



# EXECUTIVE SUMMARY

# MALL ROAD

## INTERCHANGE CONNECTOR

## FEASIBILITY STUDY

BOONE COUNTY, KY | ITEM NO. 6-446.00 | MARCH 2020



IN PARTNERSHIP WITH





## EXECUTIVE SUMMARY

The Kentucky Transportation Cabinet (KYTC) initiated this Mall Road Interchange Connector Feasibility Study to examine a potential new connection between KY 237 (Pleasant Valley Road) and the Mall Road interchange (I-71/I-75 exit 180A) in northeastern Boone County. The US 42 corridor, accessed via the next I-71/I-75 interchange to the south (exit 180) operates over capacity causing drivers to experience severe traffic congestion, especially during peak commute hours. Recent and planned large-scale developments further impact regional traffic flows.

### *Study Background*

The objective of the study is to identify a representative solution for improved east-west connectivity and improved mobility for all modes, beginning at KY 237 extending through KY 842 (Hopeful Church Road) to the Mall Road interchange with I-71/I-75.

Transportation needs within the study area (**Figure ES-1**) include:

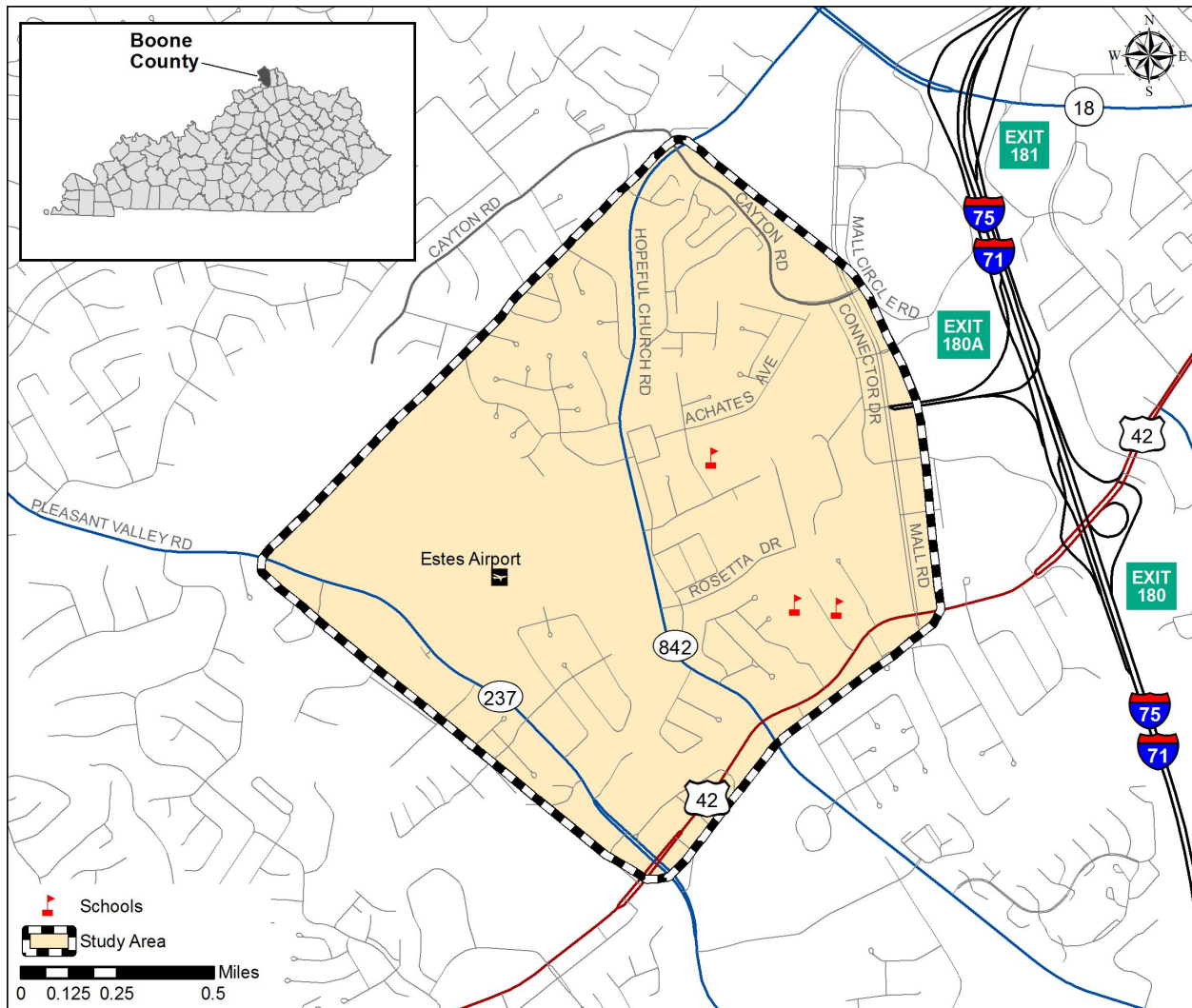
- **Limited east-west connections.** Beyond US 42, the nearest arterial connection to the north is 2.5 miles away at KY 18 (Burlington Pike); to the south, 2.0 miles of travel is required to reach KY 536 (Mt. Zion Road).
- **Congested traffic operations.** The US 42 corridor is over capacity with limited opportunities for capacity improvements without large-scale property impacts to adjacent businesses. High traffic volumes contribute to elevated crash rates throughout the corridor, particularly the high number of rear end collisions.
- **Continuing development.** Boone County is one of the fastest-growing counties in Kentucky, with continued development in the region expected to exacerbate the safety and congestion trends in the study area.

Two decades of studies along US 42 have determined major widening is necessary to accommodate peak traffic flows. This feasibility study examines a representative parallel route to estimate associated costs and impacts. Specifically, an east-west highway connection to the interchange is intended to alleviate congestion and safety issues along the built-out US 42 corridor.

Study tasks include creating an inventory of existing conditions, defining the study purpose, forecasting existing and future traffic, identifying red-flag environmental issues, developing build concepts with construction cost estimates, and documenting the study process and results.



*US 42 Congestion*

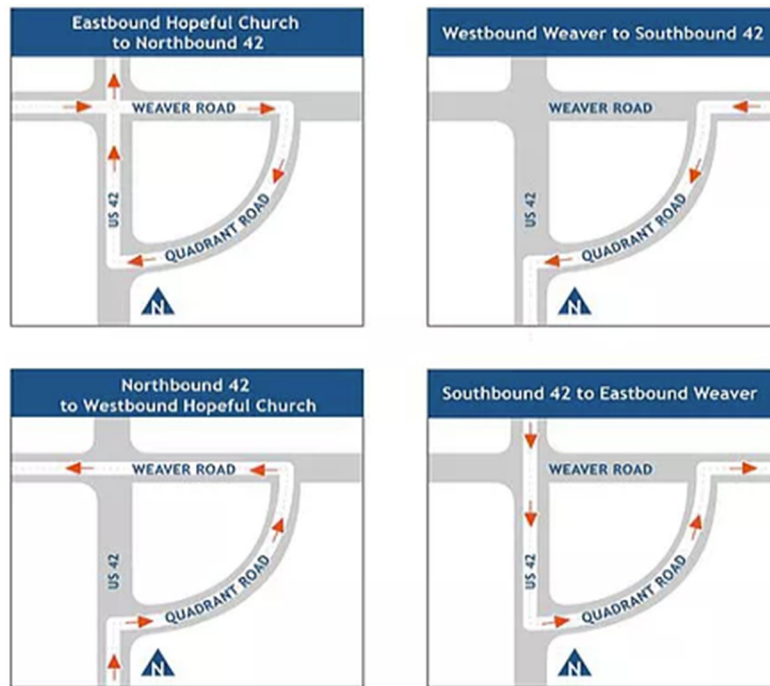


**Figure ES-1: Study Area Map**

### *Existing Conditions*

US 42 today has four 12-foot travel lanes, curb/gutter, sidewalks, and a 40-45 mph speed limit through the study area. It is part of the National Highway System and classified as an urban principal arterial, carrying 35,500 to 38,400 vehicles per day (vpd). Historic traffic counts show steady increases in traffic using the corridor since 2000. Average travel speeds decrease by 10 mph during the afternoon peak hour compared to overnight off-peak operations, which is another 10 to 15 mph below the posted speed limit.

During the course of the study, the US 42/KY 842 intersection was reconstructed as a “jug handle” style intersection (**Figure ES-2**), shifting left turns from the existing US 42/KY 842 intersection to the new Quadrant Road connector. Accordingly, five signalized study intersections in the existing scenario increased to six signalized study intersections in future year scenarios.



**Figure ES-2: New Jug Handle Layout at US 42/KY 842**

Level of Service (LOS) is a qualitative measure describing traffic conditions based on speed, travel time, freedom to maneuver, traffic interruptions, comfort, and driver convenience. It is rated on an A to F scale by density, with LOS A representing free-flow conditions through F representing oversaturated conditions with highly congested delays. Today, the five signalized study intersections along US 42 operate at LOS B-E during the AM peak hour and at LOS C-F during the PM peak hour.

Crash data for the five-year period from January 2014 through December 2018 were collected; 1,110 crashes were reported in the study area during the analysis period. US 42 data shows no fatalities, 68 injury collisions, and 573 property damage only crashes during this period. The majority of crashes were rear ends (54%) and angle/turning collisions (28%). Two crashes with bicycles and four pedestrian strikes were reported, with four (two bicycles and two pedestrians) clustered at the intersection with Mall Road. Statistical analysis shows numerous spots and segments along the corridor where reported crashes exceed expected rates.

#### *Future No-Build Traffic*

Future year traffic was generated using OKI's regional travel demand model, accounting for background socioeconomic growth predictions and committed transportation projects influencing regional traffic flows. In the 2045 No-Build scenario, US 42 volumes increase; the routes is projected to carry 51,000 to 56,000 vpd through the study area.

With the increased volumes, operational metrics continue to degrade. More turn movements operate at LOS F, particularly during the PM peak hour, with substantial queuing throughout the corridor. Overall, the six modeled intersections along US 42 operate at LOS C through F during the AM peak; all operate at LOS F during the PM peak.



### *Representative Concepts Considered*

Based on dense urban development patterns and other environmental constraints, KYTC explored a range of conceptual connector corridors throughout the study area. One general corridor emerged as an optimal location to minimize impacts: a representative parallel route on new alignment, intended solely as a baseline to estimate associated costs and impacts. From east to west, the representative alternative stretches from the Mall Road interchange, north of the Paddock Club Apartments, south along Surfwood Drive, then between the Villages of Florence and Boone Valley Estates neighborhoods to meet KY 237 approximately 900 feet northwest of the KY 237/Valleyview Drive intersection.

Within the corridor, two typical sections were examined as build alternatives:

- The three-lane build alternative includes one 12-foot travel lane per direction, a 14-foot two-way left-turn lane (TWLTL), curb/gutter, and 8-foot shared use paths on both sides.
- The four-/five-lane build alternative includes two 11-foot travel lanes per direction, a 9-foot grass median or 13-foot TWLTL, curb/gutter, and 8-foot shared use paths on both sides.

Plan views of the representative build alternatives are shown in **Figures ES-3** and **ES-4** on pages ES-5 and ES-6.

### *Future Build Traffic*

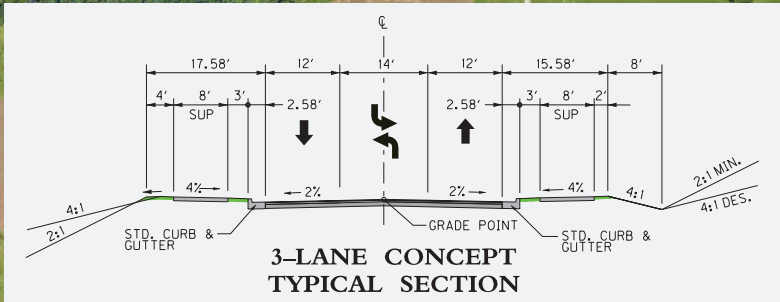
Again based on OKI's model, 2045 Build traffic forecasts were produced for each build scenario. Results show a three-lane alternative would carry an estimated 14,000 to 26,000 vpd with the higher volume on the eastern segment. By comparison, the four-/five-lane alternative would carry an estimated 21,000 to 32,000 vpd, suggesting the additional capacity of the wider alternative is warranted. US 42 volumes decrease by 4,000 to 10,000 vpd compared to the No-Build scenario.

Lower volumes along US 42 in the build scenarios lead to improved performance. Either build scenario results in similar LOS improvements for the congested corridor, shown in **Table ES-1**.

**Table ES-1: 2045 Intersection LOS along US 42 Corridor**

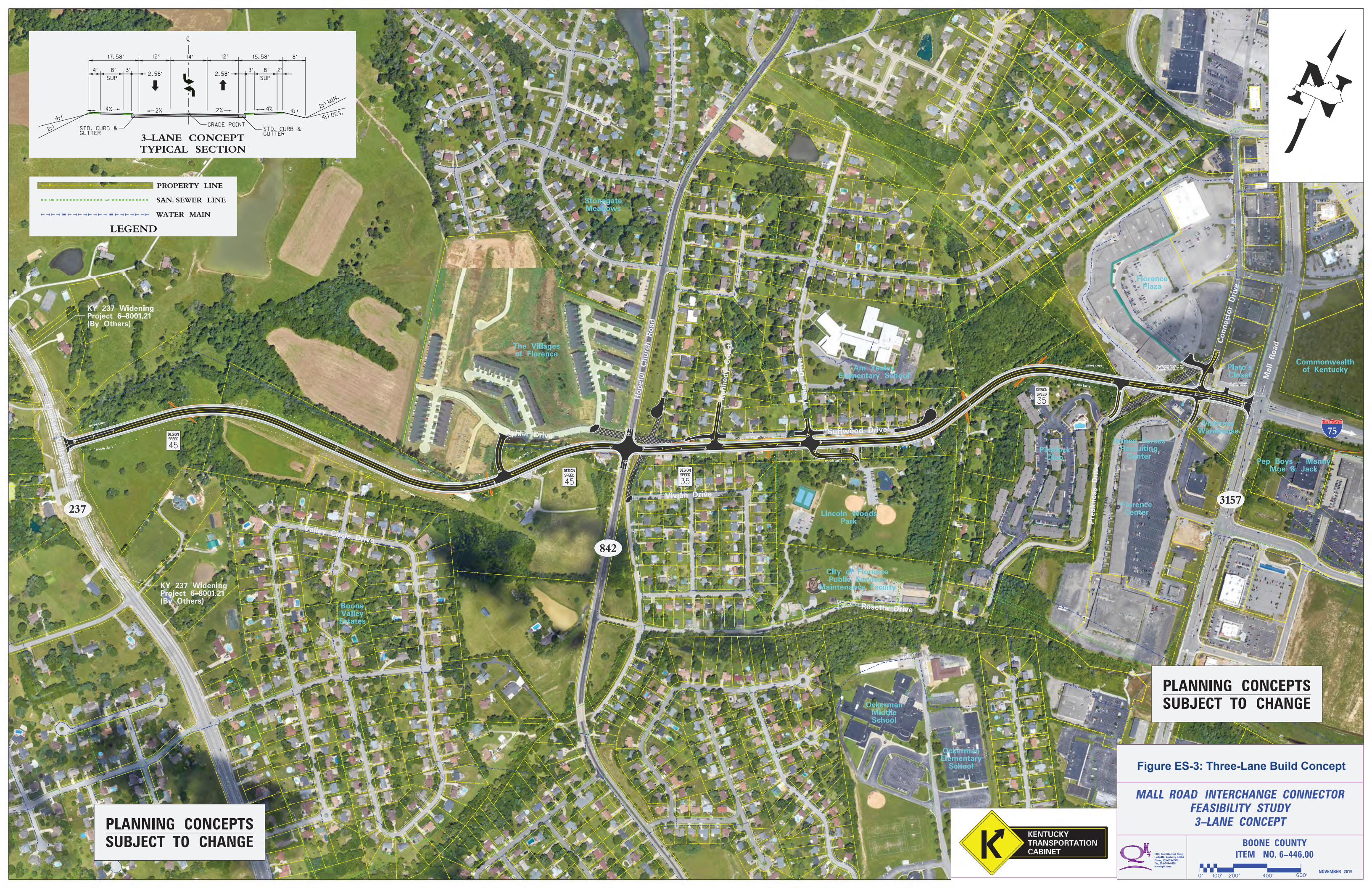
Intersection	AM Peak			PM Peak		
	No-Build	3-Lane	4/5-Lane	No-Build	3-Lane	4/5-Lane
US 42/KY 237	F	F	E	F	E	E
US 42/Harvey Quast Drive	D	B	B	F	C	C
US 42/Quadrant Road	D	B	B	F	B	B
US 42/KY 842	D	A	A	F	D	D
US 42/Ockerman Drive	C	C	C	F	D	D
US 42/Mall Road	E	D	D	F	F	F





**LEGEND**

- PROPERTY LINE
- SAN. SEWER LINE
- WATER MAIN



**PLANNING CONCEPTS  
SUBJECT TO CHANGE**

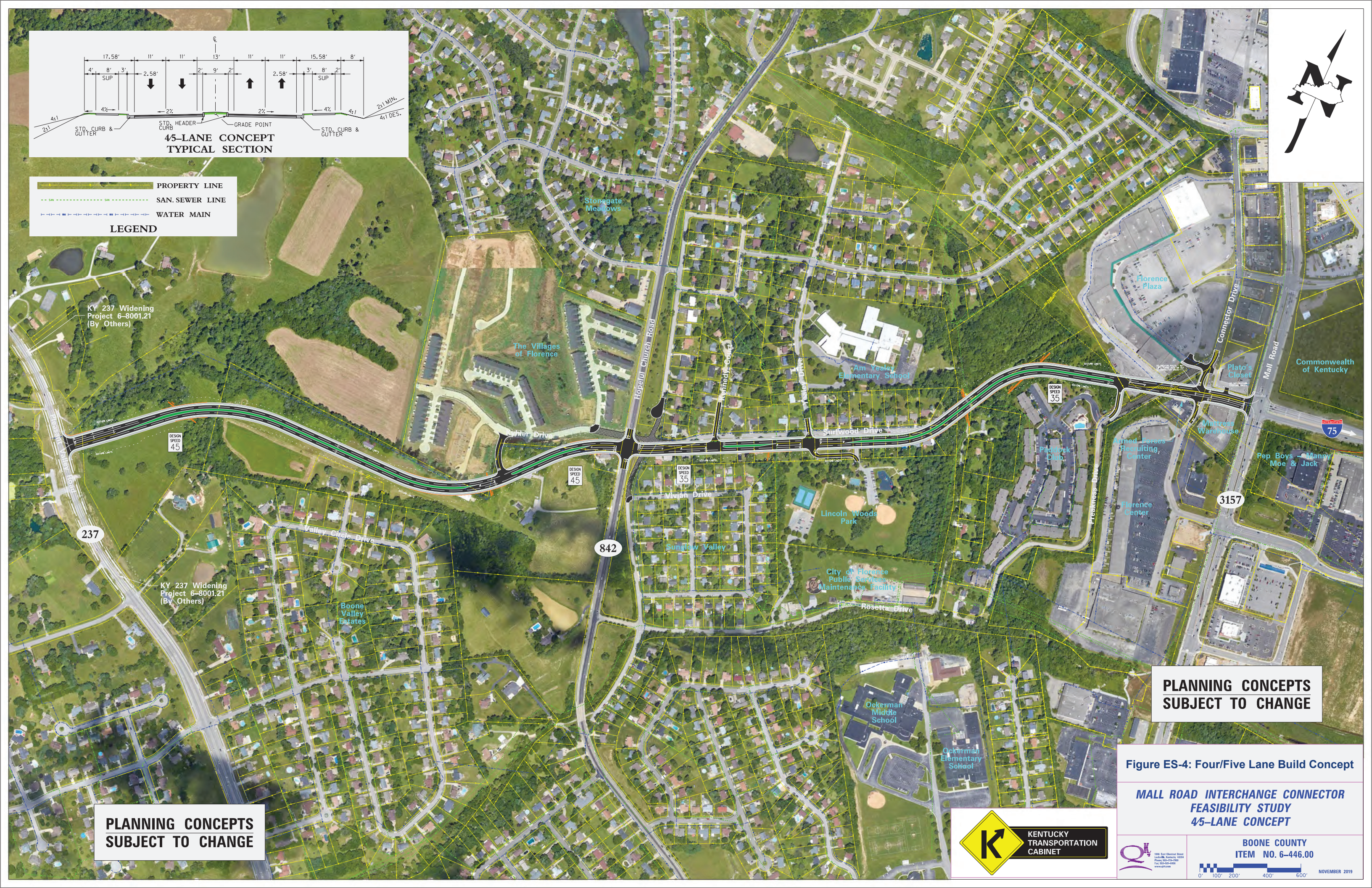
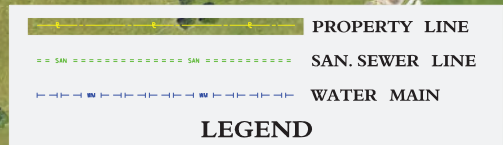
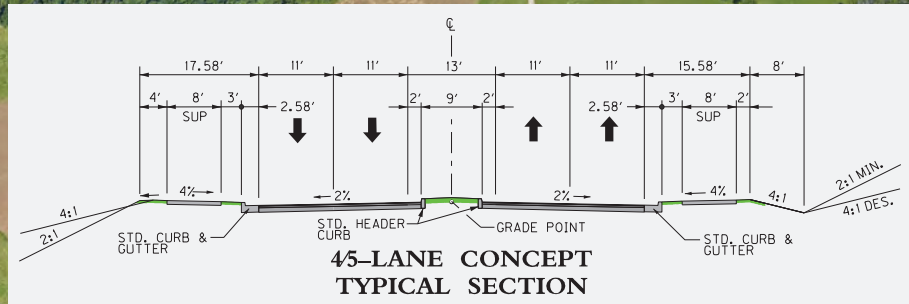
**PLANNING CONCEPTS  
SUBJECT TO CHANGE**



**Figure ES-3: Three-Lane Build Concept**

**MALL ROAD INTERCHANGE CONNECTOR  
FEASIBILITY STUDY  
3-LANE CONCEPT**





**PLANNING CONCEPTS  
SUBJECT TO CHANGE**

**PLANNING CONCEPTS  
SUBJECT TO CHANGE**

**Figure ES-4: Four/Five Lane Build Concept**

**MALL ROAD INTERCHANGE CONNECTOR  
FEASIBILITY STUDY  
45-LANE CONCEPT**





**Table ES-2** compares travel time along the US 42 corridor between scenarios, measuring between the center of the US 42/KY 237 intersection and the center of the US 42/Mall Road intersection.

**Table ES-2: US 42 Travel Time by Scenario**

Scenario	AM	PM
2019 Existing Eastbound	231 sec	239 sec
2019 Existing Westbound	244 sec	270 sec
2045 No-Build Eastbound	349 sec	266 sec
2045 No-Build Westbound	319 sec	1,538 sec*
2045 3-Lane Build Eastbound	220 sec	260 sec
2045 3-Lane Build Westbound	259 sec	359 sec
2045 4/5-Lane Build Eastbound	218 sec	218 sec
2045 4/5-Lane Build Westbound	219 sec	327 sec

\* Represents failure with complete breakdown of the model

The proposed Mall Road Connector increases traffic using the Mall Road interchange (exit 180A), nearly doubling in the build scenarios compared to No-Build volumes. The existing off-ramp provides over 2,600 feet of storage before impacting mainline I-71/I-75 operations; anticipated queue lengths in all future scenarios are well below this length.

#### *Estimated Costs and Likely Impacts*

As the footprints of the representative build alternatives are similar, the extent of impacts associated with each closely match. Preliminary disturb limits estimate 24 acres for the three-lane alternative versus 27 acres for the four-/five-lane alternative.

The representative build alternatives may displace an estimated 23 to 26 residences, concentrated along the south side of Surfwood Drive, but avoid denser residential developments and Lincoln Woods Park. The private airstrip off KY 842 and two commercial buildings opposite the current interchange would also likely be impacted.

Detailed analysis of noise impacts on adjacent noise-sensitive areas (i.e., neighborhoods, AM Yealey Elementary School, and Lincoln Woods Park) will be required to determine if mitigation is reasonable and feasible per current KYTC policy. If a build alternative advances, an assessment of potential socioeconomic impacts will also be required and will include public involvement activities and surveys distributed to potential residential relocatees.

The build alternatives cross three streams—unnamed tributaries to South Fork Gunpowder Creek—with an estimated 530 to 610 linear feet of impacts. Roughly five to six acres of wooded, threatened/endangered bat habitat could be disturbed. The preliminary footprints also impact farmland soils, which will require additional coordination if a build alternative is selected for implementation. Detailed surveys for historic and archaeological resources will be required although preliminary data identified no known red flags within the representative alternative footprint.



Conceptual design models of both build alternatives were used to estimate quantities of high-cost construction items including earthwork, pavement, and structures. KYTC District 6 provided right-of-way and utility cost estimates based on conceptual model disturb limits, aerial imagery, approximate locations of existing right-of-way and property lines. Summarized by phase in **Table ES-3**, either build alternative is anticipated to cost around \$25 million in 2019 dollars.

**Table ES-3: Planning-Level Cost Estimates by Phase (2019 Dollars)**

Phase	3-Lane Build	4/5-Lane Build
Design	\$0.7 million	\$0.7 million
Right-of-Way	\$14.9 million	\$14.9 million
Utilities	\$0.3 million	\$0.3 million
Construction + 30% contingency	\$8.7 million	\$9.3 million
<b>Total</b>	<b>\$24.6 million</b>	<b>\$25.2 million</b>

# MALL ROAD INTERCHANGE CONNECTOR FEASIBILITY STUDY



*Groundbreaking by Design.*

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