



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


Steven L. Beshear
Governor

Michael W. Hancock, P.E.
Secretary

MEMORANDUM

TO: Patricia Dunaway, P.E.
Chief District Engineer
District 4 – Elizabethtown

ATTN: Charlie Allen, P.E.

FROM: John Moore, P.E. 
Director
Division of Planning

DATE: December 3, 2014

SUBJECT: Hardin County Traffic Forecast
Minor Widening and Spot Improvement of KY 251 and KY 434
Item No. 4-153.01

In response to your May 15, 2014 request, we are providing the following forecasts on the attached report:

- 2014 and 2035 Average Daily Traffic and Design Hour Volumes
- 2014 and 2035 Daily and Design Hour Turning Movements
- Truck Percentages and 20-year ESALs

If you have any questions, please contact Jay Balaji of this Division at (502) 782-5045.

JM/JB/BC

Attachments

c/att: Randy Turner
Brad Bottoms
Joe Tucker
Dan Hite



Executive Summary

**Traffic Forecast Report and Bike/Ped
Recommendations
Hardin County
Minor Widening and Spot Improvement on KY 251 and
KY 434
Item No. 4-153.01**

Prepared for:



Prepared by:
Jayalakshmi Balaji, P.E.
Division of Planning
Kentucky Transportation Cabinet
December 3, 2014

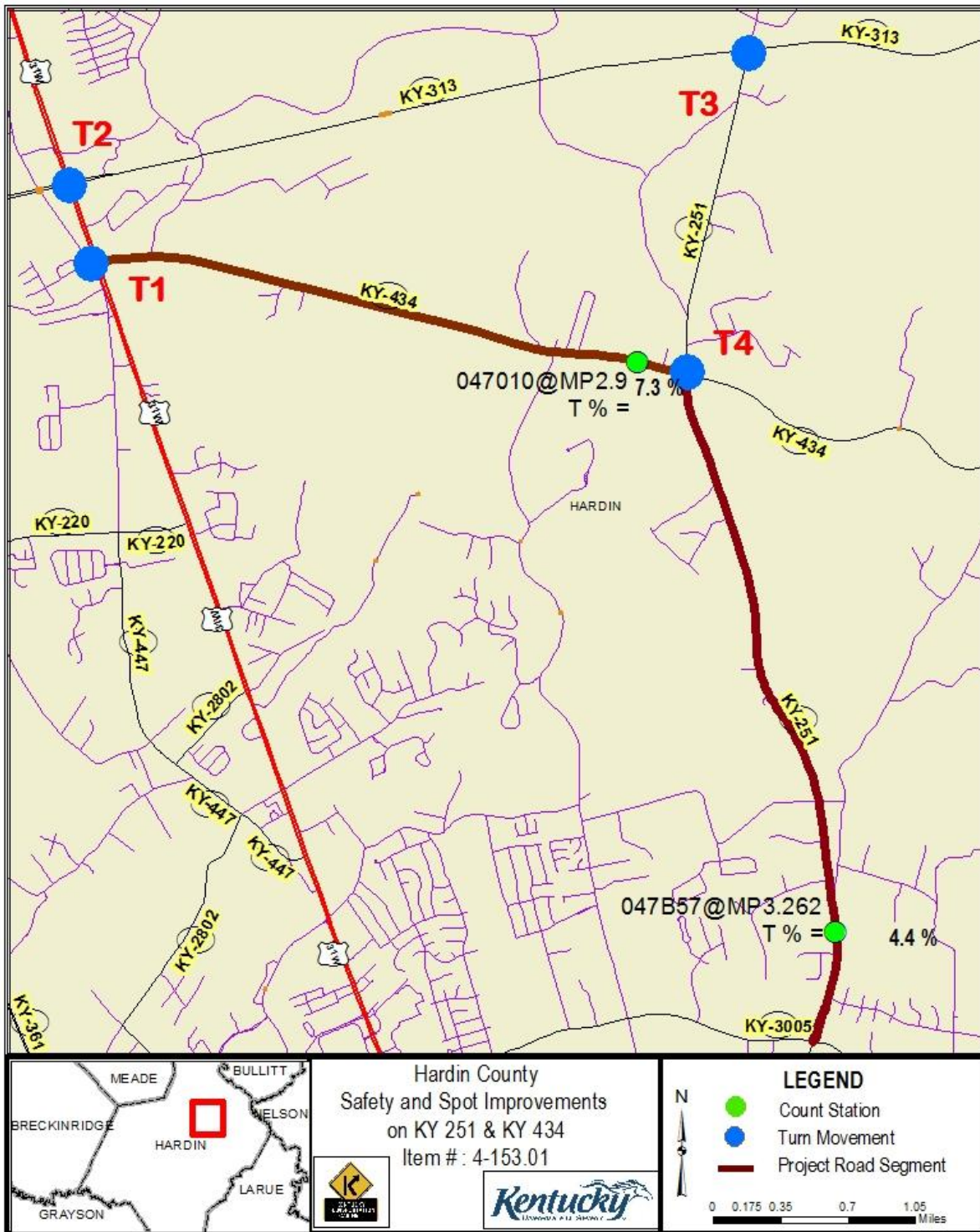
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Commonly Used Abbreviations and their Descriptions

ADT	Average Daily Traffic	Without any adjustment
DHV	Design Hour Volume	30 th 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 th 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



Traffic Forecast Executive Summary

Hardin County: Minor Widening and Spot Improvement

Item No. 4-153.01

FORECAST SUMMARY

The project calls for the minor widening and spot improvements to improve safety on KY 251 from KY 3005 to KY 434 and KY 434 from KY 251 to the US 31 W Bypass. The purpose of this report is to analyze current and future traffic utilizing Sheperdsville Road from MP 2.681 to MP 6.288 and Battle Training Road from MP 0.025 to MP 3.158

FORECAST TYPE

The following types of forecasts were developed:

- 2014 and 2035 Average Daily and Design Hourly Truck Percent Forecasts
- 2014 and 2035 Turning Movements
- 2014 and 2035 ADT and DHV values
- Peak Hour Factor
- 20-year ESALs

CURRENT-YEAR VOLUMES

The 2014 ADT volume is based on the most recent hourly volume data collected at count stations 047B57 on KY 251 (MP 3.262) and 047010 on KY 434 (MP 2.9) and the turning movement counts. All figures are subject to rounding.

DESIGN-YEAR/GROWTH FACTORS

Kentucky State Data Center suggests population for Hardin County to grow 0.83% annually. Exponential analyses performed on historical data at traffic stations 047B57 and 047010 estimated growth rates of 2.0% and 1.8% respectively. Therefore for the purpose of this forecast a growth rate of 2.0% for KY 251 and 1.8% for KY 434 were used.

DESIGN HOUR FACTORS

DHVs were estimated by analyzing the hourly volume data and the turn movements collected for this forecast. The peak AM and PM volumes were derived by dividing the highest hourly volumes from these counts by the daily total. Functional class design hour factors based on the day and month of these counts were then applied. Finally, the calculated K-factors were used in combination with the ADT forecast to produce DHVs for 2014 and 2035.

TRUCK PERCENTAGE

The truck percentage was calculated using a 2010 vehicle classification count at count station 047B57 (4.4 %) and a 2014 vehicle classification count at count station 047010 (7.3%). These truck percentages are comparable to the functional class average for similar roads. Therefore a T% of 4.4% for KY 251 and 7.3% for KY 434 and a growth rate of 0.5 % were used.

ESALs

Functional class averages from ATR data, traffic counts, and the 2035 ADT projections were used to estimate 20-year ESALs on the project road segment. The 2007 aggregated ESAL report, generated by the Kentucky Transportation Center in collaboration with the Kentucky Transportation Cabinet, was used to grow the important ESAL calculation variables. The DHVs in the ESAL sheet for KY 434 does not match with the turning movement volumes. This is due to the fact the highest volume on the project road segment occurs near the intersection of Ring Road and KY 251. For more information, please see the attached ESAL calculation sheets.

TURN MOVEMENTS

Four turn movements were requested for this project. They were

- T1: US 31 W and KY 434
- T2: US 31 W and KY 313
- T3: KY 251 and KY 313
- T4: KY 251 and KY 434

The intersections do not match due to presence of many access points in between them. The counts were then factored to determine current year ADT and DHV turn movements. The current year turn movements were grown using methods described above to determine future year turn movements.

HISTORICAL POPULATION SUMMARY

	1960	1970	1980	1990	2000	2010	60 - 70	70 - 80	80 - 90	90 - 00	00 - 10
	Population	Population	Population	Population	Population	Population	Pct	Pct	Pct	Pct	Pct
Kentucky	3,038,156	3,220,711	3,660,334	3,686,892	4,041,769	4,339,367	Change	Change	Change	Change	Change
Hardin Co	-	78,421	88,911	89,240	94,174	105,543	6.0%	13.6%	0.7%	9.6%	7.4%
							-	13.4%	0.4%	5.5%	12.1%

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

FUTURE POPULATION PROJECTIONS SUMMARY

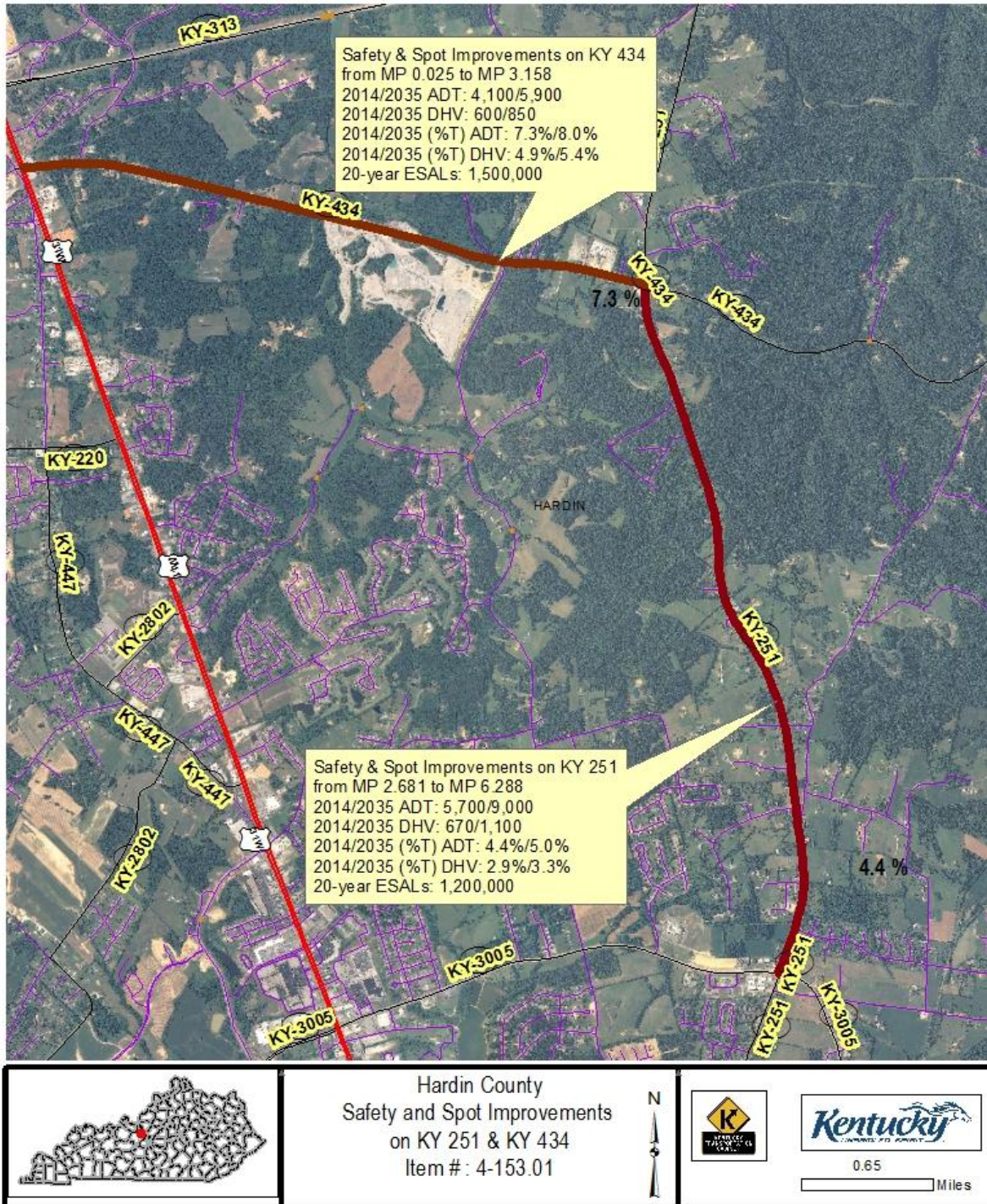
	2010	2015	2020	2025	2030	2035	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35
	Projection	Projection	Projection	Projection	Projection	Projection	Pct	Pct	Pct	Pct	Pct
Kentucky	4,339,367	4,509,429	4,672,754	4,820,390	4,951,178	5,063,331	Change	Change	Change	Change	Change
Hardin Co	105,543	111,225	116,612	121,541	125,898	129,612	3.9%	3.6%	3.2%	2.7%	2.3%
							5.4%	4.8%	4.2%	3.6%	3.0%

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
	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR
Kentucky	0.59%	1.29%	0.07%	0.92%	0.77%	0.71%	0.62%	0.54%	0.45%	0.62%
Hardin Co	-	1.26%	0.04%	0.54%	1.05%	0.95%	0.83%	0.71%	0.58%	0.71%

Summary Map



TURN MOVEMENT 2014

T1: US 31 W AND KY 434

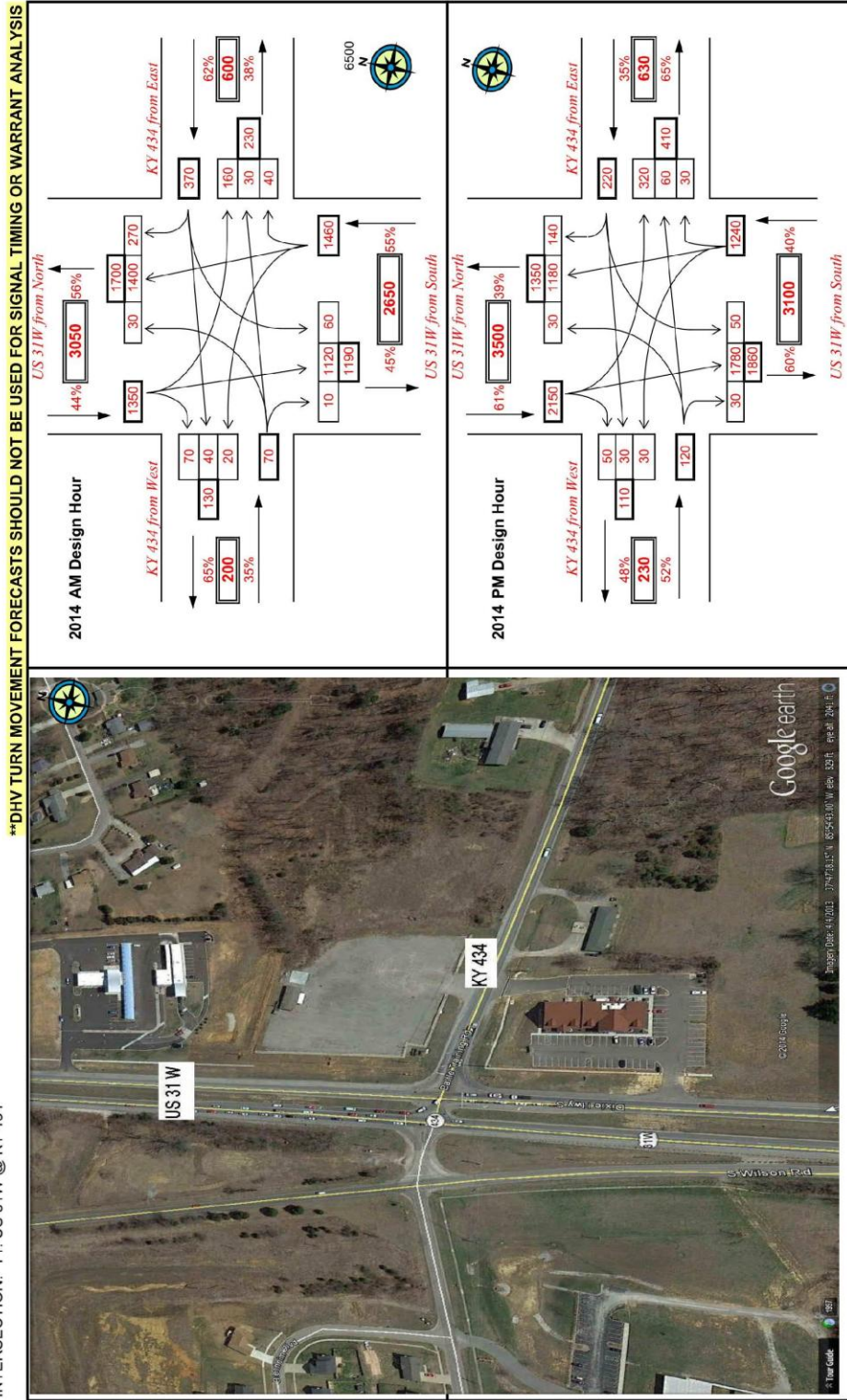
T2: US 31 W AND KY 313

T3: KY 251 AND KY 313

T4: KY 251 AND KY 434

Traffic Forecast Technical Report
 Hardin County: Minor Widening of KY 251 and KY 434
 Item No. 4-153.01

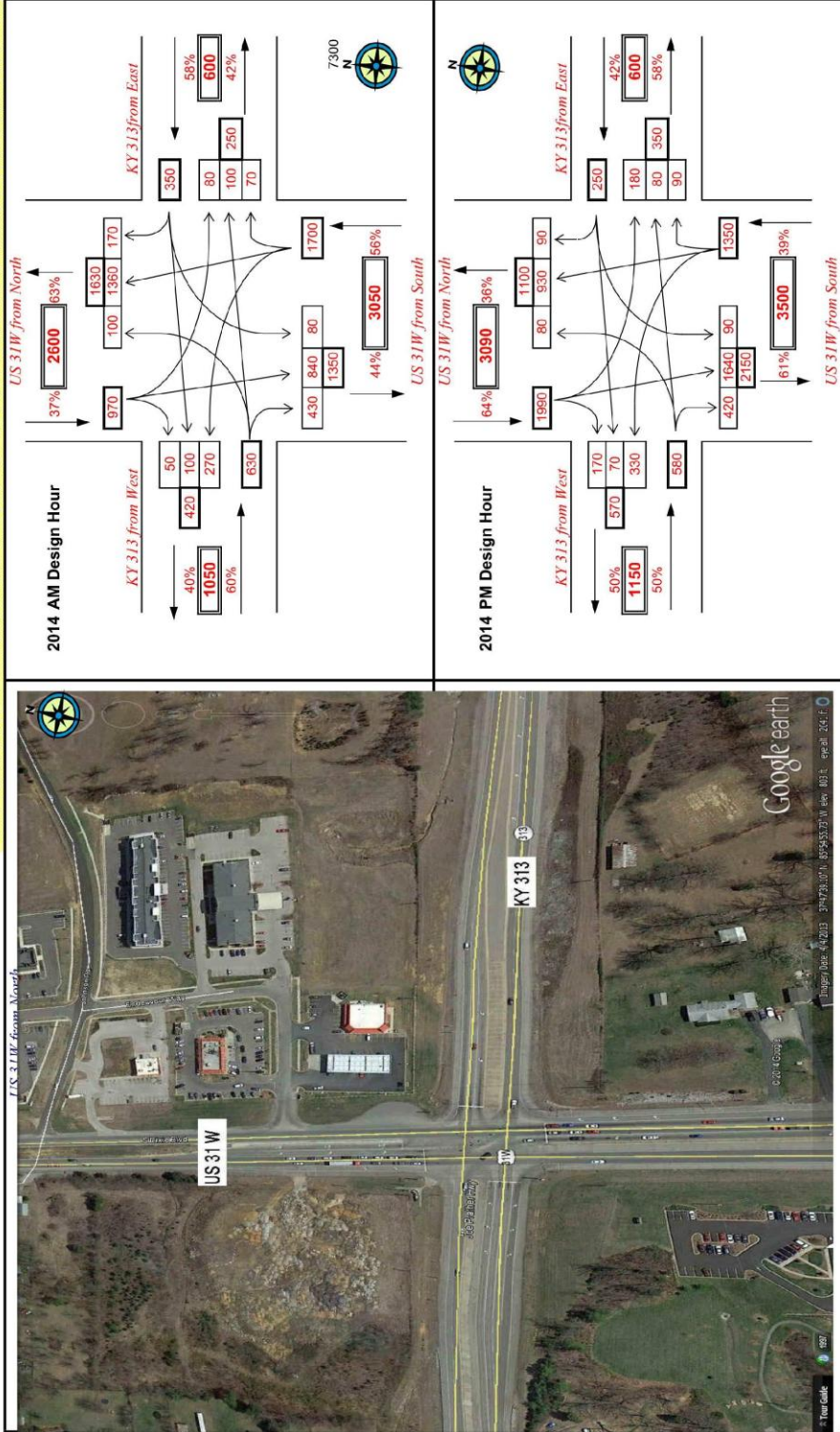
PROJECT: Safety & Spot improvements on KY 251 and KY 434
 ITEM NUMBER: 4-153.01
 MARS NUMBER: 8658313P
 REQUEST DATE: 5/15/2014
 ANALYST: J.BALAJI
 SCENARIO: 2014 ADT and Design Hour Volumes
 INTERSECTION: T1: US 31W @ KY 434



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PROJECT: Safety & Spot improvements on KY 251 and KY 434
 ITEM NUMBER: 4-153.01
 MARS NUMBER: 8658313P
 REQUEST DATE: 5/15/2014
 ANALYST: J.BALAJI
 SCENARIO: 2014 ADT and Design Hour Volumes
 INTERSECTION: T2: US 31W @ KY 313

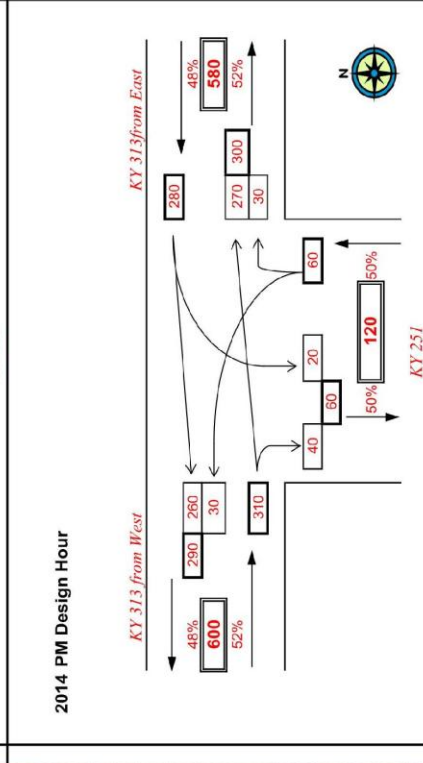
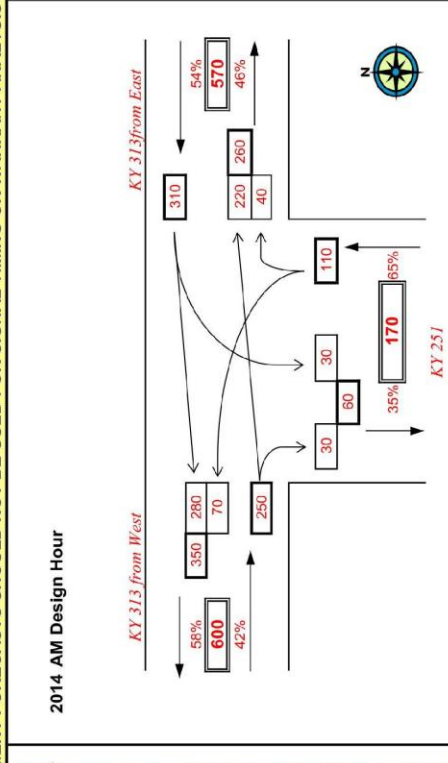
****DHW TURN MOVEMENT FORECASTS SHOULD NOT BE USED FOR SIGNAL TIMING OR WARRANT ANALYSIS**



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PROJECT: Safety & Spot Improvements on KY 251 and KY 434
 ITEM NUMBER: 4-153.01
 MARS NUMBER: 8658313P
 REQUEST DATE: 5/15/2014
 ANALYST: J.BALAJI
 SCENARIO: 2014 ADT and Design Hour Volumes
 INTERSECTION: T3: KY 313 @ KY 251

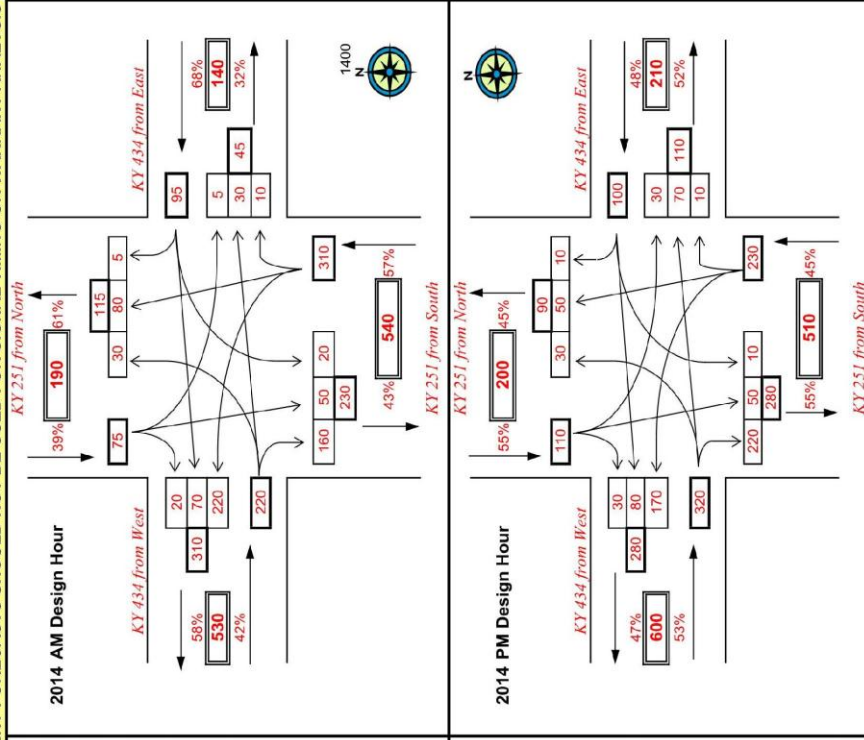
**DHV TURN MOVEMENT FORECASTS SHOULD NOT BE USED FOR SIGNAL TIMING OR WARRANT ANALYSIS



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PROJECT: Safety & Spot Improvements on KY 251 and KY 434
 ITEM NUMBER: 4-153.01
 MARS NUMBER: 8658313P
 REQUEST DATE: 5/15/2014
 ANALYST: J.BALAJI
 SCENARIO: 2014 ADT and Design Hour Volumes
 INTERSECTION: T4: KY 251 @ KY 434

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



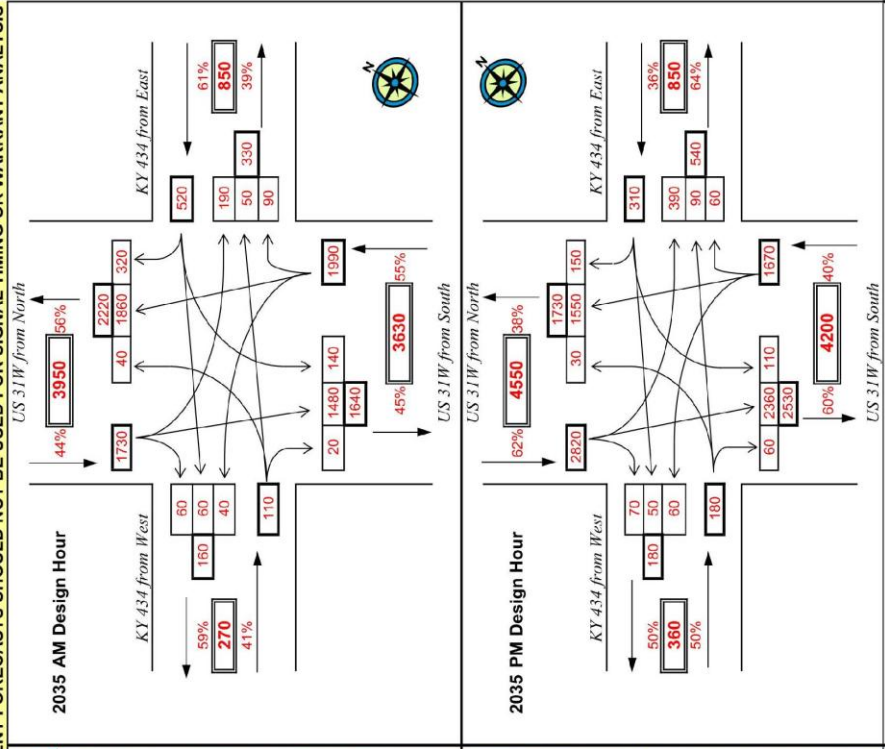
2035

- T1: US 31 W AND KY 434**
- T2: US 31 W AND KY 313**
- T3: KY 251 AND KY 313**
- T4: KY 251 AND KY 434**

Traffic Forecast Technical Report
 Hardin County: Minor Widening of KY 251 and KY 434
 Item No. 4-153.01

PROJECT: Safety & Spot improvements on KY 251 and KY 434
 ITEM NUMBER: 4-153.01
 MARS NUMBER: 8658313P
 REQUEST DATE: 5/15/2014
 ANALYST: J.BALAJI
 SCENARIO: 2035 ADT and Design Hour Volumes
 INTERSECTION: T1: US 31W @ KY 434

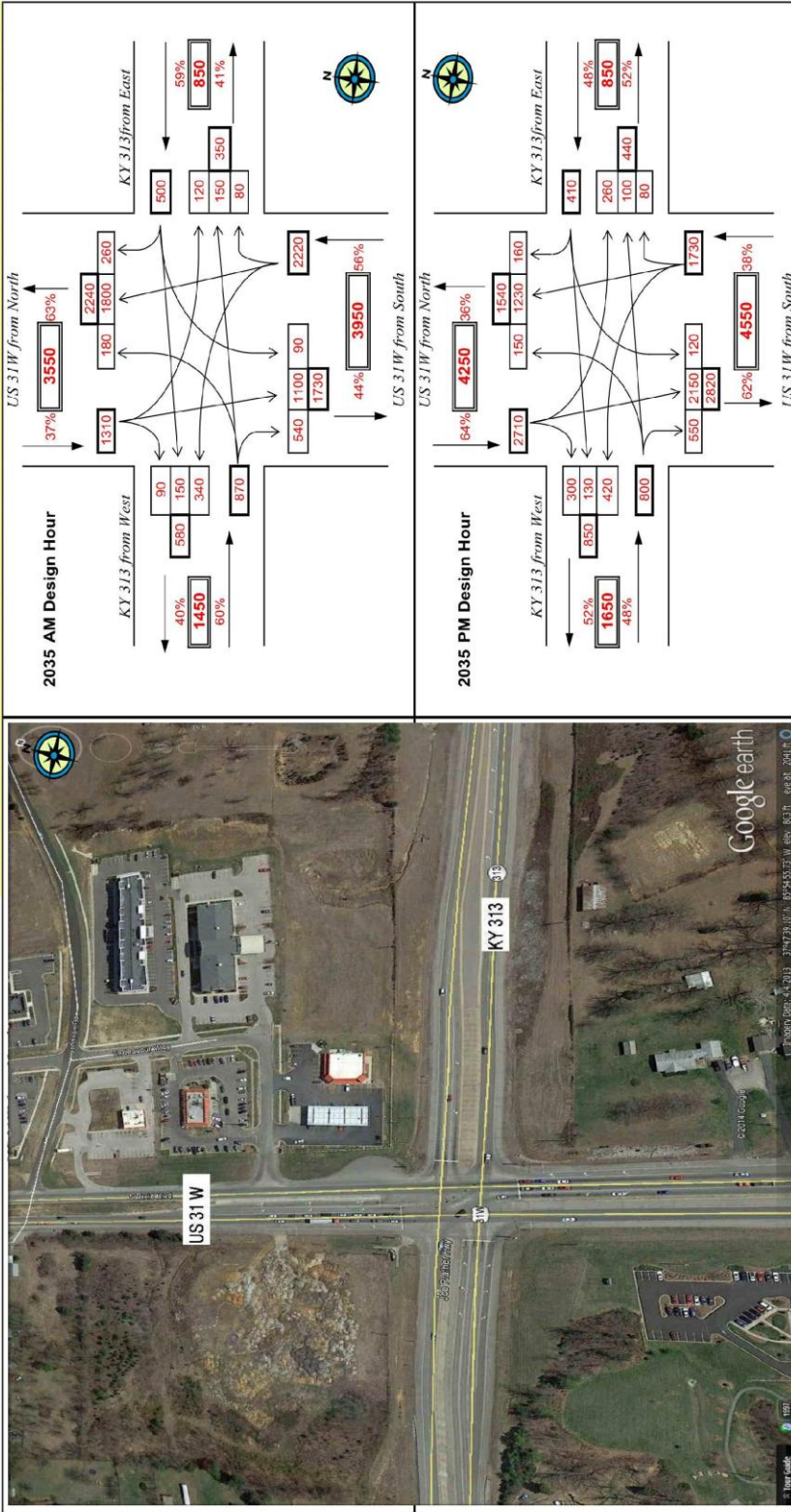
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Traffic Forecast Technical Report
 Hardin County: Minor Widening of KY 251 and KY 434
 Item No. 4-153.01

PROJECT: Safety & Spot improvements on KY 251 and KY 434
 ITEM NUMBER: 4-153.01
 MARS NUMBER: 8658313P
 REQUEST DATE: 5/15/2014
 ANALYST: J.BALAJI
 SCENARIO: 2035 ADT and Design Hour Volumes
 INTERSECTION: T2: US 31W @ KY 313

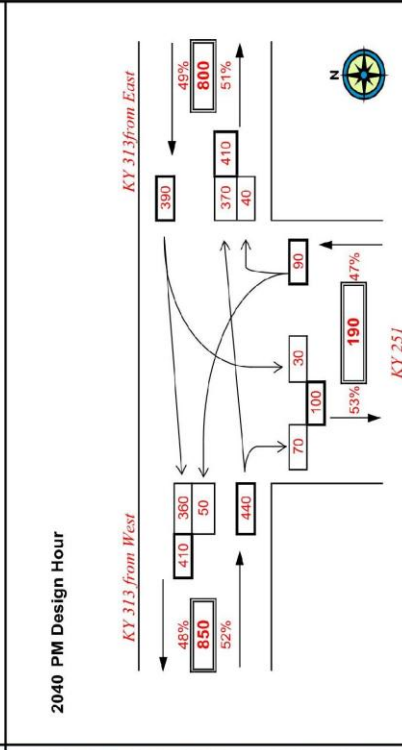
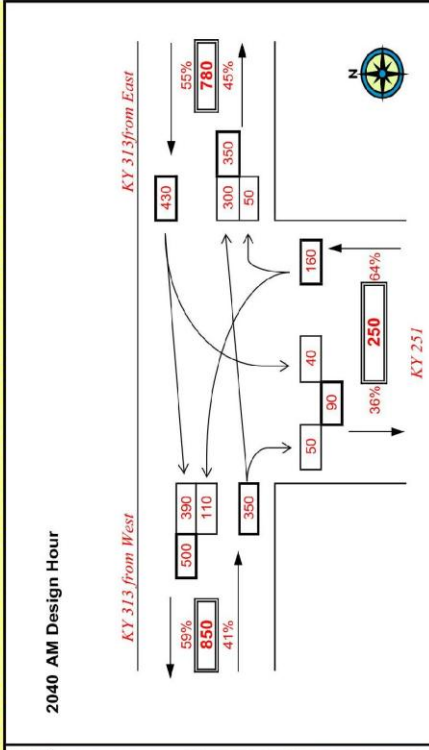
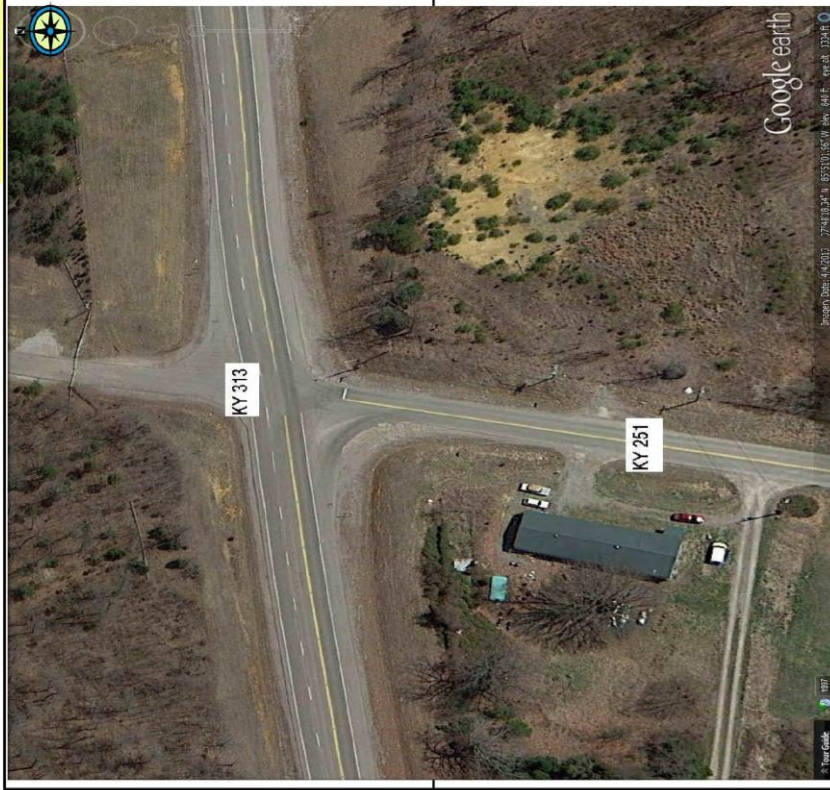
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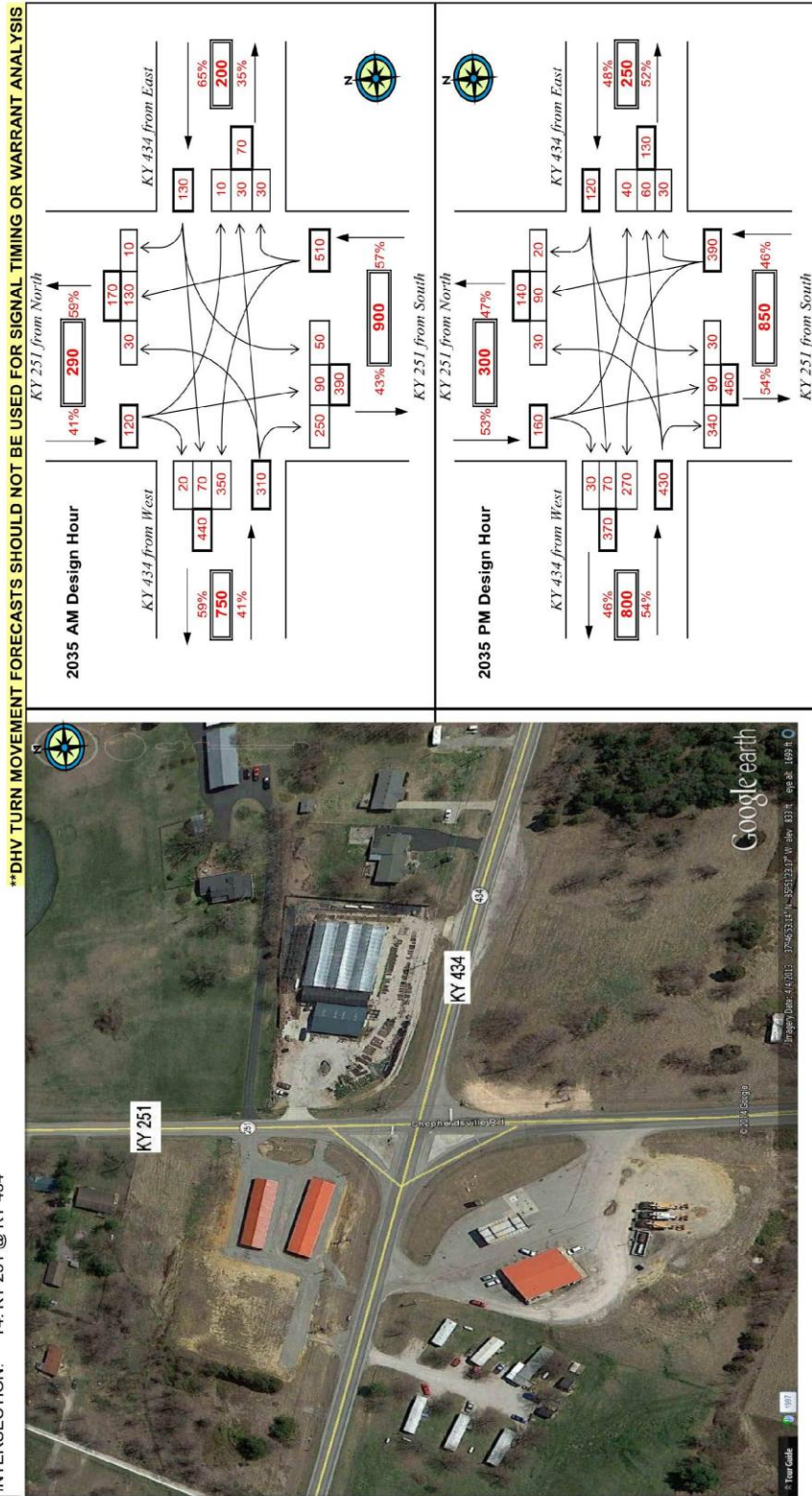
PROJECT: Safety & Spot Improvements on KY 251 and KY 434
 ITEM NUMBER: 4-153.01
 MARS NUMBER: 8658313P
 REQUEST DATE: 5/15/2014
 ANALYST: J.BALAJI
 SCENARIO: 2040 ADT and Design Hour Volumes
 INTERSECTION: T3: KY 313 @ KY 251

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



Traffic Forecast Technical Report
 Hardin County: Minor Widening of KY 251 and KY 434
 Item No. 4-153.01

PROJECT: Safety & Spot improvements on KY 251 and KY 434
 ITEM NUMBER: 4-153.01
 MAPS NUMBER: 8658313P
 REQUEST DATE: 5/15/2014
 ANALYST: J.BALAJI
 SCENARIO: 2035 ADT and Design Hour Volumes
 INTERSECTION: T4: KY 251 @ KY 434



ESAL

Traffic Forecast Technical Report
 Hardin County: Minor Widening of KY 251 and KY 434
 Item No. 4-153.01

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

ROUTE ID:

County	Hardin	Date	11/20/14
Road Name	Battle Training Road	Forecaster	Jay Balaji
Functional Class	8 - Rural Minor Collector	MARS No.	8383101D
Project Description	Safety and Spot improvements on KY 434 and KY 251	Item No.	4-153.01
Scenario	Build	Route No.	KY 434
Segment Description	KY 434 from KY 251 to US 13 W	Beg. MP	0.025
		End MP	3.158
		T.F. No.	TF14-004
		No. of Lanes	2
		1 or 2 way	2

REFERENCES:

Previous Forecasts	N/A	K- Factor Value	13.9%
Traffic Volume	047010	K-Factor Source	047010
Milepoint	2.45	PHF	0.91
Truck Percent	047010	Full Route Unique Identifier	047-KY 0434 -000
Milepoint	2.45		
ESAL Information	2.45		
Growth Rate	1.80%		

TRAFFIC PARAMETERS:

	Present Year	Growth Rate	Construction Year	Median Year	Design Year
	2014		2015	2025	2035
Volume (AADT)	4100	1.80%	4200	5000	5900
Percent Trucks (%T)	7.3%	0.5%	7.4%	8.0%	8.0%
Number of Trucks	300	2.3%	310	400	470
Percent Trucks Hauling Coal (%CT)	0.0%	0.0%	0.0%	0.0%	0.0%
<i>Non-Coal Trucks:</i>					
Axles/Truck (A/T)	2.880	0.70%	2.900	3.110	3.334
ESALs/Axle (ESAL/A)	0.254	1.60%	0.258	0.302	0.354
<i>Coal Trucks:</i>					
Axles/Truck (A/CT)	0	0.0%	0.000	0.000	0.000
ESALs/Axle (ESAL/CA)	0	0.0%	0.000	0.000	0.000

ESAL CALCULATIONS: SEE ATTACHED ESAL CALCULATION SHEET

Design ESALs in Critical Lane 1,500,000

General Comments:

Traffic Forecast Technical Report
 Hardin County: Minor Widening of KY 251 and KY 434
 Item No. 4-153.01

Safety and Spot improvements on KY 434 and KY 251(ESAL for KY 434)

Year	ADT	Car %	Truck %	Cars	Trucks	CT%	AX/T	ESAL/AX	AX/CT	ESAL/JCA	LDF	ESALs
2015	4,174	92.6%	7.4%	3866	308	0.00%	2.90	0.26	0	0	0.500	45,582
2016	4,249	92.6%	7.4%	3934	315	0.00%	2.92	0.26	0	0	0.500	47,609
2017	4,325	92.5%	7.5%	4003	322	0.00%	2.94	0.27	0	0	0.500	49,729
2018	4,403	92.5%	7.5%	4074	330	0.00%	2.96	0.27	0	0	0.500	51,947
2019	4,483	92.5%	7.5%	4145	337	0.00%	2.98	0.27	0	0	0.500	54,267
2020	4,563	92.4%	7.6%	4218	345	0.00%	3.00	0.28	0	0	0.500	56,692
2021	4,645	92.4%	7.6%	4292	353	0.00%	3.02	0.28	0	0	0.500	59,230
2022	4,729	92.4%	7.6%	4368	361	0.00%	3.05	0.29	0	0	0.500	61,884
2023	4,814	92.3%	7.7%	4445	370	0.00%	3.07	0.29	0	0	0.500	64,660
2024	4,901	92.3%	7.7%	4523	378	0.00%	3.09	0.30	0	0	0.500	67,563
2025	4,989	92.2%	7.8%	4602	387	0.00%	3.11	0.30	0	0	0.500	70,601
2026	5,079	92.2%	7.8%	4683	396	0.00%	3.13	0.31	0	0	0.500	73,778
2027	5,170	92.2%	7.8%	4765	405	0.00%	3.15	0.31	0	0	0.500	77,101
2028	5,263	92.1%	7.9%	4849	414	0.00%	3.18	0.32	0	0	0.500	80,578
2029	5,358	92.1%	7.9%	4934	424	0.00%	3.20	0.32	0	0	0.500	84,215
2030	5,454	92.1%	7.9%	5021	434	0.00%	3.22	0.33	0	0	0.500	88,019
2031	5,553	92.0%	8.0%	5109	444	0.00%	3.24	0.33	0	0	0.500	91,999
2032	5,653	92.0%	8.0%	5199	454	0.00%	3.27	0.34	0	0	0.500	96,163
2033	5,754	91.9%	8.1%	5290	464	0.00%	3.29	0.34	0	0	0.500	100,518
2034	5,858	91.9%	8.1%	5383	475	0.00%	3.31	0.35	0	0	0.500	105,075
2035	5,963	91.8%	8.2%	5477	486	0.00%	3.33	0.35	0	0	0.500	109,843

5-yr ESALS
300,000

10-yr ESALS
600,000

15-yr ESALS
1,000,000

20-yr ESALS
1,500,000

*Traffic Forecast Technical Report
 Hardin County: Minor Widening of KY 251 and KY 434
 Item No. 4-153.01*

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

ROUTE ID:

County	Hardin	Date	11/20/14
Road Name	Sheperdsville Road	Forecaster	Jay Balaji
Functional Class	16 - Urban Minor Arterial	MARS No.	8383101D
Project Description	Safety and Spot improvements on KY 434 and KY 251	Item No.	4-153.01
Scenario	Build	Route No.	KY 251
Segment Description	KY 251 from KY 3005 to KY 434	Beg. MP	2.681
		End MP	6.288
		T.F. No.	TF14-004
		No. of Lanes	2
		1 or 2 way	2

REFERENCES:

Previous Forecasts	N/A	K- Factor Value	11.8%
Traffic Volume	047B57	K-Factor Source	047B57
Milepoint	3.5	PHF	0.91
Truck Percent	047B57	Full Route Unique Identifier	
Milepoint	3.5		047-KY 0251 -000
ESAL Information	3.5		
Growth Rate	2.00%		

TRAFFIC PARAMETERS:

		Present Year	Growth Rate	Construction Year	Median Year	Design Year
		2014		2015	2025	2035
Volume	(AADT)	5700	2.00%	5800	7100	9000
Percent Trucks	(%T)	4.4%	0.5%	4%	5%	5%
Number of Trucks		250	2.5%	260	330	450
Percent Trucks Hauling Coal	(%CT)	0%	0.0%	0%	0%	0%
<i>Non-Coal Trucks:</i>						
Axles/Truck	(A/T)	2.980	1.00%	3.010	3.325	3.673
ESALs/Axle	(ESAL/A)	0.200	2.00%	0.204	0.249	0.303
<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 1,200,000

General Comments:

Traffic Forecast Technical Report
 Hardin County: Minor Widening of KY 251 and KY 434
 Item No. 4-153.01

Safety and Spot Improvements on KY 434 and KY 251(ESAL for KY 251)

Year	ADT	Car %	Truck %	Cars	Trucks	CT%	AX/T	ESAL/AX	AX/CT	ESAL/CA	LDF	ESALS
2015	5,814	95.6%	4.4%	5557	257	0.00%	3.01	0.20	0	0	0.500	33,879
2016	5,930	95.6%	4.4%	5667	264	0.00%	3.04	0.21	0	0	0.500	35,595
2017	6,049	95.5%	4.5%	5779	270	0.00%	3.07	0.21	0	0	0.500	37,402
2018	6,170	95.5%	4.5%	5893	277	0.00%	3.10	0.22	0	0	0.500	39,308
2019	6,293	95.5%	4.5%	6009	284	0.00%	3.13	0.22	0	0	0.500	41,316
2020	6,419	95.5%	4.5%	6128	291	0.00%	3.16	0.23	0	0	0.500	43,433
2021	6,548	95.4%	4.6%	6249	298	0.00%	3.19	0.23	0	0	0.500	45,665
2022	6,678	95.4%	4.6%	6373	306	0.00%	3.23	0.23	0	0	0.500	48,018
2023	6,812	95.4%	4.6%	6499	313	0.00%	3.26	0.24	0	0	0.500	50,498
2024	6,948	95.4%	4.6%	6627	321	0.00%	3.29	0.24	0	0	0.500	53,114
2025	7,087	95.4%	4.6%	6758	329	0.00%	3.32	0.25	0	0	0.500	55,872
2026	7,229	95.3%	4.7%	6891	338	0.00%	3.36	0.25	0	0	0.500	58,780
2027	7,374	95.3%	4.7%	7027	346	0.00%	3.39	0.26	0	0	0.500	61,847
2028	7,521	95.3%	4.7%	7166	355	0.00%	3.43	0.26	0	0	0.500	65,081
2029	7,671	95.3%	4.7%	7308	364	0.00%	3.46	0.27	0	0	0.500	68,492
2030	7,825	95.2%	4.8%	7452	373	0.00%	3.49	0.27	0	0	0.500	72,089
2031	7,981	95.2%	4.8%	7599	382	0.00%	3.53	0.28	0	0	0.500	75,883
2032	8,141	95.2%	4.8%	7749	392	0.00%	3.56	0.29	0	0	0.500	79,885
2033	8,304	95.2%	4.8%	7902	402	0.00%	3.60	0.29	0	0	0.500	84,107
2034	8,470	95.1%	4.9%	8058	412	0.00%	3.64	0.30	0	0	0.500	88,560
2035	8,639	95.1%	4.9%	8217	422	0.00%	3.67	0.30	0	0	0.500	93,257

5-yr ESALS
200,000

10-yr ESALS
500,000

15-yr ESALS
800,000

20-yr ESALS
1,200,000

Bicycle and Pedestrian Review for Project #4-153.01

Project Overview:

Project includes minor widening and spot improvements on KY-251 from KY-3005 to KY-434. Also includes minor widening and spot improvements on KY-434 from KY-251 to US-31W. Project improvements recommended by a 2012 KYTC Planning Study.

Local/regional Planning:

No known specific bicycle or pedestrian planning for this area

Existing conditions:

- KY-251 MP 2.7-6.3
 - a) ADT is 5320 (2011) at MP 3.3 Sta#B57
 - b) ADT is 4450 (2011) at MP 4.3 Sta#087
 - c) Posted Speed Limit from MP 2.7-2.95 is 35MPH
 - d) Posted Speed Limit from MP 2.95-6.3 is 55MPH
 - e) Curb and gutter from MP 2.7-2.95
 - f) Rural cross section with no shoulder MP 2.95-6.3
 - g) Bicyclists Comfort Index (BCI) rating is an D (MP 2.7-2.95)
 - h) Bicyclists Comfort Index (BCI) rating is an E (MP 2.95-6.3)
- KY-434 MP 0.0-3.1
 - a) ADT is 4167 (2012) at MP 2.9 Sta#010
 - b) ADT is 9040 (2011) at MP 0.3 Sta#D68
 - c) Posted Speed Limit is 55MP
 - d) No shoulder
 - e) Bicyclists Comfort Index (BCI) rating is an E

The KYTC Bicycle and Pedestrian program team recommendations are:

The Bicycle and Pedestrian program team's recommendations are:

- KY-251 MP 2.7-6.3

Best:

 - a. Continue the side walk section located at MP 2.95 if the curb and gutter design is chosen through the extent of the project.
 - b. If the design is a rural cross section, construct a shoulder of 8 feet (or more) within the highway. The shoulder would accommodate cyclist by providing a gap spacing of 10-14 feet within the rumble strips every 40-60 feet. This would provide a BCI of C

Good:

Provide a shoulder of 6 feet (or more) within the highway. The shoulder would accommodate cyclist by providing a gap spacing of 10-14 feet within the rumble strips every 40-60 feet. This would provide a BCI of C

*Traffic Forecast Technical Report
Hardin County: Minor Widening of KY 251 and KY 434
Item No. 4-153.01*

Fair:

Provide a shoulder of 6 feet (or more) within the highway.

- KY-434 MP 0.0-3.1

Best:

Provide a shoulder of 8 feet (or more) within the highway. The shoulder would accommodate cyclist by providing a gap spacing of 10-14 feet within the rumble strips every 40-60 feet. This would provide a BCI of C

Good:

Provide a shoulder of 6 feet (or more) within the highway. The shoulder would accommodate cyclist by providing a gap spacing of 10-14 feet within the rumble strips every 40-60 feet. This would provide a BCI of C

Fair:

Provide a shoulder of 6 feet (or more) within the highway.

❖ BCI: <http://transportation.ky.gov/Bike-Walk/Documents/Bicyclists%20Comfort%20Index.pdf>

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Kentucky Transportation Cabinet
December 3, 2014