

## Appendix C: Traffic Forecast Report

# **TRAFFIC FORECAST REPORT**

## **US 231 Scottsville Road Scoping and Traffic Operations Study**

### **From I-65 to Lovers Lane**

### **Warren County**

### **Six-Year Plan Item # 3-8702.00**

#### **Forecast Summary**

The Kentucky Transportation Cabinet (KYTC) has requested that CDM Smith complete a traffic forecast for the US 231 corridor in Bowling Green. KY 231 is a north-south minor arterial route on the south side of the city. The study stretches from I-65 Exit 22 (US 231 milepoint 9.060) through US 231X/KY 880 (Campbell Lane/Lovers Lane) (US 231 milepoint 10.453). Most of the corridor is lined with retail developments, including Greenwood Mall and Greenwood Square Shopping Center.

A series of traffic counts were completed by Abbie Jones Consulting and by CDM Smith. Four types of counts were conducted along the corridor to help understand traffic movements: 7-day classification counts, 24-hour counts, PM peak period counts, and spot counts. At 24-hour count locations, counts taken from video technology provided ADTs for each approach, turning movements, and three vehicle classifications (car and light/heavy truck). At peak period count locations, field technicians recorded turning movement counts from 3:00-6:00 PM. Spot counts were conducted by field technicians at intermediate intersections for 30-minute durations. Additional 15-minute spot counts were taken to understand traffic movements at driveways along the frontage roads. Counts were conducted at the following locations, moving south to north along the corridor, then along the frontage roads.

- US 231 @ Ken Bale Blvd/Three Springs Rd (KY 884) (24-hour count)
- US 231 @ Unnamed road/Motel 6 entrance (24-hour count)
- US 231 @ Pascoe Blvd (24-hour count)
- US 231 @ Greenwood Square Shopping Center/Kroger (24-hour count)
- US 231 @ Cave Mill Rd/Shive Ln (24-hour count)
- US 231 @ Bryant Way (24-hour count)
- US 231 @ Pedigo Way (24-hour count)
- US 231 @ Greenwood Mall (24-hour count)
- US 231 @ Campbell Ln/Lovers Ln (24-hour count)
- East Frontage Road @ Ken Bale Blvd (spot count)
- East Frontage Road @ Unnamed road/Red Roof Inn (spot count)
- East Frontage Road @ Pascoe Blvd (spot count)
- East Frontage Road @ Greenwood Square Shopping Center/Kroger (spot count)
- East Frontage Road @ Shive Ln (peak hour count)
- East Frontage Road @ Bryant Way (peak hour count)

- East Frontage Road @ Pedigo Way (peak hour count)
- East Frontage Road @ Greenwood Mall (spot count)
- East Frontage Road @ KY 880 (Lovers Ln – south side) (spot count)
- East Frontage Road @ KY 880 (Lovers Ln – north side) (spot count)
- West Frontage Road @ Unnamed road/Motel 6 (spot count)
- West Frontage Road @ Pascoe Blvd (peak hour count)
- West Frontage Road @ Greenwood Shopping Center/Kroger (spot count)
- West Frontage Road @ Cave Mill Rd (peak hour count)
- West Frontage Road @ Greenwood Mall (peak hour count)

Previously planned spot counts were not completed at two locations: the intersection of the west frontage road @ Three Springs Rd/KY 884 had been temporarily removed in conjunction with improvements at the KY 884 intersection with US 231. Additionally, the west frontage road access from Campbell Lane was observed to not be utilized by any traffic during a separate count at an adjacent location.

### Forecast Type

The following types of forecasts are being developed for this project:

- 2013, 2026, and 2040 No-Build AADT and DHV values
- 2013, 2026, and 2040 Build AADT and DHV values for five alternatives

### Current-Year Volumes

The traffic volume, turning movements, and vehicle classification were reviewed and balanced. Approach volumes were adjusted using the seasonal adjustment factors in *KYTC Traffic Forecasting Report – 2008* Table D2. Using these approach AADTs, segment AADTs were calculated by averaging the approach volumes at consecutive count locations and making adjustments as needed. This approach provides a realistic portrait of the existing conditions on the roadways. Intersection turning movement counts and segment AADTs are shown on **Figure 1** and **Figure 2** at the end of this document.

### Design-Year/Growth Factors

Seven road segments were used in the calculation of the growth rate. KYTC count data at stations B74, B16, C50, B67, C62, B82, and A21 along US 231 in the project corridor and adjacent segments of US 231 and US231X resulted in a linear growth rate of 0.2%. In addition, KYTC has established a methodology that blends linear growth with exponential growth. Using this method, the growth rate increases to 0.5%.

For further comparison, population projections prepared by the Kentucky State Data Center at the University of Louisville were reviewed. Comparing 2010 population to the 2040 population forecast, an average annual growth rate was calculated to be 2.0% for Warren County. According to Woods and Poole's 2012 *Complete Economic and Demographic Data Source* (CEDDS), an average annual growth rate was calculated to be 1.5% for the population of Warren County. According to the 2012 *Comprehensive Plan of the City-County Planning Commission of Warren County, Kentucky*, population is forecast to grow at an average rate of 2.0%.

The 2012 CEDDS also forecasts employment through 2040. Comparing 2010 employment to the 2040 employment forecast, average annual growth for Warren County is 1.6%.

A summary of all the growth rates discussed above is presented below:

<b><u>Traffic/Demographic Data:</u></b>	<b><u>Annual Growth Rates</u></b>
Traffic Volume Growth (linear)	0.2%
Traffic Volume Growth (blended linear/exponential)	0.5%
<i>source: KYTC, based on 20 yrs of data</i>	
Population Forecast (Warren County)	2.0%
<i>source: Kentucky State Data Center</i>	
Population Forecast (Warren County)	1.5%
<i>source: Woods &amp; Poole 2012 CEDDS</i>	
Population Forecast (Warren County)	2.0%
<i>source: Comprehensive Plan 2013</i>	
Employment Forecast (Warren County)	1.6%
<i>source: Woods &amp; Poole 2012 CEDDS</i>	

Traffic Volume Growth appears to have lower growth rates when compared to other measureables. This is due to diversion beginning in 2002 due to the completion of the Cemetery Road interchange, providing a new route to access downtown Bowling Green from I-65. Future growth of the corridor will not be influenced by this diversion; rather the future growth of Warren County and the development of Scottsville Road south of I-65 will drive future traffic. Based on the above information, a growth rate of 1.0 percent is recommended to be used for initial estimates. Additional tools will be used to validate and/or adjust the growth rate, as needed.

### **Design Parameters**

K-factors were calculated for each segment using the turning movement data provided by Abbie Jones Consulting. Approximately 7.7% to 8.4% of the daily traffic volume was concentrated during the peak hour along the corridor. The similarity across approaches allowed for a single K-factor of 9.8% to be recommended for the entire corridor. This value is similar to roads of similar functional class.

Similarly, D-factors were calculated for the corridor as a whole. Between 53% and 58% of PM peak hour traffic prevails in the southbound direction. The existing D-factors were compared to average values based on functional class found in the *Traffic Forecasting Report – 2008*. As a result, a D-factor of 0.56 is recommended to be applied along the corridor.

### **Truck Percentages**

Using the vehicle classification data collected at 24-hour count locations, the percentage of truck traffic was calculated for the 24-hour and peak period data. Based on unadjusted 24-hour count data, truck traffic along US 231 equates to an average of 4.0% of the daily traffic volume. For the forecast, a peak hour truck percentage of 4.0% is recommended to be applied along the corridor.

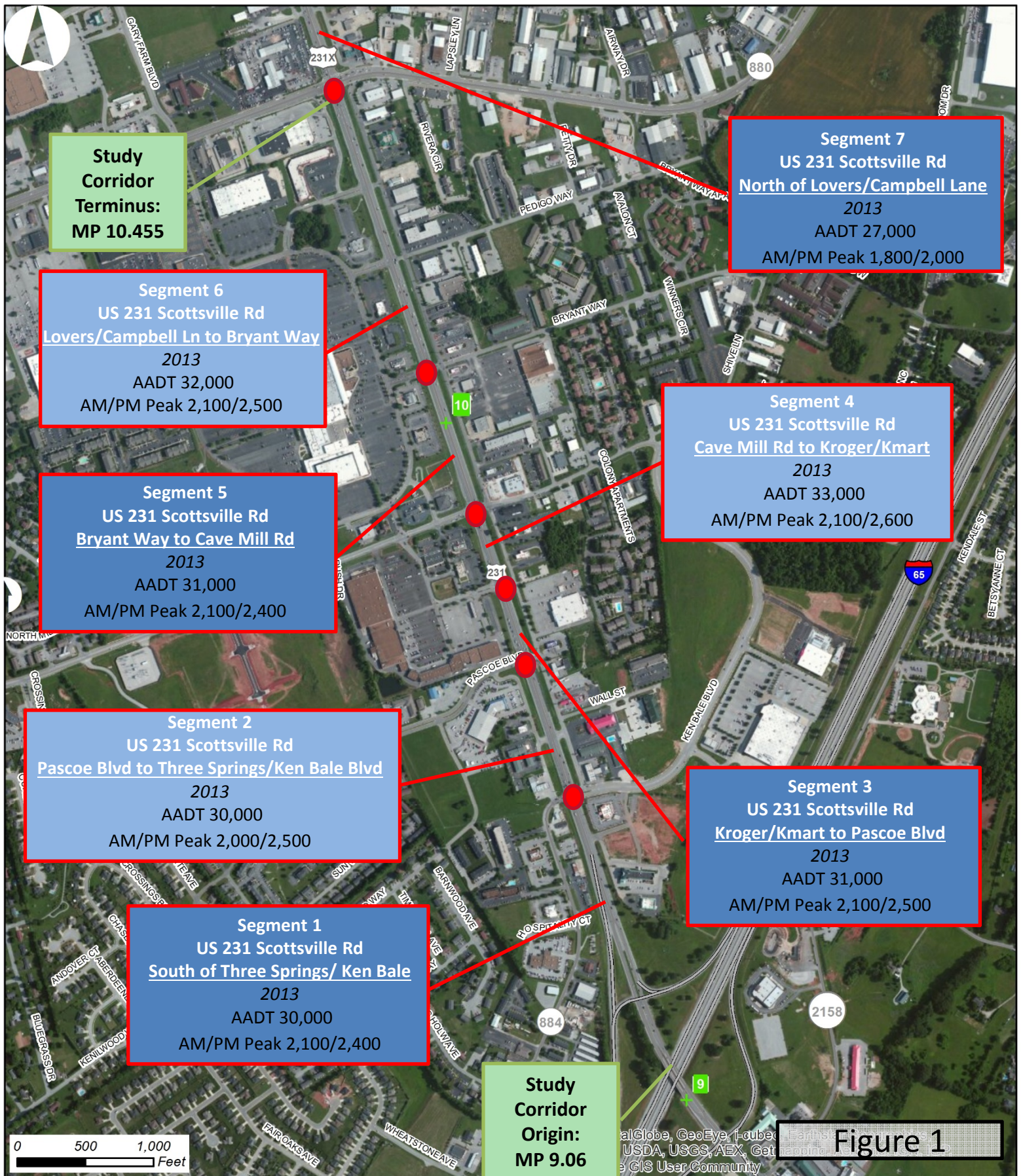


## Project Modeling and Trip Generation


The vast majority of land fronting the corridor has been developed. No traffic impact studies for new development along the corridor were available. Some side street nodes were given lower growth rates than 1.0%, due to the complete build-out of the area around them. These nodes included Motel Six/Red Roof Inn Access, Pascoe Blvd, Greenwood Square, Shive Lane, Bryant Way, Pedigo Way, and the Greenwood Mall Tertiary Entrance. KYTC completed a run of the Bowling Green MPO Travel Demand Model, which showed similar growth along the corridor.

## No-Build and Build Segment Volumes

Illustrated in **Figure 3** and **Figure 4** are the 2040 No Build AADT volumes, Design Hour volumes, and turning movements. There is not a significant difference in Design Hour volumes with each alternative; however, there is some diversion. **Figure 5** and **Figure 6** show the turning movements for Alternatives 1 and 3, respectively. These two alternatives were evaluated in more detail following a Level 1 screening process. For a more detailed description of the alternatives and the screening process, refer to the US 231 Scottsville Road Scoping and Traffic Operations Study.



Note: AADT is Average Adjusted Daily Traffic and is provided in Vehicles per Day.

 Signalized Intersections

**CDM  
Smith**



**US 231 – Scottsville Rd  
 From I-65 to Lovers Lane  
 KYTC Item No 3-8702  
 2013 Traffic Characteristics**





Note: Turning Movements are for the PM Peak Hour only.

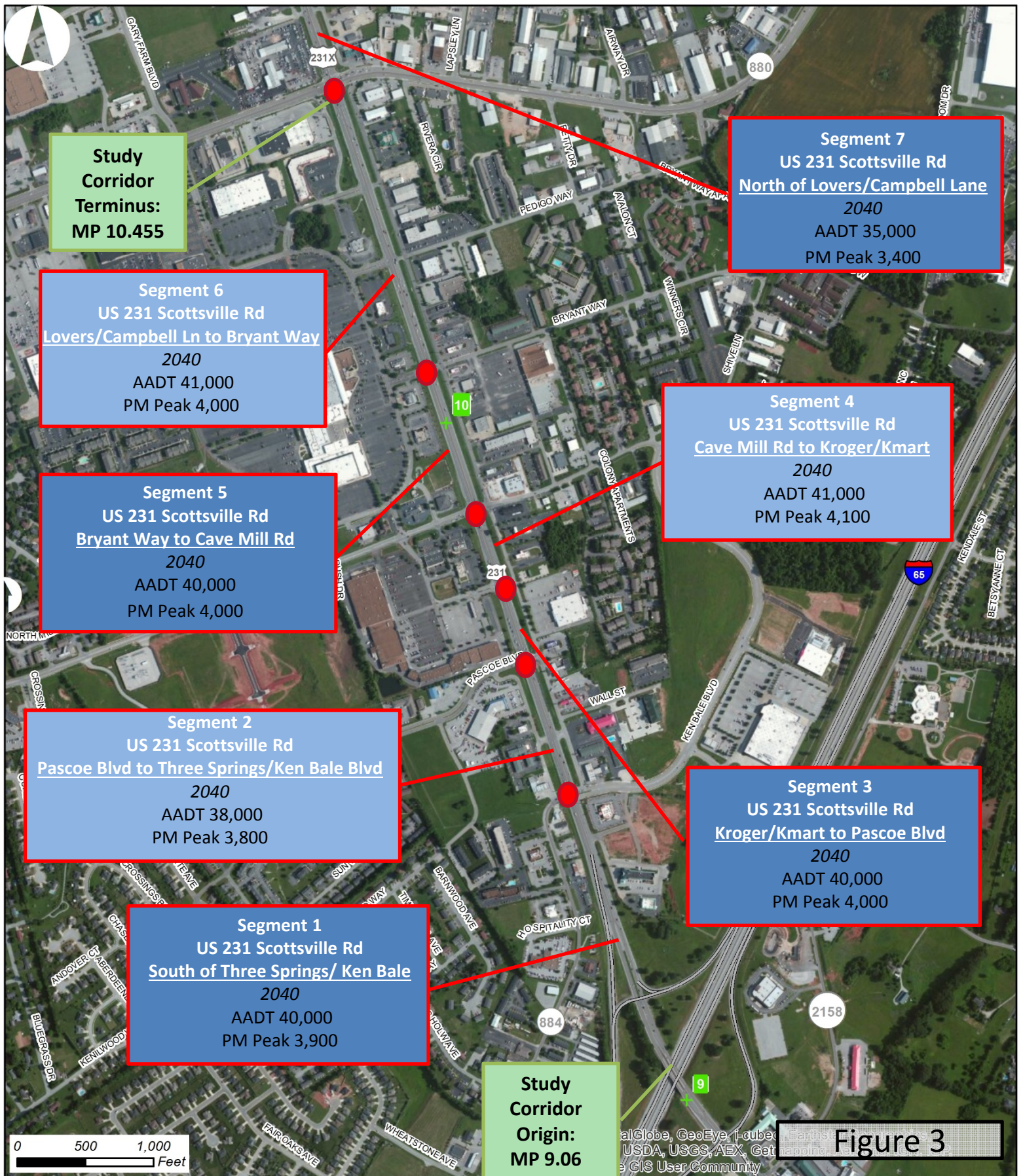
Signalized Intersections

CDM Smith




US 231 – Scottsville Rd  
From I-65 to Lovers Lane  
KYTC Item No 3-8702  
2013 Existing Traffic Volumes





Note: AADT is Average Adjusted Daily Traffic and is provided in Vehicles per Day.

 Signalized Intersections

**CDM  
Smith**



**US 231 – Scottsville Rd**  
**From I-65 to Lovers Lane**  
**KYTC Item No 3-8702**  
**2040 Traffic Characteristics**





**Figure 4**

Image courtesy of USGS State of Michigan

Note: Turning Movements are for the PM Peak Hour only.

Signalized Intersections

**CDM Smith**




**US 231 – Scottsville Rd  
From I-65 to Lovers Lane  
KYTC Item No 3-8702  
2040 No Build Volumes**





Note: Turning Movements are for the PM Peak Hour only.

 Signalized Intersections

**CDM  
Smith**



**US 231 – Scottsville Rd**  
**From I-65 to Lovers Lane**  
**KYTC Item No 3-8702**  
**2040 Alternative 1 Volumes**





Figure 6

Image courtesy of USGS State of Michigan

Note: Turning Movements are for the PM Peak Hour only.

Signalized Intersections

CDM Smith



US 231 – Scottsville Rd  
From I-65 to Lovers Lane  
KYTC Item No 3-8702  
2040 Alternative 3 Volumes