



Matthew G. Bevin
Governor

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

Greg Thomas
Secretary

MEMORANDUM

TO: Tamra Wilson, P.E.
Chief District Engineer
District 8-Somerset

ATTN: Joe Gossage, P.E.

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

DATE: November 28, 2016

SUBJECT: Lincoln County
US 27 Scoping Study
Item No. 8-167.00

In response to your August 22, 2016 request, we are providing the following forecasts in the attached report:

- 2016 and 2040 Average Daily and Design Hourly Truck Percent Forecasts
- 2016 and 2040 DHV Turn Movements
- Peak Hour Factors
- 20-year ESALs

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

JM/JB/BC

Attachments

c/att: Jeff Dick
Randy Turner
Dan Hite



An Equal Opportunity Employer M/F/D

Executive Summary

Traffic Forecast Report and Bike/Ped Recommendations Lincoln County US-27 Scoping Study Item No. 8-167.00

Prepared for:



Prepared by:
Jayalakshmi Balaji
Division of Planning
Kentucky Transportation Cabinet
November 23, 2016

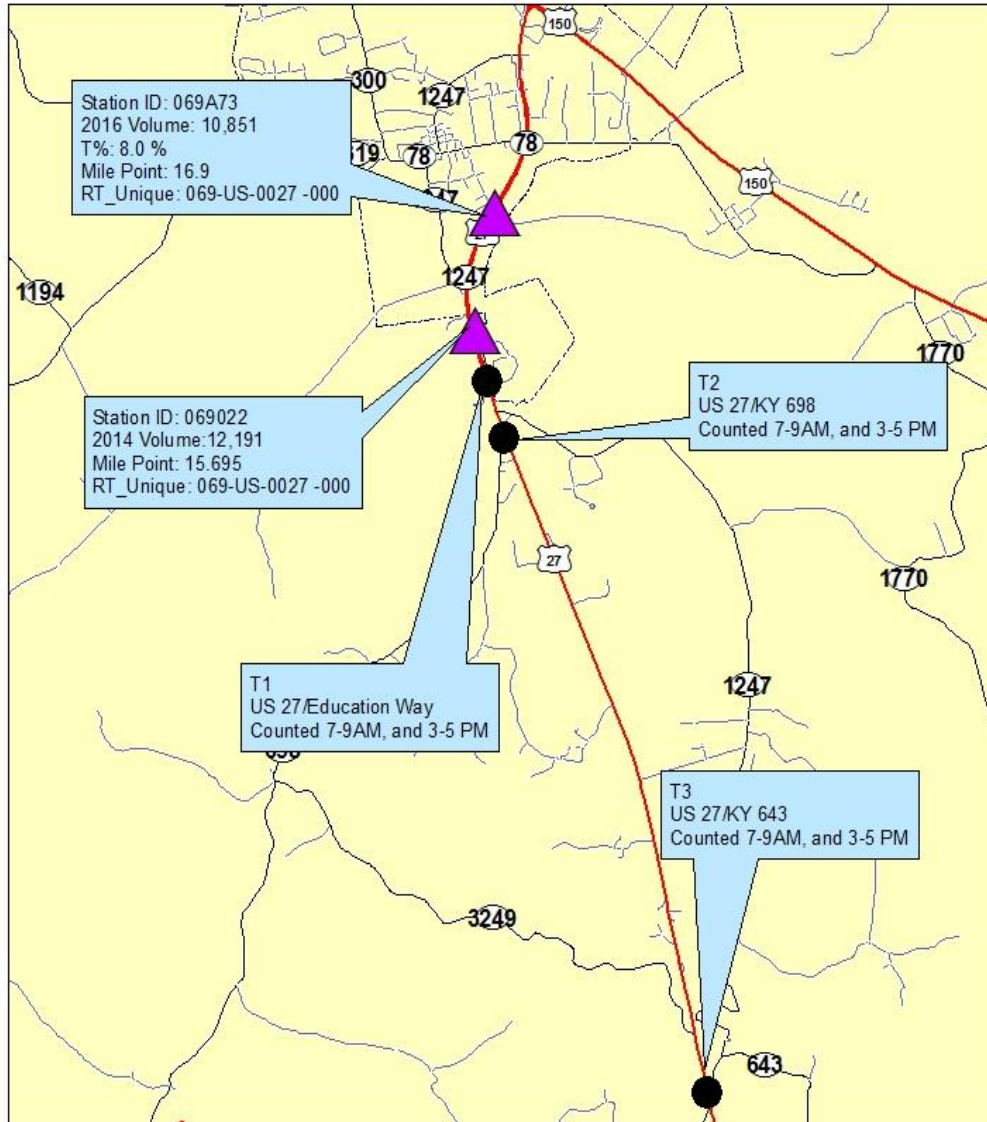
Table of Contents

Figure 1: Vicinity Map.....	Page 2
Executive Summary.....	Page 3
Figure 2: Summary Map.....	Page 5
Turn Movements.....	Page 6
20 Year ESAL Spreadsheets.....	Page 13
Bike/Ped Recommendations.....	Page 14

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
BCI	Bicycle Comfort Index	

Vicinity Map



Lincoln County
 US-27 Scoping Study
 Item # : 8-167



Legend

- Project Road
- Count Station
- Turn Movement

0 0.5 1 Miles

Traffic Forecast Executive Summary

Lincoln County: US 27 Scoping Study

Item No. 8-167.00

FORECAST SUMMARY

The purpose of this project is to improve safety and reduce congestion along US 27 from KY 1247 to Education Way. The objective of this report is to analyze current and future traffic utilizing this corridor between MP 11.169 and MP 15.881.

FORECAST TYPE

The following types of forecasts were developed:

- 2016 and 2040 Average Daily and Design Hourly Truck Percent Forecasts
- 2016 and 2040 Turn Movement Forecasts
- 2016 and 2040 ADT and DHV values
- 20-year ESALs

CURRENT-YEAR VOLUMES

The 2016 ADT volume is based on the 2014 volume count at count station 069022 (MP: 15.695). All figures are subject to rounding.

DESIGN-YEAR/GROWTH FACTORS

Kentucky State Data Center suggests population for Lincoln County to grow 0.24% annually over the next 20 years. Exponential growth analyses performed on historical data at traffic stations 069022 and 069306 estimates a growth of 1.0% in traffic volumes. Therefore a growth rate of 1.0% was used for the purpose of this forecast except at the school entrance. A growth rate of 0.25 % was used at the school entrance to be in line with the county growth.

TRUCK PERCENTAGE

The truck percentage of 8.0% was calculated from the class count taken at traffic station 069A73 and a growth rate of 1.0% calculated from the historical data mentioned in the design year growth factors was used for the truck volumes.

ESALs

Functional class averages and the 2040 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. For more information, please see the attached ESAL calculation sheets.

TURN MOVEMENTS

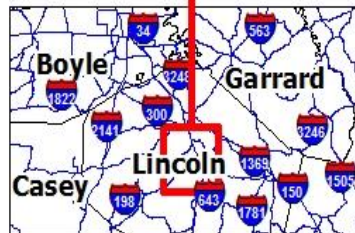
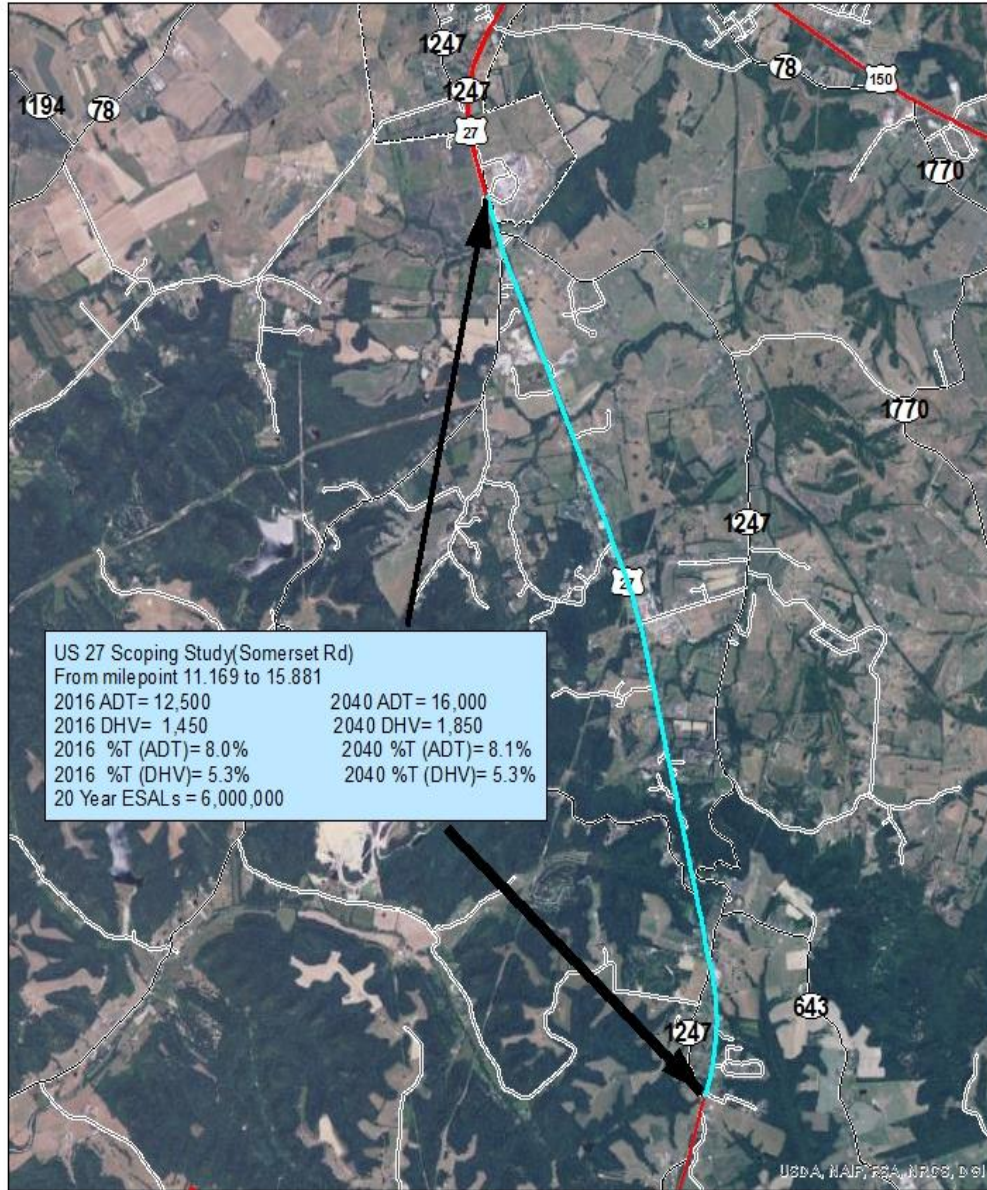
Three turn movements were requested for this forecast. Turn volumes will not match between T1, T2, and T3 due to the presence of several access points in between the intersections.

T1: US 27 and Education Way

T2: US 27 and KY 698

T3: US 27 and KY 643

Summary Map



Lincoln County
 US-27 Scoping Study
 Item # : 8-167



Legend

— Project Road

0 0.5 1 Miles

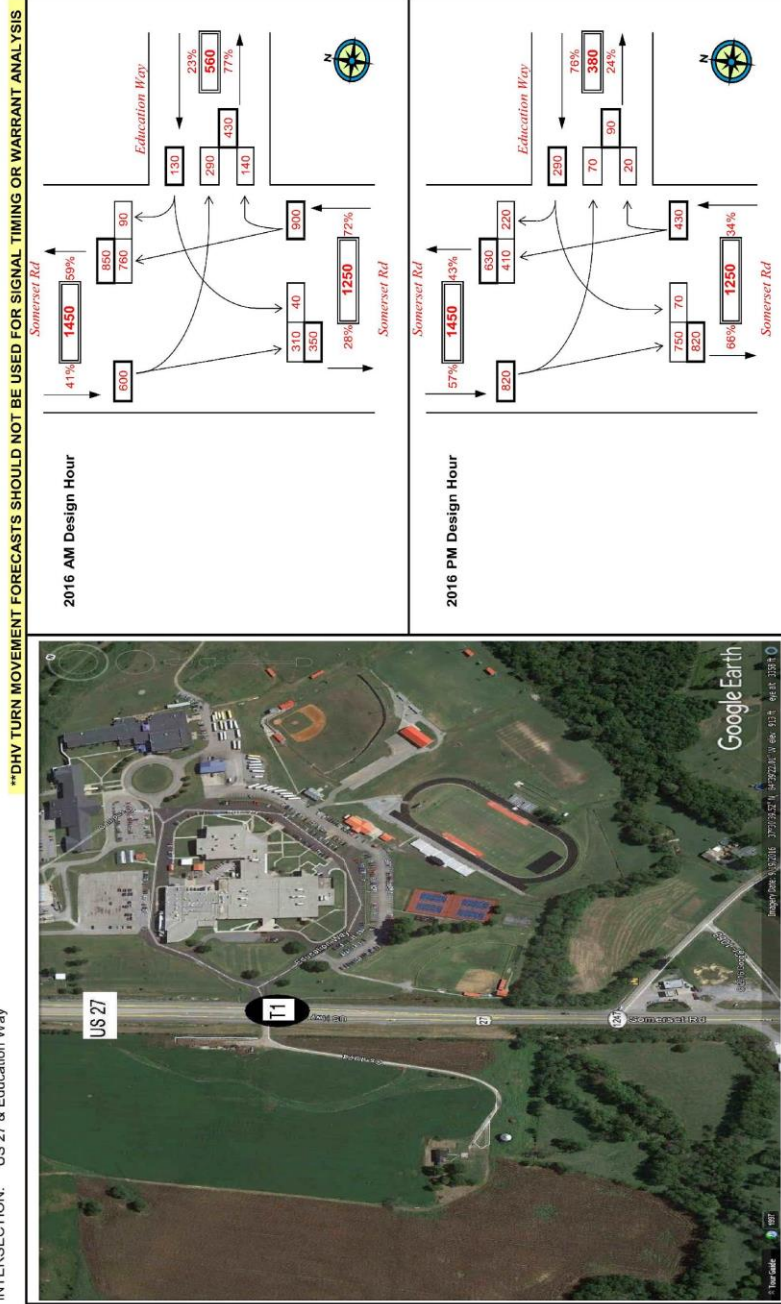
Turn Movements 2016/2040
T1: US 27 and Education Way
T2: US 27 and KY 698
T3: US 27 and KY 643

Traffic Forecast Technical Report
 Lincoln County: US-27 Scoping Study
 Item No. 8-167.00

PROJECT: US 27 Planning Study in Lincoln County
 ITEM NUMBER: 8-167
 MAPS NUMBER: 9011101D
 REQUEST DATE: Aug 11, 2016
 ANALYST: Jay Balaji
 YEAR: 2016
 INTERSECTION: US 27 & Education Way

TURN MOVEMENT 1 (2016)

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2016 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.



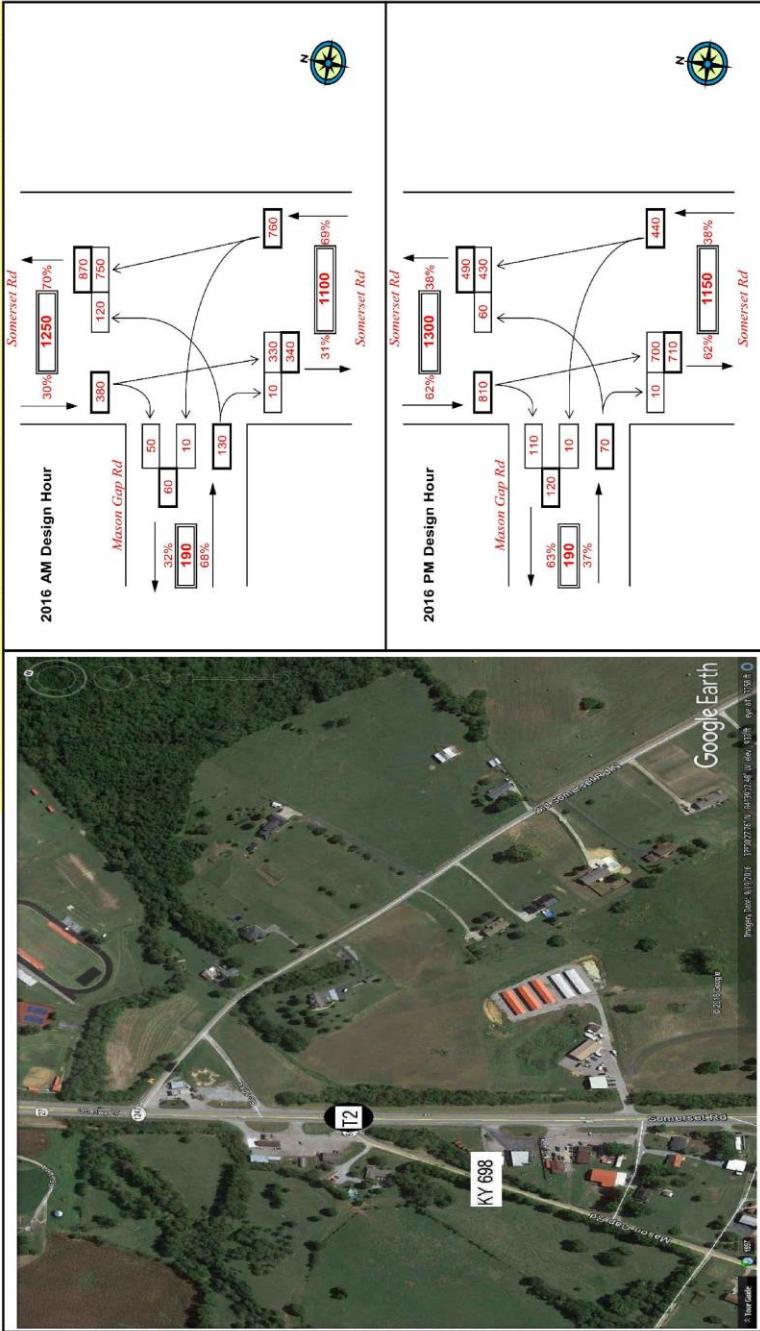
Traffic Forecast Technical Report
 Lincoln County: US-27 Scoping Study
 Item No. 8-167.00

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2016 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

PROJECT: US 27 Planning Study in Lincoln County
 ITEM NUMBER: 8-167
 MAPS NUMBER: 9011101D
 REQUEST DATE: Aug 11, 2016
 ANALYST: Jay Balaji
 YEAR: 2016
 INTERSECTION: US 27 & KY 698

TURN MOVEMENT 2 (2016)

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

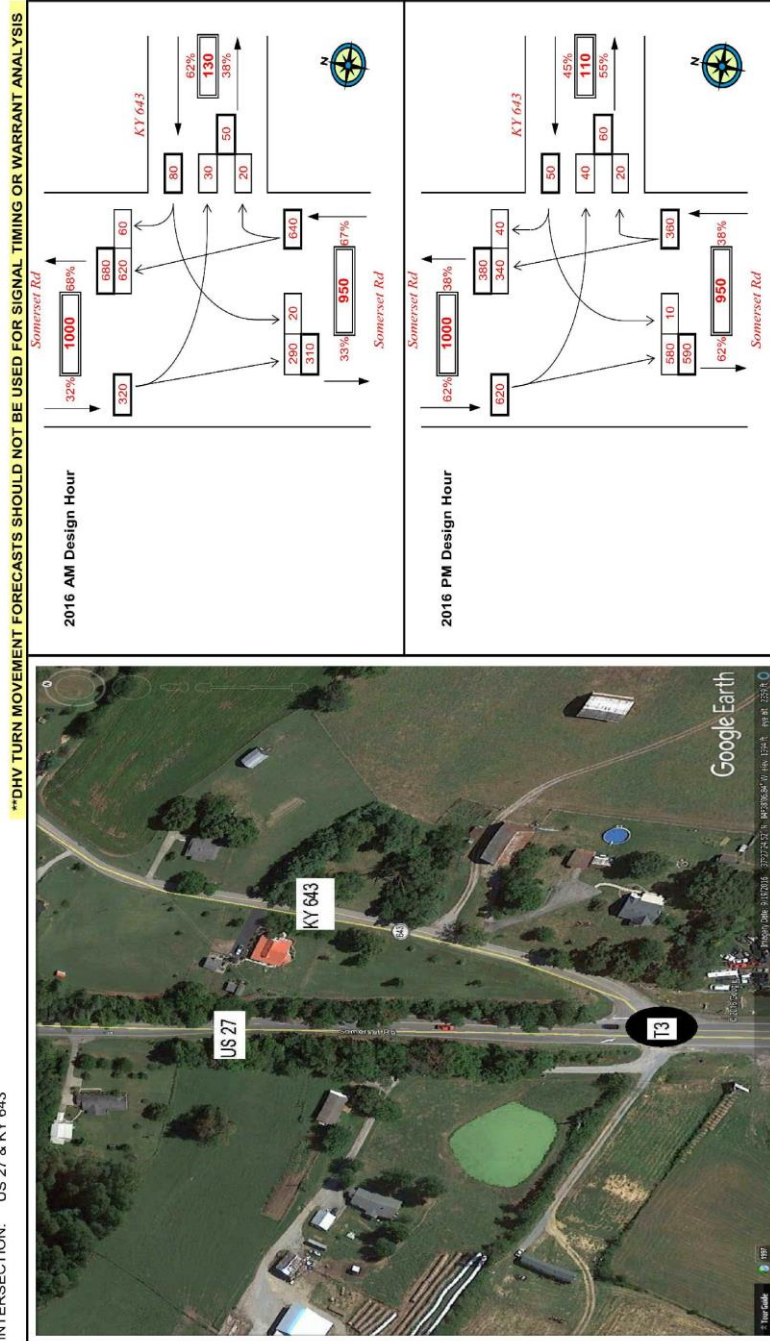


Traffic Forecast Technical Report
 Lincoln County: US-27 Scoping Study
 Item No. 8-167.00

NOTE: K-Factors, Directional Distributions, and Peak Hour Factors were determined from a 2016 Turning Movement Count. AM and PM DHVs represent 30th highest hour estimates for each turn maneuver.

PROJECT: US 27 Planning Study in Lincoln County
 ITEM NUMBER: 8-167
 MARS NUMBER: 9011101D
 REQUEST DATE: Aug 11, 2016
 ANALYST: Jay Balaji
 YEAR: 2016
 INTERSECTION: US 27 & KY 643

TURN MOVEMENT 3 (2016)



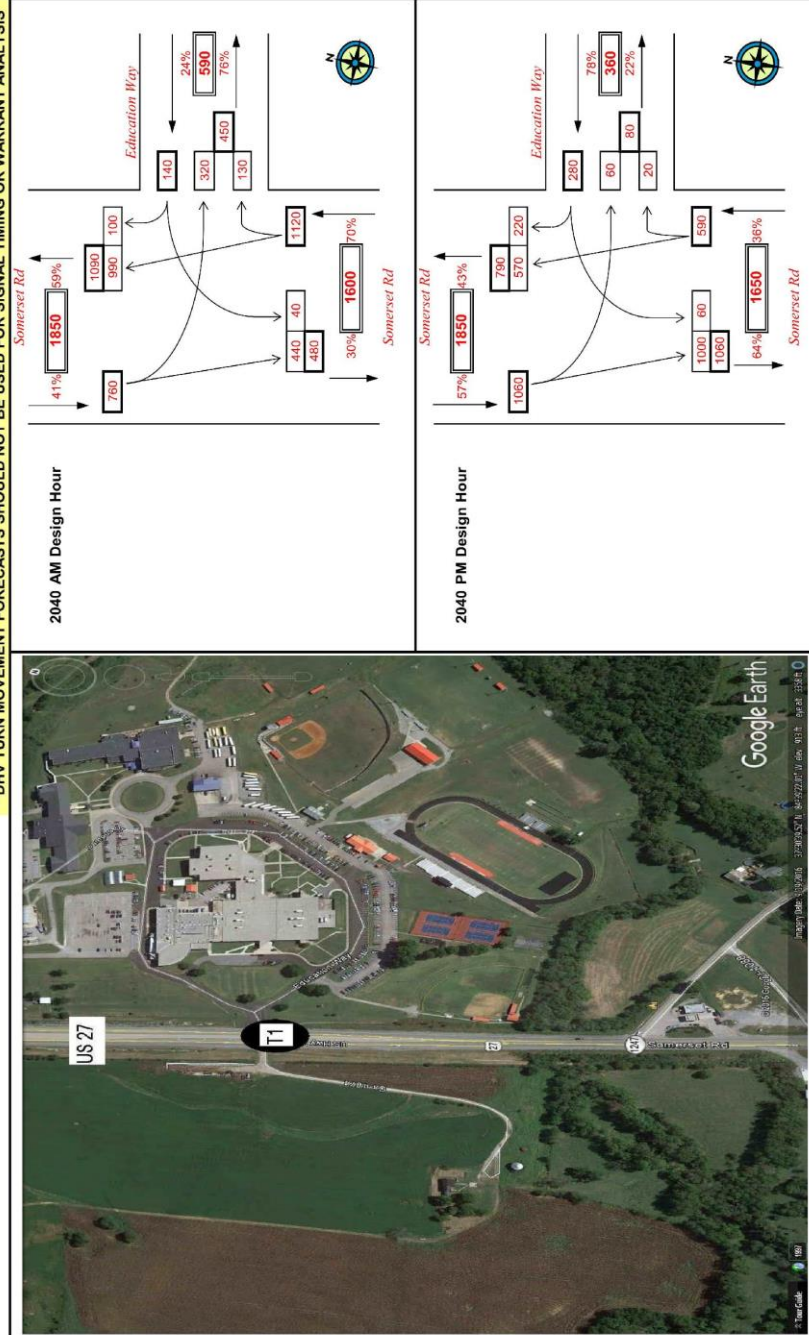
Traffic Forecast Technical Report
 Lincoln County: US-27 Scoping Study
 Item No. 8-167.00

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

PROJECT: US 27 Planning Study in Lincoln County
 ITEM NUMBER: 8-167
 MARS NUMBER: 9011101D
 REQUEST DATE: Aug 11, 2016
 ANALYST: Jay Balaaji
 YEAR: 2040
 INTERSECTION: US 27 & Education Way

TURN MOVEMENT 1 (2040)

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



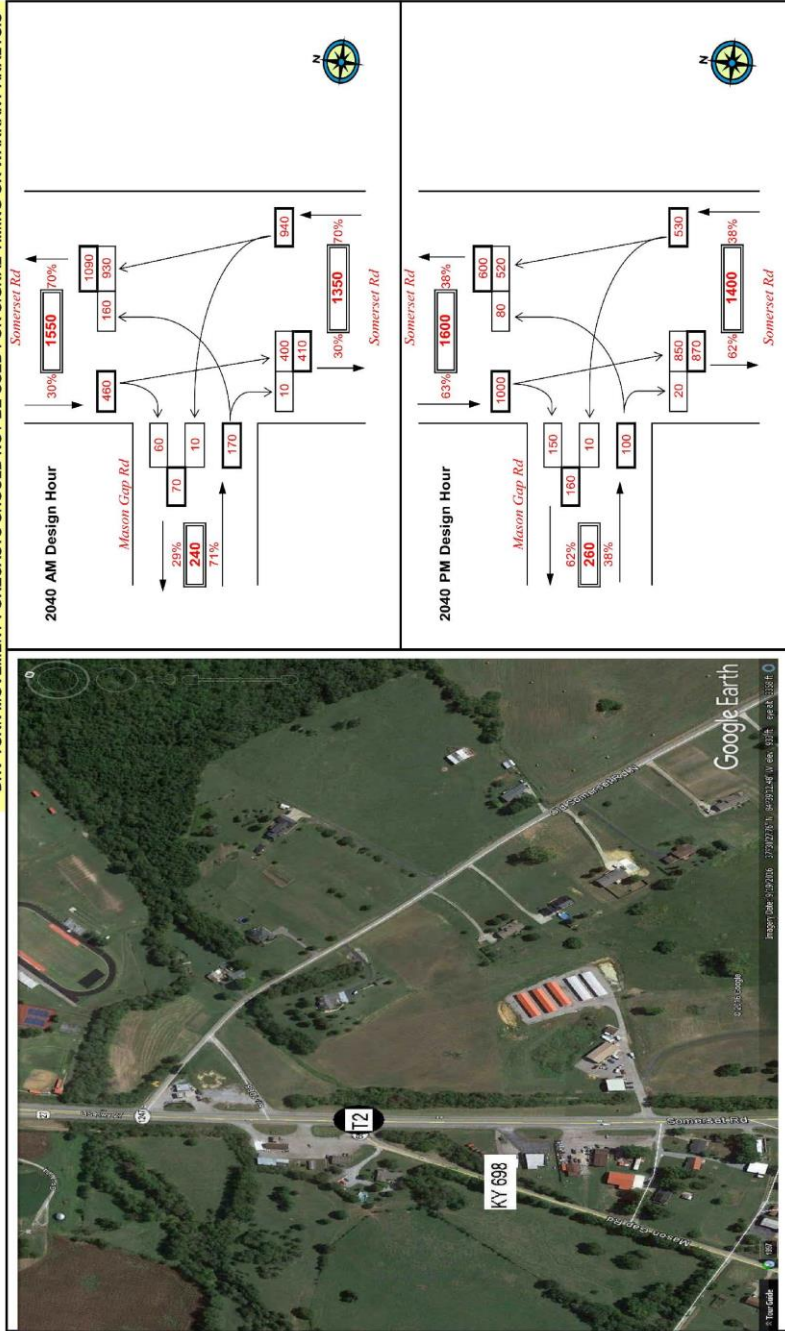
Traffic Forecast Technical Report
 Lincoln County: US-27 Scoping Study
 Item No. 8-167.00

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

PROJECT: US 27 Planning Study in Lincoln County
 ITEM NUMBER: 8-167
 MARS NUMBER: 9011101D
 REQUEST DATE: Aug 11, 2016
 ANALYST: Jay Balaji
 YEAR: 2040
 INTERSECTION: US 27 & KY 698

TURN MOVEMENT 2 (2040)

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



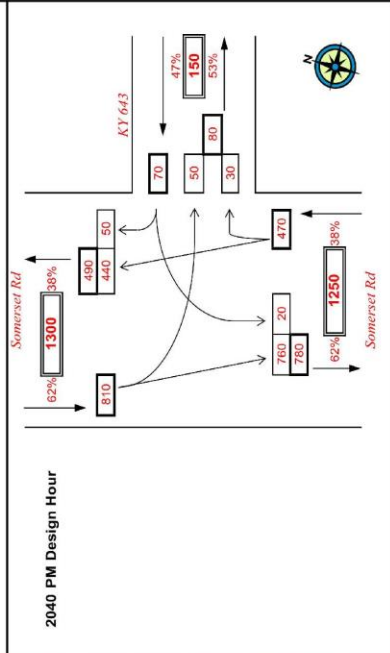
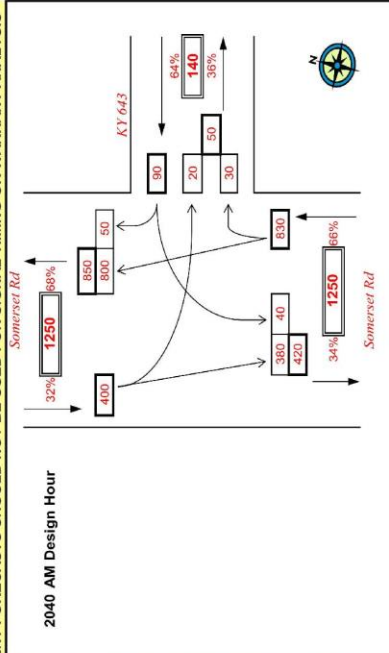
Traffic Forecast Technical Report
 Lincoln County: US-27 Scoping Study
 Item No. 8-167.00

PROJECT: US 27 Planning Study in Lincoln County
 ITEM NUMBER: 8-167
 MARS NUMBER: 9011101D
 REQUEST DATE: Aug 11, 2016
 ANALYST: Jay Balaji
 YEAR: 2040
 INTERSECTION: US 27 & KY 643

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

TURN MOVEMENT 3 (2040)

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



*Traffic Forecast Technical Report
Lincoln County: US-27 Scoping Study
Item No. 8-167.00*

FORECAST OF EQUIVALENT SINGLE AXLE LOAD ACCUMULATIONS-4 LANE (20-year)

ROUTE ID:

County	Lincoln	Date	11/07/16
Full Route Unique Identifier	069-US-0027 -000	Forecaster	Jay Balaji
Road Name	Somerset Road	County No.	69
Functional Class	2 - Rural Principal Arterial	MARS No.	9011101D
Project Description	US 27 Scoping Study	Item No.	8-167
Scenario	Build	T.F. No.	TF 16-019
Segment Description	Same	Beg. MP	11.169
		End MP	15.881
		No. of Lanes	2
		1 or 2 way	2

REFERENCES:

Previous Forecasts	None	K-Factor Source	069022
Traffic Volume	069022	K-Factor Value	11.9%
Milepoint	15.695	PHF	0.21
Class Count Station	069A73	2016 DHV	1,450
Milepoint	16.391	2040 DHV	1,850
ESAL Information Source	2013 Aggregated ESALs	2016 %T (DHV)	5.3%
ADT Growth Rate (All Vehicles)	1.0%	2040 %T (DHV)	5.3%

TRAFFIC PARAMETERS:

	Present Year	Growth Rate	Construction Year	Median Year	Design Year
Year	2016	N/A	2020	2030	2040
Volume					
Non-Trucks	11,500	1.0%	12,000	12,900	14,700
All Trucks	1,000	1.1%	1,000	1,100	1,300
Coal Trucks	0	0.0%	0	0	0
All Vehicles	12,500	1.0%	13,000	14,000	16,000
Non-Coal Trucks					
Truck Percentage of ADT	8.0%	0.1%	7.7%	7.9%	8.1%
Axles per Truck	3.405	0.0%	3.405	3.405	3.405
ESALs per Axle	0.291	1.3%	0.400	0.400	0.400
Coal Trucks					
C.T. as % of Overall Trucks	0.00%	0.00%	0.00%	0.00%	0.00%
Axles per Coal Truck	5.077	-100.0%	0.000	0.000	0.000
ESALs per Axle	3.448	-100.0%	0.000	0.000	0.000

ESAL CALCULATIONS:

Design ESALs in Critical Lane **6,000,000**

General Comments:

E-Link in Projectwise

Bicycle and Pedestrian Review for Project #8-167.00

Project Overview:

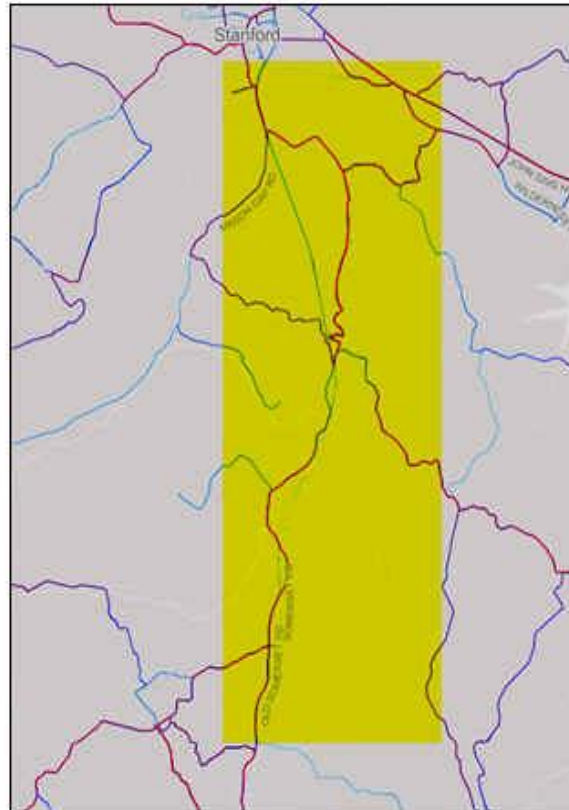
This project is a scoping study to consider improvements to US-27 (MP 11.1-15.8).

Local/regional Planning:

- Lincoln County and the City of Stanford do not currently have a bicycle or pedestrian master plan. There are no specific plans for bicycle or pedestrian travel or improvements from the local government within the project area.

Existing conditions:

- Somerset Road (US027) / MP 11.169-15.881
 - ADT is 7000-14000
 - Heavy truck % is 3.8 (550 ADT)
 - The posted speed limit is 55 MPH
 - 2 foot or less paved shoulder with rumble stripe
 - Rural cross section design
 - Lincoln County Middle School (MP 16.0)
 - The Bicyclists Comfort Index (BCI) average rating is a level D



Strava Heat Source Map for bicycling activity within project area / moderate to high activity in the area crossing US 27 <http://labs.strava.com/heatmap/#12/-84.63953/37.44611/gray/bike>

The KYTC Bicycle and Pedestrian program team recommendations are:

Best: Construct a paved shoulder on both sides of the roadway, 8 feet wide (or wider), and provide a gap of 10 feet every 40 feet within the rumble strip (if installed), to further accommodate for pedestrian and bicycling travel (Figure 1). The BCI rating would improve to a level C. Provide right-of-way or a constructed berm space for future sidewalks and or multi-use path to accommodate future growth in both residential, educational and commercial development.

Good: Construct a paved shoulder on both sides of the roadway, 8 feet wide (or wider), and provide a gap of 10 feet every 40 feet within the rumble strip (if installed) to accommodate for pedestrian and bicycling travel (Figure 1). The BCI rating would improve to a level C.

Fair: Construct a paved shoulder on both sides of the roadway 6 feet (or wider) and provide a 10 foot gap every 40 feet within the rumble strip (if installed) to accommodate pedestrian and bicycling travel (Figure 1). The BCI rating would improve to a level C.

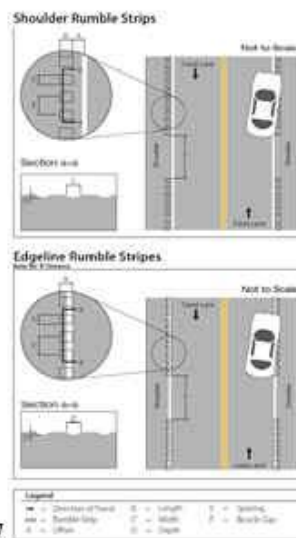


Figure 1
Bicycle gaps within the rumbles /

http://safety.fnwa.dot.gov/roadway_dept/pavement/rumble_strips/t504039/

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

Prepared by:
Troy Hearn, Bicycle & Pedestrian Program Coordinator
Division of Planning, www.transportation.ky.gov/Bike-Walk
Kentucky Transportation Cabinet
November 23, 2016

**Traffic Forecast Report
Lincoln County
US-27 Scoping Study
Item No. 08-0167.00**

Prepared for:



Prepared by:
Justin Harrod
Division of Planning
Kentucky Transportation Cabinet
March 24, 2017

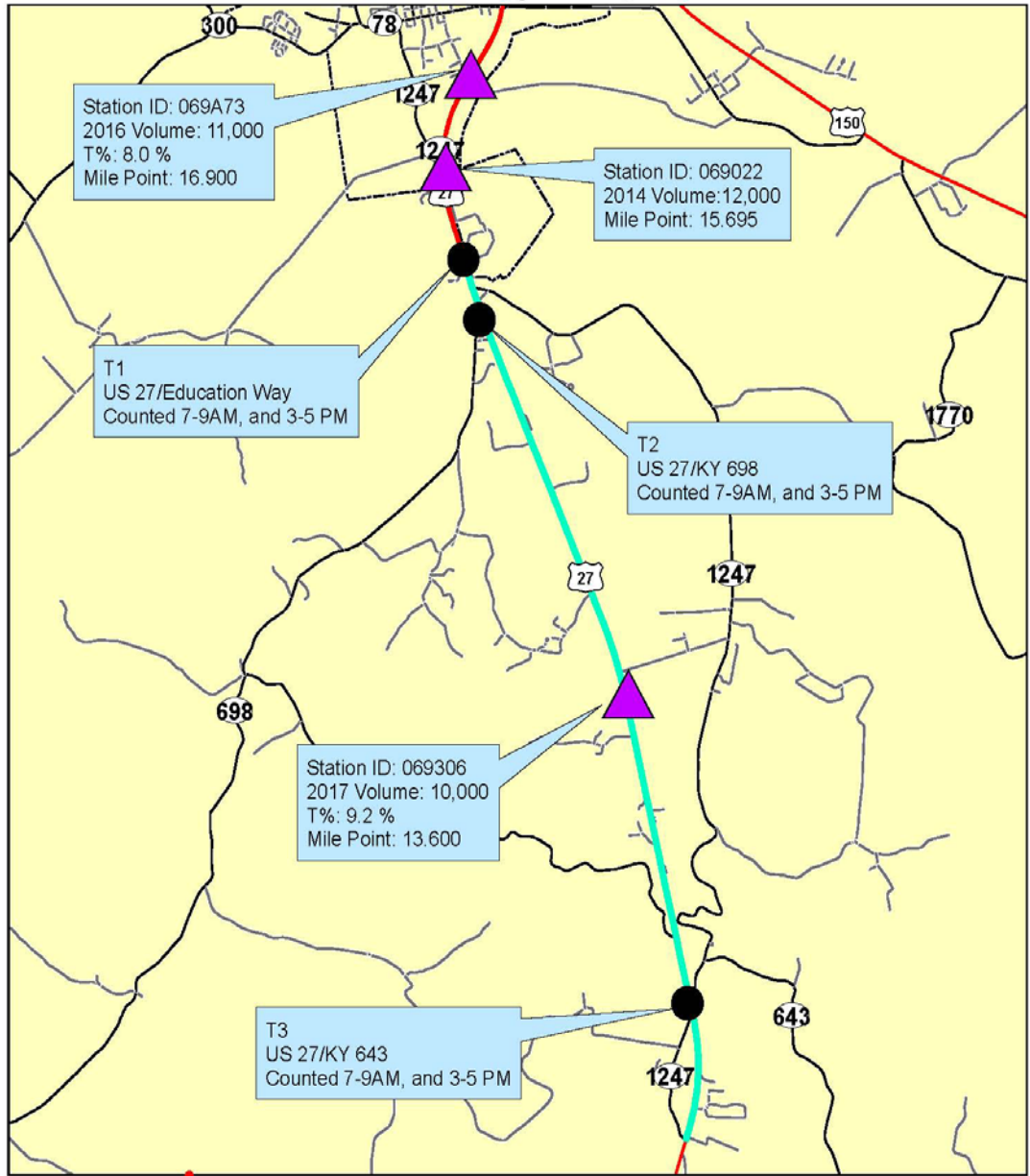
Table of Contents

Figure 1: Vicinity Map.....Page 2
 Addendum #1.....Page 3
 Figure 2: Summary Map.....Page 4

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
BCI	Bicycle Comfort Index	

Vicinity Map



Lincoln County
 US-27 Scoping Study
 Item # : 8-167



Legend

- Project Road
- Count Station
- Turn Movement

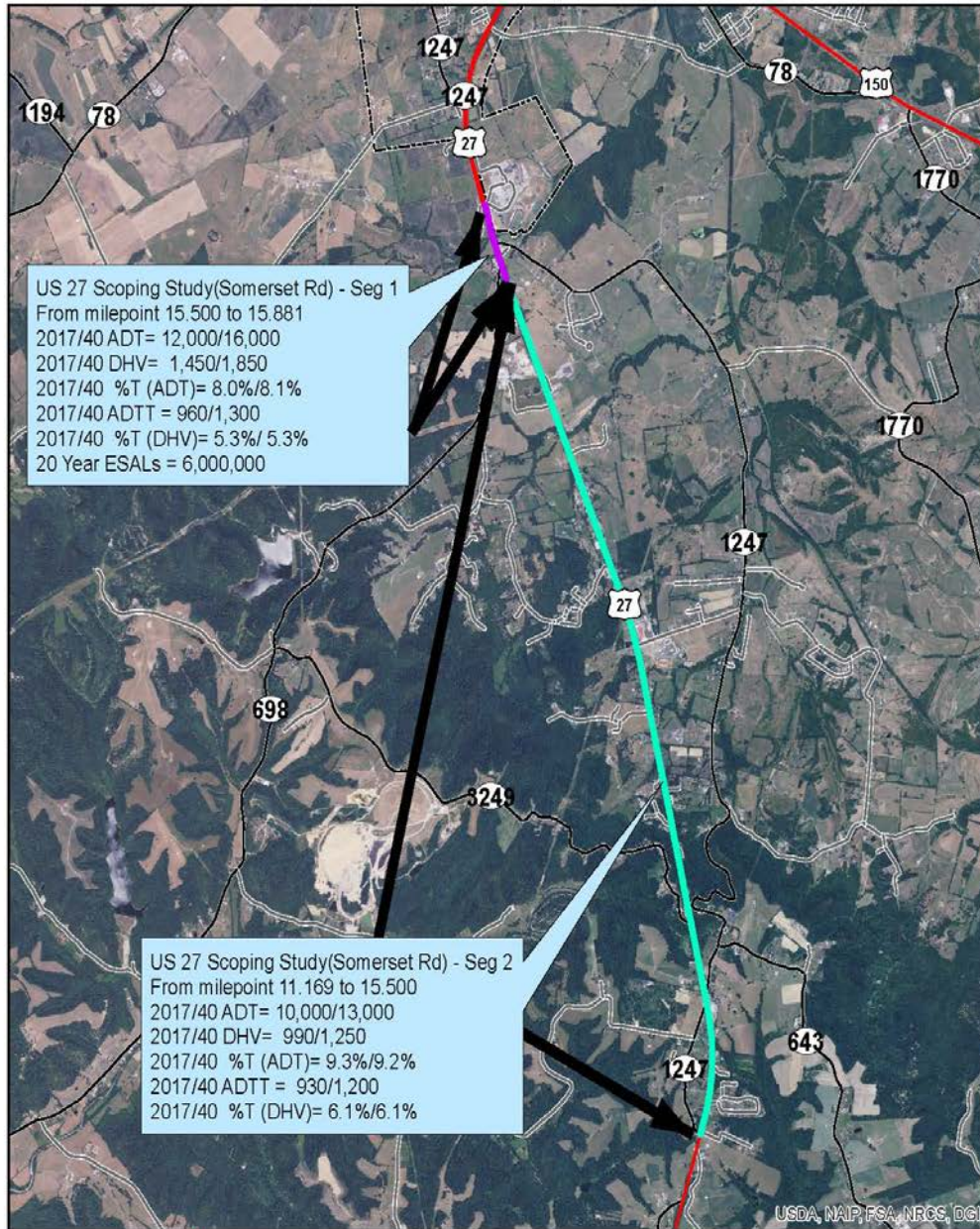
0 0.5 1 Miles

**Traffic Forecast Executive Summary
Lincoln County: US 27 Scoping Study
Item No. 8-167.00**

CURRENT-YEAR VOLUMES

The 2017 ADT volume is based on the 2017 Classification count at count station 069306 (MP: 13.600). All figures are subject to rounding.

Summary Map



US 27 Scoping Study(Somerset Rd) - Seg 1
 From milepoint 15.500 to 15.881
 2017/40 ADT= 12,000/16,000
 2017/40 DHV= 1,450/1,850
 2017/40 %T (ADT)= 8.0%/8.1%
 2017/40 ADTT = 960/1,300
 2017/40 %T (DHV)= 5.3%/5.3%
 20 Year ESALs = 6,000,000

US 27 Scoping Study(Somerset Rd) - Seg 2
 From milepoint 11.169 to 15.500
 2017/40 ADT= 10,000/13,000
 2017/40 DHV= 990/1,250
 2017/40 %T (ADT)= 9.3%/9.2%
 2017/40 ADTT = 930/1,200
 2017/40 %T (DHV)= 6.1%/6.1%



Lincoln County
 US-27 Scoping Study
 Item # : 8-167



Legend

- Seg 1
- Seg 2

0 0.5 1 Miles