

APPENDIX D:
Traffic Forecasting
Technical
Memorandum

To:	Jayalakshmi Balaji, PE	From:	Graham Winchester, PE
	KYTC Division of Planning		Stantec Consulting Services
File:	US 150 Corridor Study - Traffic Forecasting Technical Memorandum	Date:	December 12, 2022

Reference: US 150 Traffic Forecasting Technical Memorandum**PROJECT DESCRIPTION**

As part of the US 150 Corridor Study in Boyle and Lincoln Counties, Stantec was tasked with developing traffic forecasts to assist in the development and evaluation of improvement concepts. Historical traffic data, population trends, and the Kentucky Statewide Travel Demand Model (KYSTM) were used to develop the forecasts. **Figure 1** displays the study corridor highlighted in red, which includes US 127B, US 150B, and US 150 in Boyle and Lincoln Counties.

The objective of the US 150 Corridor Study is to improve safety, congestion, and mobility on US 150, US 150B, and US 127B from east of US 127 in Danville to US 27 in Stanford. This memorandum presents the methodology and assumptions used in the development of the annual growth rate and traffic forecasts for the corridor.

STUDY AREA

The study corridor is 10.8 miles and begins at US 127B milepoint 1.0 in southwest Danville, in Boyle County, just west of Fireside Drive. The US 127B portion ends at the intersection with US 127 in southeast Danville. The US 150B portion of the study corridor is approximately 2.3 miles and stretches between US 127 and US 150 with a mix of commercial and rural land uses. The corridor then becomes US 150, a rural four-lane regional connection between Boyle and Lincoln Counties, ending at the US 27 intersection in Stanford.

HISTORICAL DAILY TRAFFIC VOLUMES

Stantec analyzed counts from KYTC traffic count stations in Boyle and Lincoln Counties to estimate historical traffic trends for the study corridor and adjacent roadways. The most recent existing traffic data for the study corridor is displayed in **Figure 2**. Average daily traffic on the study corridor ranges between 11,100 VPD to 23,100 VPD, with the higher traffic volumes located in Boyle County near the US 127 intersection.

Historical average daily traffic volumes and annual growth rates, between 2011 and 2021, for the study corridor are summarized in **Table 1** and shown graphically in **Figure 3**. The red text in **Table 1** represents traffic counts from 2020 which are not an accurate representation of recent traffic patterns due to COVID shutdowns in 2020 and were not used to calculate the compound annual growth rates. Station B06, east of the US 127 intersection, has shown a decline in daily traffic over the 10-year period, at a rate of -0.87 percent per year. The seven other traffic stations along the study corridor have reported increasing traffic volumes over the past 10 years, with annual growth rates ranging between 0.07 and 3.17 percent per year. Station 276, between Gose Pike and US 150, has shown the highest growth, at 3.17 percent per year, but is not expected to maintain this high rate of growth. The 2021 daily traffic volume is now more in line with adjacent volumes and is expected to experience growth similar to the rest of the corridor.

Reference: US 150 Traffic Forecasting Technical Memorandum

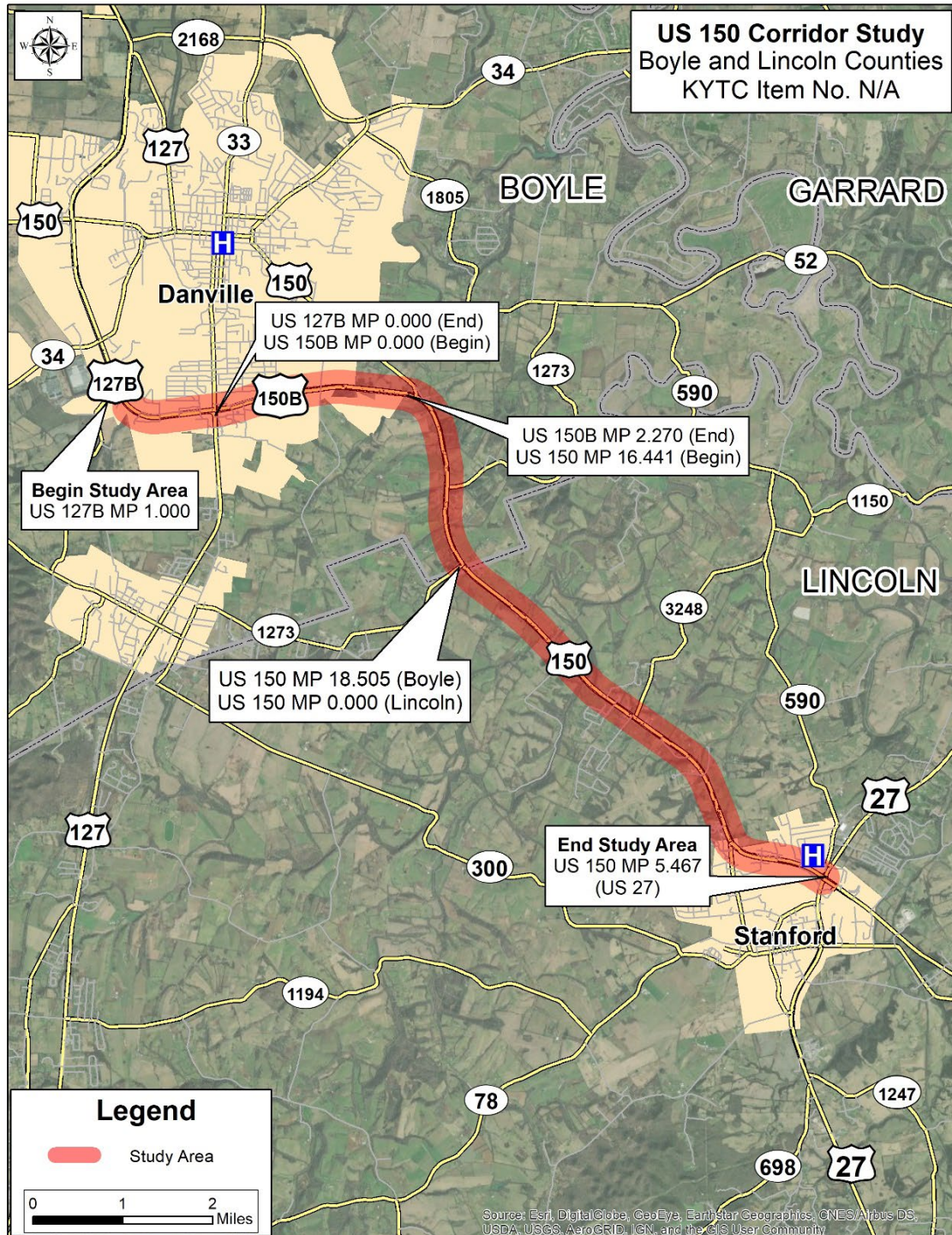


Figure 1: US 150 Corridor Study Area

Reference: US 150 Traffic Forecasting Technical Memorandum

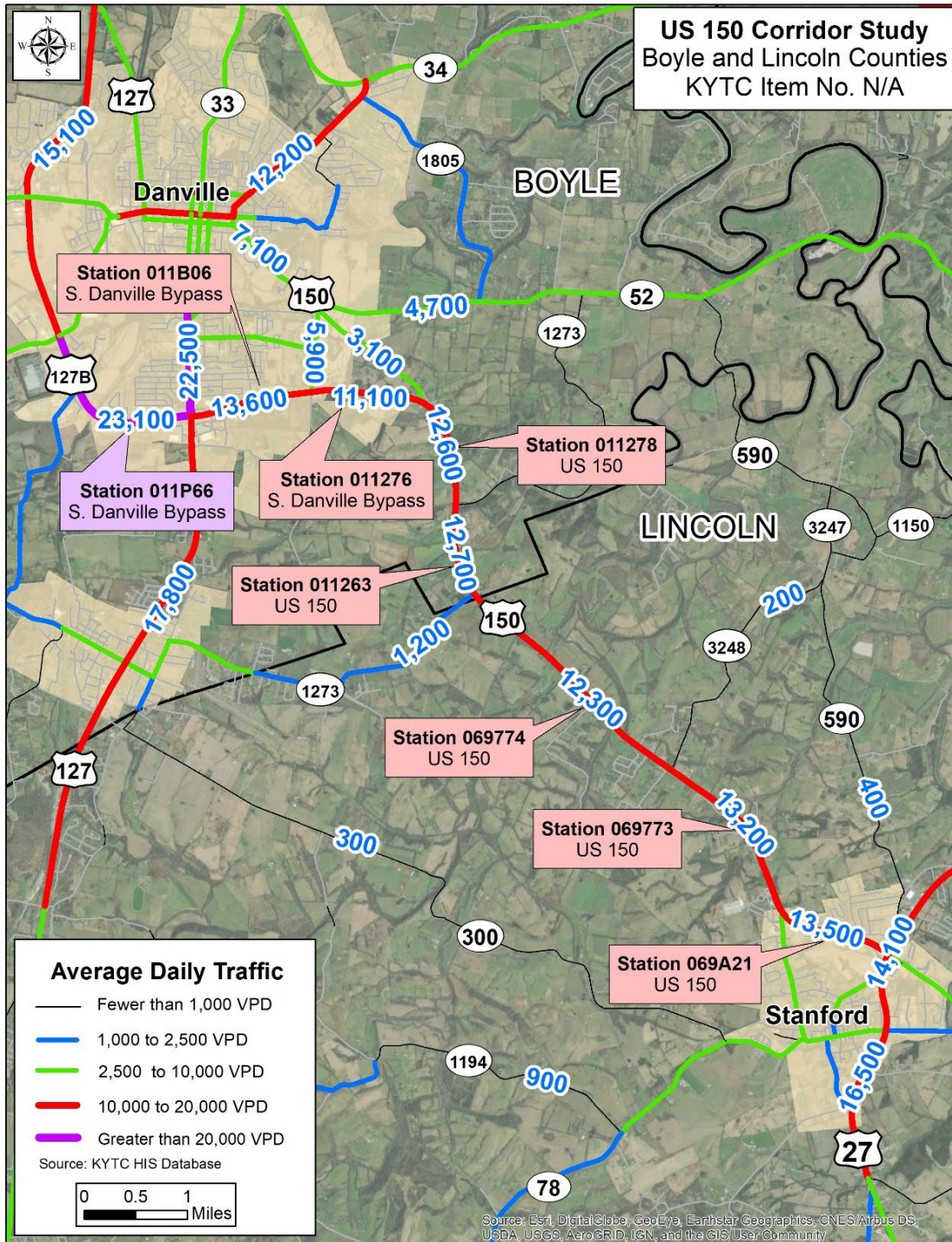


Figure 2: US 150 Corridor Study Area Average Daily Traffic

Reference: US 150 Traffic Forecasting Technical Memorandum

Table 1. US 150 Study Corridor KYTC Historical Average Daily Traffic

Year	US 127B	US 150B		US 150				
	Sta. 011P66	Sta. 011B06	Sta. 011276	Sta. 011278	Sta. 011263	Sta. 069774	Sta. 069773	Sta. 069A21
2011		14,300		11,800		12,200	12,500	
2012	21,607		8,407		10,339			12,558
2013	21,506							
2014	21,920	13,724		11,998		12,491	12,839	
2015	22,725		9,878		11,726			14,425
2016	23,457							
2017	23,477	13,567		12,588		12,253	13,160	
2018	23,448		9,497		12,199			13,515
2019	23,787							
2020	20,986	13,501		11,695		12,003	12,682	
2021	23,062		11,129		12,659			
Annual Growth Rate (%)	0.73%	-0.87%	3.17%	1.08%	2.27%	0.07%	0.86%	1.23%

Source: Kentucky Transportation Cabinet (KYTC)

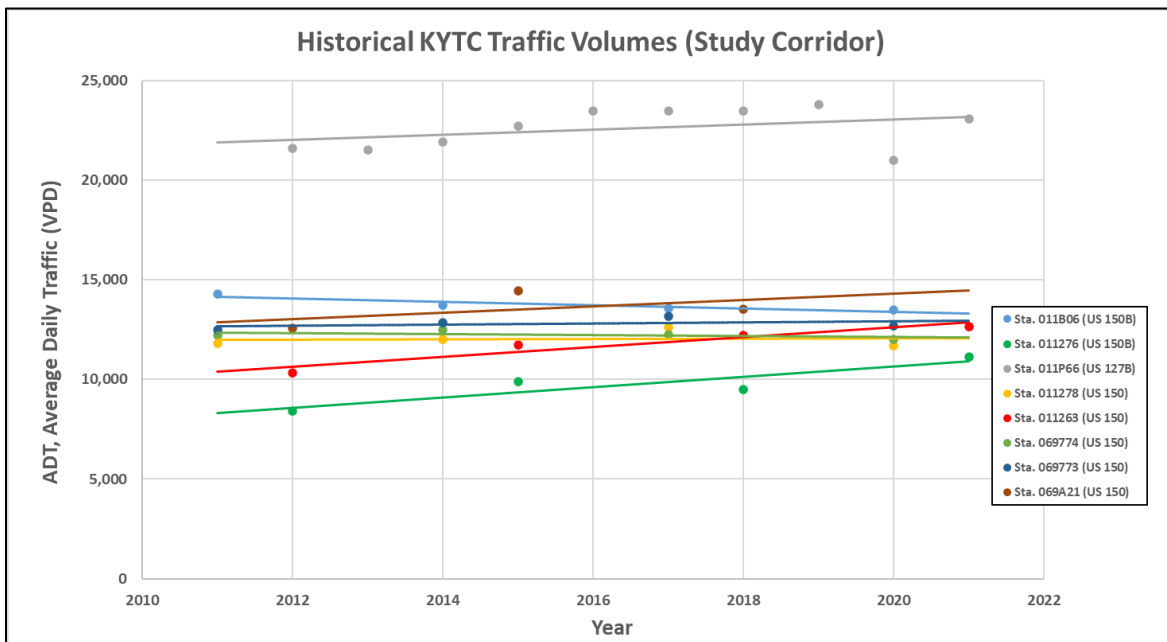


Figure 3. US 150 Study Corridor Historical KYTC Traffic Volumes

Reference: US 150 Traffic Forecasting Technical Memorandum

Historical average daily traffic volumes and annual growth rates, between 2011 and 2021, for roadways adjacent to the study corridor in Boyle County are summarized in **Table 2** and shown graphically in **Figure 4**. The red text in **Table 2** represents a traffic count from 2020 which was not an accurate representation of recent traffic patterns due to COVID shutdowns in 2020 and was not used to calculate the compound annual growth rates. Traffic stations on US 150, US 127, and Gose Pike show increasing ADT volumes, ranging from 0.11 to 1.89 percent per year. Traffic stations on KY 52, KY 1273, and US 150 show declining ADT volumes, ranging from 0.49 to 2.44 percent per year. There is not an obvious growth trend on adjacent roads in Boyle County, however intersection segments on US 127 (station A60) and US 150 (station 250) show slight positive growth.

Table 2: US 150 Adjacent Roads (Boyle County) KYTC Historical Average Daily Traffic

Year	US 150	US 150	US 127	Gose Pike	KY 52	KY 1273
	011A70	011250	011A60	011B04	011006	011013
2011	8,260					
2012			22,272	4,969		481
2013		3,100				
2014	6,728					
2015			21,401	5,672	4,853	386
2016		3,088				
2017	7,122					
2018			22,600	4,782	4,230	454
2019		3,121				
2020	6,475					
2021			22,528	5,880	4,660	460
Annual Growth Rate (%)	-2.44%	0.11%	0.13%	1.89%	-0.67%	-0.49%

Source: Kentucky Transportation Cabinet (KYTC)

While counts can fluctuate significantly from year to year for many reasons, they still provide an opportunity to identify different growth trend lines.

Reference: US 150 Traffic Forecasting Technical Memorandum

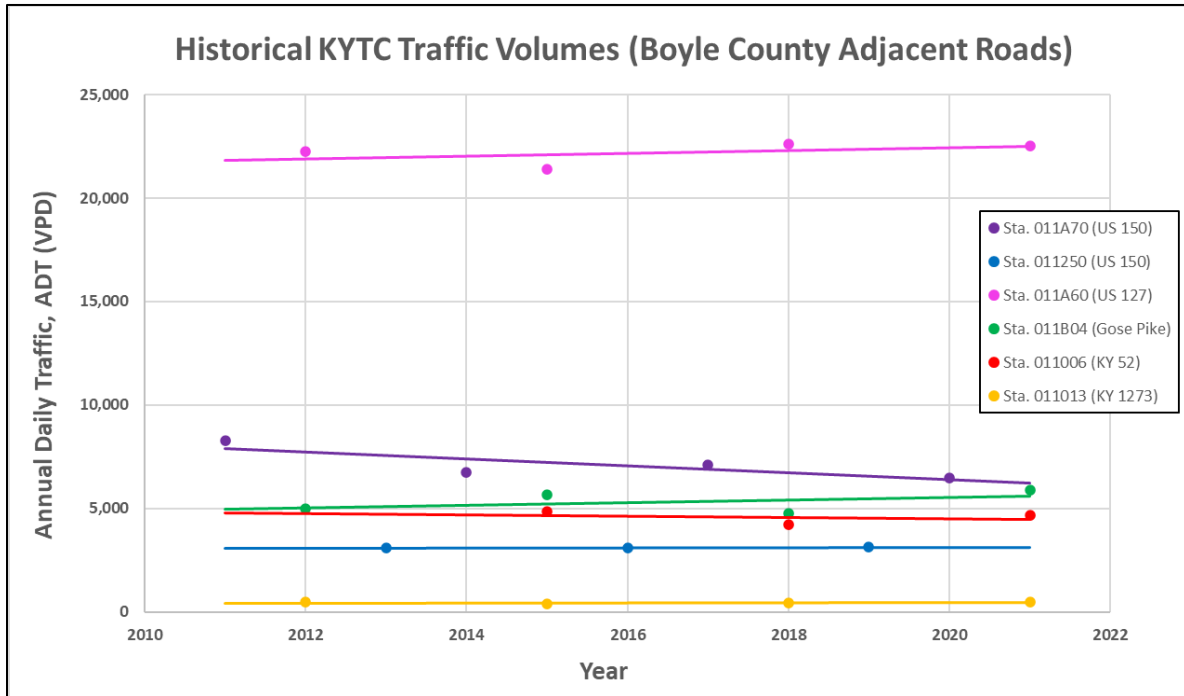


Figure 4: Boyle County Adjacent Roads Historical KYTC Traffic Volumes

Historical average daily traffic volumes and annual growth rates, between 2011 and 2021, for the adjacent roadways to the study corridor in Lincoln County are summarized in **Table 3** and shown graphically in **Figure 5**. The red text in **Table 3** represents traffic counts from 2020 which are not an accurate representation of recent traffic patterns due to COVID shutdowns in 2020 and were not used to calculate the compound annual growth rates. Traffic stations on KY 1273, US 27, and KY 1192 have shown increasing ADT volumes, ranging between 0.61 to 2.65 percent per year while traffic stations on adjacent roadways at KY 300 and KY 590 have shown decreasing ADT volumes, ranging between 0.70 and 3.71 percent per year. ADT growth on KY 3248 has remained unchanged over the 10-year period. There is not an obvious growth trend on the adjacent roads in Lincoln County, however the two high volume stations on US 27 show positive growth between 0.6 percent and 1.7 percent.

Reference: US 150 Traffic Forecasting Technical Memorandum

Table 3: US 150 Adjacent Roads (Lincoln County) KYTC Historical Average Daily Traffic

Year	KY 1273	KY 3248	KY 590	US 27	US 27	KY 300	KY 1192
	069754	069768	069001	069A19	069A20	069A40	069771
2011							731
2012	1,090			14,935			
2013		215	537		13,605	363	
2014							805
2015	1,205			17,870			
2016		169	524		10,958	387	
2017							855
2018	1,175			16,533			
2019		215	428		14,109	348	
2020					13,356		798
2021	1,228						
Annual Growth Rate (%)	1.33%	0.00%	-3.71%	1.71%	0.61%	-0.70%	2.65%

Source: Kentucky Transportation Cabinet (KYTC)

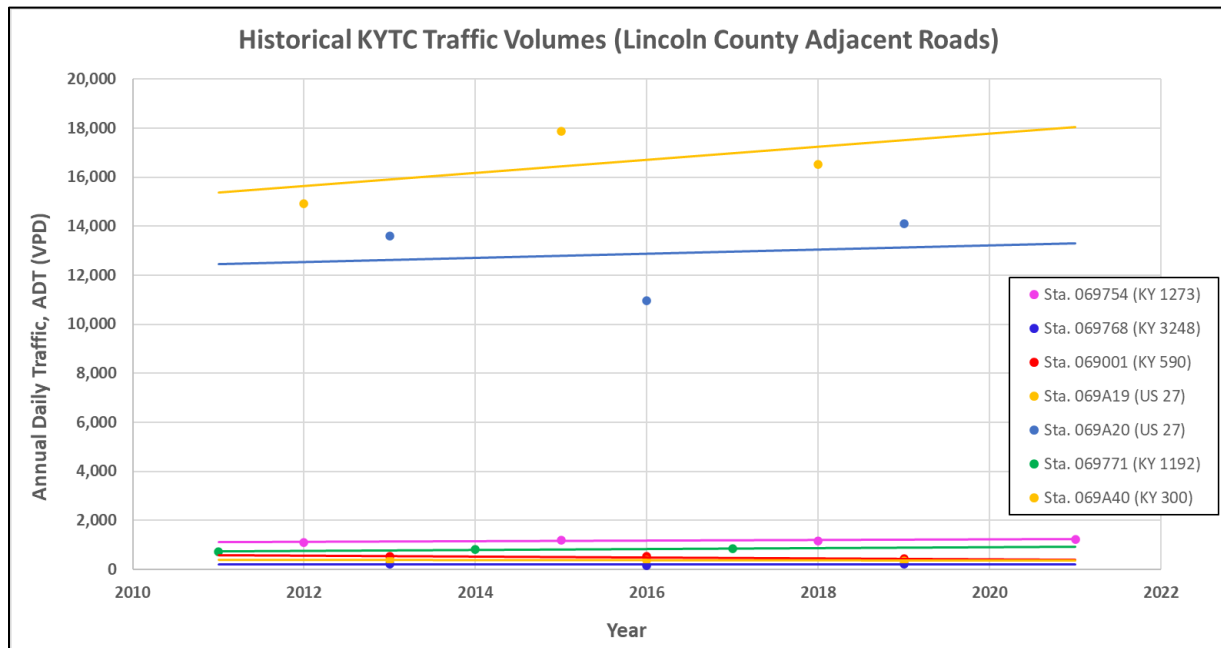


Figure 5: Lincoln County Adjacent Roads Historical KYTC Traffic Volumes

Reference: US 150 Traffic Forecasting Technical Memorandum

POPULATION

Population data, including data from the 2020 Census, were obtained from the Kentucky State Data Center (KSDC) at the University of Louisville, Kentucky's official clearinghouse for Census data. Population projections for the state of Kentucky, Boyle County, Lincoln County, Danville, and Stanford are summarized in **Table 4**. Between 2000 and 2020, Boyle County, Lincoln County, and Stanford have grown slightly slower than the state average and Danville has grown at the same rate as the state average. Over the past 20 years, Boyle County's population has increased at a rate of 0.50 percent per year while Lincoln County has increased at a slightly slower rate of 0.19 percent per year. Danville's population has increased at a rate of 0.54 percent per year while Stanford has increased by 0.30 percent per year, as shown in **Figure 6**.

Between 2020 and 2050, Boyle County is expected to continue to grow by 0.43 percent per year while Lincoln County is expected to decline by 0.62 percent per year. Overall, the entire 50-year period between 2000 and 2050, Boyle County is expected to grow at a rate of 0.46 percent and Lincoln County is expected to decrease at a rate of 0.21 percent, as shown in **Figure 7**.

Table 4: Population Estimates and Projections

Area	Census Estimates			Annual Growth	2050 Projection	Annual Growth
	2000	2010	2020	2000 - 2020		2020 - 2050
Kentucky	4,041,769	4,339,367	4,505,836	0.54%	4,785,233	0.30%
Boyle County	27,697	28,432	30,614	0.50%	33,330	0.43%
Lincoln County	23,361	24,742	24,275	0.19%	21,436	-0.62%
Danville	15,477	16,218	17,234	0.54%	N/A	
Stanford	3,430	3,487	3,640	0.30%	N/A	

Reference: US 150 Traffic Forecasting Technical Memorandum

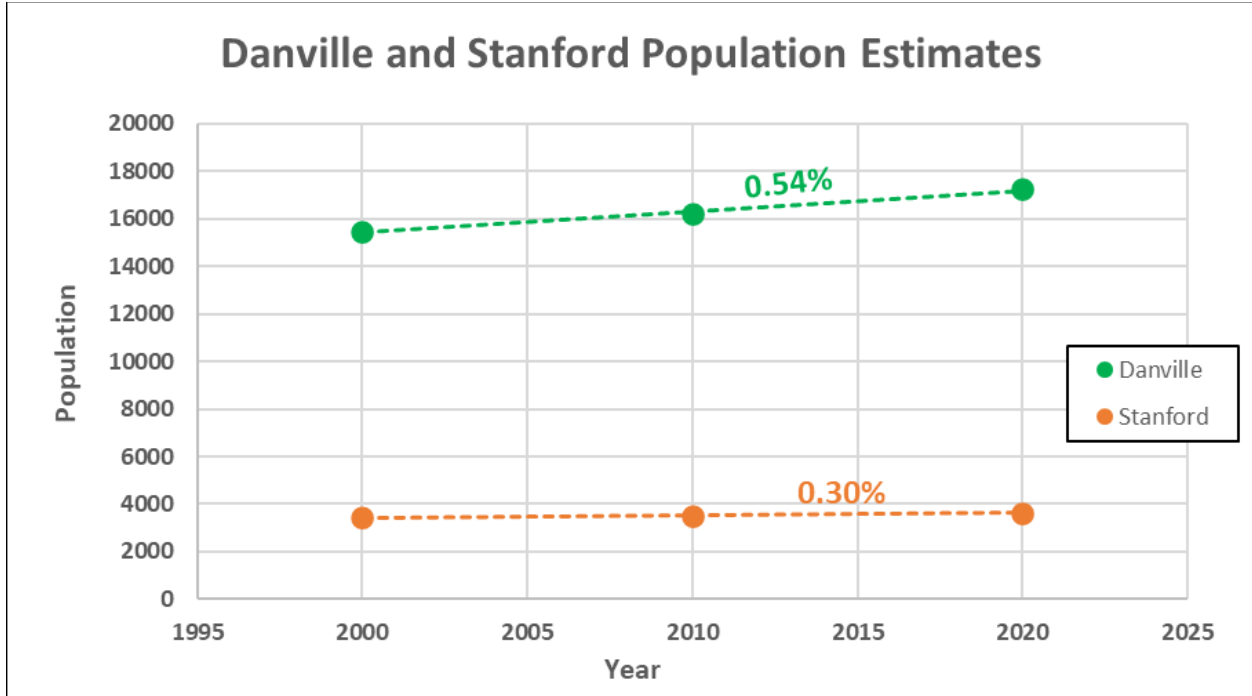


Figure 6: Danville and Stanford Population Estimates

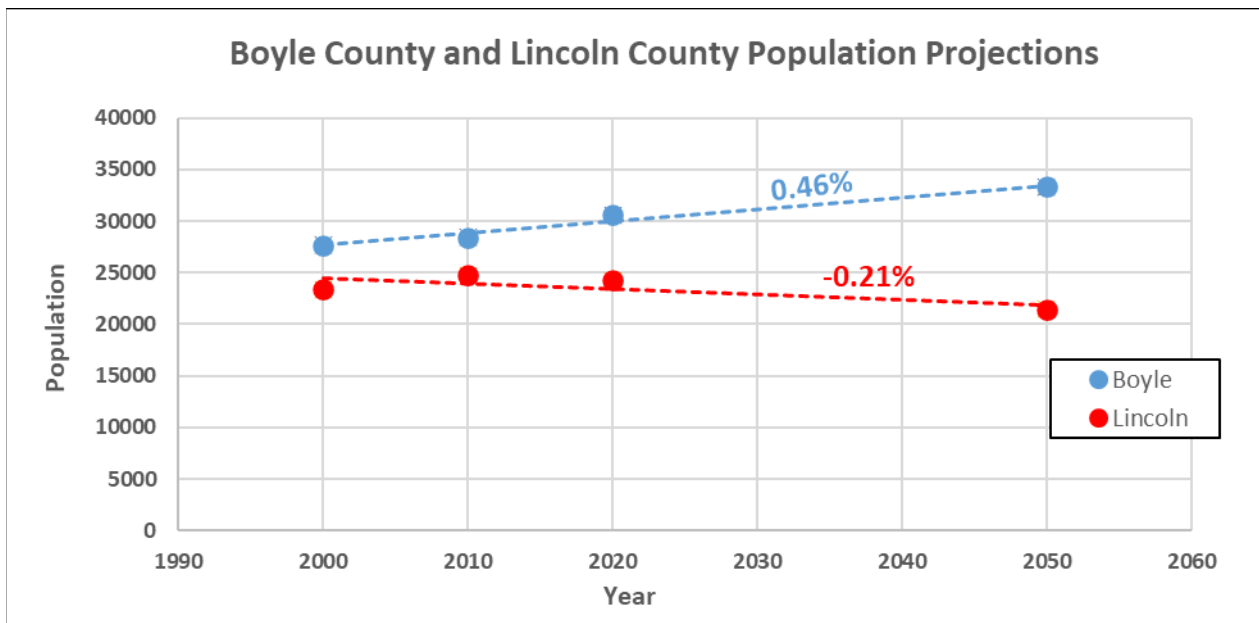


Figure 7: Boyle County and Lincoln County Population Projections

December 5, 2022

Jay Balaji

Page 10 of 14

Reference: US 150 Traffic Forecasting Technical Memorandum

KENTUCKY STATEWIDE TRAVEL DEMAND MODEL (KYSTM)

As an additional data source, study area growth rates from the Kentucky Statewide Travel Demand Model (KYSTMv19) were reviewed. **Figure 8** presents the annual growth rates on the study corridor and adjacent roadways between 2019 and 2045. Model annual growth rates on the South Danville Bypass (US 127B and US 150B) range from 0.9 to 1.1 percent per year while rates on US 150 range from 1.0 to 1.3 percent per year. Growth rates on adjacent roadways vary, but generally show slight positive growth.

GROWTH RATE CONCLUSIONS

Based on the historical count data demonstrating moderate increases in traffic, stable study area population estimates and projections, and compatible rates of growth from the most updated version of the KYSTM, an annual growth rate of 1.0 percent was selected to reflect moderate positive growth for the US 150 Corridor Study through the year 2045.

EXISTING TRAFFIC

The selected annual growth rate was applied to the latest KYTC daily traffic counts (excluding 2020) to develop 2022 bidirectional daily traffic estimates by highway segment, as shown in **Figure 9**.

2045 TRAFFIC FORECASTS

The selected annual growth rate was then used to develop similar 2045 daily traffic forecasts by segment, shown in **Figure 10**.

Reference: US 150 Traffic Forecasting Technical Memorandum

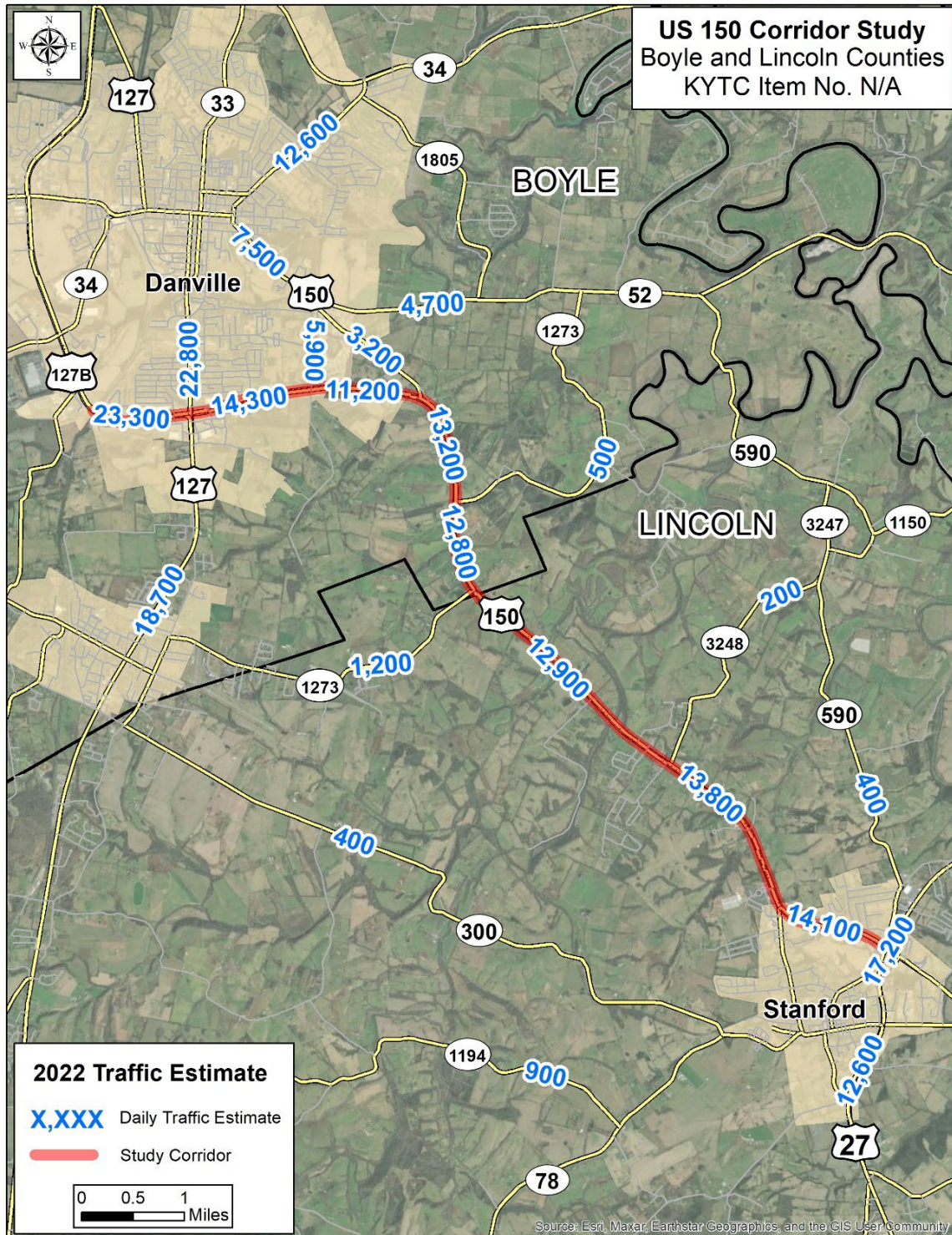


Figure 9: 2022 Daily Traffic Estimates

Reference: US 150 Traffic Forecasting Technical Memorandum

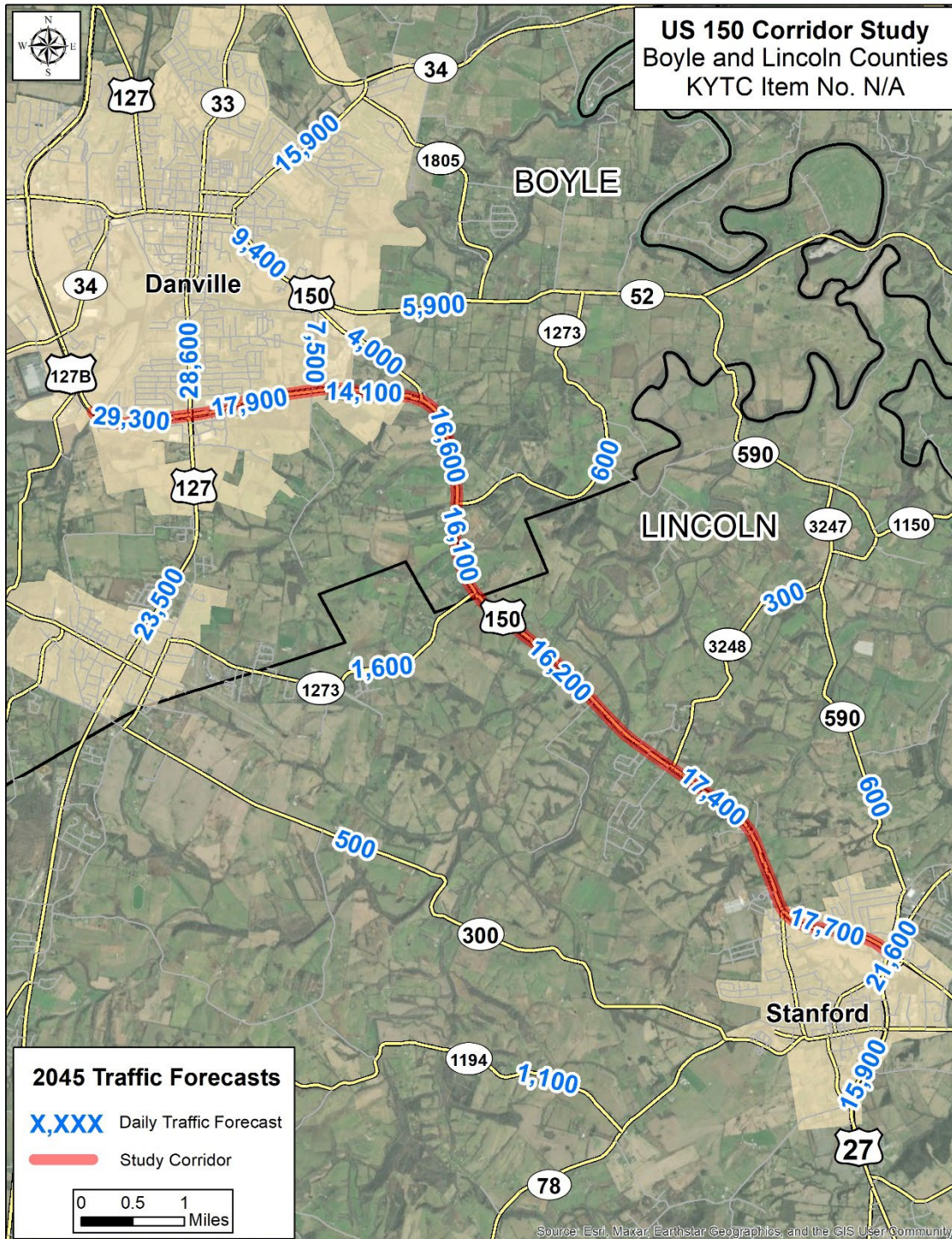


Figure 10: 2045 Daily Traffic Forecasts

December 5, 2022

Jay Balaji

Page 14 of 14

Reference: US 150 Traffic Forecasting Technical Memorandum

NEXT STEPS

The next steps are to use the forecast segment volumes and applicable annual growth rates to develop 2045 turning movement forecasts at each intersection and to analyze No-Build future intersection traffic operations.

STANTEC CONSULTING SERVICES INC.

A handwritten signature in black ink, appearing to read "Graham Winchester". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Graham Winchester, PE

Transportation Engineer

Phone: (859) 422-3055

Graham.Winchester@stantec.com