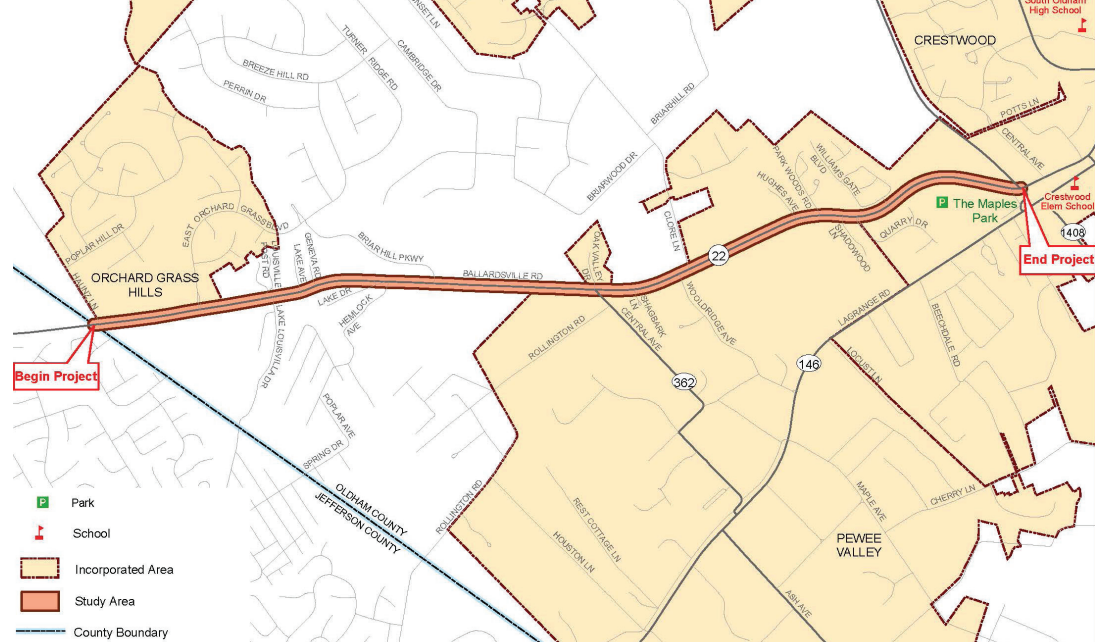




FINAL REPORT NOVEMBER 2022



KY 22

TRANSPORTATION CORRIDOR STUDY OLDHAM COUNTY, KY | ITEM NO. 5-203

Prepared for Oldham County, Kentucky
In partnership with KYTC



TEAM KENTUCKY
TRANSPORTATION
CABINET

Engineering Planning





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- E. Socioeconomic Study
- F. Meeting Summaries



ACRONYMS LIST

AASHTO	American Association of State Highway and Transportation Officials
ADD	Area Development District
ADT	Average Daily Traffic
B/C	Benefit/Cost ratio
BMP/EMP	Begin mile point / End mile point
CCRF	Critical Crash Rate Factor
CHAF	Continuous Highway Analysis Framework
DHV	Design Hourly Volume
DMV	Department of Motor Vehicles
EEC	Excess Expected Crashes
FHWA	Federal Highway Administration
GPS	Global Positioning System
HCM	Highway Capacity Manual
HCS	Highway Capacity Software
HDM	Highway Design Manual
HIS	Highway Information System
HSIP	Highway Safety Improvement Program
KHC	Kentucky Heritage Council
KIPDA	Kentuckiana Regional Planning and Development Agency
KTC	Kentucky Transportation Center
KYTC	Kentucky Transportation Cabinet
LEP	Limited English Proficiency
LO/S	Local officials/stakeholders
LOS	Level of Service
LOSS	Level of Service of Safety
LWCFA	Land and Water Conservation Fund Act
MAP-21	Moving Ahead for Progress in the 21 st Century
MP	Mile point
mph	miles per hour
MPO	Metropolitan Planning Organization
MSAT	Mobil Source Air Toxics
MTP	Metropolitan Transportation Plan
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NBIS	National Bridge Inventory System
NHS	National Highway System
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
OSA	Office of State Archaeology
PDO	property damage only
SHIFT	Strategic Highway Investment Formula for Tomorrow
STAA	Surface Transportation Assistance Act of 1982



STIP	Statewide Transportation Improvement Program
SUA	Small Urban Area
TED	Transportation Enterprise Database
TIP	Transportation Improvement Program
TWLTL	two-way left-turn lane
USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service
v/c	volume-to-capacity ratio

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Oldham County Fiscal Court initiated a transportation planning study of KY 22 from the Jefferson/Oldham County line near Haunz Lane (near mile point [MP] 0.000) to KY 329 (MP 3.270) in Crestwood in late summer 2021. **Figure ES - 1** shows the 3.27-mile corridor study area.



The study created an inventory of existing conditions, forecasted future traffic, identified red flag environmental issues; developed potential build concepts with construction cost estimates; engaged the public, elected official, and other stakeholders; and documented the study process and results.



A 2005 study effort¹ analyzed a 9.3-mile corridor of KY 22 from Herr Lane in Jefferson County to KY 329B in Oldham County. It considered existing conditions and future projections to recommend short-, mid-, and long-term improvements. Because more than 15 years have passed since the original study, an inventory of existing conditions and future 20-year projections has been compiled to determine if previously recommended improvements are still warranted and to identify potential new improvements that take into account the area's ongoing development. Additional studies and committed projects in the vicinity have also been reviewed for consideration during concept development to ascertain future traffic conditions.

The objective of this study was to identify opportunities to improve safety, reduce congestion, and provide bicycle and pedestrian accommodations.

Existing Conditions

KY 22 within the study limits is primarily a two-lane route with 10-foot lanes that widen to 11-foot lanes approaching Crestwood, and with less than 2-foot-wide paved shoulders. KY 22 is on the State Secondary System and is classified as an Urban Minor Arterial. Access is controlled by permit and this section of KY 22 has a AAA truck weight classification (40-ton max). Several locations have deficient curves and/or grades. The speed limit varies from 35 to 55 mph in the study area. Negligible bicycle or pedestrian activity was identified.

Traffic

Traffic data collected in fall 2021 shows 13,800–14,700 vehicles per day (vpd) use the corridor, compared to 8,100–9,800 vpd from KYTC's 2020 counts.² Operationally, the westbound AM peak period traffic is the heaviest, operating at level of service (LOS) E with volume-to-capacity (v/c) ratios ranging from 0.62 to 0.72 for study segments. Reviewing the directional split and regional StreetLight Data flows indicates slightly more traffic is traveling west (to Louisville) in the AM peak and east (toward Crestwood) in the PM peak.

LOS is a qualitative measure that describes traffic conditions based on measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort, and convenience. LOS is rated on a scale of A (free-flow conditions) through F (over capacity/standstill)

Based on 12-hour turning movement counts collected for the study, most intersecting cross streets are approaching capacity during peak hours, with only Lake Louisville Drive currently operating at LOS

¹ <https://transportation.ky.gov/Planning/Pages/Project-Details.aspx?Project=KY%20-%202022%20Scoping%20Studyv>

² Covid-19 pandemic appeared to have impacted 2020 KYTC counts, as traffic was increasing approximately 2% per year from the county line to KY 362 (Central Avenue) over the previous 20 years.

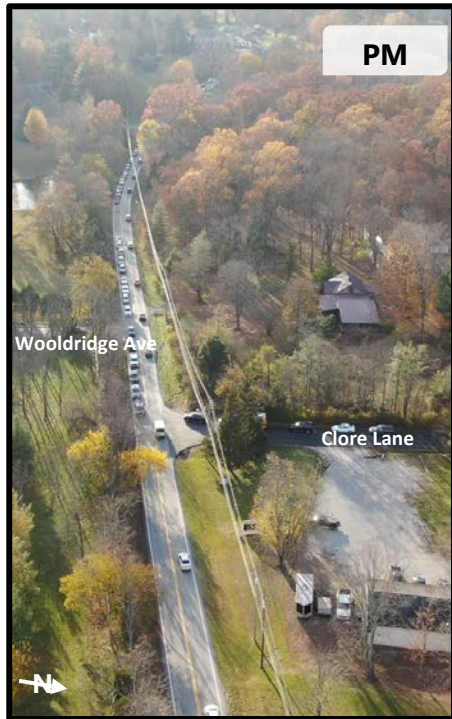


Figure ES - 2. Typical PM Peak Queue on KY 22 at Wooldridge Avenue/Clore Lane

C in the peak periods. All other intersecting cross streets operate at LOS D or worse, with most operating at LOS F in at least one of the peak periods. Drone imagery in **Figure ES - 2** captured typical peak period queues around the Wooldridge Avenue/Clore Lane intersection.

GPS-based travel time runs compared peak period speeds with the posted speed limits, highlighting significant speed drops at project termini and at intersections with Lake Louisville Drive, KY 362 (Central Ave), and Wooldridge Avenue/Clore Lane. It was uncommon to reach the posted speed limits during the peak periods.

By 2045, volumes are projected to increase to about 19,000 vpd, with LOS degrading to E for both directions in the afternoon peak period.

Safety

During the four-year (2017–2020) analysis period, 179 crashes were reported, including 2 fatal and 31 injury collisions. **Figure ES - 3** shows high crash density areas at study intersections. By type, rear-end crashes were most common (44%), followed by single vehicle (36%) and angle (11%). Corridor trends show 27% of all crashes occur on wet or icy pavement and 24% occur at night. Reviewing these same statistics for the top two types of collision (which comprise 80% of all crashes) shows 32% of rear-end crashes occur on wet or icy pavement and 10% occur at night, and 26% of single vehicle crashes occur on wet or icy pavement with 40% occurring at night.

Statistical crash analyses identified six locations along the corridor with elevated crash rates: Haunz Lane, East Orchard Grass Boulevard to Geneva Road, Briar Hill Parkway, Wooldridge Avenue/Clore Lane, Hughes Avenue to Park Woods Road, and Maples Park to Dairy Queen.

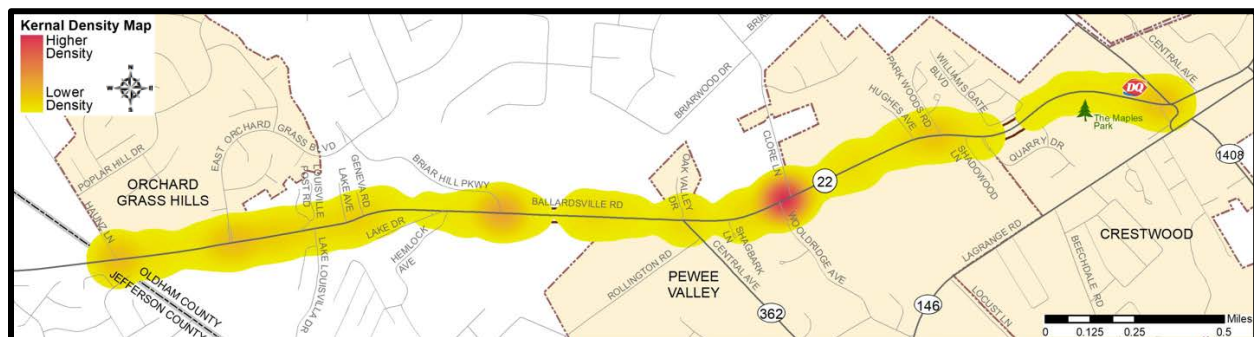


Figure ES - 3. Crash Concentrations



Environmental Setting

Red flag environmental resources identified within and adjacent to the study area include:

- Several stream tributary crossings.
- Woodland bat habitat.
- Several water wells, particularly near KY 362 (Central Avenue) and KY 329.
- A few small wetlands³ and ponds immediately adjacent to the study area.
- Several known sinkholes, with one immediately adjacent near MP 2.3.
- Karst prone or intense area.
- Four churches along the corridor and the Louisville Memorial Gardens (a cemetery) at the western terminus.
- Six Kentucky Heritage Council (KHC) historic resources mapped within the study limits and potentially eligible for listing in the National Register of Historic Places.
- Maples Park, considered a protected Section 4(f) resource.
- Several properties throughout possibly containing contaminated soils based on their historic use.
- Potential minority and Limited English Proficiency (LEP) populations in the block group north of KY 22 from the county line to include the City of Orchard Grass Hills.
- Potential higher percentage of persons aged 65 and over in the block group south of KY 22.
- Nearly half of the study area is considered prime farmland.

The Geotechnical Overview identified new cuts and embankments are anticipated to encounter overburden soils over shallow bedrock with insufficient quantity of durable bedrocks for new pavements to be constructed with a rock roadbed. Options for stabilization include either chemical stabilization⁴ with lime or cement or mechanical stabilization with 12-inch minimum of coarse aggregate wrapped with geotextile fabric.

Improvement Concepts

Potential improvement concepts were developed after careful consideration of existing conditions, future (2045) traffic operations, environmental setting, community input, and project team suggestions. Concepts ranged from spot improvements, primarily concentrated at high crash intersections, to corridor-wide improvements. **Figure ES - 4** indicates general concept locations.

Table ES - 1 provides a summary of each concept considered.

³ Note: While Lake Louisville is mapped as a wetland, the man-made lake has been drained and a tributary now flows in its place.

⁴ Typically, the more cost-effective solution.

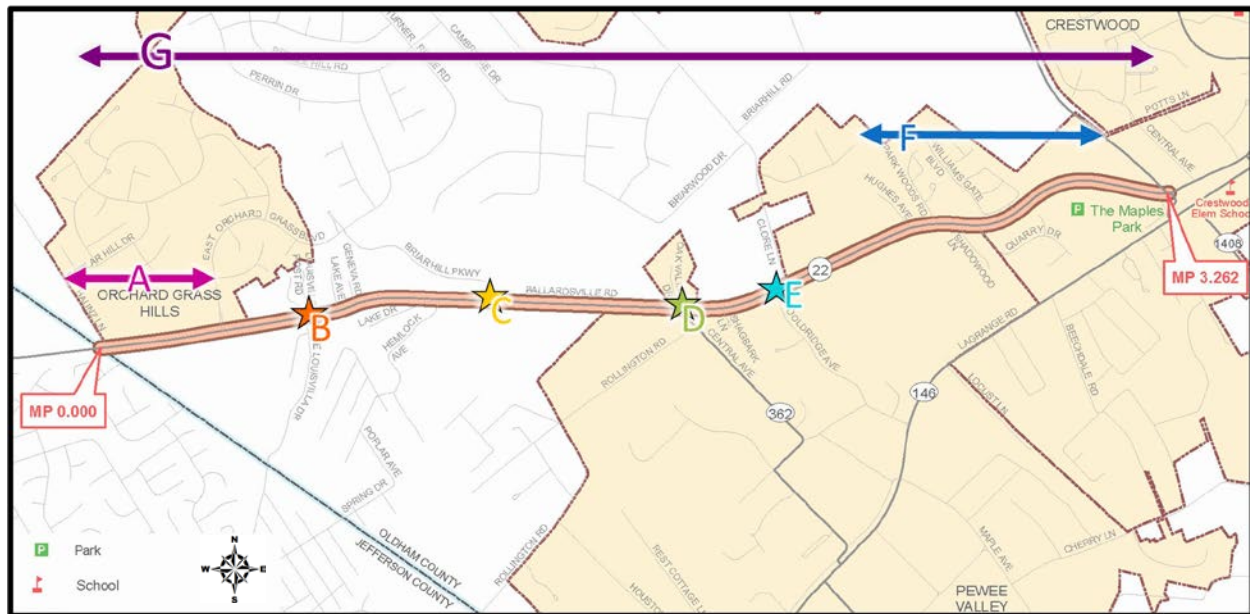


Figure ES - 4. Representative Improvement Concept Locations

Table ES - 1. Summary of Improvement Concepts

Spot Improvements	A	Haunz Lane – East Orchard Grass Boulevard	MP 0.021–0.300
		Realign Haunz Lane to a “T” intersection with KY 22, add a left- and a right-turn lane on Haunz Lane, and add a left-turn lane from eastbound KY 22 to northbound Haunz Lane. Add a two-way left-turn lane (TWLTL) on KY 22 from Haunz Lane to East Orchard Grass Boulevard, creating two 11-foot-wide driving lanes, a 13-foot-wide center turn lane, and 6-foot-wide shoulders (2 feet paved). Add a right- and a left-turn lane to East Orchard Grass Boulevard from KY 22. Add a 10-foot-wide shared-use path on the north side of KY 22 from the Poplar Hill neighborhood on Haunz Lane to the apartment complex east of East Orchard Grass Boulevard to provide multimodal connectivity to the businesses at this intersection.	
	B	Lake Louisville Drive	MP 0.653
		Raise the grade of Lake Louisville Drive approaching KY 22 and KY 22 by approximately 5 feet to improve sight distance, install guardrail to the southeast of the intersection, cut back the rock outcrops, and clear trees and vegetation. This requires a culvert extension.	
	C	Briar Hill Parkway	MP 1.264
		Add a left-turn and a right-turn lane on KY 22 for traffic accessing Briar Hill Parkway, restripe the area to indicate a no-passing zone, and include tree clearing to improve sight distance.	



Spot Improvements	D KY 362 (Central Avenue)/Oak Valley Drive	MP 1.825
	Improve access control on the southwest quadrant (adjacent to Integrity Automotive Solutions) of the intersection by installing a curb and gutter section, and clear trees/vegetation to the east. Add a left- and a right-turn lane on both KY 22 and KY 362 (Central Avenue) with modifications to correct the skew of KY 362 (Central Avenue) by shifting to the east and reducing the buffer for the KY 362 (Central Avenue) right-turn lane.	
	E Clore Lane/Wooldridge Avenue	MP 1.900–2.200
	E.1: As a potential immediate fix, add four lanes between the offset intersections with KY 22, with dedicated left-turn lanes to each cross street separated by a raised median, and clear trees/vegetation to improve sight distance. E.2: Align Wooldridge Avenue and Clore Lane with left-turn lanes and right-turn pockets on both streets and dedicated left-turn lanes on KY 22. Shift Wooldridge Avenue east and Clore Lane west to minimize impacts to the large house on Wooldridge Avenue and the Assemblies of God church on Clore Lane. Tree/vegetation clearing is also recommended.	
	F Williamsgate Boulevard – KY 329	MP 2.35–3.207
	Construct a TWLTL on KY 22 from Williamsgate Boulevard to KY 329, creating two 11-foot-wide driving lanes, a 13-foot-wide center turn lane, and 6-foot-wide shoulders (2 feet paved); and including a 5-foot-wide sidewalk north of KY 22 from Hughes Avenue to the existing sidewalk at KY 329 and guardrail in areas of steep drop-offs. Two options were considered: widening symmetrically (F.1) impacts Maples Park but fixes side slope issues while widening to the north (F.2) does not impact the park, impacts more commercial properties, and does not fix the side slope issues. The team recommended considering a pedestrian tunnel to connect residential areas north of KY 22 to Maples Park to the south without an at-grade crossing of KY 22.	
Corridor-Wide Improvements	G Study Corridor	MP 0.000–3.207
	G.1: Construct a TWLTL the entire length of KY 22 through the study area, creating two 11-foot-wide driving lanes, a 13-foot-wide center turn lane, and 8-foot-wide shoulders (6 feet paved). Include 5-foot-wide sidewalk connections from Haunz Lane to East Orchard Grass Boulevard and from Hughes Avenue to KY 329. Considering growth patterns in Oldham County, a TWLTL could support future development and it meets access point density requirements for the entire study area. A corridor-wide option would also include the intersection spot improvements A through F. G.2: Another concept for the corridor could be to improve the existing two-lane template—widen lanes to 11-feet and shoulders to 8 feet (6 feet paved)—with intersection spot improvements, keeping a TWLTL where warranted, and raising the grade through the Lake Louisville Drive area. A future project could consider a hybrid of the two corridor-wide concepts, reducing the TWLTL to an improved two-lane template in areas in frequent use.	



Recommendations

After reviewing potential impacts and benefits of each (see **Section 8.0**), the study gathered public opinion on the potential concepts, and prioritized projects for future implementation (see **Section 9.0**). Concepts were categorized as high, medium, low, or not recommended. **Table ES - 2** summarizes the study recommendations, listing the concepts benefit-cost (B/C) ratios and planning-level cost estimates that include design, right-of-way, utility, and construction phase estimates, plus a 30% contingency. **Section 10.5** (p. 63) provides project sheets that include a summary of additional information and conceptual drawings of each.

Table ES - 2. Study Recommendations

	Concept	MP	Public Feedback	B/C Ratio	Total Cost (Millions)	Priority
A	Haunz Lane to East Orchard Grass Boulevard – TWLTL and Haunz Realign	0.021-0.300	2	2.24	\$5.9	High
B	Lake Louisville Drive – Raise Grade	0.653	5	0.55	\$2.6	Medium
C	Briar Hill Parkway – Turn Lanes	1.264	4	2.80	\$2.2	High
D	Central Avenue/Oak Valley Drive – Realign and Access Management	1.825	3	1.11	\$2.5	Medium
E.2	Clore Lane/Wooldridge Avenue – Realign with Turn Lanes	1.900-2.200	1	28.24	\$3.1	High
F	Williamsgate Boulevard to KY 329 – Widen with Pedestrian Tunnel	2.35-3.207	6	0.88	\$9.1	Medium
G.1	Study Area KY 22 Corridor Widening – TWLTL with Intersection Improvements	0.000-3.207	-	2.50	\$34.4	High

Long-Term High Priority Corridor-Wide Widening & Intersection Improvements (Ultimate Build Concept)

- **G.1 | Study Area Corridor Widening – TWLTL**—With a positive B/C ratio of 2.50, this concept was determined to be a worthwhile investment that would best address the goals and objectives of the transportation study and provide the most effective solution to



corridor issues. The concept shows operational improvements over Concept G.2 for future 2045 operations. Based on 72% of 280 survey responses, the public preferred this corridor concept. Future project development phases could consider a reduced template, segmentation for construction, and complete streets options.

Table ES - 3. Potential Corridor-Wide Improvement Segments

Segments	County Line-Briar Hill Parkway	Briar Hill Parkway-Wooldridge Avenue	Wooldridge Avenue-KY 329
Mile Points	0.0-1.4	1.4-2.1	2.1-3.3
Length (mile)	1.5 ¹	0.7	1.2
Includes Concepts	A. Haunz Lane-East Orchard Grass Boulevard B. Lake Louisville Drive C. Briar Hill Parkway	D. KY 22/KY 362 (Central Avenue)	E. Wooldridge Avenue/Clore Lane F. Williamsgate Boulevard to KY 329 with Pedestrian Tunnel
Total Cost ²	\$14.3	\$4.6	\$15.7
B/C Ratio	1.49	1.51	3.5

¹Includes 0.1 mile into Jefferson County to account for Haunz Lane left-turn taper length and storage; ²Millions

Short-Term High Priority Spot Improvements

- **Concept E.2 | Clore Lane/Wooldridge Avenue Realign with Turn Lanes**—This intersection had the highest number of total crashes, more severe crashes, and the highest crash rate factor (1.58) of all intersections studied. In addition, the intersection was the top safety concern identified during both rounds of public engagement, and this improvement concept was preferred by the public (nearly 60%). The project team determined the concept would better address the intersection issues, particularly safety concerns. This concept had the highest B/C ratio of all spots at 28.24, and some local match funds are already available.
- **Concept A | Haunz Lane to East Orchard Grass Boulevard**—Haunz Lane was the second highest intersection of concern identified during both rounds of public engagement. This study segment had the second highest number of total crashes and Haunz Lane has the second highest volume of traffic for an intersecting street. The concepts B/C ratio was over 2, indicating it is a meaningful safety improvement for the area.
- **Concept C | Briar Hill Parkway**—This concept has a B/C ratio (over 2) similar to that of concept A, but the road experiences less traffic and has historically had fewer crashes than Haunz Lane. Nearly half of the crashes at this intersection were rear-end types. It has a high crash rate factor (1.39). Improving this intersection is a local priority due to the number of residences it serves and local amenities such as Briar Hill Park.



Short-Term Medium Priority Spot Improvements

- **Concept D | Central Ave/Oak Valley Drive – Realign**—This concept was determined to be a medium priority project. This intersection was identified as the public’s third highest priority during the second round of public engagement. It has a positive B/C ratio and addresses key intersection issues.
- **Concept F | Williamsgate Boulevard to KY 329 TWLWL & Pedestrian Tunnel**—This improvement was identified as a medium priority project. This concept ranked as the lowest public priority. The survey effort identified the preferred pedestrian improvements in the area to be a sidewalk connection from Williamsgate Boulevard to KY 329 and a pedestrian tunnel to Maples Park. The B/C ratio was nearly one.
 - Considering this concept without a pedestrian tunnel may make securing future competitive safety funds for a standalone pedestrian tunnel project challenging as there were no historical pedestrian crashes. The project team recommended including the pedestrian tunnel with this concept to provide a safe crossing for the residential area north of KY 22 to Maples Park to the south.
 - Instead of selecting an alignment (F.1 widen symmetrically versus F.2 widen to the north), it was decided future project development phases could further explore options. KYTC recommended including the higher estimate when seeking future funds.
- **Concept B | Lake Louisville Drive** —This concept was determined to be a medium priority project. This concept had the lowest B/C ratio, fewest total crashes of any of the study intersections, and the public ranked it in the bottom two.

Short-Term Medium Priority Maintenance-Type Activities

- Repair shoulders and add wider edge lines. This could also include improving the clear zone (cutting back rock outcrops and improving ditches and/or adding guardrail). The Safe Streets and Roads for All grant program could be a potential funding source.⁵ A project of this type might also be eligible for Highway Safety Improvement Program (HSIP) funding.
- Trim or remove vegetation on inside of curves and near intersecting roadways throughout the corridor. This could potentially be completed through coordination with KYTC maintenance division.

Additional Information

Written requests for additional information should be sent to:

Oldham County Planning & Zoning
Oldham County Fiscal Court
100 W. Jefferson Street
LaGrange, KY 40031
502.222.1476

or **KYTC District 5 Planning**
KYTC District 5
8310 Westport Road
Louisville, KY 40242
502.210.5400

⁵ https://www.kipda.org/wp-content/uploads/2022/08/August-25-2022_External-Grant-Opportunities.pdf

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1.0 INTRODUCTION

Oldham County Fiscal Court initiated a corridor study of KY 22 from the Jefferson/Oldham County line near Haunz Lane (MP 0.000) to KY 329 (MP 3.270) in Crestwood in late summer 2021. **Figure 1** shows the 3.27-mile corridor study area.

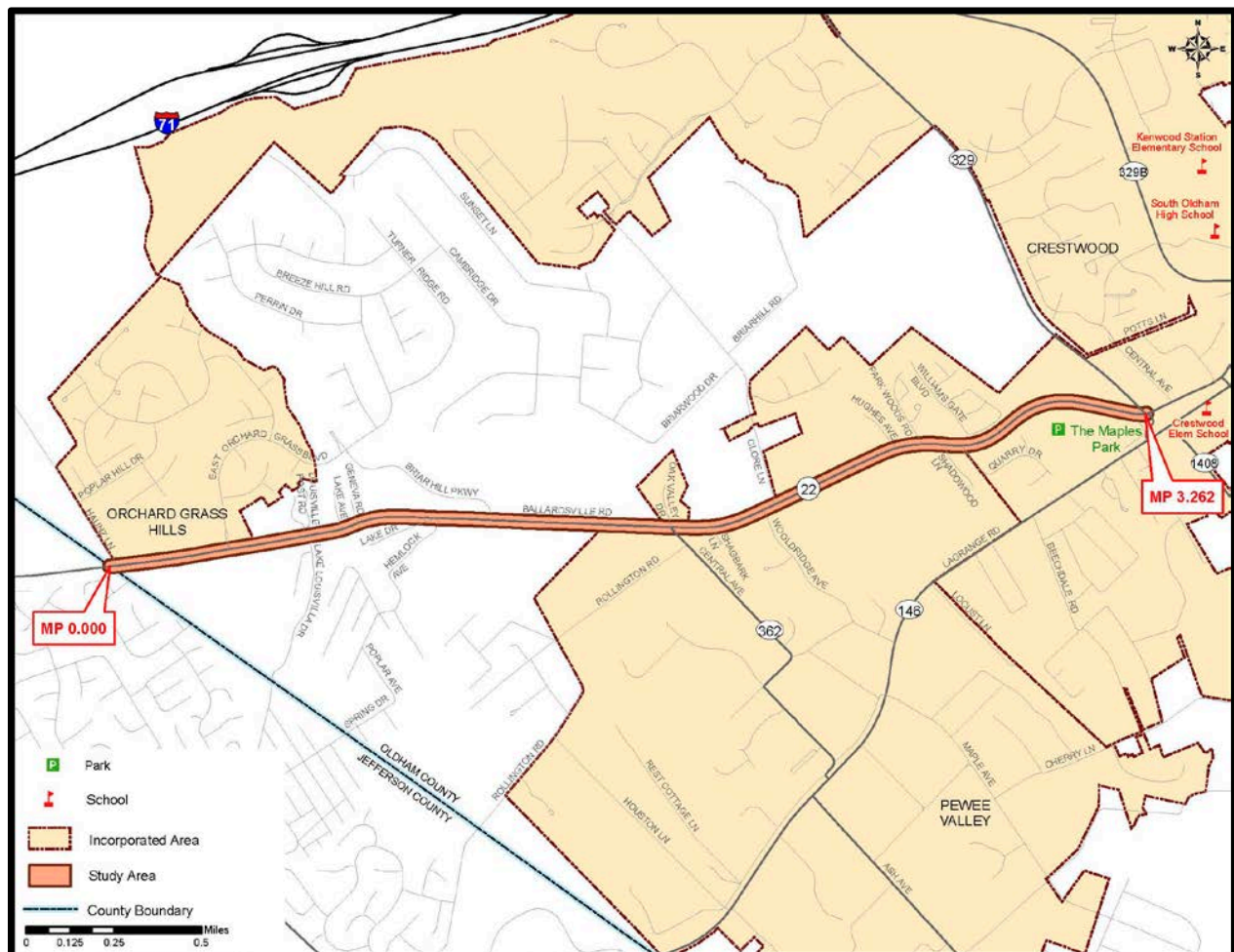


Figure 1: Study Area

Study tasks (**Figure 2**) included creating an inventory of existing conditions, defining goals for the study, analyzing existing and future traffic, identifying red flag environmental issues, developing build concepts with construction cost estimates, and documenting the study process and results. The following chapters detail these efforts. Improvement concepts include prioritized spot



improvement-type projects to quickly address issues identified, and corridor-wide improvements for future programming through KYTC's SHIFT⁶ process.

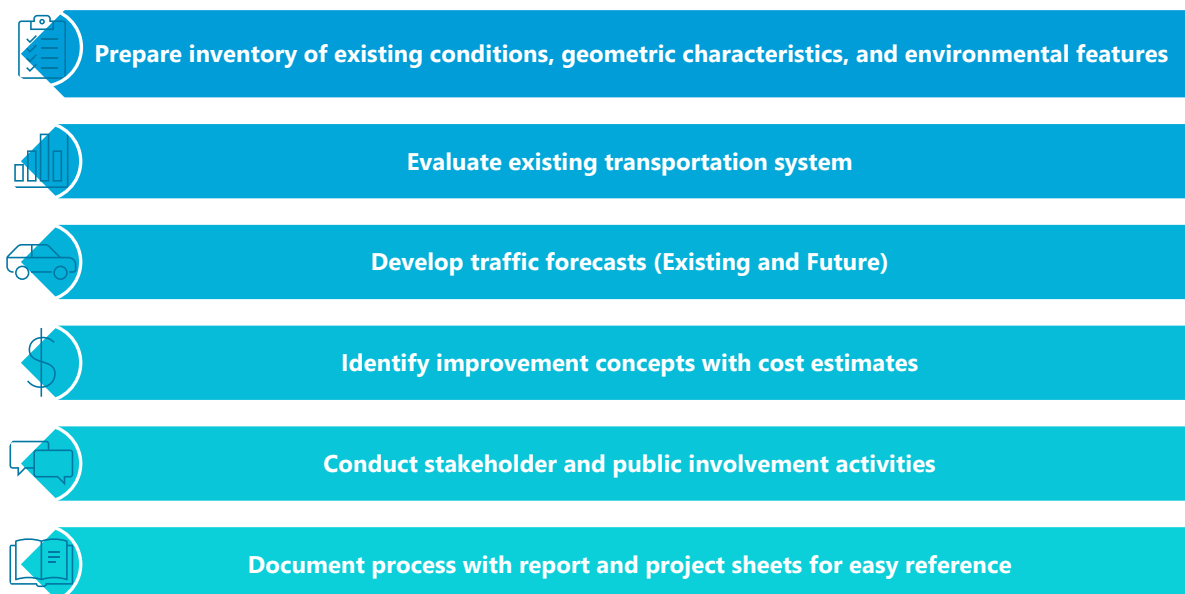


Figure 2. Study Tasks

The study was prepared for the Oldham County Fiscal Court (local agency) with Federal Highway Administration (FHWA) funding and Kentucky Transportation Cabinet (KYTC) oversight.

Oldham County is within the Kentuckiana Regional Planning and Development Agency (KIPDA) boundaries, which serves as the Area Development District (ADD) and Metropolitan Planning Organization (MPO).

1.1 Project History

A planning study was previously completed along KY 22 from Herr Lane in Jefferson County to KY 329B in Oldham County.⁷ This study serves as an update to the 2005 analysis for Oldham County from the county line to KY 329 in Crestwood. Since more than 15 years have passed, this analysis will review current conditions and 20-year projections to recommend improvement concepts.

⁶ SHIFT, or the Strategic Highway Investment Formula for Tomorrow, is a data-driven project scoring process to compare and prioritize capital improvement projects to make better use of the limited transportation funds in the biennial budget.

⁷ <https://transportation.ky.gov/Planning/Pages/Project-Details.aspx?Project=KY%20-%202022%20Scoping%20Studyv>



1.2 Previous Studies Identified and Committed Projects

Previous studies and proposed projects located within the study area vicinity were compiled from recent planning studies, Kentucky's *FY 2022–FY 2028 Highway Plan*⁸, the Continuous Highway Analysis Framework (CHAF)⁹ database, KIPDA's Metropolitan Transportation Plan¹⁰ (MTP) and Transportation Improvement Program¹¹ (TIP), and studies listed in local transportation plans or recent planning studies.

Completed Planning Studies

Five planning studies have been completed in the study area, chronologically:

- **2005 | 5-371 KY 22 Scoping Study**¹² This Planning Study analyzed KY 22 from Herr Lane in Jefferson County to KY 329B in Oldham County, considering existing conditions and future projections to recommend short-, mid-, and long-term improvements. This 9.3-mile corridor was divided into three study sections: Herr Lane to Hurstbourne Lane, KY 1694 to Haunz Lane, and Haunz Lane to KY 329B. The Haunz Lane to KY 329B segment overlaps the current study limits. Because more than 15 years have passed since that original study, this current study includes an updated inventory of existing conditions and future projections to determine if previously recommended improvements are still warranted and to identify potential new improvements that take into account the area's ongoing development. The 2005 study recommended the following improvements along the KY 22 corridor:
 - **Maintenance Improvements:**
 - Trim or remove vegetation on inside of curves throughout the corridor.
 - Lower the speed limits from 55 mph in Oldham County.
 - Add advance warning sign of school bus stop in Lake Louisville area.
 - Investigate potentially slick pavement condition at MP 2.4, west of Hughes Avenue.
 - **Short-term Improvements:**
 - At Old KY 329 add signal and implement access management.

⁸ <https://transportation.ky.gov/Program-Management/Pages/2022-Enacted-Highway-Plan.aspx>

⁹ CHAF is an application that collects, tracks, and analyzes identified transportation needs. It provides a means to sponsor, score, and rank projects as part of the Strategic Investment Formula for Tomorrow (SHIFT).

¹⁰ <https://www.kipda.org/transportation/core-products/metropolitan-transportation-plan/>

¹¹ <https://www.kipda.org/transportation/core-products/transportation-improvement-program/>

¹² <https://transportation.ky.gov/Planning/Pages/Project-Details.aspx?Project=KY%20-%202022%20Scoping%20Study>



- Add a northbound right-turn lane at KY 362 (Central Avenue) and add a westbound left-turn lane and eastbound right-turn lane at Oak Valley.
- Add an eastbound left-turn lane onto Clore Lane and add a westbound left-turn lane onto Wooldridge Avenue and include a signal. Also, add a left-turn lane on Clore Lane and realign Wooldridge Avenue and add a left-turn lane on Wooldridge Avenue.
- **Mid-term Improvements**
 - (Jefferson and Oldham) Construct a three-lane section just west of Windy Willow Drive and ending at East Orchard Grass Boulevard. Include an eastbound left-turn lane, a westbound right-turn lane and consider signalizing intersection at Windy Willow. Add a westbound right-turn lane and increase southbound right turning radius at Haunz Lane and consider signalizing intersection.
 - Construct a three-lane section between KY 329 and KY 329B in Crestwood and implement access management.
 - Construct a three-lane section in the Lake Louisville area to straighten horizontal curves, improve vertical curves, improve drainage, and fix sight distance obstructions between East Orchard Grass Boulevard and Briar Hill Parkway.
- **Ultimate Rebuild**
 - Widen to three lanes (1 lane per direction plus TWLTL) including turning lanes, curb and gutter, bike lanes, and sidewalks.
- **2006 | Oldham County Intersection Improvement Study¹³** This study analyzed potential improvements at four intersections within Oldham County: KY 146 and Cedar Point Road (KY 1817), KY 329 Bypass and Arbor Ridge; KY 22 and KY 329 Bypass, and KY 22 and Clore Lane/Wooldridge Avenue (which overlaps this study effort). The 2006 report considered improving intersections through signalization or construction of modern roundabouts. Renderings from the 2006 study for the Clore Lane/ Wooldridge Avenue offset intersection are provided in **Figure 3**.

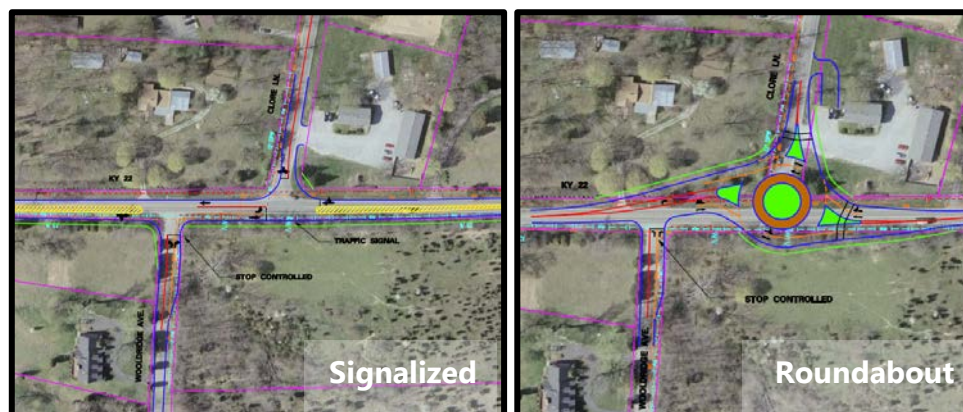


Figure 3. 2006 Clore Lane/Wooldridge Avenue Intersection Improvement



- **2010 | Oldham County Road Classifications & Proposed Future Roads¹⁴** In 2010, Oldham County evaluated areas where future connector roads may be required to alleviate traffic demand on arterials or collectors. A new collector route to link Clore Lane to Spring Hill Trace to support residential development and system connectivity was an identified need, and it has since been constructed. Another recommendation was a new I-71 interchange with connections to US 42/KY 22.
- **2019 | Middletown to Simpsonville Needs Analysis Study¹⁵** This study examined safety and congestion needs for portions of Jefferson, Oldham, and Shelby counties. A portion of the study area overlapped the current study effort at KY 362 (Central Avenue). Among other projects in the region, the 2019 study prioritized the 2005 KY 22 concept for improving safety at Central Avenue that would add a northbound right-turn lane on KY 362 (Central Avenue) and a westbound left-turn lane and eastbound right-turn lane on KY 22.
- **2022 | Crestwood Railroad Crossing Study¹⁶** Responding to a 2020 Resolution from CSX railroad, KYTC initiated this planning study to examine a recurring mobility challenge in Oldham County. This study identified potential solutions to reduce the number of heavy trucks using this railroad crossing, including:
 - Construction-Based Solutions
 - Truck Escape Route
 - One-way KY 329 Crossing
 - Close KY 329 Crossing
 - Lower Cost Solutions
 - Redesignate KY 329 Routing
 - Truck Chime or Low-Clearance Warning
 - Legislative Truck Prohibition
 - U-Turn off KY 329 Railroad Avenue
 - Redesignate KY 329 Routing

Next steps of this 2022 study include KYTC coordination with CSX, city/county officials, and other stakeholders regarding the study findings. Locally, there is interest in pursuing intersection improvements to streamline operations along KY 22/KY 146 independent of the railroad crossing.

¹⁴ <https://www.oldhamcountky.gov/sites/default/files/pdf/Phase%20I%20Report%20-%20Revised%20April%202010.pdf>

¹⁵ <https://transportation.ky.gov/Planning/Pages/Project-Details.aspx?Project=Middletown%20to%20Simpsonville%20Needs%20Analysis%20Study>

¹⁶ <https://transportation.ky.gov/Planning/Pages/Project-Details.aspx?Project=Downtown%20Crestwood%20Railroad%20Crossing%20Study>



Planned and Committed Projects

There are several committed projects and identified concepts for potential future projects in the vicinity of the study area. **Figure 4** shows the projects from KYTC's Highway Plan and the CHAF database, with **Table 1** listing the local and Highway Plan projects and

Table 2 listing the CHAF database projects.

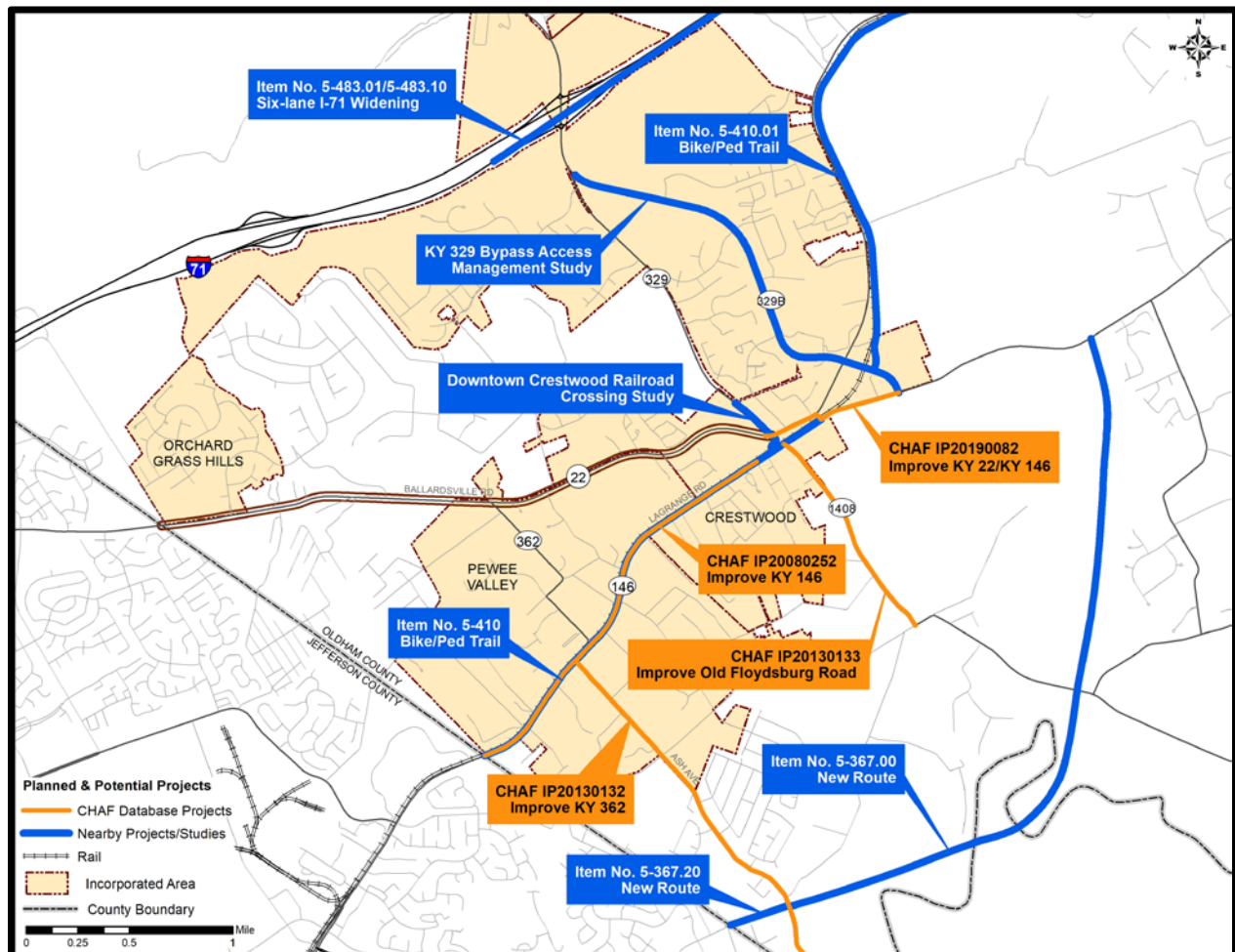


Figure 4. Planned Projects and Project Concepts



Table 1. Nearby Oldham County Projects

Item #	Route	BMP	EMP	Purpose	Estimate (\$Million)
N/A	KY 329B	0.000	2.062	KY 329 Bypass Access Management Study from KY 22 to I-71.	N/A
N/A	KY 329	8.600	8.935	Downtown Crestwood Railroad Crossing Study.	N/A
5-367.00	New	N/A	N/A	New route between the KY 362 (Ash Avenue) in Pewee Valley and KY 22 (Ballardsville Road)/KY 329B in Crestwood (5.518 mi).	\$47.33
5-367.20	New	N/A	N/A	Extension of Old Henry Road east to Ash Avenue (KY 362) (1.98 mi).	\$18.00
5-410	KY 146	0.000	2.361	Construct a non-motorized corridor from LaGrange to Jefferson County line along the Buckner Connector, the new 393 alignment to Wendell Moore Park, and/or along KY 146 at the new pedestrian bridge over I-71 (Inter-urban Greenway).	\$0.63
5-410.01	CR 1203	0.000	3.391	Oldham County bicycle and pedestrian trail - Section along Old LaGrange Road from North Camden Lane to KY 329B and to the intersection with KY 146 in Crestwood.	\$0.31
5-483.01	I-71	14.100	18.000	I-71 widening project from I-265 to KY 329 (<i>I-MOVE in Construction</i>).	\$66.47
5-483.10	I-71	14.100	18.000	I-71 widening project from KY 329 to KY 393.	\$32.95

Table 2. KYTC Oldham County CHAF Database Projects

CHAF	Route	BMP	EMP	Purpose	Estimate (\$Million)
IP20080252	KY 146	0.000	2.021	Reduce congestion, improve access, and provide better mobility for all modes along KY 146 from the Oldham/Jefferson County line to Pryor Avenue in Crestwood. Project design will consider reconstructing KY 146 as a 2-lane road (no additional lanes) from Jefferson/Oldham County line to Pryor Avenue in Oldham County with consideration for turn lanes at Ash Avenue, Houston Avenue, Maple Avenue and Central Avenue.	\$14.75
IP20130132	KY 362	0.975	3.039	Improve safety, access, and address geometric deficiencies along KY 362 from the Oldham/Shelby County line to KY 146. Includes consideration of a 3-lane widening with a two-way left-turn lane and bike/pedestrian accommodations.	\$10.39
IP20130133	KY 1408	2.036	3.132	Improve safety, access, and address geometric deficiencies along KY 1408 (Old Floydtsburg Road) from Old Floydtsburg Road to KY 146 (3-lane section).	\$5.30
IP20190082	KY 22	3.250	3.929	Reconstruct KY 22/KY 146 from Pryor Avenue to KY 329B – 3-lane section with center turn lane.	\$16.50



2.0 EXISTING CONDITIONS

Existing transportation conditions of the corridor are described in the following sections. Information on the characteristics of the roadway geometry, functional classification, bridges, traffic volumes and operations, and crash history were obtained from KYTC's Highway Information System (HIS) database, KYTC's Transportation Enterprise Database (TED), bridge inspection reports, National Bridge Inventory forms, traffic counts, and field reviews.

2.1 Roadway System Designations

Roadway system designations indicate the purpose of the road to connect people and places. It is used to determine appropriate funding sources and design parameters based on its intended use.

Functional Classification is the process of grouping streets and highways according to the character of travel service and access to adjacent land use they provide. This classification system recognizes that travel involves movement through a hierarchical system of facilities that progress from lower classifications handling short, locally oriented trips to higher classifications serving longer distance travel at higher mobility levels. A roadway's classification is further designated as urban or rural based upon whether it is located within on the FHWA Adjusted Urban Area boundaries. The major functional classes with brief definitions are listed in **Figure 5**.

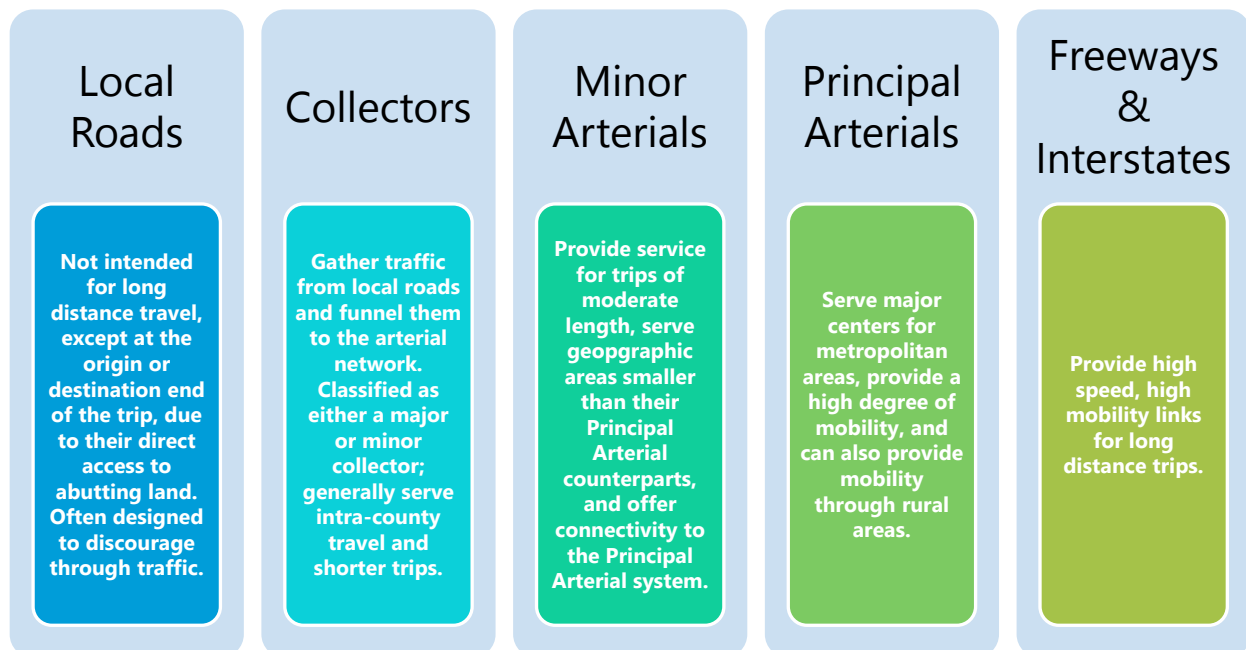


Figure 5. Functional Classification Definitions



Additionally, functional classification is used as a tool for transportation agencies and designers. A roadway's functional class suggests expectations about roadway design; specifically, vehicle speed, capacity, and the roadway's relationship to land use development. Federal legislation uses functional classification in determining eligibility under the Federal-aid program. Transportation agencies typically describe roadway system performance, benchmarks, and goals by functional classification.

Functional Class

KY 22 is classified as an Urban Minor Arterial. From west to east, the functional class of its major intersecting roads include, Haunz Lane—an Urban Minor Collector, KY 362 (Central Avenue)—an Urban Major Collector, and KY 329—an Urban Minor Collector as shown in **Figure 6**.

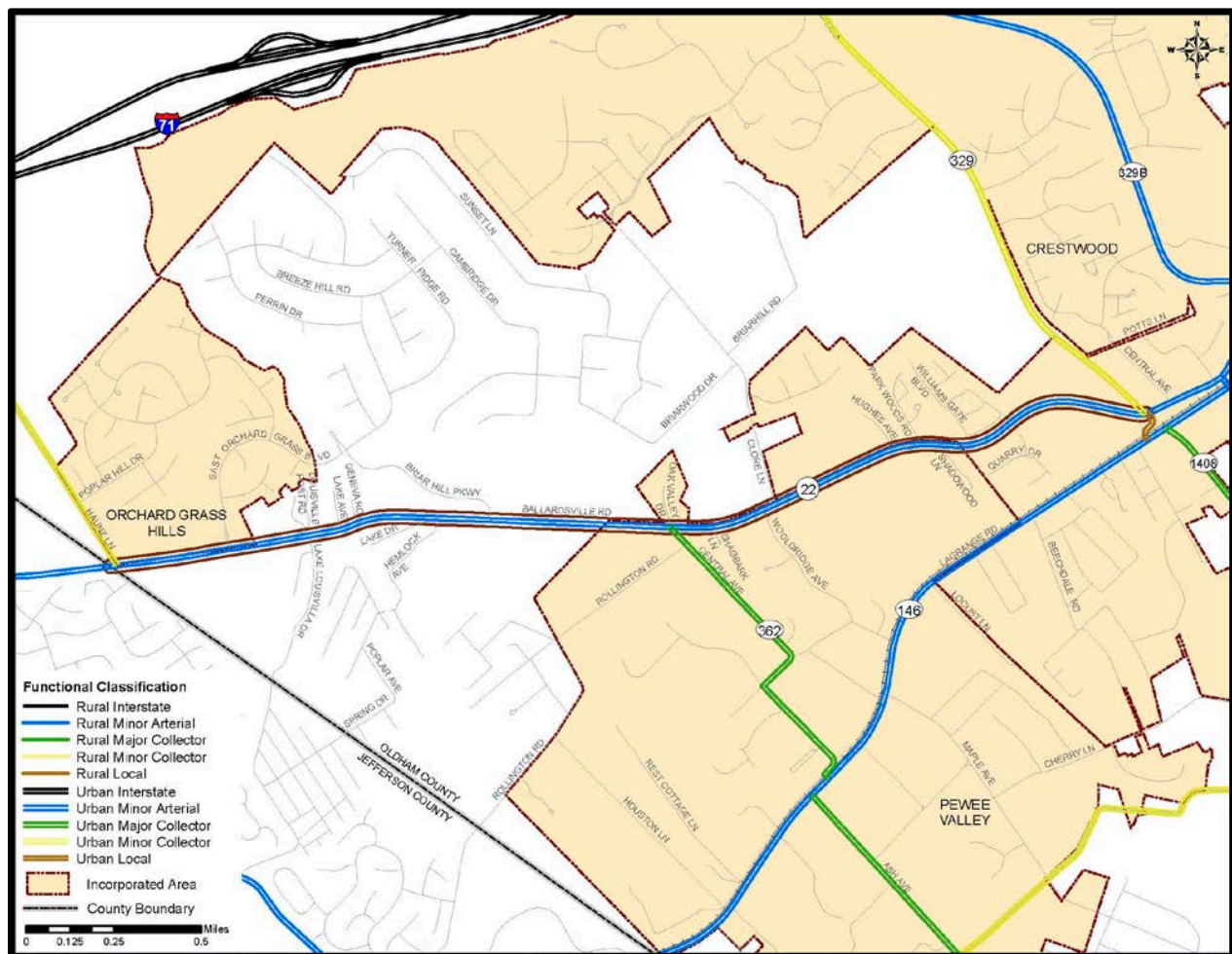


Figure 6. Nearby Routes Functional Classification



Truck Route

In compliance with the Surface Transportation Assistance Act of 1982 (STAA), Kentucky established a network of highways on which commercial vehicles with increased dimensions may operate. These “STAA” vehicles include semi-trailers with 53-foot-long trailers and single-unit trucks with a total length of 45 feet.

KY 22 is listed in Kentucky’s Highway Freight Network in Tier 3, meaning it is a statewide, regionally significant route. It is not a National Truck Route. The truck weight limit is AAA or 40-ton gross vehicle weight.

Highway Systems

The National Highway System (NHS) includes roadways important to the nation’s economy, defense, and mobility. KY 22 is not on the National Highway System. The Kentucky State Highway System classifies state-maintained roadways by the type of service and function they provide. KY 22 is in the State Secondary System. It is considered a regionally significant route of shorter distance, which provides mobility and access to land use activity in Oldham County.

2.2 Roadway Geometric Characteristics

KYTC’s HIS database was queried to obtain route geometric characteristics, including posted speed limits, number of lanes and lane widths, shoulder type and width, median type and width, horizontal curve data, vertical grade information, existing bridge details, and current bicycle and pedestrian facilities. A summary of these findings is provided below, with **Figure 7** showing how the horizontal curve data, vertical grade information, shoulder width, median width, and lane width line up along the corridor.

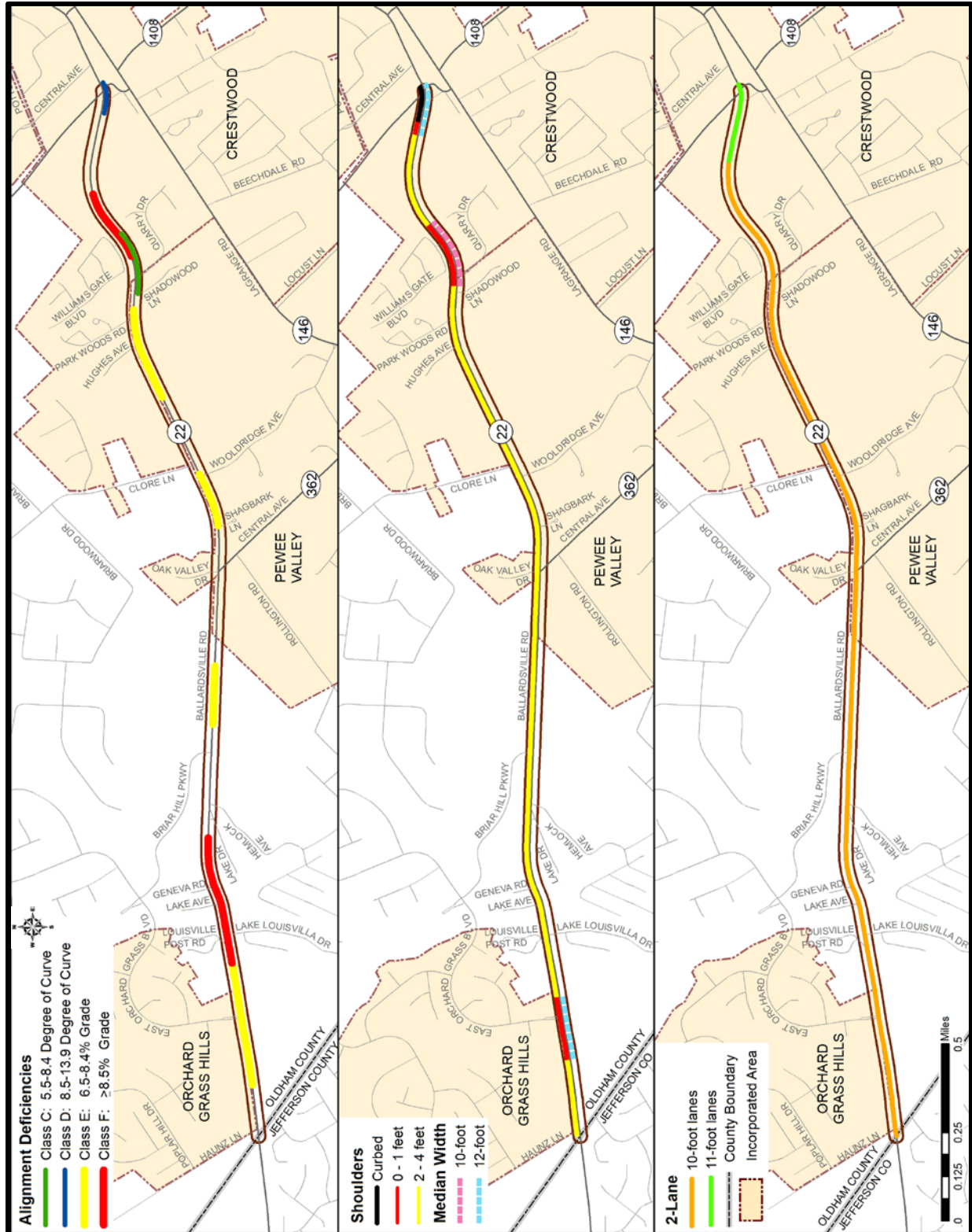


Figure 7. Comparison of Grades, Curves, Shoulders, Medians, and Lanes



Number of Lanes and Widths

HIS and **Figure 7** show existing lanes as mostly 10-foot-wide, widening to 11 feet at MP 3.05 approaching KY 329 in Crestwood. KYTC's *2020 Highway Design Manual* (HDM)¹⁷ recommends 11- to 12-foot-wide lanes for Urban Minor Arterial highways, for segments less than 45 mph and greater than 45 mph, respectively.

Median Types and Widths

HIS shows KY 22 as mostly a two-lane undivided highway, intermittently becoming divided by a flush median at the following locations:

- Near Orchard Grass Boulevard, MP 0.247–MP 0.451
- Between Quarry Drive/Williams Gate Boulevard, MP 2.677–MP 2.874
- Approaching KY 329, MP 3.133–MP 3.403

Approximately 21% of this 3.27-mile corridor is divided as shown in **Figure 7**.

Shoulder Types and Widths

According to the HIS database most of the shoulders are asphalt combination with approximately 1-foot-wide paved and 3 feet total width. About 14% of KY 22 through the study area has no shoulders or curbs, and less than 2% through the study area is curbed. Shoulder widths and types are shown in **Figure 7**. Curbed shoulders exist near the KY 329 intersection. Representative views of shoulder types are shown in **Figure 8**. Much of the corridor has edge-line rumble strips.



Figure 8. Representative Views of Shoulder Widths

¹⁷ <https://transportation.ky.gov/Organizational-Resources/Policy%20Manuals%20Library/Highway%20Design.pdf>



Speed Limits

The posted speed limit varies from 35 to 55 mph, with most of the corridor either 45 mph (44%) or 55 mph (55%). The KY 22 speed limit along the study corridor is 45 mph crossing the Jefferson/Oldham County line, immediately increases to 55 mph at Haunz Lane, then decreases to 45 mph between Briar Hill Parkway and KY 362 (Central Avenue), and then further decreases to 35 mph past Williamsgate Boulevard, approaching Crestwood.

Horizontal Curves and Vertical Grades

HIS data were reviewed to identify substandard grades or curves along KY 22 in the study area. Data was compared to HDM design recommendations for maximum vertical grades and minimum horizontal curves.

At a planning level, KYTC organizes horizontal curves into six classes, graded A (most sweeping) through F (sharpest). Similarly, vertical grades are organized into six classes, graded A (flattest) through F (steepest). Both curve and grade classes are presented in **Table 3**.

Table 3. Curve and Grade Class Descriptions

Horizontal Curve Class		Vertical Grade Class	
Code	Description (degrees)	Code	Description (percent)
A	0.0-3.4	A	0.0-0.4
B	3.5-5.4	B	0.5-2.4
C	5.5-8.4	C	2.5-4.4
D	8.5-13.9	D	4.5-6.4
E	14.0-27.9	E	6.5-8.4
F	28+	F	8.5+

HDM exhibit 700-04 recommends maximum vertical grades for rolling, Urban Minor Arterial highways by speed limit with 6% for 55 mph (grade class D), 7% for 45 mph (grade class E), and 8% for 35 mph (grade class E). A review of Highway Capacity Software (HCS) data identified no grade class D vertical curves in the 55-mph speed zone.

Minimum horizontal curve radii are determined considering various parameters in accordance with Chapter 3 of AASHTO's "A Policy on Geometric Design of Highways and Streets," current edition. Converting these radii to degree of curves reveals curve class C or worse for 45 and 55 mph and curve class D or worse for 35 mph are considered deficient.



Figure 7 shows locations with curve class C or worse and grade class E or worse. A summary of deficient curves and grades is provided in **Table 4**.

Table 4. Summary of Deficient Curves and Grades

Horizontal Curve Class					Vertical Grade Class				
Curve Class	BMP	EMP	Length	Speed Limit	Grade Class	BMP	EMP	Length	Speed Limit
C	2.656	2.830	0.174	45 mph	E	0.165	0.561	0.396	55 mph
D	3.199	3.282	0.083	35 mph	F	0.561	0.971	0.410	55 mph
					E	1.353	1.533	0.180	55-45 mph
					E	1.954	2.109	0.155	45 mph
					E	2.350	2.611	0.261	45 mph
					F	2.762	2.966	0.204	45-35 mph

Bridges

There are no bridges in the study area. All stream crossings are via culvert.

Bicycle and Pedestrian Accommodations

According to HIS data, existing bicycle and pedestrian accommodations along KY 22 are limited. There is a 5-foot-wide concrete sidewalk starting at MP 3.256 on the north side of KY 22 approaching Crestwood, as pictured in **Figure 9**.

Publicly available Strava¹⁸ heat maps were reviewed (**Figure 10**) to identify the existing pedestrian and bicycle demand. Consistent with the facility type and lack of bicycle pedestrian accommodations, bicycle and pedestrian usage on KY 22 was infrequent, with slightly more bicyclists than pedestrians using the route. There were higher concentrations of usage in the adjacent neighborhoods.



Figure 9. Existing Sidewalk

¹⁸ <https://www.strava.com/heatmap#11.37/-85.51570/38.31861/hot/all>

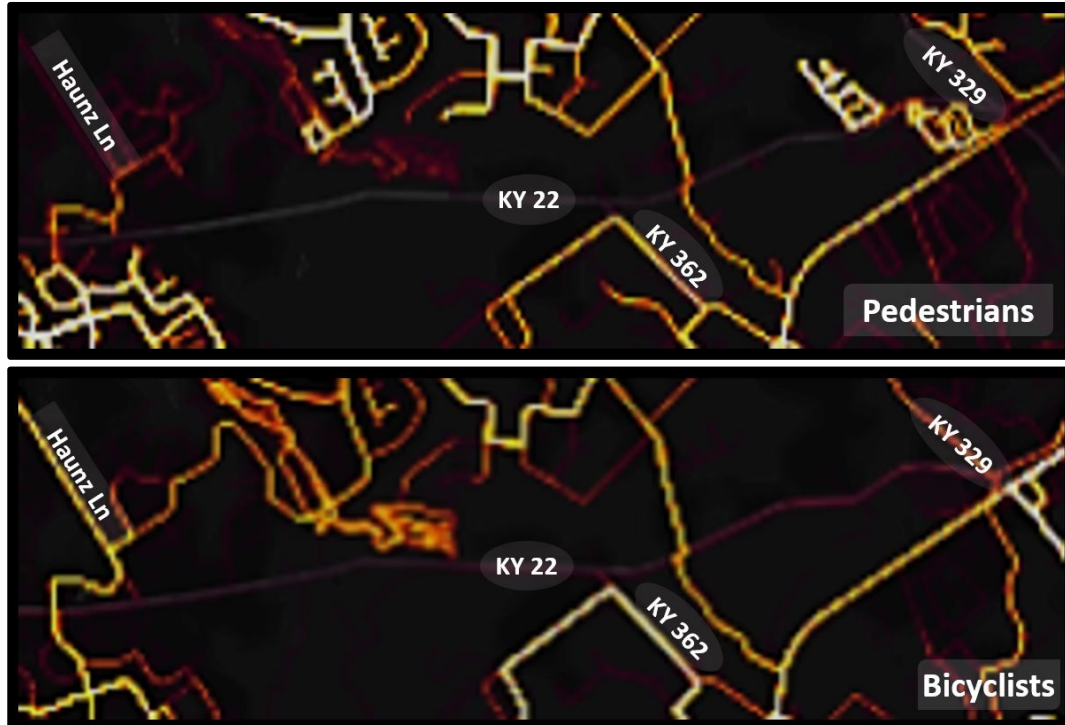


Figure 10. Pedestrian and Bicycle Activity

The Oldham County Parks and Recreation Department completed the *Oldham County Park and Recreation Master Plan* in 2008¹⁹. Linking parks, schools, neighborhoods, and commercial areas throughout the county is one of the main goals of this masterplan. It recommended considering a paved shared use path along KY 22.

2.3 2021 Traffic Volumes and Operations

Available existing study area roadway traffic volumes were reviewed, including truck percentages, K factors,²⁰ and peak-hour direction distribution. Additionally, 12-hour turning movement counts were collected at eight intersections during fall 2021:

- Haunz Lane
- East Orchard Grass Boulevard
- Lake Louisvilla Drive
- Briar Hill Parkway
- KY 362 (Central Ave)/Oak Valley Drive
- Wooldridge Avenue
- Clore Lane
- KY 329

The counts classified vehicles into one of five categories: motorcycles, cars, buses, single unit trucks, and articulated trucks. The KY 22/KY 329 intersection in Crestwood is the only signalized

¹⁹ https://www.oldhamcountyky.gov/sites/default/files/pdf/Oldham%20County%20P%26R%20MP_0.pdf

²⁰ K-factor is defined as the proportion of annual average daily traffic occurring in the design hour.



intersection along the study corridor; all others are stop-controlled on the minor approaches. Additional traffic details are available in *The Traffic Forecast Report* in **Appendix A**.

Traffic Volumes

Existing year (2021) traffic volumes were calculated based on appropriate historical trends. Pre-2020 traffic counts were increasing by nearly 2% per year over the last 20 years, consistent with the steady development of Oldham County. However, the most recent KYTC count in 2020 indicated a decline in traffic, which was assumed to likely be an impact of travel restrictions imposed by the Covid pandemic. Thus, historical trends (omitting the 2020 count) were applied to estimate the 2021 volumes at 9,000–11,000 vpd, with nearly 8% trucks using the corridor.

Fall 2021 intersection turning movement counts were factored up to 24-hour (average daily traffic) estimates, which indicate 13,000–15,000 vpd use the route today, with 7.5% representing trucks. Directional flows show slightly more traffic is traveling westbound (to Louisville) in the morning commute and then eastbound (to Crestwood) in the evening commute.

Travel Time Data

The study corridor was driven during the peak periods in October 2021 to capture representative travel times via GPS technology. These GPS-based runs highlight the periodic slowdowns at cross-streets and driveways. **Figure 11** compares the collected travel speeds to the posted speed limits, showing travel speeds are typically lower than the posted speed limits, with much lower speeds approaching study intersections though KY 22 movements are not stop-controlled. The AM peak period experiences more slowdowns than the PM peak. It is uncommon to reach the posted speed limits during the peak periods.

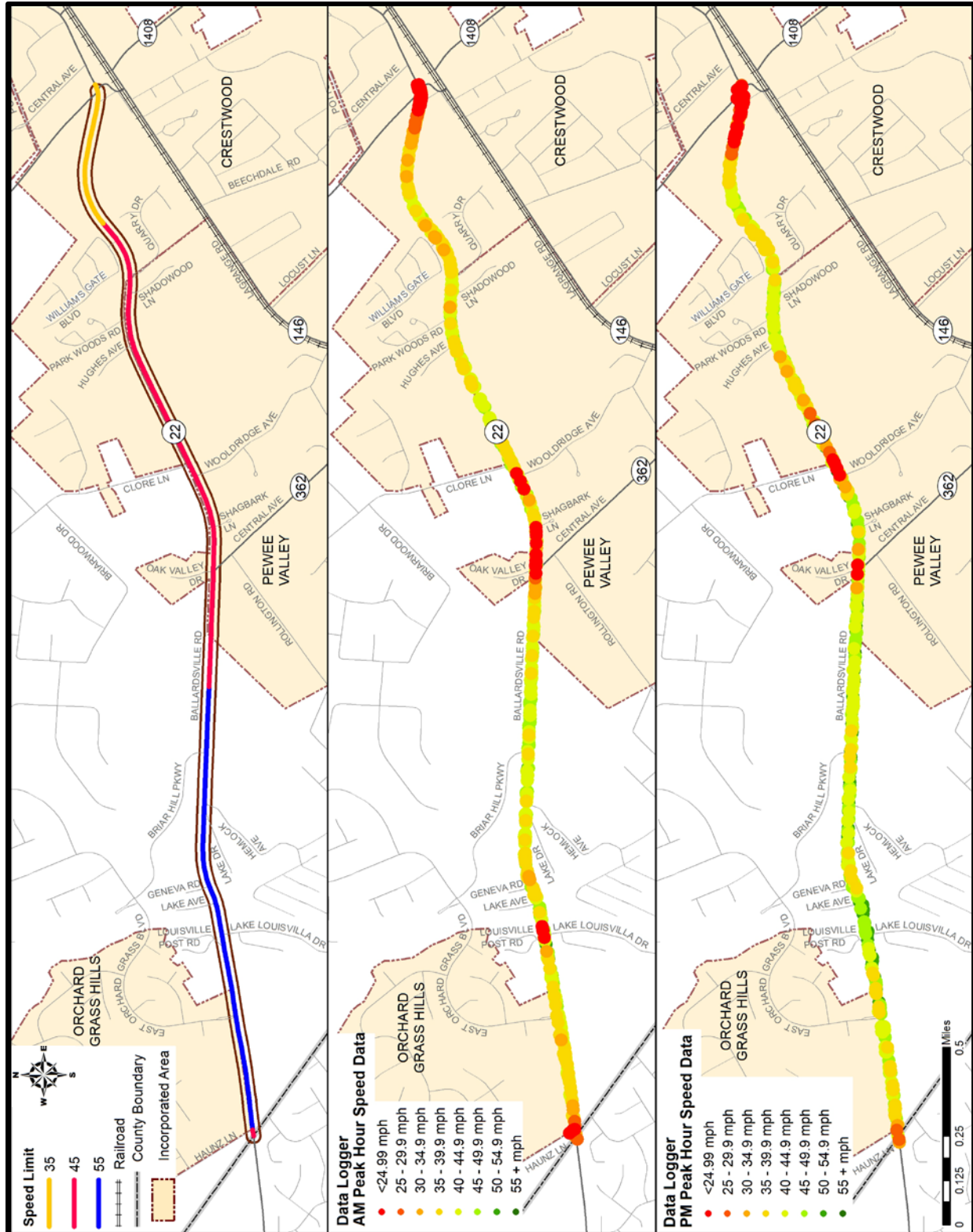


Figure 11: GPS-based Travel Time Data Collected October 2021 Compared to Posted Speed



Traffic Operations

Two commonly applied highway performance indicators, level of service (LOS) and volume-to-capacity (v/c) ratios, were calculated to describe the quality of performance of the corridor. Computations were performed in accordance with *Highway Capacity Manual* (HCM) 6th edition procedures for study segments and intersections.

- Level of Service** LOS is a qualitative measure that describes traffic conditions based on measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort, and convenience. LOS typically represents a driver's perspective of traffic conditions based on perceived congestion. As illustrated in **Figure 12**, LOS A is associated with free flow conditions, high freedom to maneuver, and little or no delay. Conditions at or near capacity typically are associated with LOS E. LOS F represents oversaturated traffic conditions beyond capacity, with low travel speeds, little or no freedom to maneuver, and lengthy delays. LOS D is generally acceptable in urban areas.

Existing LOS was determined for the highest traffic hour based on design hourly volume (DHV) calculations, applying K- and d-factors (i.e., hourly and directional adjustments) to ADT counts to approximate. Results show segments operate at LOS C through E during peak periods. The westbound AM peak flow operates the worst as LOS E for all segments. Stop-controlled cross-streets at study intersections operate

LEVEL OF SERVICE	SEGMENT	
A	- Average Travel Speed. - Free traffic flow with few restrictions on maneuverability or speed. NO DELAYS	
B	- Stable traffic flow. - Speed becoming slightly restricted. - Low restriction on maneuverability. NO DELAYS	
C	Stable traffic flow, but less freedom to select speed, change lanes, or pass. MINIMAL DELAYS	
D	- Traffic flow becoming unstable. - Speeds subject to sudden change. - Passing is difficult. MODERATE DELAYS	
E	- Unstable traffic flow. - Speeds change quickly and maneuverability is low. MAJOR DELAYS	
F	- Heavily congested traffic. - Demand exceeds capacity and speeds vary greatly. MAJOR DELAYS	

LEVEL OF SERVICE	INTERSECTION	
A	Highly stable, free-flow condition with little or no congestion. Signalized Delay: <10 seconds/vehicle Unsignalized Delay: <10 seconds/vehicle	
B	Stable, free-flow condition with little congestion. Signalized Delay: 10 to 20 seconds/vehicle Unsignalized Delay: 10 to 15 seconds/vehicle	
C	Free-flow condition with moderate congestion. Signalized Delay: 20 to 35 seconds/vehicle Unsignalized Delay: 15 to 25 seconds/vehicle	
D	Approaching unstable condition with increasing congestion. Signalized Delay: 35 to 55 seconds/vehicle Unsignalized Delay: 25 to 35 seconds/vehicle	
E	Unstable, congested condition. Signalized Delay: 55 to 80 seconds/vehicle Unsignalized Delay: 35 to 50 seconds/vehicle	
F	Stop and go. Signalized Delay: >80 seconds/vehicle Unsignalized Delay: >50 seconds/vehicle	

Figure 12. Segment and Intersection Level of Service Descriptions



at LOS C through F during peak hours, with most (5/8) operating at LOS F during at least one peak period. Field reviews and public input (**Section 4.3**) suggest driver comfort may be impacted by narrow lanes, driveways/number of entrances, and driver speed.

- **Volume-to-Capacity** Another measure, the volume to-to-capacity ratio (v/c), compares traffic volume using a facility to its theoretical capacity over a specific duration, one hour in this instance. A v/c ratio greater than 1.0 indicates a route has exceeded its theoretical capacity and additional lanes may be justified. As v/c is measured over an hour period by segment, a roadway or intersection could be congested during peak commuter periods but show a relatively low v/c averaged over a longer duration.

The v/c for each segment is 0.26 to 0.72, suggesting adequate capacity exists. At intersections, v/c is measured by approach. **Table 5** summarizes the LOS and v/c ratios for the worst operating approach(es) at the study intersections. The v/c ratios vary from 0.1 to 2.47 for the worst operating approach at study intersections. Six of the eight intersections have a v/c ratio approaching (>0.9) or exceeding 1.0 in at least one of the peak periods, suggesting that movement is approaching or has exceeded its capacity.

Table 5. Worst Operating Intersection Movements

Intersection	Movement	LOS	v/c	Movement	LOS	v/c
	AM Peak			PM Peak		
Haunz Lane	Left turn from Haunz	F	0.96	Left turn from Haunz	F	1.34
East Orchard Grass Boulevard	NB East Orchard Grass	F	0.46	NB East Orchard Grass	F	0.44
	SB East Orchard Grass	F	1.22	SB East Orchard Grass	F	1.52
Lake Louisville Drive	NB Lake Louisville	C	0.10	NB Lake Louisville	C	0.15
Briar Hill Parkway	SB Briar Hill	F	0.99	SB Briar Hill	E	0.51
KY 362 (Central Avenue)	NB KY 362	F	2.47	NB KY 362	F	1.04
	SB KY 362	F	0.71	SB KY 362	F	0.33
Wooldridge Avenue	NB Wooldridge	E	0.34	NB Wooldridge	C	0.22
Clore Lane	SB Clore	F	1.30	SB Clore	D	0.58
KY 329	KY 22 WB Thru	F	1.02	KY 22 EB Thru	D*	0.83

**Note: These movements also operate at LOS D with better v/c ratios; KY 329 NB thru. KY 329 NB right, KY 329 SB thru, and KY 329 SB right.*



2.4 Crash History

Historical crash data retrieved from KYTC's TED warehouse were evaluated for study area roadways for a four-year period (January 2017 through December 2020). Crash location, severity, and manner of collision are shown in **Figure 15**. During this timeframe, 179 crashes occurred along the corridor. No bicycle or pedestrian crashes were reported. Corridor trends show 27% of all crashes occur on wet or icy pavement and 24% occur at night. The corridor is not illuminated at night throughout the study area, and some intersections have a light pole or two directly at the intersection. Only two commercial vehicle crashes were reported. Seventeen reports indicated deer involvement; however, the locations did not appear to be concentrated. A table of corresponding crash data is in **Appendix B**.

Severity

By severity, there were two fatal (indicated as red stars in **Figure 15**), 31 injury, and 146 property damage only crashes.

Fatalities were reviewed to identify potential trends; however, none were observed. They were not close in proximity, had different light conditions (one during the day and one overnight), and had differing manners of collisions (head-on and single vehicle). Both fatal crashes occurred on dry pavement and had human contributing factors (no seatbelt and drug involvement).

Per the standard "KABCO" classifications as shown in **Table 6**, injury crashes are further divided by severity: one was serious, 13 were minor, and 17 had possible injuries. Nearly 55% of injury crashes were rear-ends, followed by 22% single vehicle. About 32% of all injury crashes occurred on wet or icy pavement.

Table 6. Crash Severity Classification

K	Fatal
A	Severe Injury
B	Minor Injury
C	Possible Injury
O	No Injury Detected



Manners of Collisions

Manners of collisions are mapped in **Figure 15**. The percentage of each manner of collision is shown in **Figure 13**. Most crashes were rear-ends, followed by single vehicle and angle crashes.

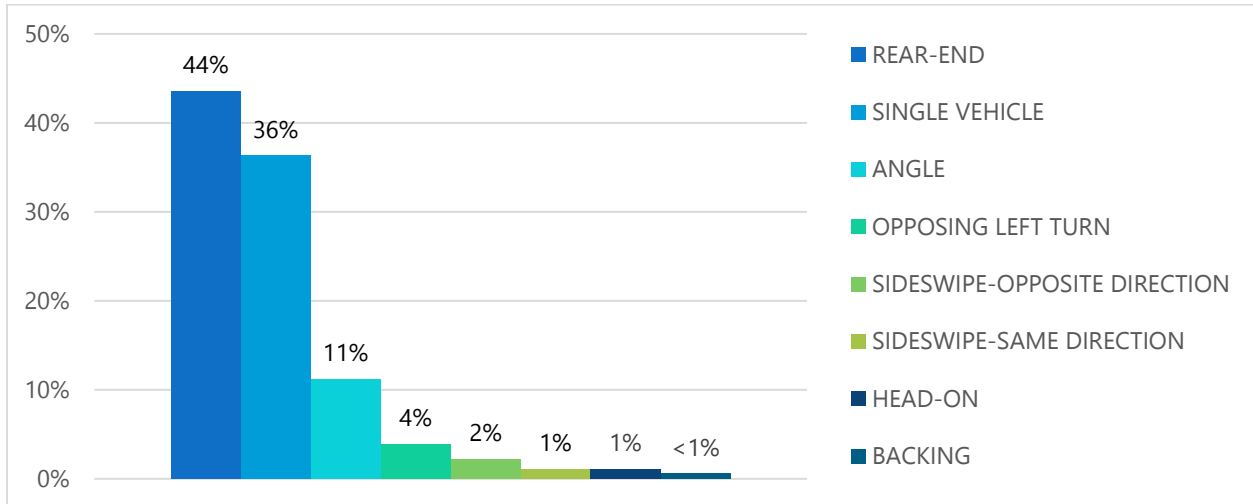


Figure 13. Crash Manner of Collision

The top two manners of collisions comprise 80% of crashes. Crash trends (**Figure 14**) show more (32%) rear-end crashes occurred on wet or icy pavement, and more single vehicle crashes (40%) occurred at night.

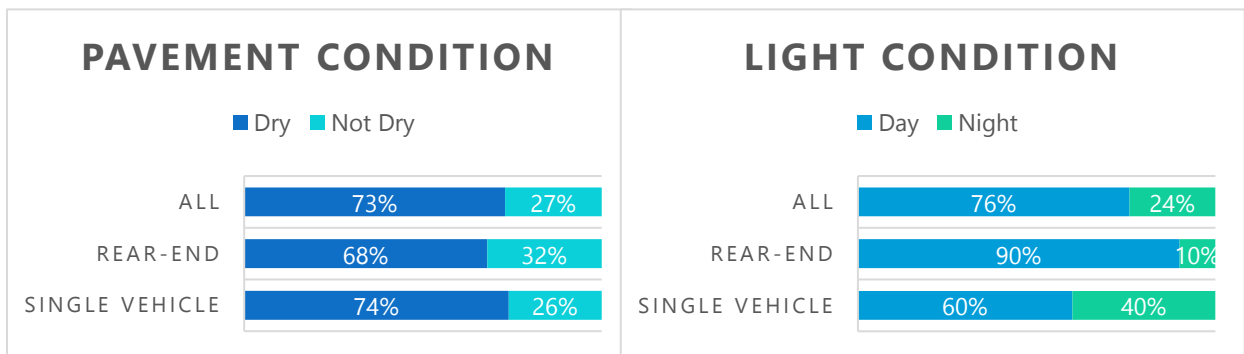


Figure 14. Conditions During Crashes

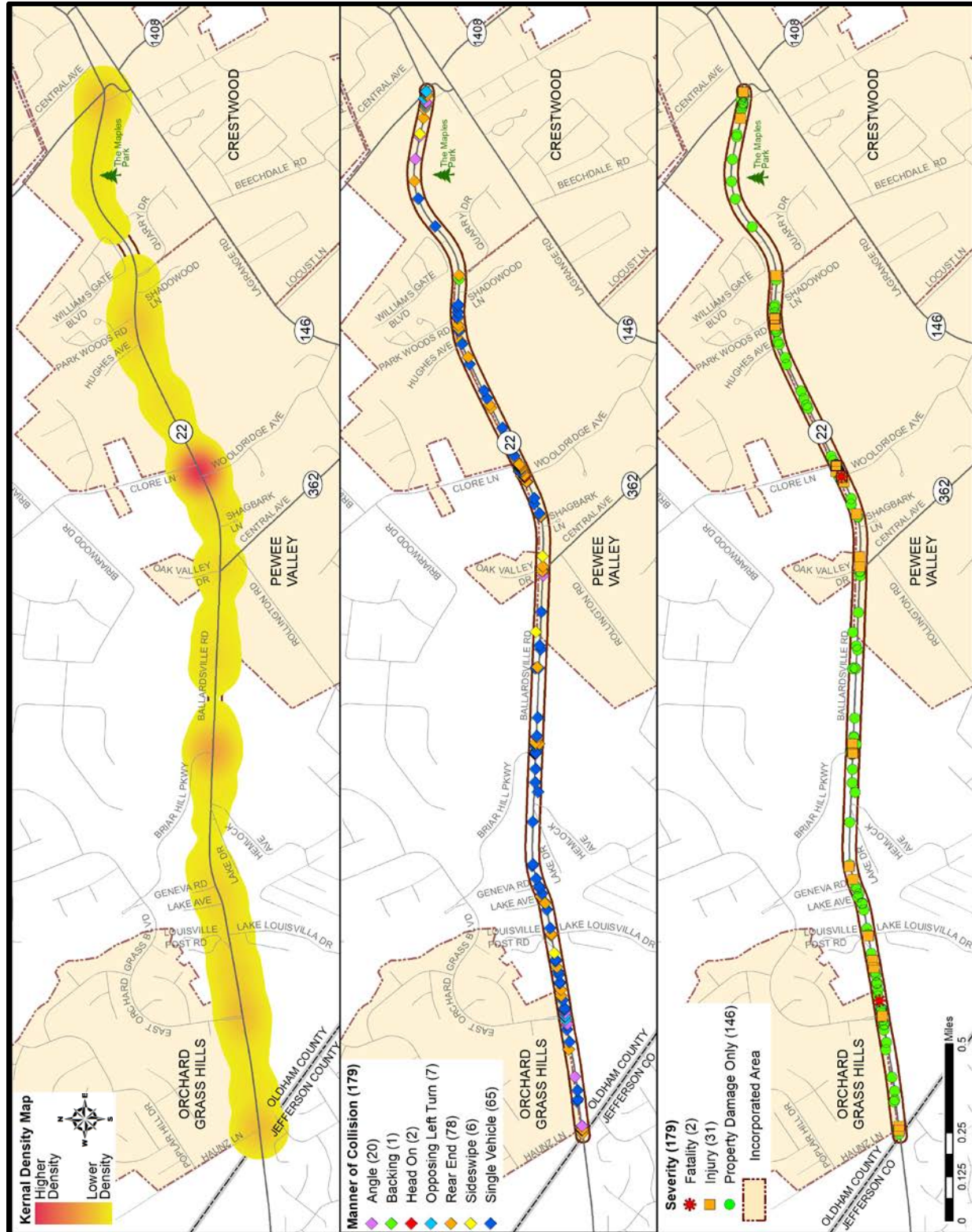


Figure 15: Crash Density, Severity, and Manner of Collision



Statistical Crash Analyses

Two types of statistical crash analyses were performed on study area routes based on methods comparing existing crash rates with crash rates of similar types of facilities throughout Kentucky: *Critical Crash Rate Factor (CCRF)* and *Level of Service of Safety (LOSS)*.

- **Critical Crash Rate Factor** Crashes were geospatially referenced and compared to statewide data to identify locations experiencing above-average crash rates. The Critical Crash Rate methodology used by KYTC is defined in the Kentucky Transportation Center (KTC) research report *Analysis of Traffic Crash Data in Kentucky (2014–2018)*.²¹ The report defines two analysis types performed on study routes: “segments” and “spots.”
 - Segments vary in length and are divided along roadways as geometry or traffic volumes change.
 - Spots are identified by analyzing 0.1-mile-long or 0.3-mile-long sections for concentrated crash areas.

Analysts used crash numbers, traffic volumes, roadway type, lane numbers, and segment length to determine the CCRF for each roadway segment and spot. CCRF is one measure of roadway safety, expressed as a ratio of the crash rate at a given location compared to statewide crash rates for similar roadways. A CCRF greater than 1.0 indicates crashes may be occurring more often than can be attributed to random occurrence. This procedure is a screening technique identifying locations where further analysis may be needed; it is neither a definitive statement nor measurement of a crash problem.

There are no high crash segments. Two high crash spots were identified, with an additional spot approaching 1.0 (CCRF >0.9) as detailed in **Table 7**.

Table 7. High Crash Spots

Spot	Location	BMP	EMP	ADT	Fatal	Injury	PDO	CCRF
0.1-mi	Haunz Lane	0.000	0.100	8,056	0	2	9	0.90
0.1-mi	Briar Hill Parkway	1.200	1.300	8,056	0	3	15	1.39
0.3-mi	Wooldridge Avenue/Clore Lane	1.900	2.200	9,785	1	11	40	1.58

²¹ https://uknowledge.uky.edu/ktc_researchreports/1645/

A 0.3-mile spot was analyzed for the offset intersection of Wooldridge Avenue and Clore Lane due to their proximity (pictured in **Figure 16**), and the 0.1-mile spot analysis resulted in a CCRF of 0.92 for Wooldridge Avenue and of 2.55 for Clore Lane. This offset intersection is the highest CCRF location with a transitioning grade between them from grade class E to D. The primary crash type at this spot was rear-end (62%), followed by single vehicle (27%), and angle (6%). Nearly 71% of rear-end crashes were westbound and 35% occurred on wet or icy pavement.



Figure 16. Views of Offset KY 22 Intersection at Clore Lane/Wooldridge Avenue

The second highest CCRF location was at Briar Hill Parkway (**Figure 17**). This location exhibits curve class A and grade class C. Nearly half (47%) of crashes at this location were rear-ends, followed by single vehicle (35%), and angle (12%). Most of the rear-end crashes (63%) were eastbound. Three of the 17 total crashes resulted in injury. All three injury

crashes occurred in 2020, with two rear-end crashes and one single vehicle crash occurring when the vehicle had swerved to avoid rear-ending a vehicle ahead.



Figure 17. Views from Briar Hill Parkway

Haunz Lane was the third highest CCRF location at 11 crashes, with two including injuries. Nearly 64% of crashes were rear-end types, all of which involved eastbound vehicles. This location exhibits curve class A and grade class B. **Figure 18** shows representative views for turning vehicles from Haunz Lane.



Figure 18. Views from Haunz Lane

- **Level of Service of Safety (LOSS)** KYTC and the KTC developed a more refined statistical methodology based on the *Highway Safety Manual* (HSM) to evaluate safety needs of projects, including those in the 2020 SHIFT process. This methodology is referred to as Excess Expected Crashes (EEC) and it is based on a crash prediction model estimating the number of crashes expected on an average roadway segment of a given type and length. It represents the number of excess crashes a segment is experiencing compared to other roadways of its type, adjusting for traffic volumes and a statistical correction. EEC is positive when more crashes are occurring than expected and negative when fewer crashes are occurring than expected.



EECs are grouped into one of four categories, identified as the Level of Service of Safety (LOSS). Summarized graphically in **Figure 19**, LOSS categories 1 and 2 represent sites with fewer than anticipated crashes, whereas category 4 has more than 1.5 standard deviations more crashes than expected. Because LOSS 4 sites experience such elevated crash rates, there is a higher probability that safety countermeasures at these locations will result in greater improvements.

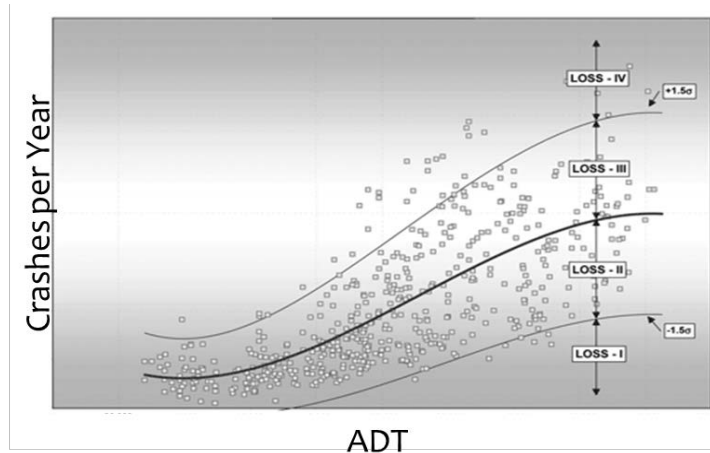


Figure 19: LOSS Categorical Thresholds

The corridor was analyzed as a whole and by segments, broken out by lane width change, median type change, and speed limit change to compare segment scores and potential to reduce crashes. KY 22 has a moderate to high potential for crash reduction, with several LOSS 3 and 4 segments for all crash types. Segment analyses yielded positive EECs with LOSS 4 for KAB crashes, meaning there is a high potential to reduce severe crashes corridor wide.

Comparison between Crash Analyses

Figure 20 (p. 27) presents a side-by-side comparison of the statistical crash analyses. The left panel highlights substandard horizontal curves and steep vertical grades. The middle panel displays the CCRF findings. The right panel displays the LOSS findings, highlighting spots and sections with a LOSS 3 or LOSS 4 for both severe (KAB) and non-severe (CO) crash types.

These statistical crash analyses highlighted six locations along the corridor with elevated crash rates, which may yield reduced severe crash rates should spot improvements addressing safety be implemented. These locations include:

1. Haunz Lane
2. East Orchard Grass Boulevard to Geneva Road
3. Briar Hill Parkway
4. Wooldridge Avenue/Clore Lane
5. Hughes Avenue to Park Woods Road
6. Maples Park to Dairy Queen

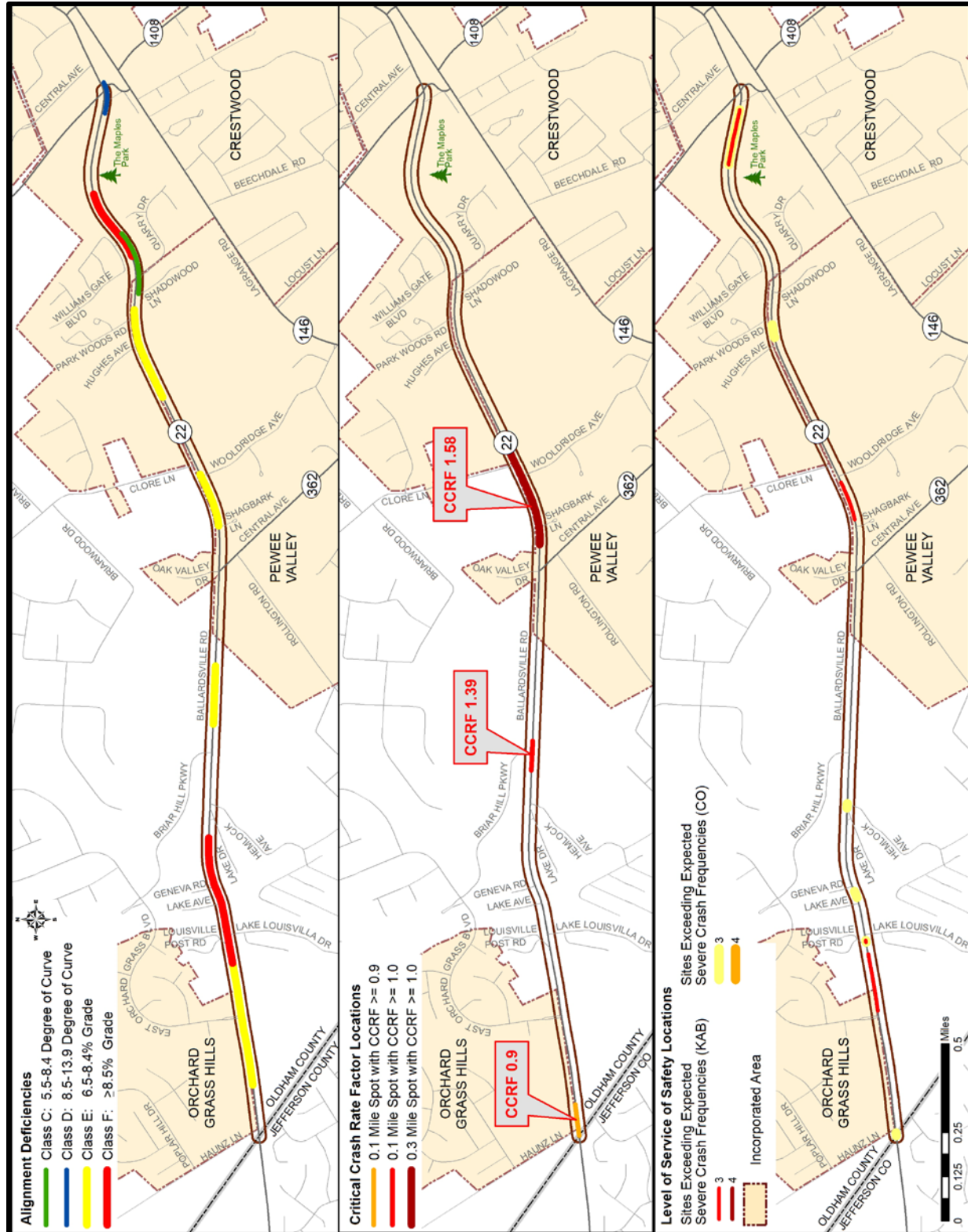


Figure 20. Comparative Crash Analysis



3.0 ENVIRONMENTAL

A red-flag environmental overview was prepared to identify resources for consideration during the development of transportation improvement concepts. Natural and human environmental resources were identified from available literature and database review and site visits. Study area resources in Oldham County are shown in **Figure 21** (p. 29) and summarized in the following sections.

The purpose of this overview was not to quantify potential environmental impacts, but instead to identify potential environmental issues to consider during the project development process. This information should aid the project team in making decisions to avoid, minimize, and/or plan for mitigation of potential project impacts, as appropriate. Should future projects develop following this study, additional environmental studies will likely be required.

If there is a federal nexus (e.g., federal funds, lands, permits, etc.) on a future project, then the procedures established from the National Environmental Policy Act (NEPA) must be followed. NEPA requires, to the fullest practicable extent, policies, regulations, and laws of the federal government be interpreted and administered in accordance with its environmental protection goals. It requires an interdisciplinary approach in planning and decision-making for any action that adversely impacts the environment. The potential environmental impacts and need for safe and efficient transportation must be considered to reach a decision that is in the best overall public interest.

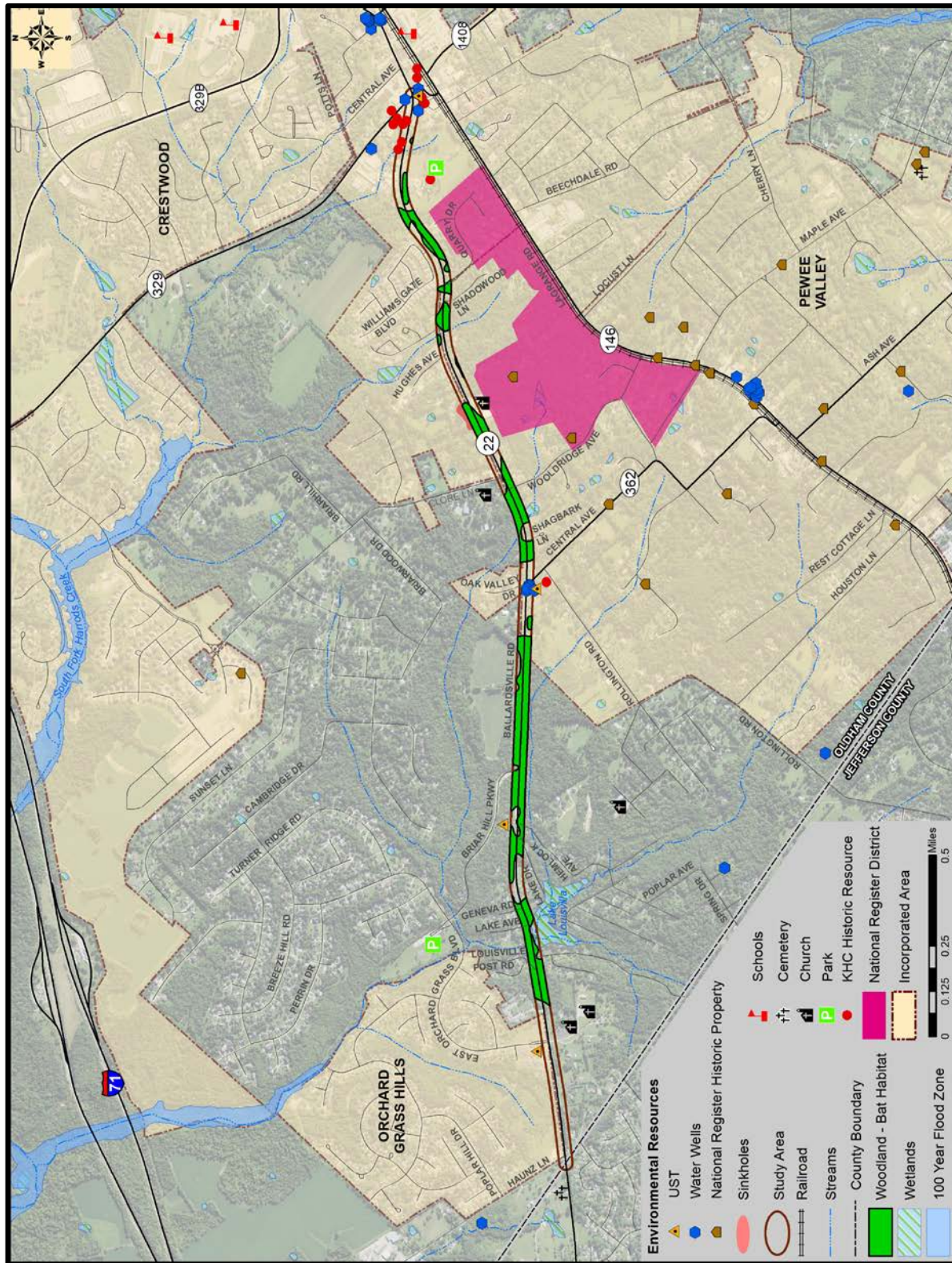


Figure 21: Environmental Resources in Oldham County



3.1 Natural Environment

The natural environment includes all living and non-living things occurring naturally (not artificial or human-built). This includes aquatic ecology, such as rivers, streams, and wetlands; threatened and endangered species; farmlands; and geotechnical resources.

Water Resources

There are no named water resources in the study area. There is an unnamed tributary of South Fork Harrods Creek between Lake Louisville Drive and Lake Avenue. Surface water appears to flow to a series of unnamed tributaries of South Fork Harrods Creek which intersect KY 22 roughly near MPs 0.7, 2.0, 2.6, 2.9, and 3.1. A tributary runs parallel to KY 22 from MP 1.0 to 1.4. A small pond and potential wetland area are just west of Wooldridge Avenue near MP 2.0.

No federally designated Wild or Scenic Rivers or Outstanding State Resource Waters exist in the study area. Lake Louisville, a manmade lake developed in the 1920s, was drained in 1989. While mapped as a wetland, the lake has been filled and a tributary now flows in its place. There are no floodplains in the study area.

Impacts to streams and wetlands require permit coordination with the US Army Corps of Engineers, US Coast Guards, and/or Kentucky Division of Water, depending on the scale of the water resource and potential disturbance.

Listed Species

The US Fish and Wildlife Service (USFWS) maintains a database²² of federally protected species—listed as endangered or threatened under the Endangered Species Act. There are three listed bat species and one clam species that have the potential to occur within the study area. Listing status for all species are shown in **Table 8**, including candidate species as they could be listed prior to construction of future projects. There is no designated critical habitat within the study area.

Table 8: Listed Threatened and Endangered Species

Group	Name	Scientific Name	Status
Mammals	Gray Bat	<i>Myotis grisescens</i>	Endangered
Mammals	Indiana Bat	<i>Myotis sodalis</i>	Endangered
Mammals	Northern Long-eared Bat	<i>Myotis septentrionalis</i>	Threatened
Clams	Pink Mucket	<i>Lampsilis abrupta</i>	Endangered
Insect	Monarch Butterfly	<i>Danaus plexippus</i>	Candidate

²² <https://ecos.fws.gov/ipac/>

A habitat assessment should be completed in the early stages of project development for future project(s) to assess potential project impact to threatened and endangered species. Projects that occur within an area of known bat habitat would require project-specific evaluation to assess appropriate minimization/mitigation measures. For other federally listed species, specific ecological surveys may be required for projects that have the potential to impact habitat. Coordination with the USFWS Kentucky Field Office would be necessary to determine the need for future project-specific surveys.

Farmland Classifications

Natural Resource Conservation Service (NRCS) soil survey maps were reviewed to identify farmland classifications within the study area. The geographic distribution of the farmland classifications is shown in **Figure 22**. The study area includes 49% prime farmland soils. Farmlands of statewide importance represent another 27% and the remaining 24% is not considered prime farmland.

No protected agricultural easements or agricultural districts were identified within the study area. Should federal funds be used on future projects, the *Farmland Protection Policy Act* must be followed. If there is potential to convert farmland, coordination with the local NRCS office is required.

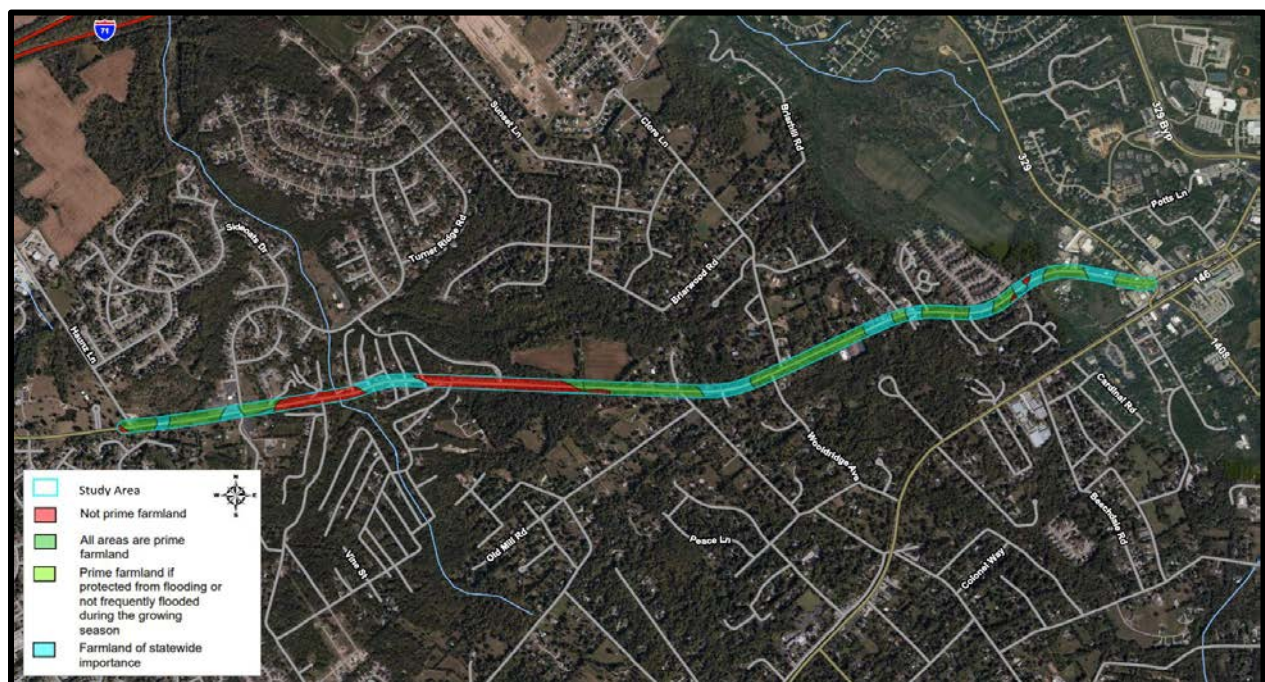


Figure 22: NRCS Farmland Soil Classifications

Geotechnical

A geotechnical overview was completed for the study area to review existing field conditions, published geologic mapping, and past KYTC geotechnical works in the area to identify geotechnical concerns that may affect potential project design. A summary of those findings and future recommendation are provided here, with the full report attached in **Appendix C**.

- **Geology** The project is in the Outer Bluegrass Physiographic Region, which is typically characterized by low to moderate relief soils that range from thick over limestone to thin over shale. Native soils are predominantly residuum. Artificial soil is mapped at the east end of the corridor and colluvium is mapped on several stream valleys located just north of KY 22. Geologic maps indicate the soils beneath the existing roadway alignment are underlain by Ordovician and Silurian age bedrock. Site reconnaissance revealed majority of the existing road has been established with relatively short cut and fill embankment slopes, with the exceptions of mile point 0.7 and near the previous Lake Louisville. Side slopes as steep as 1H:1V, minor signs of soil creep, were observed in this area as pictured in **Figure 23**. Outcropping bedrock was typical in the cuts as shown in **Figure 23**.



Figure 23. Geotechnical Field Reconnaissance

- **Karst Potential** The majority of the study area is mapped as having prone or intense karst potential. Approximately 17 sinkholes are mapped within one mile of the corridor, with seven of those within 0.5 mile. There is one sinkhole immediately adjacent to the roadway in the upland near MP 2.3 (**Figure 21**).



- **Topography and Drainage** The roadway elevation varies from a high of El. 790 in the upland near MP 2.3 to an approximate El. 620 in the valley near MP 0.7. The terrain steepens as the roadway descends into a valley presently occupied by an unnamed tributary of South Fork Harrods Creek (previously manmade Lake Louisville). Surface water appears to flow into a series of unnamed tributaries of South Fork Harrods Creek, intersecting KY 22.
- **Recommendations for New Cut and Embankment Slopes** It is assumed minor (10 feet or less) new cuts and embankments will be required to widen or otherwise reconfigure the existing geometry. New cuts will typically encounter overburden soils over shallow bedrock. The bedrock is anticipated to consist primarily of limestones and dolomites, with a lesser amount of shale. Final cut and embankment geometry should be designed in accordance with current KYTC *Geotechnical Guidance Manual*. Planning level concepts can estimate proposed cuts and embankments at 2H:1V. Roadway improvements should consider flattening existing embankments near MP 0.7 to 2H:1V.
- **Recommendations for Subgrade Stabilization** It is anticipated there would be insufficient quantities of durable bedrock to be used as rock roadbed. Options for stabilization include either chemical stabilization with lime or cement or mechanical stabilization with 12 inches (minimum) of coarse aggregate wrapped with geotextile fabric. Chemical stabilization is typically the more cost-effective solution.

3.2 Human Environment

The human environment includes people and the resources they define: land use, community features, cultural historic resources, pollution (hazardous materials, air quality, noise), etc. Each could potentially be impacted by any future projects, and all are identified in the following sections for consideration during the project development process.

Land Use

The study area is primarily zoned residential with commercial areas north of KY 22 at either terminus and intermittently near Briar Hill Parkway, Clore Lane, and Hughes Avenue.

Community Features

Community facilities and services are limited along KY 22.



- **Communities** There are three cities along KY 22: Orchard Grass Hills, Pewee Valley, and Crestwood. The residences in the neighborhoods surrounding Lake Louisville and Briar Hill Park likely experience a sense of community cohesion due to their proximity to one another, community resources, and time of development.
- **Services** Service along KY 22 include gas stations, automotive solutions, The Maples Park, Oldham County Tourism and Conventions Center, local tax and insurance services, AT&T, and Dairy Queen. Additional businesses are located to the east in Crestwood and west in Louisville. Emergency services are outside of the study area and provided by Anchorage Middletown Fire and EMS to the west and Oldham County Fire Department to the east. There are several hospitals in the greater metropolitan area accessed via KY 22 to I-265. The South Oldham Government Center, a DMV office, and the US Postal Service Office are in Crestwood.
- **Schools** The only school in the study area is Cadence Academy Preschool. Crestwood Elementary and Oldham County School for the Arts are east of the study area on KY 146.
- **Churches and Cemeteries** Louisville Memorial Gardens East, a cemetery and funeral home, is located at the western terminus of the study corridor.

There are four places of worship along KY 22—from west to east, Crestwood/Prospect Congregation of Jehovah’s Witnesses, Kenwood Baptist Church, Kentucky Ministry Network, and The Church of Jesus Christ of Latter-day Saints and Temple.

Camp Crestwood is located off Clore Lane. It was established by the Kentucky Assemblies of God in 1948 and today hosts events (retreats, conferences, camps, etc.) by various Christian faith groups.

- **Historic and Archaeological Resources** A Kentucky Heritage Council (KHC) and Office of State Archaeology (OSA) databases search was conducted to identify records of known cultural historic resources and archaeological sites (**Appendix D**). Fourteen cultural historic resources were mapped within (12) or in the viewshed of (2) the study area. All mapped resources are near the area’s eastern terminus and may include sites previously determined eligible for listing in the National Register of Historic Places (NRHP); however, their eligibility status is undetermined because the records have not been updated to include their status. There is an NRHP eligible district (Wooldridge Avenue–LaGrange Road Historic District) south of KY 22. No known archaeological sites were mapped within the study area. There is a nearby archaeological site, south of KY 22 outside of the study



area; however, to protect identified resources, known site locations are not included on public mapping.

Should federal monies or permits be included in future projects, field survey and coordination with the State Historic Preservation Officer (SHPO) at the KHC would be required to assess project impacts to cultural historic and archaeological resources.

Socioeconomic Profile

A socioeconomic study was completed for the corridor (**Appendix E**) to identify areas statistically likely to contain elevated concentrations of minority, elderly, low-income, limited English proficiency (LEP), and/or disabled populations. Statistics are reported from 2019 American Community Survey 5-year estimates. There are three block groups adjacent to KY 22 in the study area. Three of the five categories reviewed have one statistical geographic area exceeding the county threshold, as highlighted in **Figure 24**. In the study area, US Census tract 306.01 has the following characteristics that should be considered during future phases of project development.

- **Block Group 1**—bounded by the Jefferson/Oldham County line, KY 22, a tributary of the south fork of Harrods Creek, and I-71, includes minority and LEP population concentrations above the Oldham County reference thresholds.
- **Block Group 2**—bounded by a tributary of the south fork of Harrods Creek, KY 22, KY 329, and I-71, does not have any areas of concern exceeding the county reference thresholds.
- **Block Group 3**—bounded by the Jefferson/Oldham County line, KY 146, and KY 22, includes a higher percentage of persons aged 65 and over than the reference threshold of Oldham County.

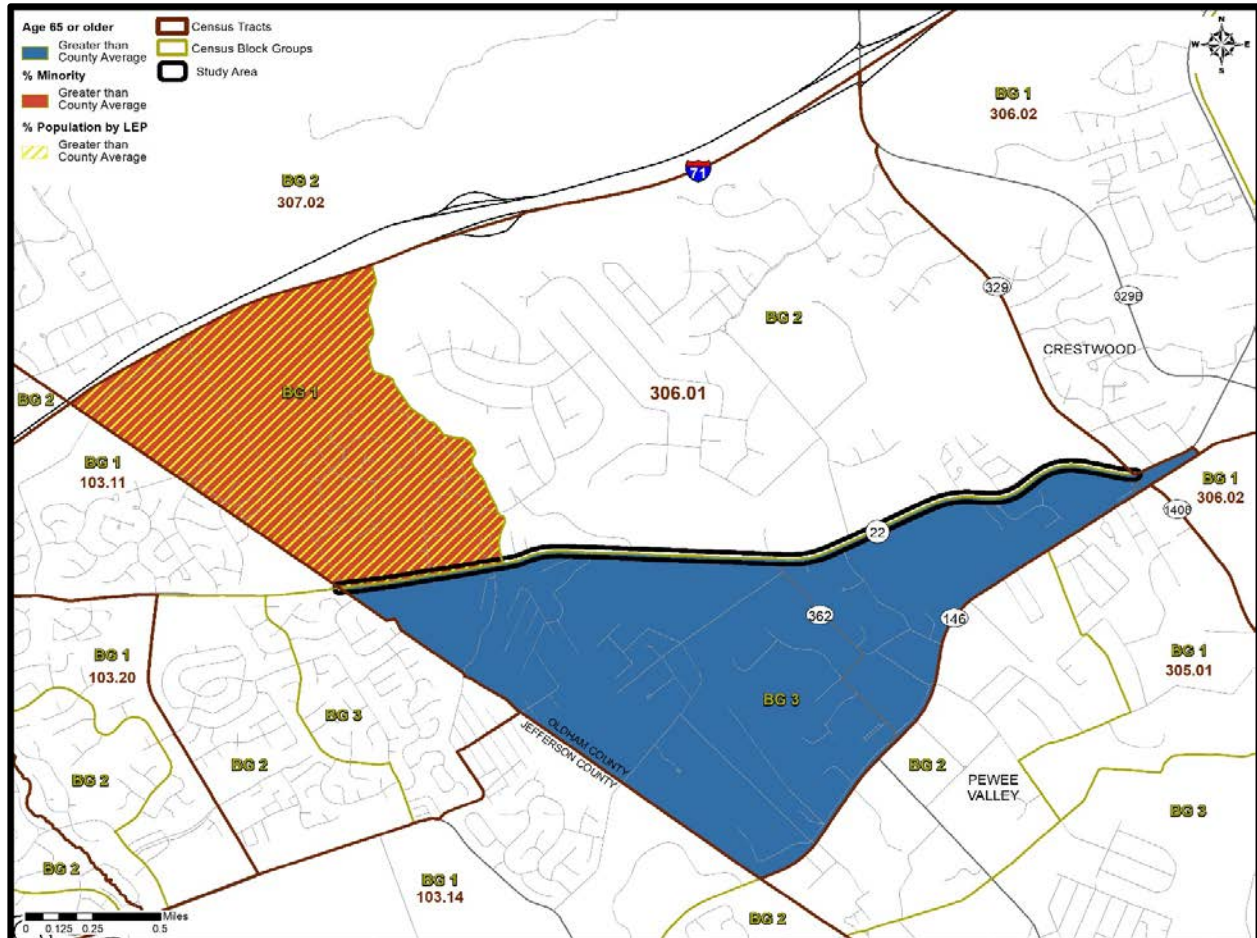


Figure 24. Socioeconomic Populations Exceeding County Thresholds

Section 4(f)

Section 4(f) of the Department of Transportation Act of 1966 applies to federally funded projects. It is a substantive law that applies to land from publicly owned parks, recreation areas, wildlife and waterfowl refuges, and public or private historic site eligible for or listed on the NRHP. A federally funded highway project that uses a Section 4(f) property can only be approved after a determination is made that no prudent or feasible alternative to the use of the property exists and that project planning minimizes harm to Section 4(f) sites. Potential Section 4(f) protected properties within the study area are sites (cultural historic and archaeological) eligible for listing or listed in the NRHP and Maples Park.

Section 6(f)

Section 6(f) of the Land and Water Conservation Fund (LWCF) Act applies to both state and federally funded projects. The LWCF provides federal grants to acquire land for outdoor



recreation, protect important natural areas, and to develop or renovate outdoor recreation facilities (campgrounds, picnic areas, swimming facilities, etc.). Impacts must be addressed when projects result in permanent conversion of outdoor recreation property that was acquired or developed using LWCF grant assistance. No properties that have received LWCF funds were identified along the corridor.

Hazardous Materials Considerations

Readily available records from the US Environmental Protection Agency (USEPA) were compiled to illustrate the range of monitored sites within the study area. As mapped in **Figure 21**, several USTs are adjacent to the study corridor. Field visits and historical record reviews identified other properties of concern which may contain contaminated soils, including a vacant lot near Haunz Lane, Integrity Automotive Solutions, Pete Coons Auto Service and Collision, C&W Automotives, KOI Auto Parts, Superb Dry Cleaning and Laundry, Plainview Cleaners.

Air Quality Considerations

USEPA has established National Ambient Air Quality Standards (NAAQs) for six criteria pollutants: ozone, lead, nitrogen dioxide, sulfur dioxide, carbon monoxide, and particulate matter (PM_{2.5} and PM₁₀). Oldham County is currently in non-attainment for 8-hour ozone.

The study area is located within the KIPDA MPO region; therefore, federally funded transportation projects should be included in both the statewide transportation improvement program (STIP) and the local transportation improvement program (TIP) to ensure air quality conformity requirements are satisfied. Future federal projects may need to analyze potential Mobile Source Air Toxics (MSAT) impacts based on the project type.

Noise Considerations

There are noise sensitive receptors in the vicinity of potential future improvements. Noise sensitive receptors include all outdoor areas of frequent human use such as residential areas, parks, cemeteries, hospitals, churches, schools, and some commercial properties with exterior use. As the area is primarily residential, receptors are present along the study corridor.

Specific traffic noise impact analyses may be required in future project development activities. State funded projects do not require a traffic noise impact analysis unless directed by the legislature. However, federally funded projects that add capacity or shift traffic closer to sensitive receptors do require the consideration of traffic noise impacts.



4.0 INITIAL COORDINATION EFFORTS

Throughout the course of the study, the project team coordinated with local official/stakeholders (LO/S) and the public to identify areas of concern and potential improvement opportunities. The project team included Oldham County, KYTC District 5 and Central Office staff from various disciplines, KIPDA, and consultant personnel. Summaries of all meetings are in **Appendix F**.

4.1 Project Team Meeting No.1

The project team virtually reviewed the existing conditions and discussed upcoming community outreach efforts on December 6, 2021. Existing conditions information included previous studies, nearby planned/conceptualized projects, roadway geometry, traffic characteristics, high crash locations, environmental resources, and geotechnical conditions.

4.2 Local Official and Stakeholder Meeting No.1

A hybrid (virtual and in-person) meeting was held with local officials and stakeholders January 26, 2022. The purpose of this meeting was to review the existing conditions with this group of interested parties, seek added insight from them on the existing needs of the corridor, and share public engagement opportunities. Local concerns include:

- The railroad crossing in Crestwood, just outside and east of the study area, causing backups onto KY 22 when a truck becomes stuck trying to cross the tracks.
- Future sources of funding for this study's recommended projects.
- Creating or addressing inadvertent blind spots where an added turn lane may hide a car behind it from oncoming traffic.
- The need for traffic signals.
- Ongoing developments adding to traffic on KY 22.
- Should this study recommend widening, there is concern that widening KY 22 would create a chokepoint along KY 22 west of the study area from the county line to Murphy Lane, as this 0.679-mile segment would be the only two-lane segment remaining.

4.3 Online Public Engagement

A virtual public meeting was held January 26, 2022, from 6:30 to 7:30 p.m., to review the existing conditions of the corridor. Twenty-seven individuals attended. The event was advertised via the Oldham County website, through email blasts, and on social media platforms. Topics of public concern heard during the meeting include:



- Ensuring 2021 collected traffic volumes were compared with pre-covid counts.
- Concern for the section of KY 22 between Murphy Lane and Haunz Lane.
- The types of improvement concepts that would be considered.
- The need for turn lanes into new developments.
- Future funding for and prioritization of improvements recommended by the study.
- Concern for regional needs to be met by extending the future Old Henry Road (Item No. 5-367) to LaGrange to serve as a bypass and attract traffic away from KY 22.
- The railroad crossing in Crestwood, just outside and east of the study area, causing backups onto KY 22 when a truck becomes stuck trying to cross the tracks.
- Retaining connectivity during design, utility, and construction phases for Oldham County Emergency Management to maintain emergency response times.
- Roadway width to handle added traffic from an I-71 shutdown.
- Bicycle demand to use KY 22 as a scenic route and having insufficient pavement width to safely accommodate them.

Public comments were collected online from January 26 through February 28, 2022. A brief survey supplemented with a GIS-based crowdsourcing application was used to collect input on existing conditions and local areas of concern. Over the 34-day comment period, 856 surveys were received. When asked to identify areas for improvement, 226 written responses were received with an added 257 GIS location points placed on the crowdsourcing mapping application.

- Nearly 40% of respondents live along the corridor. An additional 34% neither live nor work along the corridor; presumably they use KY 22 to commute. About 20% live and work along KY 22.
- Nearly 70% of survey respondents travel the corridor daily, with another 24% travelling at least weekly.
- Less than 3% of respondents think no improvements are needed. The top needs for improvements (**Figure 25**) included narrow lanes and shoulders, limited visibility at cross-streets and driveways, speeding, sharp curves, and steep hills.

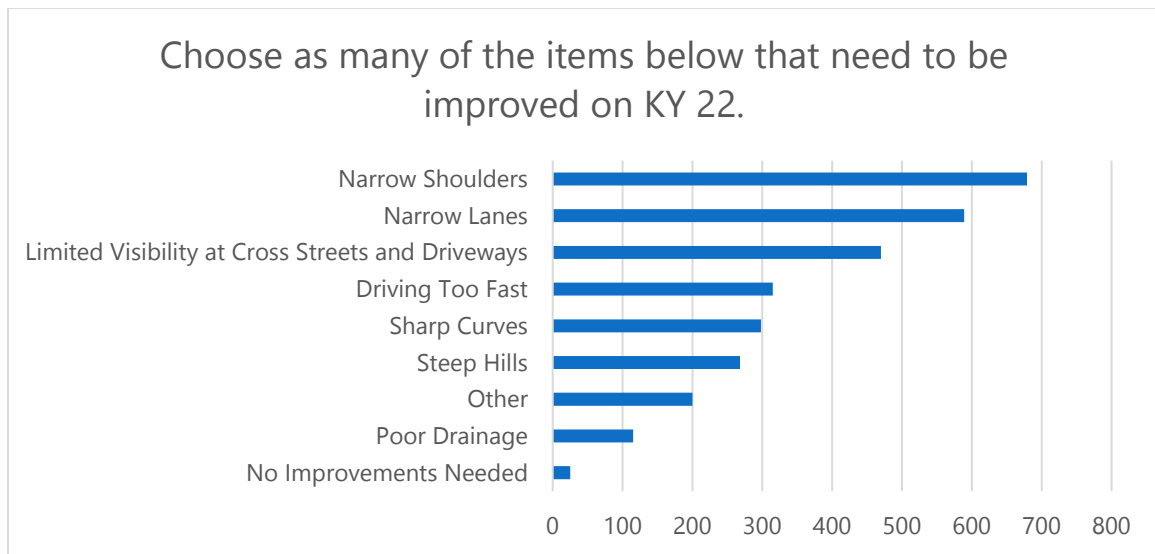


Figure 25. Top Public Needs Identified

- Common recommendations for improvements include adding a two-way center left-turn lanes, adding turn lanes at intersections, adding traffic signals (particularly at Haunz Lane, Clore Lane, and Central Avenue), creating a bike lane and/or sidewalk (near both project termini), improving nighttime visibility (e.g., street lighting or reflective pavement striping or markers), addressing steep drop-offs (near Lake Louisville Drive and Maples Park), and upgrading pavement conditions (particularly near Haunz Lane due to heavy truck traffic).
- Nearly every intersection was mentioned as needing improvements. The most-often-cited suggestions include adding turn lanes, signalization, addressing geometry to improve visibility, or cutting back vegetation to improve sight distance. Intersections of concern along KY 22, from most cited to least, include:
 1. Clore Lane/Wooldridge Avenue
 2. Haunz Lane
 3. Briar Hill Parkway
 4. Central Avenue
 5. Lake Louisville Drive
 6. KY 329
 7. Williamsgate Boulevard
 8. Maples Park access drive
 9. East Orchard Grass Boulevard



As shown in **Figure 26**, public comments were not concentrated in specific locations; rather, they were corridor-wide. A summary of location-based comments is provided in **Appendix F**.

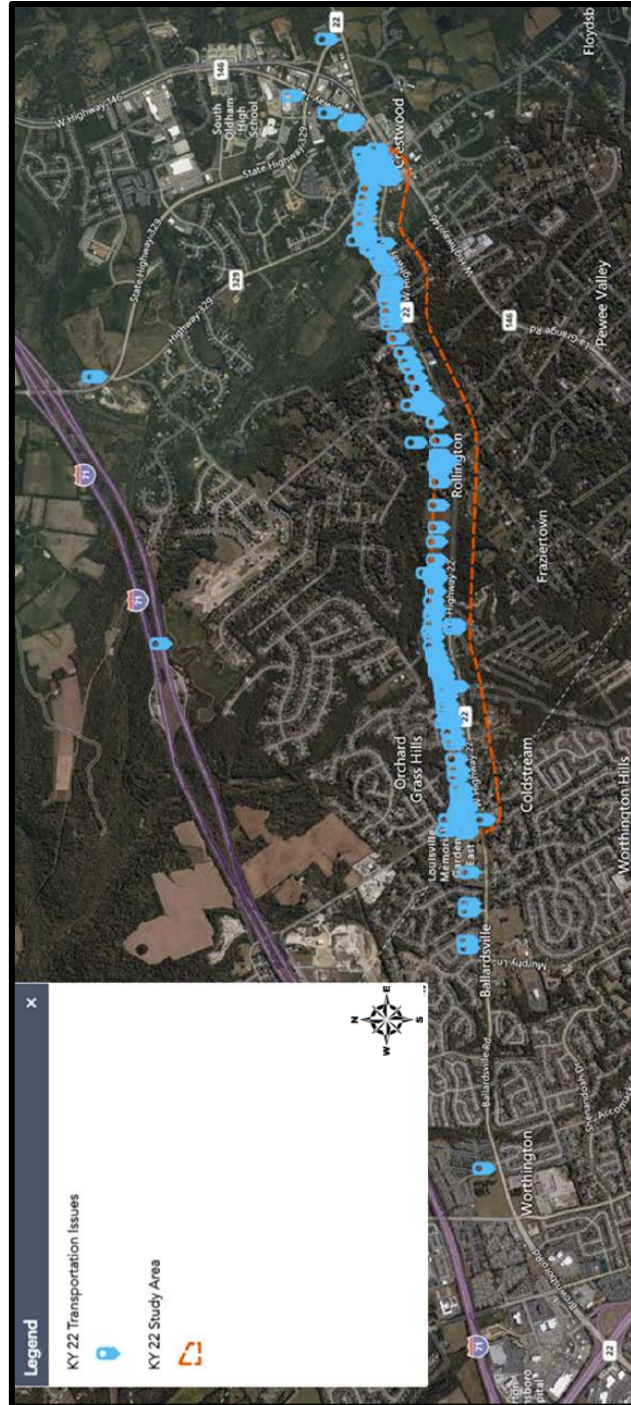


Figure 26. Crowdsourcing GIS Application Comment Location Points



5.0 Study Goals and Objectives

A project’s Purpose and Need Statement clearly describes the transportation problem it is intended to solve. It serves as the foundation for determining a reasonable range of solutions and comparing their effectiveness in meeting the defined project’s Purpose and Need.

The objective of this study is to identify and evaluate potential improvement options to increase safety and reduce congestion on KY 22 from Haunz Lane to KY 329 in Oldham County.

The needs were identified through a review of existing conditions (**Section 2.0**) and local coordination efforts (**Section 4.0**), and are summarized in **Table 9**.

Table 9. Needs Identified from the Study

	Crashes are corridor-wide with elevated concentrations at study intersections. Rear-end and single vehicle crashes comprised 80% of total crashes over the last four years.	
Nearly 14,000 vpd travel the corridor. The morning commute into Louisville experiences major delays with stop and go traffic, operating at LOS E.		
	Deficient curves and grades throughout the corridor limit visibility.	
There is little recovery area as lanes are primarily 10 feet wide with less than one foot of paved shoulder width and steep drop-offs in a few locations.		



6.0 2045 TRAFFIC FORECAST AND NO-BUILD OPERATIONS

Growth rates from the KIPDA Travel Demand Model, recent traffic data from KYTC stations, fall 2021 12-hour intersection turning movement counts, background socioeconomic growth assumptions, existing and committed projects, and origin-destination matrices from StreetLight²³ were used to develop future year traffic forecasts (attached in **Appendix A**).

6.1 2045 No-Build Traffic and Operations

Considering historic traffic growth rates, population projections, anticipated development, and the Traffic Demand Model projections for area projects, a growth rate of 1.25% was applied to the existing 2021 traffic to project future 2045 No-Build traffic volumes. Oldham County's population has been historically increasing, and it is projected to increase from its current approximately 70,000 persons to nearly 100,000 persons by 2040. **Table 10** shows traffic is anticipated to grow to about 19,000 vpd by 2045.

Table 10. Comparison of Segment Volumes between 2021 and 2045

Segment	2021 Existing				2045 No-Build		
	% Trucks	ADT	AM Peak	PM Peak	ADT	AM Peak	PM Peak
County Line to KY 362 (Central Avenue) MP 0.000-1.825	7.5	14,700	1,510	1,570	19,800	2,040	2,110
KY 362 (Central Avenue) to KY 329 MP 1.825-3.262	7.5	13,800	1,580	1,530	18,700	2,190	2,080

The corridor is estimated to operate primarily as LOS E in both the AM and PM peak periods by 2045, experiencing moderate to major delays as outlined in **Table 11**. With this level of congestion, it is likely drivers would divert to other routes during the more demanding travel times or alter their travel patterns to avoid the busiest times.

Table 11. 2045 No-Build Operations

Direction of Travel	Eastbound		Westbound	
Peak	AM	PM	AM	PM
Driver Density ¹	14.6	21.2	33.4	17.9
Level of Service	D	E	E	E

¹drivers/mile/lane

²³ Big data for mobility, <https://www.streetlightdata.com/our-data/>



Table 12 compares the worst operating intersection movements between the 2021 existing and 2045 forecast during the peak periods. By 2045, every study intersection will have at least one movement operating at LOS F during at least one of the peak periods. The v/c ratios suggest these movements are approaching or have exceeded their capacity as increasing KY 22 thru traffic adds delay for turns from cross-streets.

Table 12. Comparison of Worst Operating Intersection Movements Between Existing and Forecast

Intersection	Movement	Existing 2021				2045 No-Build			
		AM Peak		PM Peak		AM Peak		PM Peak	
		LOS	v/c	LOS	v/c	LOS	v/c	LOS	v/c
Haunz Lane	Left turn from Haunz	F	0.96	F	1.34	F	3.51	F	9.62
	Right turn from Haunz	D	0.45	B	0.21	F	1.03	C	0.38
East Orchard Grass Boulevard	NB East Orchard Grass	F	0.46	F	0.44	F	2.15	F	1.68
	SB East Orchard Grass	F	1.22	F	1.52	F	6.33	F	9.28
Lake Louisville Drive	NB Lake Louisville	C	0.10	C	0.15	F	0.28	E	0.47
Briar Hill Parkway	SB Briar Hill	F	0.99	E	0.51	F	3.21	F	1.55
KY 362 (Central Avenue)	NB KY 362	F	2.47	F	1.04	F	29.44	F	1.74
	SB KY 362	F	0.71	F	0.33	F	7.95	F	0.41
Wooldridge Avenue	NB Wooldridge	E	0.34	C	0.22	E	0.40	E	0.41
Clore Lane	SB Clore	F	1.30	D	0.58	F	4.27	F	1.98
KY 329	KY 22 WB Thru	F	1.01	C	0.663	F	1.51	E	0.98
	KY 22 EB Thru	C	0.72	D*	0.83	F	1.11	F	1.29

**Note: These movements also operate at LOS D with better v/c ratios; KY 329 NB thru. KY 329 NB right, KY 329 SB thru, and KY 329 SB right.*

7.0 CONCEPT DEVELOPMENT

Initial improvement concepts were developed considering existing conditions, public feedback, recommendations from the 2005 KY 22 study, traffic forecasts, and project team input to improve safety and reduce congestion.

7.1 Project Team Meeting No. 2

Preliminary concepts were presented to the project team in a meeting March 21, 2022, for the locations labeled in **Figure 27**.

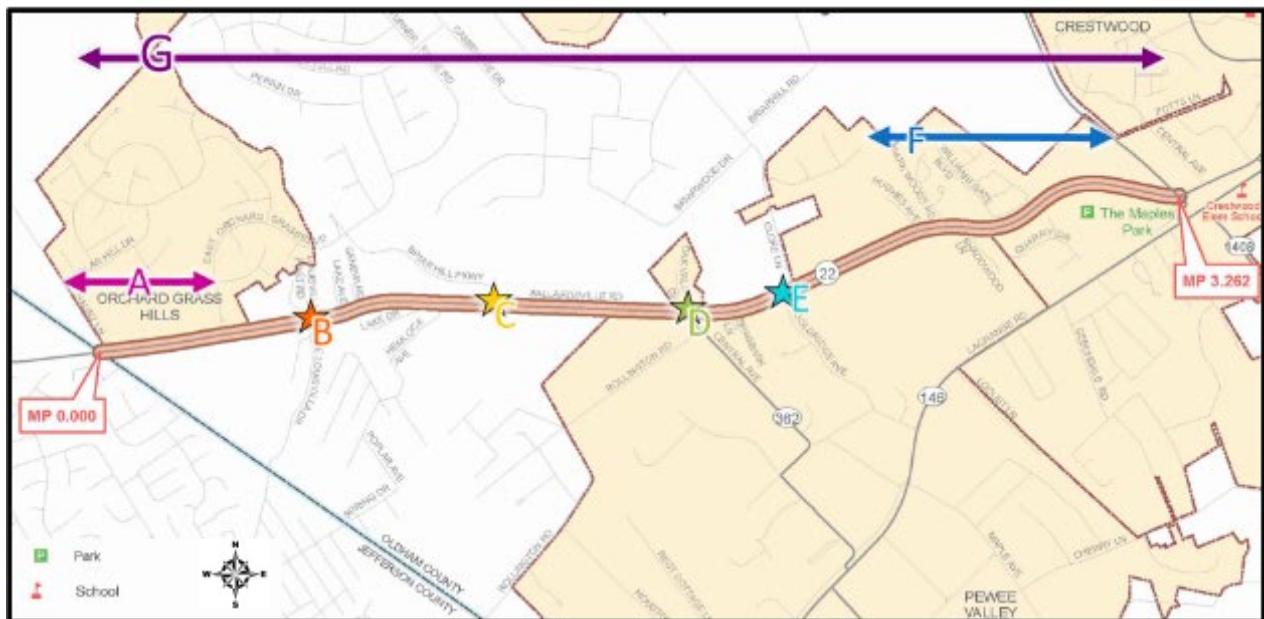


Figure 27. Representative Improvement Concept Locations

Preliminary Improvement Concepts

The preliminary concepts and suggestions made by the project team during the meeting are summarized herein, together with how they compare to previous studies' recommendations. Full meeting details are provided in the attached minutes (**Appendix F**).

- **Concept A | Haunz Lane – East Orchard Grass Boulevard (MP 0.021–0.300):** The safety analysis discussed in **Section 2.4** identified Haunz Lane and East Orchard Grass Boulevard as potential spot improvement locations. The first round of public engagement (**Section 4.3**) identified the KY 22/Haunz Lane intersection as one of the

top two safety concern locations. There were many suggestions to both improve sight distance and consider signalization at this location.



Figure 28. Representative Views of Haunz Lane

Further developed from the 2005 planning study,²⁴ this concept suggests eliminating the existing skew (see **Figure 28**) by realigning Haunz Lane to a “T” intersection with KY 22, shifting east toward a nearby gravel parking lot to avoid impacts to the adjacent cemetery to the west and to improve sight distance. This concept would add a left- and a right-turn lane on Haunz Lane and add a left-turn lane from eastbound KY 22 to northbound Haunz Lane. It would also add a TWLTL on KY 22 from Haunz Lane to East Orchard Grass Boulevard, creating two 11-foot-wide driving lanes, a 13-foot-wide center turn lane, and 6-foot-wide shoulders (2 feet paved). This concept would include right- and left-turn lanes to East Orchard Grass Boulevard from KY 22. It also suggests adding a 10-foot-wide shared-use path on the north side

²⁴ Note: the 2005 study also recommended installing a traffic signal at Haunz Lane; however, it does not currently meet the Manual on Uniform Traffic Control Devices (MUTCD) signal warrants. Potential signalization of this intersection should be further coordinated with KYTC D5 Traffic if future engineering study and traffic conditions determine it is warranted.



of KY 22 from Haunz Lane to the apartment complex east of East Orchard Grass Boulevard to provide multimodal connectivity to the businesses and community resources at this intersection. This recommendation was based on observed users and distance from residential areas to the destinations.

Logical termini for the shared used path were discussed during the meeting. The concept was revised to extend the path tie-in near Haunz Lane north to the existing sidewalk in the Poplar Hill neighborhood. A future project could further explore multimodal connectivity options in this area.

- **Concept B | Lake Louisvilla Drive (MP 0.653):** As a more immediate fix with lesser impacts than the TWLTL considered during the 2005 study, this concept suggests raising the grade of Lake Louisvilla Drive approaching KY 22 by approximately 5 feet to improve sight distance, installing guardrail to the southeast of the intersection, cutting back the rock outcrops, and clearing trees and vegetation. This work would require a culvert extension but would improve sight distance in the area and was suggested to address the single vehicle crashes east and west of Lake Louisvilla Drive. Sight distance obstructions at this location were noted from field reviews and public feedback. Reviewing traffic and safety analyses, of the study intersections, Lake Louisville Drive operates at LOS C and historically only four crashes have occurred at this intersection over the past four years.
- **Concept C | Briar Hill Parkway (MP 1.264):** The residential area has continued to develop over the last 16 years and currently operates at a worse LOS than the 2030 projections from the 2005 KY 22 planning study. The safety analysis (see **Section 2.4**) identified this location as a high crash spot, with nearly 50% being rear-end crashes.

This concept considers adding a left- and right-turn lanes on KY 22 for traffic accessing Briar Hill Parkway, restriping the area to make it a no-passing zone in response to public feedback, and including tree clearing to improve sight distance for residents leaving the neighborhood.

- **Concept D | KY 362 (Central Avenue)/Oak Valley Drive (MP 1.825):** An immediate fix for this intersection, as shown in **Figure 29**, could improve access control on the southwest quadrant (adjacent to Integrity Automotive Solutions) of the intersection by installing a curb and gutter section to better delineate and define entrances to the business and clearing trees/vegetation to the east to improve sight distance.



Figure 29. Access Control Along Business

The team decided to also carry forward the 2005/2019 concept of adding left- and right-turn lanes on both KY 22 and KY 362 (Central Avenue) with modifications to correct the skew of KY 362 (Central Avenue) by shifting to the east and reducing the buffer for the KY 362 (Central Avenue) right-turn lane.



Figure 30. Representative Views of KY 362 (Central Avenue)



- **Concept E | Wooldridge Avenue/Clore Lane (MP 1.900–2.200):** As this location was the top identified safety need, both in quantity and severity (**Section 2.4**), and the top public concern (**Section 4.3**), previously studied concepts were reviewed and new ideas to improve this offset intersection were explored.

The 2005 study suggested adding an eastbound left-turn lane to Clore Lane and adding a westbound left-turn lane to Wooldridge Avenue and including a signal.²⁵ The study also recommended adding a left-turn lane on Clore Lane, realigning Wooldridge Avenue, and adding a left-turn lane on Wooldridge Avenue.

The 2006 study also considered signaling this intersection or replacing it with a roundabout. A residence has since been built on the southeast leg, resulting in additional impacts and costs. Clore Lane has been connected to Spring Hill Trace with added residential development more than doubling the peak-hour traffic Clore Lane carries since that study; therefore, construction would likely have major disruptions to traffic. Considering there is grade class E with sight distance issues on either side of this intersection, there was concern with transitioning from a 45 mph to a much reduced (typically 15 to 25 mph) entrance speed for a roundabout, which would initially be an unexpected intersection type for this stretch of roadway.

As the main safety concern location, the current study effort explored an option for a quicker fix by adding four lanes between the offset intersection, with dedicated left-turn lanes onto each cross street separated by a raised median, and tree/vegetation clearing to improve sight distance.

²⁵ Note: Potential signalization of this intersection should be further coordinated with KYTC D5 Traffic if future engineering study and traffic conditions determine it is warranted.



Figure 31. E.1 KY 22 Left-Turn Lanes to Clore Lane and Wooldridge Avenue

Closing Wooldridge Avenue's access to KY 22 was also conceptually considered but was dismissed as not viable after consulting with local officials.

Another option was presented (similar to the original 2005 concept) that would align Wooldridge Avenue and Clore Lane, and add left-turn lanes and right-turn pockets on both streets and dedicated left-turn lanes on KY 22. Wooldridge Avenue could shift east and Clore Lane west to minimize impacts to the residence on Wooldridge Avenue and the Assemblies of God church on Clore Lane. Tree/vegetation clearing is also recommended to improve sight distance.



Figure 32. E.2 Clore Lane/Wooldridge Avenue Realign with Turn Lanes



- **Concept F | Williamsgate Boulevard – KY 329 (MP 2.813–3.207):** This segment of KY 22 traverses grade class D and E, has more than 20 access points along KY 22, and was identified as a site exceeding expected crash frequencies.

This concept would construct a TWLTL (creating two 11-foot-wide driving lanes, a 13-foot-wide center turn lane, and 6-foot-wide shoulders including 2 feet paved) from Williamsgate Boulevard to KY 329, with a 5-foot-wide sidewalk north of KY 22 and guardrail in areas of steep drop-offs. Two options were considered: F.1 widening symmetrically, which impacts Maples Park but fixes side slope issues, and F.2 widening to the north, which does not impact the park but impacts more commercial properties and does not fix the side slope issue. Sidewalk connectivity as far west as Hughes Avenue (MP 2.514) to the existing sidewalk at KY 329 was also explored.

The team conceptually explored pedestrian crossing opportunities to provide users from the residential areas north of KY 22 access to the Maples Park south of KY 22. Ideas included an at-grade, mid-block crosswalk (however there were safety concerns, particularly related to driver sight distance issues and congestion), a pedestrian bridge (which would have added costs for either a ramp or elevator to meet ADA compliance), or a tunnel under KY 22. After much discussion, the team recommended further consideration of a pedestrian tunnel.

- **Concept G | Haunz Lane to KY 329 (MP 0.000–3.207):** The 2005 KY 22 study recommended a five-lane template (four driving lanes and a center turn lane) from KY 1694 (Brownsboro Road, MP 4.827 in Jefferson County) to Quarry Drive (MP 2.706 in Oldham County), and a three-lane template (two driving lanes and a center turn lane) from Quarry Drive to KY 329B (MP 3.935 in Oldham County). Since that study, KY 22 has been widened to a three-lane template from KY 1694 to Murphy Lane (MP 6.046) in Jefferson County. Based on future traffic volumes and operations discussed in **Section 6.0**, a four- or five-lane template from Jefferson County to KY 329 may better improve future operations. However, KY 22 is currently two lanes at either end of the study area and the extent of widening required to accommodate four- or five-lanes would have significant property impacts and costs.



Thus, consistent with the KY 22 template in Jefferson County, this concept recommends constructing a three-lane template with a TWLTL the entire length of the study area, thereby creating two 11-foot-wide driving lanes, a 13-foot-wide center turn lane, and 8-foot-wide shoulders (6 feet paved); and adding a 10-foot-wide shared use path from Haunz Lane to East Orchard Grass Boulevard and a 5-foot-wide sidewalk from Hughes Ave to KY 329. The primary manner of collision was rear-end crashes (44%). There are currently nearly 100 access points along the 3.207-mile corridor, with more than 10/mile (see **Table 13**). Considering growth patterns in Oldham County, and the amount of developable land remaining, a TWLTL could support future development. All eight study intersections (**Section 2.3**) meet current left-turn lane warrants.

Table 13. Access Points per Mile

MP's	Approximate Number of Access Points
0.000-1.000	20
1.000-2.000	25
2.000-3.000	35
3.000-3.262	15

The team recommended adding the intersection spot improvements (e.g., realigning Haunz Lane, realigning KY 362 [Central Avenue], etc.) to the ultimate rebuild concept. It was noted that slide issues continue to be a problem in the former Lake Louisville area; therefore, the ultimate rebuild options should also consider raising the grade of KY 22 through this section.

The team also suggested considering another ultimate concept that improves the existing two-lane template (widening lanes to 11 feet and shoulders to 8 feet with 6 feet paved) by providing intersection spot improvements, keeping a TWLTL where warranted, and raising the grade through Lake Louisville.

Both the LO/S and public meetings produced feedback concerning the chokepoint (MP 0.679) this concept would create, i.e., leaving a two-lane template from Murphy Lane in Jefferson County to the Jefferson/Oldham County line. As a transportation corridor planning study prepared for Oldham County, the study limits were from the Jefferson/Oldham County line to KY 329 in Crestwood. KYTC partners noted the potential gap and would be open to a partnering to address this chokepoint should a future project advance from this study.



8.0 Potential Impacts and Benefits

The assessment of improvement concept impacts, including future traffic operations, costs, and benefit-cost analysis are provided herein.

8.1 2045 Build Scenario Traffic and Operations

The No-Build forecast applies to the two build scenarios, which both include all the intersection improvements (concepts A through F). As most of the concepts are smaller-scale, safety-driven improvements, they will have negligible impacts on traffic volumes using the corridor. Using HCS software, future operations were predicted and summarized in **Table 14**. The TWLTL offers minor improvement in capacity, specifically reducing the amount of vehicle hours of delay and driver density. As indicated in the *Traffic Forecast Report (Appendix A)*, some segments would experience an improved LOS with the TWLTL concept over the improved two-lane template.

Table 14. Comparison of Future Operations Between No Build and Build Concepts

Direction	2045 No-Build				2045 Build 2 Lane				2045 Build TWLTL			
	Eastbound		Westbound		Eastbound		Westbound		Eastbound		Westbound	
Peak	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
VHD ¹	1.23	1.76	3.26	1.46	1.16	1.66	3.23	1.44	1.00	1.17	2.41	1.25
Driver Density ²	14.6	21.2	33.4	17.9	14.3	20.8	33.0	17.7	12.2	17.8	28.5	15.8
Level of Service	D	E	E	E	D	E	E	E	D	E	E	E

¹VHD=Vehicle Hours of Delay; ²drivers/mile/lane

Intersection improvements are the same for both build scenarios, which shows small improvements in approach delay times at some of the intersections.

8.2 Cost Estimates

Planning-level design concepts were quantified to provide preliminary estimates for high-cost construction items, including earthwork, pavement, and structures. KYTC District 5's average unit bid prices were used to estimate the construction costs. Each construction phase estimate includes an additional 30% for contingencies. KYTC District 5 subject matter experts provided right-of-way and utility estimates. The planning-level cost estimates in 2022 dollars are provided in **Table 15** by phase for each concept.



Table 15. Cost Estimates

	Concept	Design	Right-of-Way	Utilities	Construction	Total
A	Haunz Lane to East Orchard Grass Boulevard – TWLTL and Haunz Realign	\$230,000	\$1,100,000	\$2,300,000	\$2,300,000	\$5,930,000
B	Lake Louisville Drive – Raise Grade	\$130,000	\$780,000	\$390,000	\$1,300,000	\$2,600,000
C	Briar Hill Parkway – Turn Lanes	\$130,000	\$350,000	\$490,000	\$1,230,000	\$2,200,000
D	Central Avenue/Oak Valley Drive – Realign	\$90,000	\$660,000	\$890,000	\$840,000	\$2,480,000
E.1	Clore Lane/Wooldridge Avenue – Left-Turn Lanes	\$140,000	\$290,000	\$560,000	\$1,400,000	\$2,390,000
E.2	Clore Lane/Wooldridge Avenue – Realign with Turn Lanes	\$170,000	\$660,000	\$560,000	\$1,700,000	\$3,090,000
F	Williamsgate Boulevard – KY 329 – Widen Symmetrically	\$220,000	\$2,200,000	\$1,200,000	\$2,200,000	\$5,820,000
	Williamsgate Boulevard – KY 329 – Widen North	\$260,000	\$2,500,000	\$1,200,000	\$2,600,000	\$6,560,000
	Pedestrian Tunnel ¹	\$300,000	-	-	\$3,000,000	\$3,300,000
	Williamsgate Boulevard – KY 329 – Widen Symmetrically with Pedestrian Tunnel	\$460,000	\$2,200,000	\$1,200,000	\$4,600,000	\$8,460,000
	Williamsgate Boulevard – KY 329 – Widen North with Pedestrian Tunnel	\$500,000	\$2,500,000	\$1,200,000	\$5,000,000	\$9,200,000
G.1	Study Area Corridor Widening – TWLTL	\$2,100,000	\$5,800,000	\$6,400,000	\$20,100,000	\$34,400,000
G.2	Study Area Corridor Widening – 2-Lane	\$1,900,000	\$5,000,000	\$6,400,000	\$18,100,000	\$31,400,000

¹Includes 2,000 feet of sidewalk north of KY 22 and 10-foot-wide shared use path through tunnel.



8.3 Benefit-Cost Analysis

Crash modification factors (CMF) from the CMF Clearinghouse²⁶ were applied to the four years of crash data discussed in **Section 2.4** to estimate potential safety benefits for each of the proposed improvements outlined above. Monetized values of crashes by severity were taken from the 2020 *Kentucky Traffic Collision Facts*²⁷ report published by the KTC.

Table 16 lists each concept's estimated B/C ratios over a 20-year analysis horizon (2022–2042) for each concept. A ratio greater than one means the discounted present value of benefits exceeds the discounted present value of costs, suggesting the project is a worthwhile investment. Ratios assume a 3% discount rate. Most of the concepts have ratios much greater than one, indicating the anticipated safety benefits are well worth the costs. Concepts B and F do not have B/C ratios greater than one, which suggests they may not be worthwhile standalone investments. However, they are included in both ultimate Build options (G.1 and G.2), which both have positive ratios. Concept F (Williamsgate Boulevard to KY 329) B/C ratio varies depending on the direction of widening (F.1 symmetrically and F.2 north) and inclusion of pedestrian tunnel.

Table 16. Benefit-Cost Summary

Concept	MP Limits	2017-2020 Crashes	Benefit/Cost Ratio
		Total Fatal/Injury/PDO	
A	Haunz Lane to East Orchard Grass Boulevard	41 0/4/37	2.24
B	Lake Louisville Drive	4 0/1/3	0.55
C	Briar Hill Parkway	23 0/3/20	2.80
D	Central Avenue/Oak Valley Drive - Realign	5 0/2/3	1.11
E.1	Clore Lane/Wooldridge Avenue – Left-Turn Lanes	54 1/12/41	21.26
E.2	Clore Lane/Wooldridge Avenue – Realign with Turn Lanes	54 1/12/41	28.24
F	Williamsgate Boulevard – KY 329	30 0/5/25	0.88 ¹
G.1	Study Area Corridor Widening – TWLTL	201 1/33/167	2.50
G.2	Study Area Corridor Widening – 2-Lane	201 1/33/167	2.16

¹B/C ratio varies: Widen North with Ped Tunnel: 0.88, Widen Symmetrically with Ped Tunnel: 0.95; Widen North without Ped Tunnel: 1.19; Widen North without Ped Tunnel: 1.31

²⁶ <http://www.cmfclearinghouse.org/>

²⁷ http://kentuckystatepolice.org/wp-content/uploads/2021/09/CrashFacts_2020_FY2021_Revised-1.pdf



9.0 FINAL COORDINATION MEETINGS

Final coordination efforts detailed herein informed project team decisions to refine and prioritize the concepts developed in **Section 7.0**. Meeting summaries of each coordination point are chronologically included in **Appendix F**.

9.1 Project Team Meeting No. 3

The project team met virtually July 6, 2022, to review the concept revisions requested during Project Team Meeting No. 2 and plan for upcoming coordination efforts. The key revisions included:

- Modifying the sidewalk tie-in near Haunz Lane.
- Realigning the KY 362 (Central Avenue) intersection to a “T” intersection and shortening right-turn bays.
- Adding a pedestrian tunnel to connect residential areas north of KY 22 with Maples Park.
- Adding intersection improvements to the ultimate build TWLTL concept.
- Considering TWLTL to be a worthwhile investment for the entire corridor and considering widening the roadway template with intersection improvements.

9.2 Local Official and Stakeholder Meeting No. 2 / Public Meeting No. 2

A second coordination point with local officials, stakeholders, and the public occurred July 21, 2022. Local officials and stakeholders were invited to preview the improvement concepts before the public open-house style meeting at the Deibel Barn at Maples Park. Handouts and paper surveys supplemented the improvement concept display boards. About 40 people attended. The project StoryMap and online survey were linked in the paper materials and shared online via social media outlets and the local news. Preliminary study concepts were shared, and feedback on local priorities and general improvement suggestions was requested.

The survey was available for about a month (June 8, 2022 to August 5, 2022) and 287 responses were received (279 electronically and 8 paper copies).

- Half the survey takers live along the corridor, 23% are presumed to commute (neither live nor work along KY 22), and 20% live and work along the corridor.
- Most (80%) travel the corridor daily and 15% travel it weekly.
- Results revealed the following priority list, with 1 being the most important.



Priority	Improvement Concept
1	E. Clore Lane/Wooldridge Avenue
2	A. Haunz Lane to East Orchard Grass Boulevard
3	D. KY 362 (Central Avenue)/Oak Valley Drive
4	C. Briar Hill Parkway
5	B. Lake Louisville Drive
6	F. Williamsgate Boulevard to KY 329

- When asked why they chose their top priority, most respondents noted safety and sight distance.
- Regarding the concept options for E, most (nearly 60%) preferred Clore Lane and Wooldridge Avenue be realigned.
- Considering sidewalk connectivity near the eastern terminus (Concept F), over half of the respondents indicated a connection is needed from Williamsgate Boulevard to KY 329 and about half indicated a pedestrian tunnel is needed to improve access to Maples Park. About a quarter of the respondents noted the sidewalk should extend west to Hughes Avenue.
- Comparing the ultimate build options, majority (nearly 75%) preferred a TWLTL. Only 7 respondents stated no improvement is needed.
- Other improvements suggested included adding more guardrail throughout the corridor, considering signals and roundabouts (particularly at Haunz Lane and Clore Lane), lowering the speed limit, including bicycle/pedestrian facilities for the entire length of the study area, fixing curves and grades, clearing vegetation, widening KY 22 to four or five lanes, designing for handling traffic during I-71 incidents, addressing deer/wildlife, and extending improvements to Murphy Lane in Jefferson County.

9.3 Project Team Meeting No. 4

The final project team meeting was held online August 19, 2022, to discuss study findings and concept prioritization. The Oldham County, KYTC, and consultant team reviewed the existing conditions, feedback from both rounds of public engagement, future build operations, concept summary sheets, and benefit-cost analyses to prioritize recommendations for future projects.



10.0 RECOMMENDATIONS

The project team decided to group the concepts into high, medium, and low priorities for both long-term (corridor-wide) and short-term (spot) improvement type projects. Some of the concepts were not recommended for further consideration.

10.1 Long-Term Improvements

Two corridor-wide improvement concepts were considered: G.1 TWLTL and G.2 Wider 2-lane template. Both concepts included all the intersection spot improvements. One of these options was recommended as a high priority ultimate build concept and the other was not recommended.

High Priority Corridor-Wide Widening & Intersection Improvements (Ultimate Build Concept)

- **G.1 | Study Area Corridor Widening – TWLTL** was the recommended high priority corridor-wide improvement project. The concept shows operational improvements over the G.2 concept for future 2045 operations, and was determined to best address the goals and objectives of the transportation study and provide the best ultimate solution for the corridor. With a positive B/C ratio of 2.50, this concept was determined to be a worthwhile investment to address the needs of the corridor. Based on 72% of 280 survey responses, the public preferred this corridor concept.
 - While this was the preferred long-term concept, the project team had concerns about securing funding for a project of this size, which is why the spot improvements were also prioritized in case funding could be more easily secured to implement them ahead of an ultimate build concept. Additionally, potential construction segmentation opportunities were discussed to achieve more manageable funding goals. The project team decided to segment the corridor into thirds, splitting at Briar Hill Parkway and Clore Lane, to consider the benefits and costs. To facilitate potential future project programming, segment cost estimates and benefit-cost ratios were determined as detailed in **Table 17**.



Table 17. Potential Corridor-Wide Improvement Segments

Segments	County Line-Briar Hill Parkway	Briar Hill Parkway-Wooldridge Avenue	Wooldridge Avenue-KY 329
Mile Points	0.0-1.4	1.4-2.1	2.1-3.3
Length (mile)	1.5 ¹	0.7	1.2
Includes Concepts	A. Haunz Lane-East Orchard Grass Boulevard B. Lake Louisville Drive C. Briar Hill Parkway	D. KY 22/KY 362 (Central Avenue)	E. Wooldridge Avenue/Clore Lane F. Williamsgate to KY 329 with Pedestrian Tunnel
D	\$800,000	\$300,000	\$1,000,000
R	\$2,200,000	\$800,000	\$2,800,000
U	\$3,500,000	\$1,000,000	\$2,000,000
C	\$7,800,000	\$2,500,000	\$9,900,000
T	\$14,300,000	\$4,600,000	\$15,700,000
Total Crashes Fatal/Injury/PDO	88 0/12/76	26 0/5/21	87 1/16/70
B/C Ratio	1.49	1.51	3.5

¹Includes 0.1-mile into Jefferson County to account for Haunz Lane left-turn taper length and storage

- o Another opportunity to reduce project costs could consider an alternative that reduces the TWLTL template in areas where it may not realize much use. However, it does meet warrants for the entire study length and is recommended to support this growing area. A preliminary review of current areas with lower access point density reveals three locations, each less than 0.2-mile long (between required design taper lengths of proposed left-turn lanes) that may support a reduced two-lane template. A future project could further explore potential cost savings. There is developable land in all three of these locations and cumulatively they account for approximately 15% of the study length.
- o Concerning sidewalk connections, as indicated in the spot improvements, a 10-foot-wide shared use path from Haunz Lane to East Orchard Grass Boulevard and a 5-foot-wide sidewalk from Hughes Avenue to KY 329 are currently proposed. A future project could further consider complete street²⁸ options to potentially connect more residential areas to community resources.



10.2 Short-Term Improvements

Short-term improvements could include the identified spot improvements and/or maintenance-type activities.

High Priority Spot Improvements

- **Concept E.2 | Clore Lane/Wooldridge Avenue Realign with Turn Lanes** was recommended as a high priority spot improvement. This intersection had the highest number of total crashes and the more severe crashes than other intersections, the highest crash rate factor (1.58), was the main public concern expressed during both rounds of engagement, and has some local match money already available. This concept was preferred by the public (nearly 60%) and the project team determined that it would best address the intersection needs, particularly safety concerns. It was more expensive than Concept E.2 but had the highest B/C ratio of all spots at 28.24.
- **Concept A | Haunz Lane to East Orchard Grass Boulevard** was recommended as a high priority spot improvement. Haunz Lane was the second highest intersection of concern identified during both rounds of public engagement. This segment had the second highest number of total crashes. The concepts B/C ratio was over 2, indicating it is a meaningful safety improvement for the area. Haunz Lane has the second highest volume of traffic for an intersecting street.
- **Concept C | Briar Hill Parkway** was identified as a high priority spot improvement. It had a similar B/C ratio (over 2) to concept A, but experiences less traffic and has historically had fewer crashes. Nearly half of the crashes at this intersection were rear-ends. It has a high crash rate factor (1.39). This intersection is a local priority due to the volume of residences it serves and local amenities such as Briar Hill Park.

²⁸ <https://www.kipda.org/wp-content/uploads/2022/08/KIPDA-Complete-Streets-Policy-FINAL.pdf>



Medium Priority Spot Improvements

- **Concept D | Central Ave/Oak Valley Drive – Realign** was determined to be a medium priority project. This intersection was identified as the public's third highest priority during the second round of public engagement. It has a positive B/C ratio and addresses key intersection issues.
- **Concept F | Williamsgate Boulevard to KY 329 TWLTL and Pedestrian Tunnel** was identified as a medium priority project. This concept ranked as the lowest public priority. This section of KY 22 has historically experienced more crashes than the section approaching Lake Louisville Drive. The survey effort identified the top pedestrian improvements in the area to be a sidewalk connection from Williamsgate Boulevard to KY 329 and a pedestrian tunnel to Maples Park. The B/C ratio was nearly 1, and it was noted if approximately \$1 million in cost savings could be realized then the B/C ratio would exceed 1.
 - Considering this concept without a pedestrian tunnel may make securing future competitive safety funds for a standalone pedestrian tunnel project challenging as there were no historical pedestrian crashes. The project team recommended including the pedestrian tunnel with this concept to provide a safe crossing for the residential area north of KY 22 to Maples Park to the south.
 - Instead of selecting an alignment for widening (F.1 symmetrically versus F.2 north), it was decided future project development efforts could further explore options. KYTC recommended including the higher estimate when seeking future funds.
- **Concept B | Lake Louisville Drive** was determined to be a medium priority project. This concept had the lowest B/C ratio, fewest total crashes of any of the study intersections, and the public ranked it in the bottom two.



Medium Priority Maintenance-Type Activities

As interim projects to address existing conditions issues, the following items could be addressed if specific funding types were available prior to the implementation of an ultimate Build concept.

- Repair shoulders and add wider edge lines. Wider edge lines are an FHWA proven safety countermeasure, proven to reduce fatal and injury crashes on two-lane rural roads.²⁹ According to the HIS database, most of the existing shoulders are asphalt combination with approximately 1-foot-paved and 3-foot-total-width (see **Figure 7**). About 14% of the study corridor roadway has no shoulders or curbs. Single vehicle crashes comprise 36% total crashes, with 1 fatality and 8 resulting in injuries. This could also include improving the clear zone (cutting back rock outcrops and improving ditches and/or adding guardrail). Safe Streets and Roads for All could be a potential funding source.³⁰ A project of this type would also be potentially eligible for Highway Safety Improvement Program (HSIP) funding.
- Trim or remove vegetation on inside of curves and near intersecting roadways throughout the corridor. This could potentially be completed through coordination with KYTC maintenance division.

²⁹ <https://safety.fhwa.dot.gov/provencountermeasures/wider-edge-lines.cfm>

³⁰ https://www.kipda.org/wp-content/uploads/2022/08/August-25-2022_External-Grant-Opportunities.pdf



10.3 Improvements Not Recommended

The following concepts were not recommended for further study other options for those locations better addressed the objectives of the study.

- **Concept G.2 | Study Area Corridor Widening – 2-Lane.** The approximate \$3 million cost savings compared to Concept G.1 was deemed insufficient justification for carrying this concept forward. The reduced B/C ratio (2.16 versus 2.50 with G.1), strong public preference for a three-lane (72%) over a two-lane (23%) concept, and inability to improve future Build LOS over the future No-Build operations (which does not meet the study purpose of reducing congestion) drove the project team decision to not recommend this concept.
- **Concept E.1 | Clore Lane/Wooldridge Avenue – Left-Turn Lane.** The minimal cost savings (~\$700,000) compared to Concept E.2 did not justify implementing this project ahead of the goal of realigning this intersection. The project team had concerns about future Build operations, particularly with the limited storage length provided and potential left weave issues. This concept would less effectively address the safety concerns at this location, and the public feedback preferred E.2 over this concept. Thus, this concept was not recommended for further consideration.

10.4 Project Sheets

Individual information sheets for improvement concepts A through G are presented in this section. These sheets summarize study findings (e.g., crash history, worst operating intersection movement, geometry, costs, general environmental concerns in the vicinity,³¹ etc.).

³¹ Note: environmental concerns do not necessarily indicate anticipated impacts, instead they are resources to be aware of as future design concepts are developed.



A.	Haunz Lane to East Orchard Grass Boulevard		
KY 22 MP 0.021-0.300	Haunz Lane MP 0.000	East Orchard Grass Boulevard MP 0.000	
IMPROVEMENT DESCRIPTION:		PHASE ESTIMATES:	
• Realign Haunz Lane to a “T” intersection with KY 22. • Add a left- and a right-turn lane on Haunz Lane. • Add a left-turn lane from eastbound KY 22 to Haunz Lane. • Add a TWLTL from Haunz Lane to East Orchard Grass Boulevard. • Include right- and left-turn lanes on KY 22 to East Orchard Grass Boulevard.		(2022 Dollars)	
		Design:	\$230,000
		Right-of-Way:	\$1,100,000
		Utilities:	\$2,300,000
		Construction:	\$2,300,000
Short-Term	Oldham County	Total Cost:	\$5,930,000
IDENTIFIED NEEDS:			
• 2017-2020 Crashes: 39 crashes, 5 injuries, 1 fatality; top manners of collisions: 36% single vehicle, 31% rear-end, 23% angle; Haunz Lane CCRF 0.90; East Orchard Grass Boulevard CCRF 0.82; LOSS 3. • 2021 Traffic: 13,500 vpd; Haunz Lane Left-Turn LOS F, v/c 1.34. • 2045 Traffic: 18,500 vpd; Haunz Lane Left-Turn LOS F, v/c 9.62. Haunz Lane Right-Turn LOS F, v/c 1.03. • Existing Geometry: Two 10-ft-wide lanes; <1-ft-wide shoulders; skewed intersection at Haunz Lane. • Other: Speed limit transitions from 45 MPH to 55 MPH; public concern area; heavy truck traffic with access to Ernst Concrete and quarry.			
ENVIRONMENTAL CONCERNS:		Louisville Memorial Gardens	
PROJECT CONCEPT:			
			
New Pavement	Sidewalk/MUP	Directional Striping	Edge line/arrows



B.		Lake Louisvilla Drive	
KY 22 MP 0.653		Lake Louisville Drive MP 0.000	
IMPROVEMENT DESCRIPTION:		PHASE ESTIMATES: (2022 Dollars)	
• Raise the grade of Lake Louisvilla Drive and KY 22 by approximately 5 feet. • Cut back the rock outcrops along KY 22. • Clear trees and vegetation. • Extend the culvert and install guardrail to the southeast of the intersection.		Design:	\$130,000
		Right-of-Way:	\$780,000
		Utilities:	\$390,000
		Construction:	\$1,300,000
Short-Term	Oldham County	Total Cost:	\$2,600,000
IDENTIFIED NEEDS:			
• 2017-2020 Crashes: 4 crashes, all westbound; 3 rear-ends, all left turns; 1 injury. • 2021 Traffic: Lake Louisville Drive LOS C, v/c 0.15. • 2045 Traffic: Lake Louisville Drive LOS F, v/c 0.28. • Existing Geometry: Two 10-ft-wide lanes; grade class D on KY 22; Lake Louisvilla Drive intersects KY 22 at steep upgrade on Lake Louisville Drive and a steep downgrade on KY 22. • Other: Speed limit 55 MPH, steep drop offs, rock outcrops, and vegetation.			
ENVIRONMENTAL CONCERNS:		Drained lake, bat habitat, & socioeconomic	
PROJECT CONCEPT:			
New Pavement	Guardrail	Directional Striping	Edge line/arrows



C.		Briar Hill Parkway	
KY 22 MP 1.264		Briar Hill Parkway MP 0.000	
IMPROVEMENT DESCRIPTION:		PHASE ESTIMATES:	
• Add left- and right-turn lane on KY 22. • Restripe the area to make it a no-passing zone. • Clear trees and vegetation.		(2022 Dollars)	
		Design:	\$130,000
		Right-of-Way:	\$350,000
		Utilities:	\$490,000
		Construction:	\$1,230,000
Short-Term	Oldham County	Total Cost:	\$2,200,000
IDENTIFIED NEEDS:			
• 2017-2020 Crashes: 17 crashes, 3 injuries; top manners of collisions: 47% rear-end, 35% single vehicle; CCRF 1.39. • 2021 Traffic: Briar Hill Parkway LOS F, v/c 0.99. • 2045 Traffic: Briar Hill Parkway LOS F, v/c 3.21. • Existing Geometry: Two 10-ft-wide lanes; Briar Hill Parkway intersects KY 22 on a downgrade. • Other: Speed limit 55 MPH; exposed rock along Briar Hill Parkway.			
ENVIRONMENTAL CONCERNS:		Bat habitat	
PROJECT CONCEPT:			
			
New Pavement	Directional Striping	Edge line/arrows	



D.		KY 362 (Central Avenue) / Oak Valley Drive	
KY 22 MP 1.825	KY 362 (Central Avenue) MP 0.000	Oak Valley Drive MP 0.000	
IMPROVEMENT DESCRIPTION:		PHASE ESTIMATES:	
• Realign KY 362 (Central Avenue) to a “T” intersection with KY 22. • Add a right-turn lane on KY 362 (Central Avenue). • Add right- and left-turn lanes on KY 22. • Clear trees and vegetation. • Add curb and gutter along southwest quadrant for access control.		(2022 Dollars)	
		Design:	\$90,000
		Right-of-Way:	\$660,000
		Utilities:	\$890,000
		Construction:	\$840,000
Short-Term	Oldham County	Total Cost:	\$2,480,000
IDENTIFIED NEEDS:			
• 2017-2020 Crashes: 5 crashes, 2 injuries, 40% rear-ends. • 2021 Traffic: KY 362 (Central Avenue) LOS F, v/c 2.47. • 2045 Traffic: KY 362 (Central Avenue) LOS F, v/c 29.44. • Existing Geometry: Two 10-ft-wide lanes; skewed intersection. • Other: Speed limit 45 MPH; uncontrolled access along southwest quadrant, parking lot abuts roadway along inside curve.			
ENVIRONMENTAL CONCERNS:		Hazmat, water wells, historic resource	
PROJECT CONCEPT:			
New Pavement		Median Island	Directional Striping
			Edge line/arrows



E.		Clore Lane / Wooldridge Avenue	
KY 22 MP 1.900-2.200		Clore Lane MP 0.000	Wooldridge Avenue MP 0.000
IMPROVEMENT DESCRIPTION:		PHASE ESTIMATES: (2022 Dollars)	
- Align Wooldridge Avenue and Clore Lane with left-turn lanes and right-turn pockets on both streets. - Add dedicated left-turn lanes on KY 22. - Clear trees and vegetation.		Design:	\$170,000
		Right-of-Way:	\$660,000
		Utilities:	\$560,000
		Construction:	\$1,700,000
Short-Term	Oldham County	Total Cost:	\$3,090,000
IDENTIFIED NEEDS:			
2017-2020 Crashes:		52 crashes, 11 injuries, 1 fatality; top manners of collisions: 62% rear-end, 27% single vehicle; CCRF 1.58; LOSS 3 (KAB).	
2021 Traffic:		Wooldridge Avenue LOS E, v/c 0.34; Clore Lane LOS F, v/c 1.30.	
2045 Traffic:		Wooldridge Avenue LOS E, v/c 0.41; Clore Lane LOS F, v/c 4.27.	
Existing Geometry:		Two 10-ft-wide lanes; offset intersection; grade class transitions from E to D in this area.	
Other:		Speed limit is 45 MPH; public concern area.	
ENVIRONMENTAL CONCERNS:		Bat habitat, church	
PROJECT CONCEPT:			
 Trim Vegetation 			
New Pavement	Directional Striping	Edge line/arrows	



F.		Williamsgate Boulevard to KY 329	
KY 22 MP 2.350-3.270		Williamsgate Boulevard MP 0.000	KY 329 MP 8.840
IMPROVEMENT DESCRIPTION:		PHASE ESTIMATES: (2022 Dollars)	
- Construct a TWLTL from Williamsgate Boulevard to KY 329 with a 5-foot-wide sidewalk north of KY 22. - Add guardrail in areas of steep drop-offs. - Add a pedestrian tunnel to connect residential areas to the north to Maples Park to the south without an at-grade crossing of KY 22.		Design:	\$500,000
		Right-of-Way:	\$2,410,000
		Utilities:	\$1,200,000
		Construction:	\$4,960,000
Short-Term	Oldham County	Total Cost:	\$9,070,000
IDENTIFIED NEEDS:			
2017-2020 Crashes:		18 crashes, 3 injuries; top manners of collisions: 33% rear-end, 28% angle, 22% opposing left turn.	
2021 Traffic:		13,800 vpd; KY 22 westbound through LOS F, v/c 1.01 at KY 329 signal.	
2045 Traffic:		18,700 vpd; KY 22 westbound through LOS F, v/c 1.51 at KY 329 signal.	
Existing Geometry:		Two 12-ft-wide lanes; grade class E; KY 329 is a skewed, offset, and signalized intersection.	
Other:		Speed limit transitions from 45 MPH to 35 MPH; public concern area – crossing to Maples Park and significant backups from the signal to Williamsgate Boulevard; several business entrances to the north.	
ENVIRONMENTAL CONCERNS:		Bat habitat, Maples Park, hazmat, historic resources, water wells, stream	
PROJECT CONCEPT:			
			
New Pavement	Sidewalk/MUP	Directional Striping	Edge line/arrows
			Guardrail



G. Two-Way Center Left-Turn Lane for Study Length	
KY 22 MP 0.000-3.270	
IMPROVEMENT DESCRIPTION:	PHASE ESTIMATES: (2022 Dollars)
- Construct as a three-lane road with a 13-foot-wide TWLTL, two 11-foot-wide driving lanes and 8-foot-wide shoulders (6 feet paved) the entire length of the study area; and a 10-foot-wide shared use path from Haunz Lane to East Orchard Grass Boulevard and a 5-foot-wide sidewalk from Hughes Avenue to KY 329. - Includes all intersection improvements (A-F).	Design: \$2,100,000
	Right-of-Way: \$5,800,000
	Utilities: \$6,400,000
	Construction: \$20,100,000
Long-Term	Oldham County
	Total Cost: \$34,400,000
IDENTIFIED NEEDS:	
2017-2020 Crashes: 179 crashes, 31 injuries, 2 fatalities; CCRF 0.90; rear-ends and single vehicle crashes comprise 80%; the Clore/Lane Wooldridge Avenue intersection statistically has experienced the most crashes. 2021 Traffic: About 14,000 vpd; AM westbound LOS E. 2045 Traffic: About 19,000 vpd; AM westbound LOS E, PM eastbound and westbound LOS E. Existing Geometry: Mostly two 10-ft-wide lanes with less than 1-foot-wide paved shoulders; rolling terrain. Other: Speed limit transitions between 35 MPH, 45 MPH, and 55 MPH; travel speeds typically lower than posted during the peak periods, with significant slowdowns approaching intersections; most intersecting street movements operate at LOS F.	
ENVIRONMENTAL CONCERNS:	Louisville Memorial Gardens, churches, bat habitat, hazmat, water wells, historic resources, Maples Park, sinkhole, streams
PROJECT CONCEPT:	
The figure consists of two maps of the study area (KY 22 MP 0.000-3.270). The top map is a 'Kernal Density Map' showing higher density in yellow and lower density in orange. The bottom map is a 'Manner of Collision (179)' map showing 179 collisions with symbols for Angle (20), Backing (1), Head On (2), Opposing Left Turn (7), Rear End (78), Sideswipe (6), and Single Vehicle (65). The maps show the study area's location relative to Oldham County and Jefferson County, and nearby roads like East Orchard Grass Blvd, Haunz Lane, and Hughes Avenue.	



11.0 NEXT STEPS

The next phase in the project development process for long-term projects is Phase I Preliminary Engineering. Future funding is needed to advance any of the concepts identified herein this study. If federal funds are used or federal permits are required, additional environmental analyses will be required to satisfy the National Environmental Policy Act (NEPA). Short-term projects may be initiated through local funding or if the KYTC district's routine maintenance, traffic programs, or Highway Safety Improvement Program (HSIP) allow. The County could collaborate with key partners, KYTC, and KIPDA to implement projects. A first step could be to recommend project for input into KYTC's CHAF³² database for consideration alongside other projects in the next SHIFT³³ prioritization cycle (occurring every two years) to secure funding for future project development phases. Continued coordination with local officials, key stakeholders, and the public will be critical in considering the potential for impacts to nearby residents, natural and community resources, and traveling motorists.

12.0 ADDITIONAL INFORMATION

Written requests for additional information should be sent to:

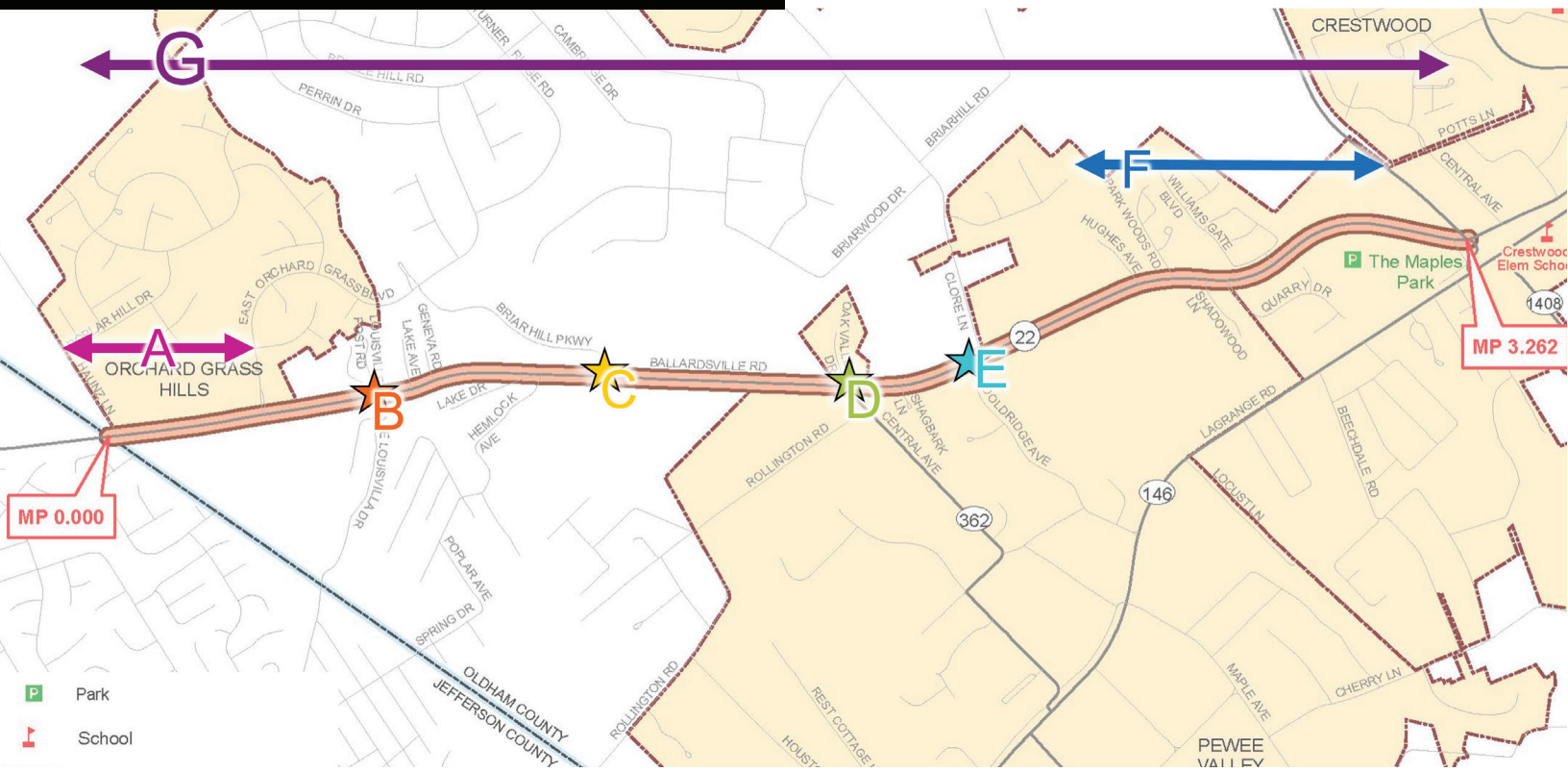
Oldham County Planning & Zoning	or	KYTC District 5 Planning
Oldham County Fiscal Court		KYTC District 5
100 W Jefferson Street		8310 Westport Road
LaGrange, KY 40031		Louisville, KY 40242
502.222.1476		502.210.5400

³² CHAF: Continuous Highway Analysis Framework,
<https://transportation.ky.gov/Planning/Pages/CHAF.aspx>

³³ SHIFT: Strategic Highway Investment Formula for Tomorrow,
<https://transportation.ky.gov/SHIFT/Pages/default.aspx>

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OLDHAM COUNTY KY 22 CORRIDOR STUDY
PRELIMINARY IMPROVEMENT CONCEPTS



Engineering Planning