EXECUTIVE SUMMARY

The Kentucky Transportation Cabinet (KYTC) initiated this *Mayfield Small Urban Area (SUA) Study* for the City of Mayfield and surrounding areas in Graves County, Kentucky. SUA studies provide thorough examinations of study area roadways—including geometry, existing traffic patterns, predicted future traffic changes, and safety-related issues—to identify transportation needs and prioritize potential solutions. Shown in **Figure ES - 1**, the study area encompasses roughly 41 square miles; study routes represent approximately 57 centerline miles of state-maintained highways plus three miles of high-volume local routes.

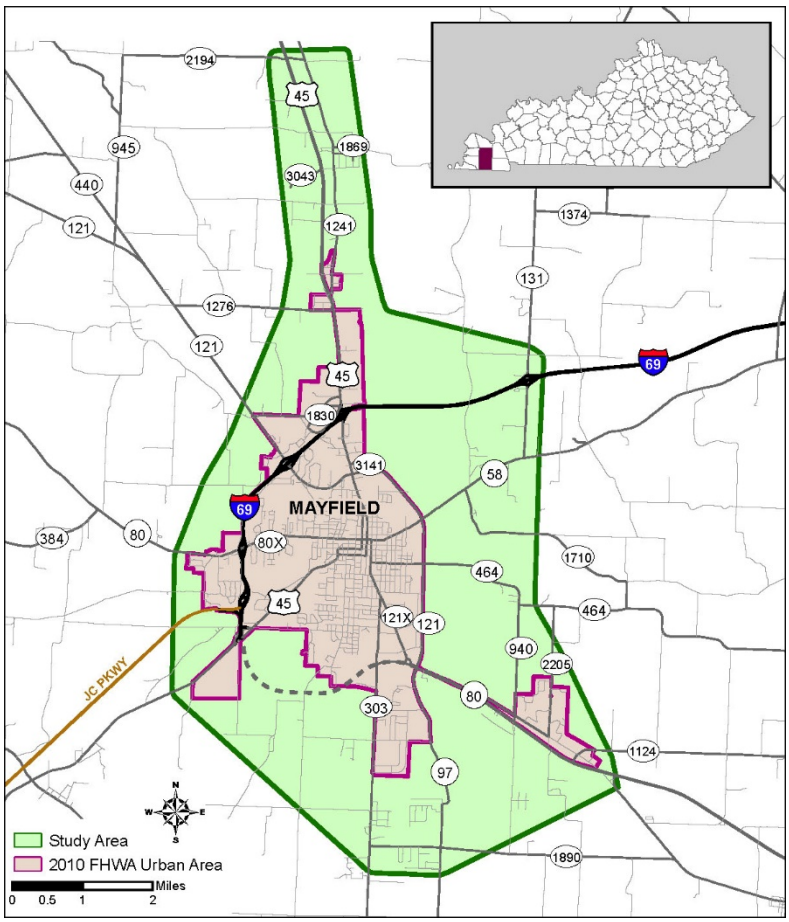

Figure ES - 1: Project Location Map

Planned and Committed Projects. Two projects are included in Kentucky's *FY 2020—FY 2026 Highway Plan:* Item No. 1-80103 proposes to widen KY 303 (Cuba Road) and Item No. 1-80104 proposes to widen KY 131 from KY 58 to KY 483. Both include all project development phases (i.e., design, utility, right-of-way, and construction) and use entirely state-level funding sources. Regionally, efforts to convert the Purchase Parkway to I-69 from Mayfield south to Tennessee (Item No. 1-26) are also ongoing. Thirteen other transportation needs have been identified for future development in the Continuous Highway Analysis Framework (CHAF) database.

Existing Conditions. Existing transportation network conditions include roadway geometrics, roadway systems, multimodal facilities, crash history, and traffic volumes—these are presented in more detail in **Chapter 2.0**.

- Highways providing the highest levels of mobility are US 45, KY 80, and the KY 121 bypass. These routes are classified as Principal Arterials and listed on the National Highway System.

- State-maintained study routes have speed limits ranging from 25 to 65 miles per hour (mph), with the highest speeds on rural portions of US 45 and KY 80.
- Most routes have two lanes and shoulders four feet wide or less, including curb and gutter sections. Exceptions are the higher mobility routes—US 45, KY 121, and KY 80.
- US 45 north of I-69 and I-69/Purchase Parkway are federally designated truck routes. US 45 south of I-69, KY 80, KY 121, and KY 131 are on Kentucky's Highway Freight Network.
- Geometric reviews note no vertical deficiencies but there are sharp horizontal curves (28+ degrees) on three study routes: US 45 in downtown Mayfield, KY 1241 (Old US 45) at the intersection with US 45, and on KY 1863 in Hickory.
- There are 65 bridges identified within the study area; all structures on study routes are in Good or Fair condition per their latest inspections.

Year 2020 average daily traffic (ADT) volumes were calculated based on historic counts, adjusting pre-2020 volumes to create a consistent 2020 dataset while minimizing influence of the COVID pandemic on volumes. Turning movement counts were collected at nine intersections during October 2020. Four study routes carry more than 10,000 vehicles per day (vpd): US 45, KY 58 (West Broadway), KY 121, and KY 121X (Paris Road/6th Street).

Traffic analyses included two highway performance indicators: Level of Service (LOS), rated A (best, free flow) to F (worst, gridlocked), and volume-to-capacity (v/c) ratios. Most highway segments operate at LOS D or better, which is generally acceptable for urban areas. All routes exhibit a v/c ratio less than 0.5, indicating they are using 50 percent or less of their available capacity during the peak hour analyzed. Signalized study intersections operate at LOS D or better but a few local cross-street approaches at two-way stop-controlled study intersections operate at LOS E-F.

During 2017—2019, 1,089 crashes were reported on study routes. These included 10 fatalities and 210 injury collisions; seven of the ten fatalities were the result of angle collisions. Predominant crash types for all crashes reported on all study routes were rear end collisions (32 percent), followed by angle (27 percent), and single vehicle collisions (22 percent). Six pedestrian strikes occurred, one of which was fatal—north of the city on US 45. Discussed further in Section 2.7.1, two types of statistical crash analyses were performed to identify locations with elevated crash rates: Critical Crash Rate Factor (CCRF) and Level of Service of Safety (LOSS).

- A CCRF greater than 1.0 indicates crashes may be occurring more often than can be attributed to random occurrence. Analyses identified four segments and 22 spots with a CCRF greater than 1.0. Segments vary in length, divided along roadways as geometry or traffic

volumes change, and are concentrated downtown. Spots are 0.10-mile long and are scattered throughout the SUA study area, many at busy intersections.

- LOSS is derived from a crash prediction model estimating the number of crashes expected on an average roadway segment, weighted by traffic volume and a statistical correction. When looking at just severe crashes, the intersections at KY 58/KY 131—where a Highway Safety Improvement Program (HSIP) Project was recently implemented—and College/9th streets showed the highest excess of expected crashes, neither of which are study routes.

An environmental overview was conducted to identify resources for consideration during the development of transportation improvement concepts. Project sheets for recommended improvements note environmental red flag considerations where applicable.

Coordination Efforts. The project team—including KYTC District 1 and Central Office personnel, Purchase Area Development District (PADD) staff, and consultant personnel—met virtually throughout the course of the study. Two virtual meetings for local officials and stakeholders (LO/S) were held to gain insight into the Mayfield transportation network; public outreach efforts were undertaken through online engagement activities.

To kick off the study, an online crowdsourcing map collected need data during July and August 2020. The site registered 271 data points divided among four categories: safety (121), congestion (85), geometry (5), and other (60). Figure ES - 2 shows the distribution of comments. Main themes emerging from the comments included: congestion and safety along KY 303 (Cuba Road), drainage along KY 58 (West Broadway), long traffic queues associated with school traffic, signal timing or phasing at various intersections, and traffic calming/pedestrian safety concerns.

2045 No-Build Traffic. KYTC's statewide travel demand model formed the basis of year 2045 traffic projections. The model simulates a 24-hour period, accounting for background socioeconomic growth, land use changes, network improvements, and other factors. The KY 80 extension between US 45 and KY 303 opened to traffic in late 2020 and was included in the future No-Build scenario.

Most analysis segments exhibited little to no growth versus 2020 volumes, corresponding to static county population projections. With the KY 80 extension, traffic volumes using KY 80 and the KY 121 Bypass are anticipated to increase, adding about 5,700 and 3,000 vpd respectively. US 45 also increases by about 2,000 vpd near the proposed industrial parks north of town. Aside from these facilities, changes in traffic patterns are relatively minor between the Existing and future No-Build scenarios.

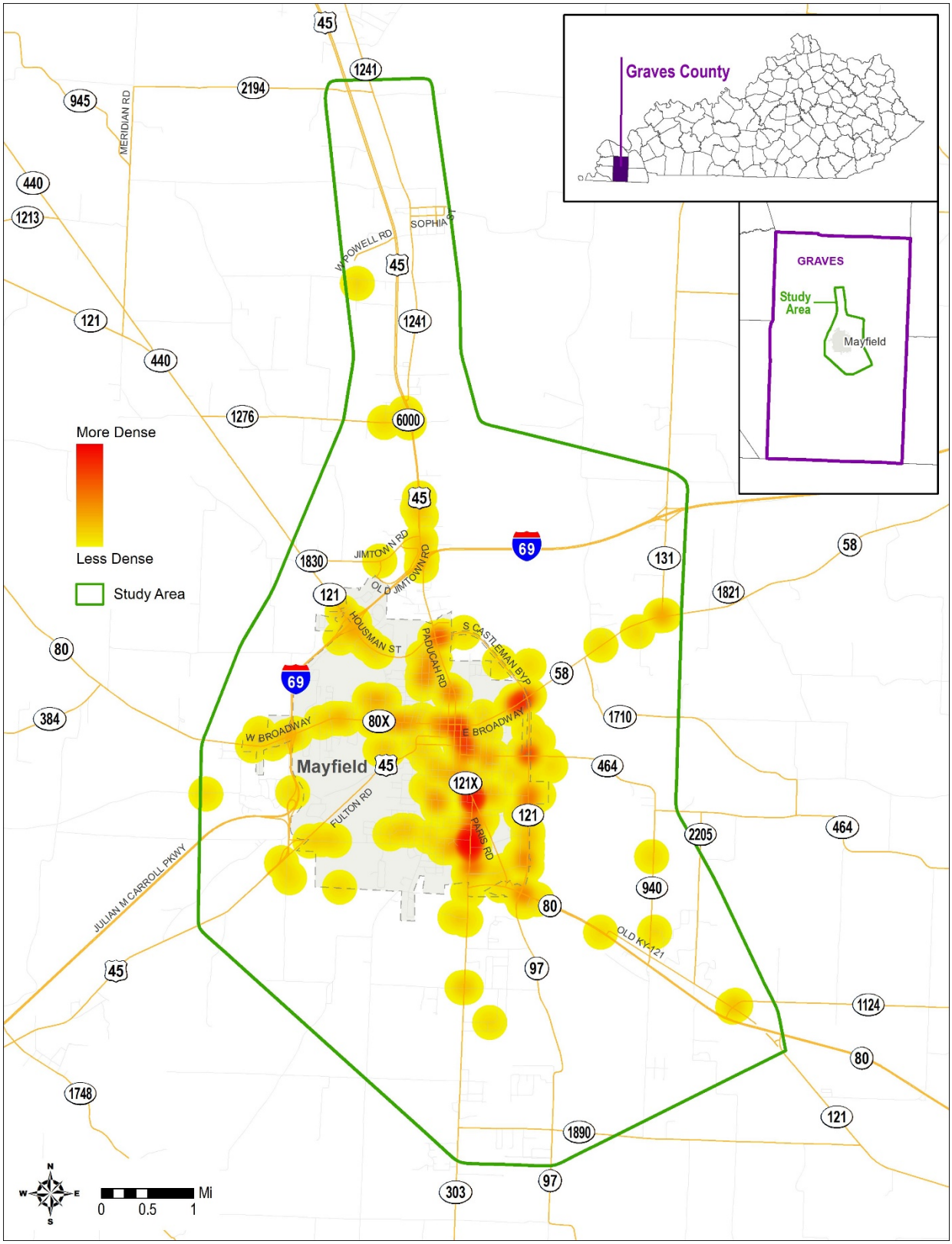

Figure ES - 2: Heat Map showing Public Comment Concentrations

Operationally, several intersections along the bypass experience worse LOS in the future No-Build scenario, associated with the increased volumes. Segments of five routes exhibiting LOS E in 2020 are predicted to remain at LOS E in 2045: KY 80X (West Broadway), KY 121X (Paris Road/6th Street), KY 131, KY 303, and East Farthing Street. No-Build operations degrade to LOS E along portions of four other study routes: KY 58 (East Broadway), the KY 121 bypass, KY 1276, and KY 1710. The highest v/c ratio in the No-Build scenario is 0.58, occurring along KY 121.

Development of Improvement Concepts. Initial concepts to improve safety and reduce congestion were developed based on review of existing geometric deficiencies, existing and future traffic operations, crash concentrations, field reconnaissance, and input from the project team, community leaders, and the public. The consultant team initially evaluated existing conditions data at 40 locations to identify problem areas and feasible solutions. The list was reduced to 19 locations (**Figure ES - 3**), presented to the project team in November 2020. Small-scale improvement concepts included mostly intersection improvements—tweaking signal timing/phasing, increasing visibility, or adding turn lanes—and pedestrian amenities. Large-scale improvement concepts represented corridor-level widening, signal coordination, and/or access management.

Ten small-scale improvement concepts are listed in **Table ES - 1** (page ES-7) alongside corresponding existing conditions data to highlight needs. Eight large-scale improvement concepts are listed in **Table ES - 2** (page ES-7), following the same format.

- The "Crashes" column denotes the total number of crashes occurring within the proposed improvement concept limits, also noting any fatalities.
- The "CCRF" column notes any high CCRF spots or segments that overlap the limits.
- Community input identifies how many corresponding GIS pins were added in the crowdsourcing app or if the concern was mentioned during the initial LO/S meeting.
- Survey rank corresponds to the prioritization surveys distributed to LO/S, discussed further in **Section 8.0**.
- Costs are presented in 2020 dollars.

Highlighted cells represent the worst performers (i.e., greatest needs) in each category.

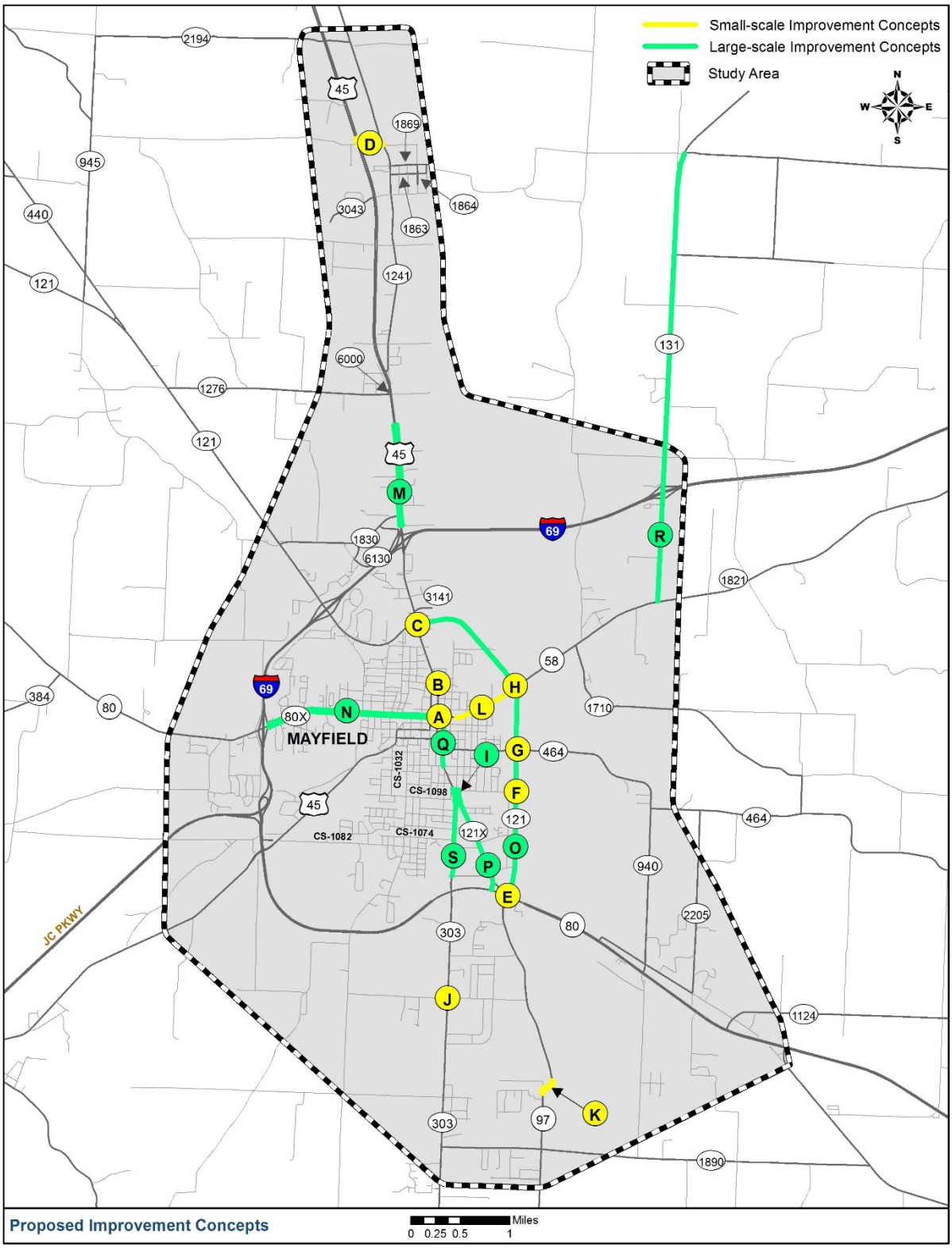

Figure ES - 3: Proposed Improvement Concepts

Table ES - 1: Small-Scale Improvement Concepts

ID	Location	Description	Crashes (Total)	CCRF	Community Input	Survey Rank	Cost
A	US 45/Broadway	Signal & Striping Improvements	25	3 segments: US 45 N: 1.51 KY 80X: 1.32 KY 45 S: 1.64	3	-	$40k
B	US 45/James St	Crosswalks, Lighting, Improved Visibility	16	2.75 spot	4	4	$170k
C	US 45/KY 121	Crosswalk & Signal Improvements	39	1.32 spot (north leg)	7	3	$90k
D	US 45/Poultry Dr	Widen Poultry Dr with R-cut at US 45	7 (1 Fatal)	1.39 spot	LO/S concern	-	$600k-$1.5M
E	KY 121/KY 80/KY 97	Signal Improvements	36	1.44 spot (south leg)	5	2	$290k
F	KY 121/Douthitt St	Signalize with Right Turn Lane	7 (1 Fatal)	-	4	2	$900k
G	KY 121/KY 464	Add School Zone with Right Turn Lane and Lighting	3	-	10	1	$390k
H	KY 121/KY 58	Signal, Striping, & Lighting Improvements	24	1.23 spot (KY 58)	5	1	$270k
J	KY 303/Tucker Rd	Add Left Turn Lanes with Improved Visibility	6 (1 Fatal)	1.16 spot (south leg)	2	-	$550k
K	KY 97 S-Curve	Repave to fix Superelevation	8	1.2 spot	-	-	$450k
L	KY 58 E Broadway	Maintenance for Drainage	10	-	10	1	$220k

Table ES - 2: Large-Scale Improvement Concepts

ID	Concept	Length	Crashes (Total)	CCRF	Community Input	Survey Rank	Cost
M	US 45 N TWLTL	0.9 mi	40	-	3	1	$1.2M
N	KY 80X W Broadway signal coordination and crosswalks	1.8 mi	95	1.0, 1.2, 1.3 spots; 1.32 segment	19	4	$850k
O	KY 121 Bypass widening	3.4 mi	75 (2 Fatal)	-	45	-	$8.1-12.3M
P	KY 121X Paris Road access	1.0 mi	110	1.06 & 1.00 spots	2	5	$10.0-21.4M
Q	KY 121X Sixth Street intersection improvements and crosswalks	0.5 mi	77	-	17	3	$1.0M
R	**Item 1-80104** KY 131 widening	4.6 mi*	14	-	3	4	$25.4M
S	**Item 1-80103** KY 303 Cuba Road widening	0.8 mi	44	1.43 spot (Willow/Wyatt)	44	2	$12.8M
I	KY 121X/KY 303 intersection reconfiguration	-	54	1.00 spot (KY 303)	16	3	$5.7-7.0M

** Extends beyond study area limits*

2045 Build Traffic. Spot O, widening the KY 121 Bypass to five lanes between KY 80 and US 45, represents a potential large-scale change in traffic patterns and was modeled in the statewide model. Modeling showed increased roadway capacity would draw an estimated 500-600 vpd to the facility versus the 2045 No-Build scenario. While many of the recommendations are safety-driven with little

impact on capacity, intersection reconstructions would improve operations at US 45/Poultry Drive (Spot D), KY 80/KY 97/KY 121 (Spot E), KY 121/Douthitt Street (Spot F), and KY 121X/KY 303 (Spot I).

Once improvement concepts were developed, virtual meetings were held in early 2021 to gather input from LO/S and the project team and to prioritize potential improvements. Respondents ranked Spots G, H, and L as the highest small-scale priority concepts with Spots M and S as the highest large-scale priority concepts.

Recommendations. Recommended improvement concepts were divided into one of three priority categories—high, medium, or low. The highest priorities for small-scale improvements are associated with three KY 121 Bypass intersections (Spots C, G, and H) and the US 45 (7th St)/KY 80 (Broadway) intersection downtown, Spot A. Spot L was omitted from prioritization as it will be addressed in Spring 2021 by District maintenance forces. Top large-scale priorities were improvements to KY 80X (West Broadway, Spot N), widening the KY 121 Bypass (Spot O), and widening KY 303 (Cuba Road, Spot S). Individual sheets for improvement concepts A through S are presented in Section 8.1. Table ES - 3 and Table ES - 4 summarize prioritization for each recommended improvement.

Table ES - 3: Priorities for Small-Scale Improvement Concepts

ID	Location	Description	Cost	Priority
A	US 45/Broadway	Signal & Striping Improvements	$40k	High
B	US 45/James Street	Crosswalks, Lighting, Improved Visibility	$170k	Med
C	US 45/KY 121	Crosswalk & Signal Improvements	$90k	High
D	US 45/Poultry Drive	Widen R cut at US 45	$600k-$1.5M	Med
E	KY 121/KY 80/KY 97	Signal Improvements for Visibility	$290k	Med
F	KY 121/Douthitt Street	Signalize with Right Turn Lane	$900k	Low
G	KY 121/KY 464	Add School Zone with Right Turn Lane and Lighting	$390k	High
H	KY 121/KY 58	Signal, Striping, & Lighting Improvements	$270k	High
J	KY 303/Tucker Road	Add Left Turn Lanes with Improved Visibility	$550k	Low
K	KY 97 S-Curve	Repave to fix Superelevation	$450k	Low

Table ES - 4: Priorities for Large-Scale Improvement Concepts

ID	Concept	BMP-EMPea	Length	Cost	Priority
M	US 45 N TWLTL	19.330-20.230	0.9 mi	$1.2M	Low
N	KY 80X W Broadway signal coordination and crosswalks	0.000-1.825	1.8 mi	$850k	High
O	KY 121 widening	5.499-8.940	3.4 mi	$8.1-12.3M	High
P	KY 121X Paris Road access	0.000-1.034	1.0 mi	$10.0-21.4M	Low
Q	KY 121X Sixth Street intersection improvements and crosswalks	1.389-1.870	0.5 mi	$1.0M	Med
R	**Item 1-80104** KY 131 widening	0.000-4.555	4.6 mi*	$25.4M	Med
S	**Item 1-80103** KY 303 Cuba Road widening	16.034-16.807	0.8 mi	$12.8M	High
I	KY 121X/KY 303 intersection reconfiguration	0.900-1.200	-	$5.7-7.0M	Med

Next Steps. The next phase in the project development process for large-scale improvement concepts is Phase I Preliminary Engineering. Concepts not currently included in KYTC's CHAF database should be added to compete for funding alongside other needs statewide.

Small-scale improvement concepts may be initiated through the district's routine maintenance and traffic programs or become part of systematic specialty programs such as HSIP.