0%	8.0%	8006	693	0.00%	4.50	0.40	0	0	0.500	234,805
2032	8,785	91.9%	8.1%	8075	710	0.00%	4.50	0.40	0	0	0.500	240,590
2033	8,873	91.8%	8.2%	8145	728	0.00%	4.50	0.40	0	0	0.500	246,519
2034	8,962	91.7%	8.3%	8216	746	0.00%	4.50	0.40	0	0	0.500	252,596
2035	9,052	91.5%	8.5%	8287	765	0.00%	4.50	0.40	0	0	0.500	258,825

5-yr ESALS 600,000  
 10-yr ESALS 1,500,000  
 15-yr ESALS 2,600,000  
 20-yr ESALS 3,800,000

*Traffic Forecast Technical Report  
 Calloway County: US 641 Reconstruction from the TN state line to Murray  
 Item No. 01-0314.20*

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

**ROUTE ID:**

County	Calloway	Date	06/27/12
Road Name	US 641	Forecaster	Daniel Hulker
Functional Class	14 - Urban Principal Arterial	MARS No.	6879003D
Project Description	Reconstruction/Relocation of US 641	Item No.	01-0314.20
Scenario	Build	Route No.	US 641
Segment Description	From KY 1828 to Murray	Beg. MP	N/A
		End MP	N/A
		T.F. No.	TF 12-002
		No. of Lanes	2
		1 or 2 way	2

**REFERENCES:**

Previous Forecasts	TF 07.053	K- Factor Value	9.0%
Traffic Volume	Z01	K-Factor Source	0
Milepoint	0.1	PHF	0.9
Truck Percent	Z01	Full Route Unique Identifier	
Milepoint	0.1		018-US-0641 -000
ESAL Information	2007 Aggregated ESALS		
Growth Rate	1.00%		

**TRAFFIC PARAMETERS:**

	Present Year	Growth Rate	Construction Year	Median Year	Design Year
	2012		2015	2025	2035
Volume (AADT)	7500	1.00%	7700	8500	9400
Percent Trucks (%T)	6.0%	1.5%	6%	7%	8%
Number of Trucks	450	2.5%	490	600	750
Percent Trucks Hauling Coal (%CT)	0%	0.0%	0%	0%	0%
<i>Non-Coal Trucks:</i>					
Axles/Truck (A/T)	3.600	1.50%	3.764	4.369	5.070
ESALs/Axle (ESAL/A)	0.310	1.60%	0.325	0.381	0.447
<i>Coal Trucks:</i>					
Axles/Truck (A/CT)	0	0.00%	0.000	0.000	0.000
ESALs/Axle (ESAL/CA)	0	0.00%	0.000	0.000	0.000

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

Design ESALs in Critical Lane 4,000,000

General Comments: This new segment runs from KY 1828 (Midway Rd) to Murray

Traffic Forecast Technical Report  
 Calloway County: US 641 Reconstruction from the TN state line to Murray  
 Item No. 01-0314.20

**New Segment from KY 1828 (Midway Rd) to Murray**

Year	ADT	Car %	Truck %	Cars	Trucks	CT%	AXIT	ESAL/AX	AX/CT	ESAL/CA	LDF	ESALS
2015	7,727	93.7%	6.3%	7242	485	0.00%	3.76	0.33	0	0	0.500	114,897
2016	7,805	93.6%	6.4%	7308	497	0.00%	3.82	0.33	0	0	0.500	121,148
2017	7,883	93.5%	6.5%	7373	510	0.00%	3.88	0.34	0	0	0.500	127,753
2018	7,961	93.4%	6.6%	7439	522	0.00%	3.94	0.34	0	0	0.500	134,733
2019	8,041	93.3%	6.7%	7506	535	0.00%	4.00	0.35	0	0	0.500	142,109
2020	8,121	93.2%	6.8%	7573	549	0.00%	4.06	0.35	0	0	0.500	149,904
2021	8,203	93.1%	6.9%	7640	563	0.00%	4.12	0.36	0	0	0.500	158,141
2022	8,285	93.0%	7.0%	7708	577	0.00%	4.18	0.36	0	0	0.500	166,846
2023	8,368	92.9%	7.1%	7776	591	0.00%	4.24	0.37	0	0	0.500	176,046
2024	8,451	92.8%	7.2%	7845	606	0.00%	4.30	0.38	0	0	0.500	185,768
2025	8,536	92.7%	7.3%	7914	622	0.00%	4.37	0.38	0	0	0.500	196,044
2026	8,621	92.6%	7.4%	7984	637	0.00%	4.43	0.39	0	0	0.500	206,903
2027	8,707	92.5%	7.5%	8054	653	0.00%	4.50	0.39	0	0	0.500	218,342
2028	8,794	92.4%	7.6%	8125	670	0.00%	4.50	0.40	0	0	0.500	227,173
2029	8,882	92.3%	7.7%	8196	686	0.00%	4.50	0.40	0	0	0.500	232,972
2030	8,971	92.2%	7.8%	8267	704	0.00%	4.50	0.40	0	0	0.500	238,709
2031	9,061	92.0%	8.0%	8339	721	0.00%	4.50	0.40	0	0	0.500	244,588
2032	9,151	91.9%	8.1%	8412	740	0.00%	4.50	0.40	0	0	0.500	250,614
2033	9,243	91.8%	8.2%	8485	758	0.00%	4.50	0.40	0	0	0.500	256,791
2034	9,335	91.7%	8.3%	8558	777	0.00%	4.50	0.40	0	0	0.500	263,121
2035	9,429	91.5%	8.5%	8632	797	0.00%	4.50	0.40	0	0	0.500	269,610

5-yr ESALS  
700,000

10-yr ESALS  
1,600,000

15-yr ESALS  
2,700,000

20-yr ESALS  
4,000,000



**HISTORICAL POPULATION SUMMARY**

	1960	1970	1980	1990	2000	2010	60 - 70	70 - 80	80 - 90	90 - 00	00 - 10
Population	3,038,156	3,220,711	3,660,334	3,686,892	4,041,769	4,339,367	Change 6.0%	Change 13.6%	Change 0.7%	Change 9.6%	Change 7.4%
Kentucky	-	27,692	30,031	30,735	34,177	37,191	Pct -	Pct 8.4%	Pct 2.3%	Pct 11.2%	Pct 8.8%
Calloway Co											

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

**FUTURE POPULATION PROJECTIONS SUMMARY**

	2010	2015	2020	2025	2030	2035	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35
Projection	4,339,367	4,506,569	4,669,801	4,838,370	5,001,748	5,147,274	Change 3.9%	Change 3.6%	Change 3.6%	Change 3.4%	Change 2.9%
Kentucky	37,191	37,658	39,069	40,784	42,354	43,590	Pct 1.3%	Pct 3.7%	Pct 4.4%	Pct 3.8%	Pct 2.9%
Calloway Co											

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

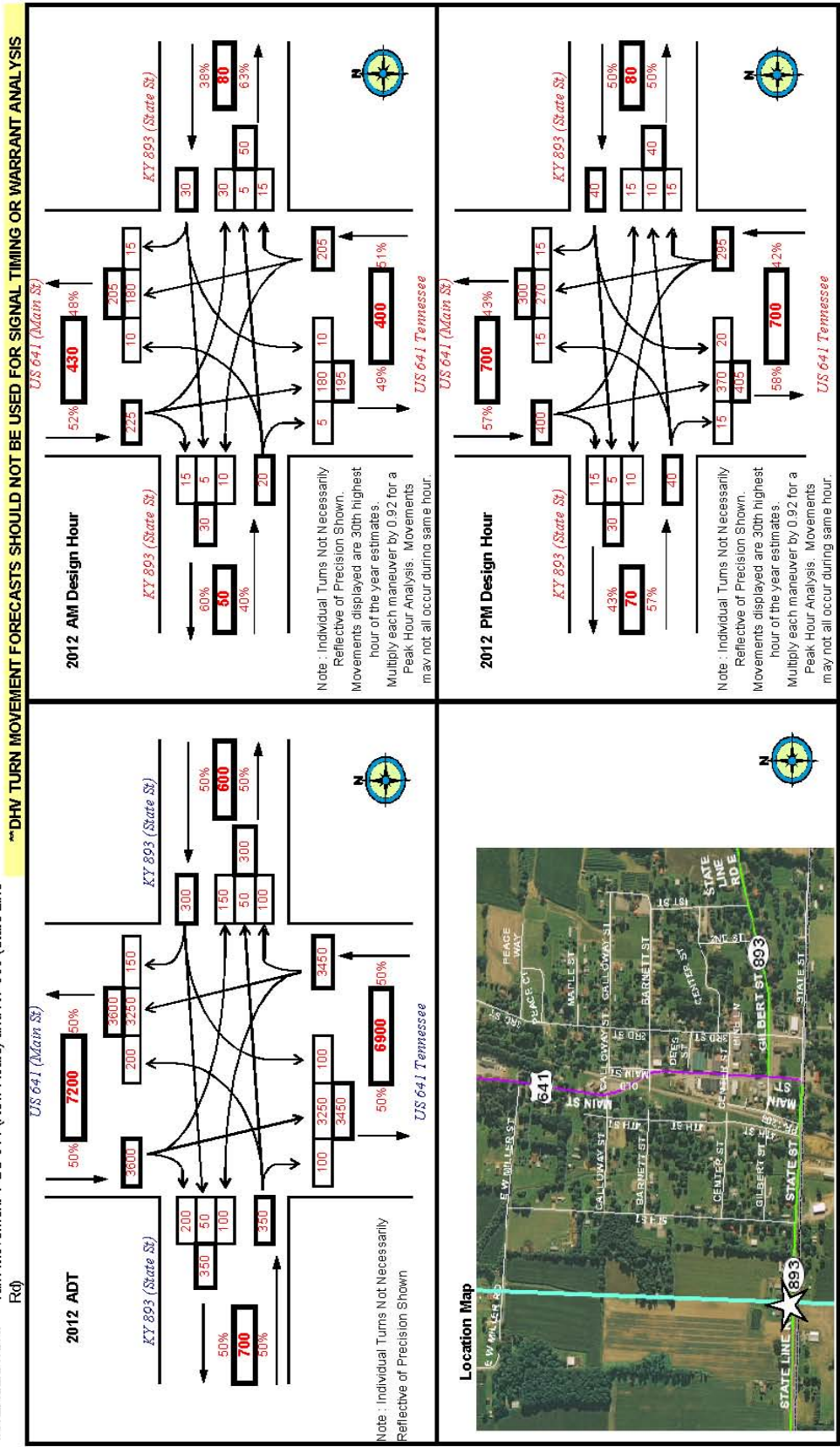
**ANNUAL POPULATION GROWTH RATES FROM HISTORICAL DATA AND PROJECTIONS**

	60 - 70	70 - 80	80 - 90	90 - 00	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	10 - 30	10 - 35
GR	0.59%	1.29%	0.07%	0.92%	0.76%	0.71%	0.71%	0.67%	0.58%	0.55%	0.69%
Kentucky	-	0.81%	0.23%	1.07%	0.25%	0.74%	0.86%	0.76%	0.58%	0.46%	0.64%
Calloway Co											

Traffic Forecast Technical Report  
 Calloway County: US 641 Reconstruction from the TN state line to Murray  
 Item No. 01-0314.20

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2008 Turning Movement Count. AM and PM DHV's represent 30th highest hour estimates for each turn maneuver.

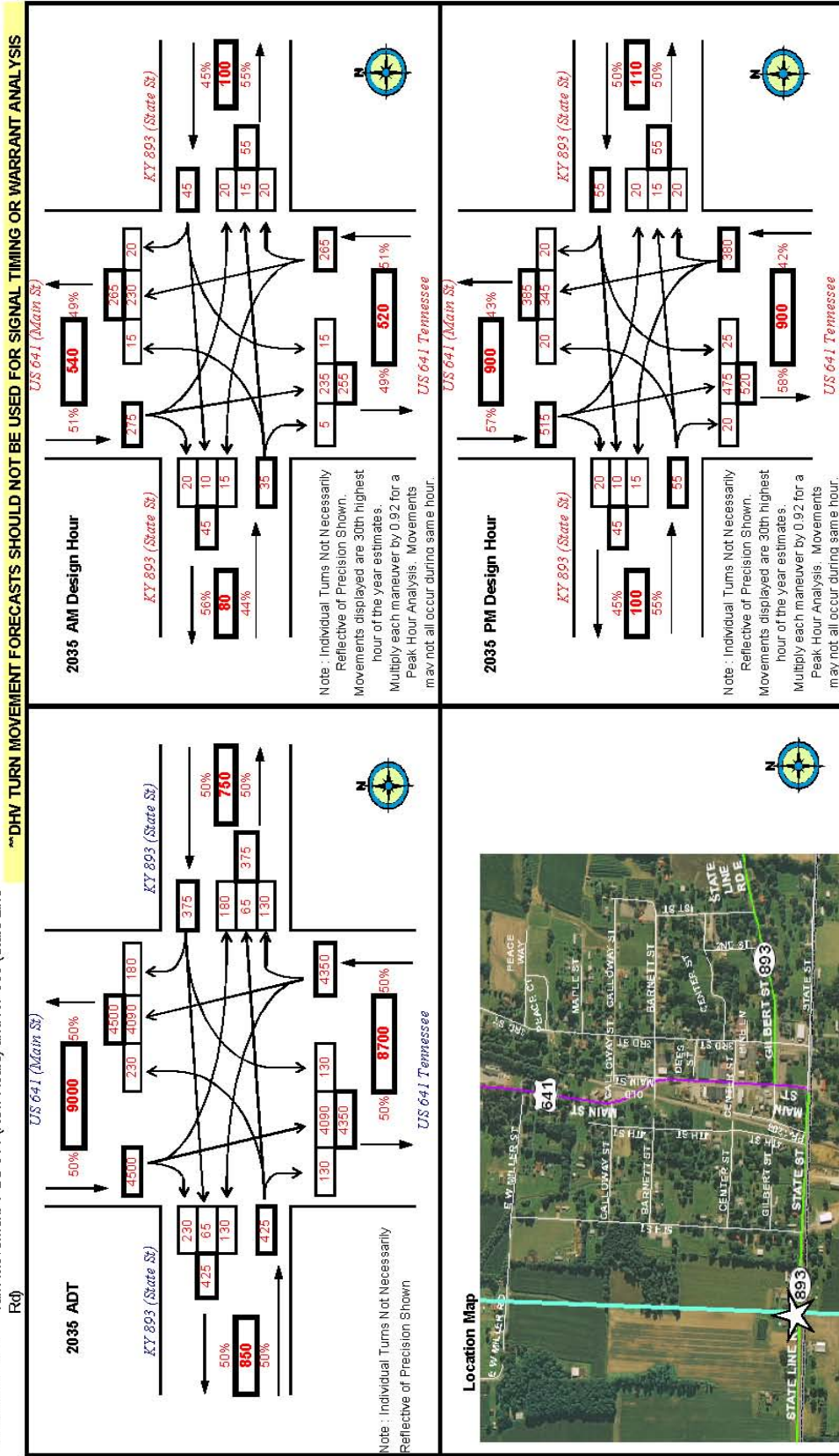
PROJECT: US 641 Reconstruction in Calloway County  
 ITEM NUMBER: 01-0314.20  
 MAPS NUMBER: 6879003D  
 REQUEST DATE: 1/23/2012  
 ANALYST: Daniel Hulker  
 SCENARIO: 2012 ADT and Design Hour Volumes  
 INTERSECTION: Turn Movement 1 US 641 (New Route) and KY 893 (State Line) R0



Traffic Forecast Technical Report  
 Calloway County: US 641 Reconstruction from the TN state line to Murray  
 Item No. 01-0314.20

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2008 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

PROJECT: US 641 Reconstruction in Calloway County  
 ITEM NUMBER: 01-0314.20  
 MAPS NUMBER: 6879003D  
 REQUEST DATE: 1/23/2012  
 ANALYST: Daniel Hulker  
 SCENARIO: 2035 ADT and Design Hour Volumes  
 INTERSECTION: Turn Movement 1 US 641 (New Route) and KY 893 (State Line Rd)

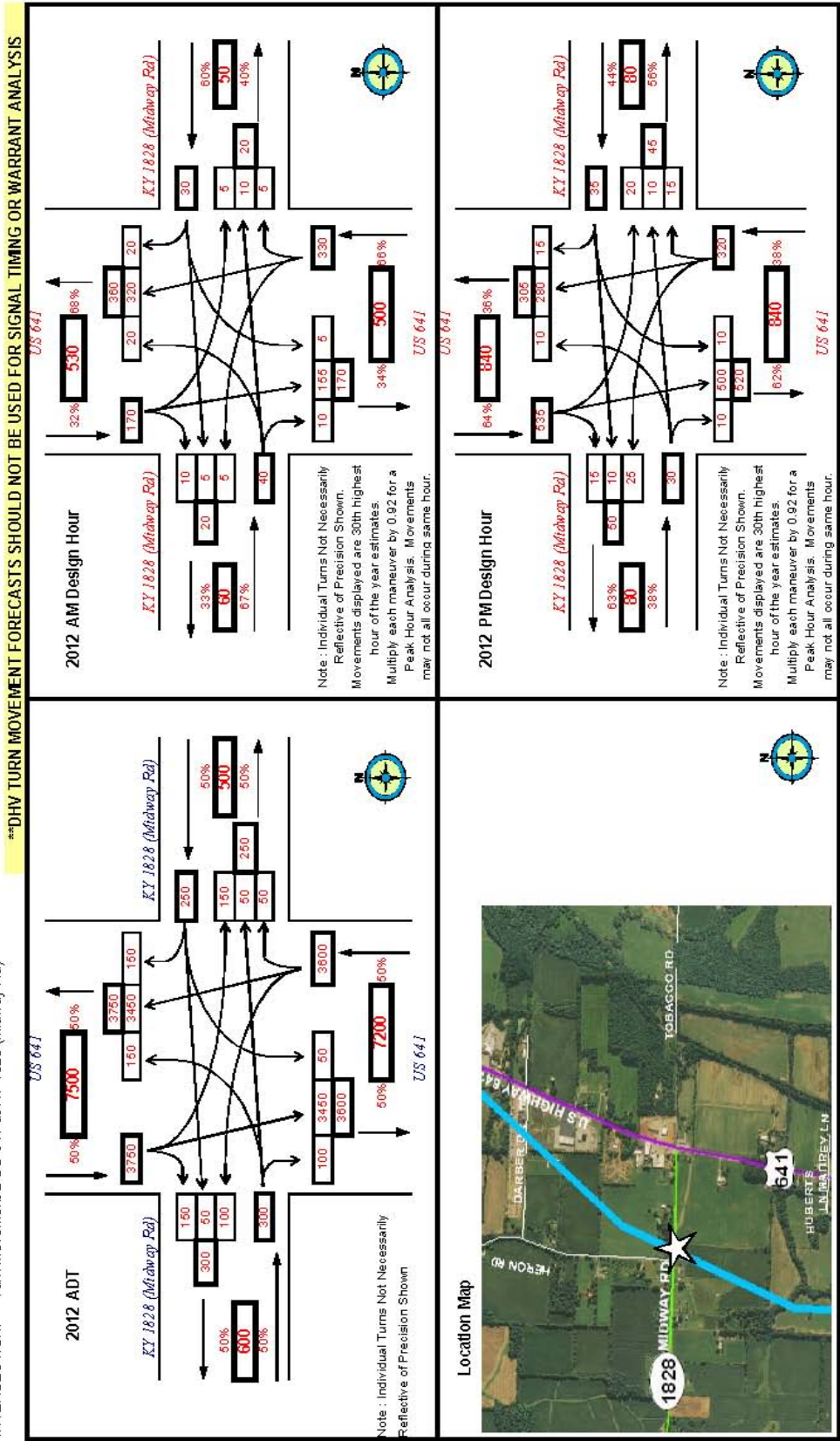




Traffic Forecast Technical Report  
 Calloway County: US 641 Reconstruction from the TN state line to Murray  
 Item No. 01-0314.20

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2008 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

PROJECT: US 641 Reconstruction in Calloway County  
 ITEM NUMBER: 01-0314.20  
 MAPS NUMBER: 6879003D  
 REQUEST DATE: 1/23/2012  
 ANALYST: Daniel Hulker  
 SCENARIO: 2012 ADT and Design Hour Volumes  
 INTERSECTION: Turn Movement 2 US 641 at KY 1828 (Midway Rd)





Traffic Forecast Technical Report  
 Calloway County: US 641 Reconstruction from the TN state line to Murray  
 Item No. 01-0314.20

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2008 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

PROJECT: US 641 Reconstruction in Calloway County  
 ITEM NUMBER: 01-0314.20  
 MARS NUMBER: 6879003D  
 REQUEST DATE: 1/23/2012  
 ANALYST: Daniel Hulker  
 SCENARIO: 2035 ADT and Design Hour Volumes  
 INTERSECTION: Turn Movement 2 US 641 at KY 1828 (Midway Rd)

