



EXECUTIVE SUMMARY **Smallhouse Road Study**

In Partnership with:



Bowling Green-Warren County Metropolitan Planning Organization

HMB Professional Engineers, Inc.

June 2023

Introduction and Study Area

The Smallhouse Road Study was initiated in November 2022 by the Bowling Green – Warren County Metropolitan Planning Organization (BG-WC MPO) to provide recommendations on how to transform the corridor to a safer, more user-friendly roadway. As part of the study, considerations are given to safety, capacity access management, and bicycle / pedestrian improvements along the corridor to determine future short-term and long-term solutions. **Figure ES-1** shows the extents of the study area along Smallhouse Road. The study area extends from US 231 (Campbell Lane) south to KY 884 (Three Springs Road). from the intersection with US 231 in the east to the intersection with KY 1554 in the west. It extends into the county south to the area where I-165 intersects with KY 142. All state-maintained routes within this boundary were included for consideration of this study. The study was conducted in coordination with the BG-WC MPO, the City-County Planning Commission of Warren County (CCPC), Kentucky Transportation Cabinet (KYTC), City of Bowling Green, and Warren County Public Works.

The study goals are as follows:

- Provide necessary safety, capacity, access management, and bicycle / pedestrian improvements for all users into the future.
- Recommendations for major intersections along the corridor including, but not limited to US 231 (Campbell Lane), Cave Mill Road, Grider Pond Road, Elrod Road, and KY 884 (Three Springs Road).
- Have minimal right-of-way impacts.

To accomplish the study goals, the Project Team (consisting of the organizations listed above and consultant personnel) worked collaboratively with the local community on the following tasks:

- Conduct a comprehensive review of the existing conditions.
- Identify improvement concepts for both intersection / spots and corridor-wide to address identified capacity and safety issues that incorporate bicycle and pedestrian connectivity.
- Model and forecast current and future traffic to help with comparative analysis.
- Evaluate improvement concepts relative to operations, safety, impacts, and costs.
- Provide a prioritized list of locations and improvement concepts the MPO and coordinating agencies can use for future transportation project development.

Existing Conditions

Information on elements of the existing Smallhouse Road corridor was collected including roadway facility types and geometrics, vehicle speeds, traffic volumes and operations, crash history and analysis, and bicycle and pedestrian accommodations.

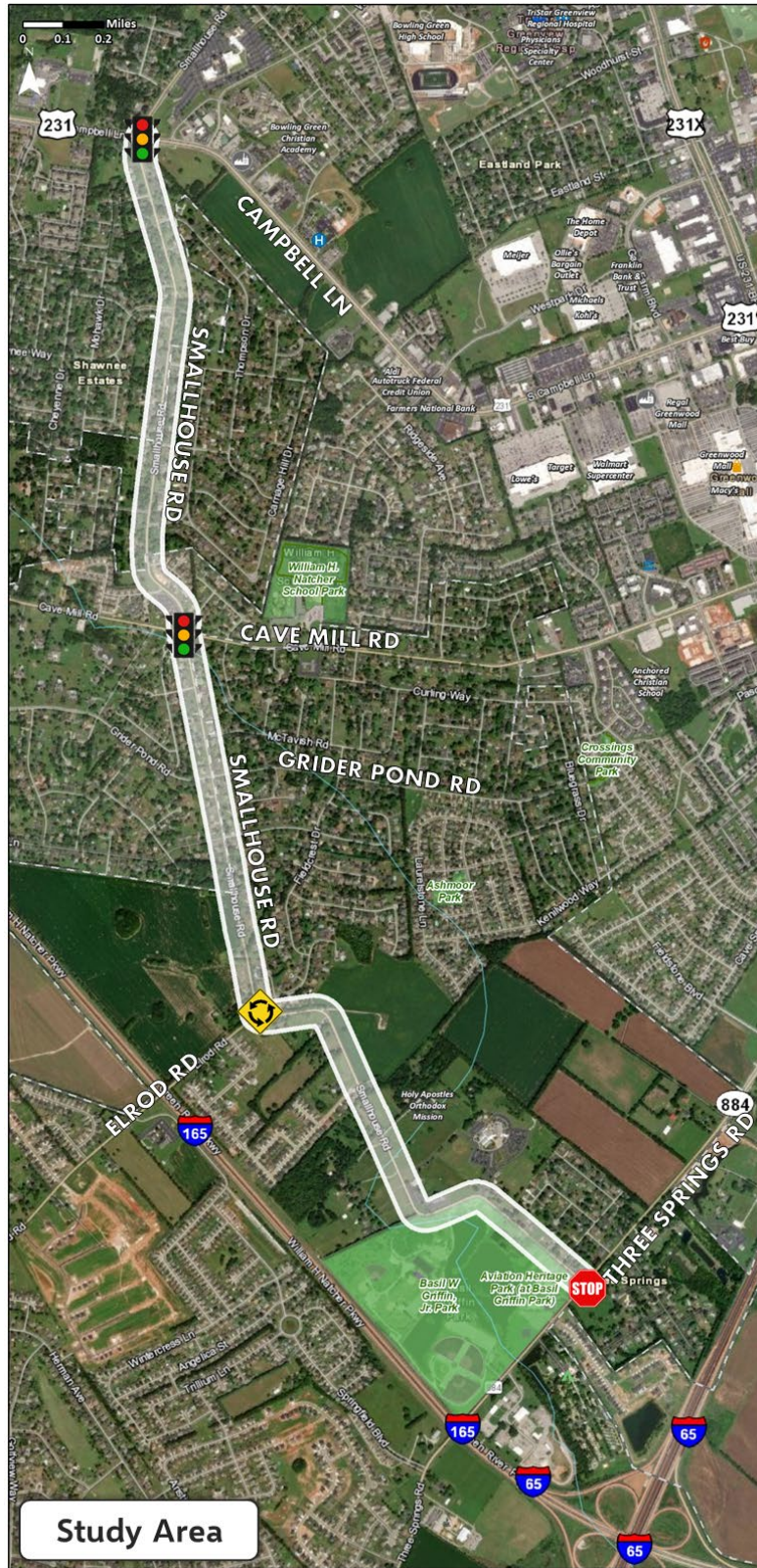
Functional Class and Roadway Systems – Smallhouse Road (between US 231 and KY 884) is classified as an Urban Major Collector. These types of roadways serve as a connection between local roads and higher functional arterials and typically serve shorter trips.

Maintenance – The City of Bowling Green and Warren County both maintain portions of Smallhouse Road.

Typical Section – Smallhouse Road consists of two travel lanes (no median) that range from ten to twelve feet. There is minimal to no shoulder width (zero to one foot).

Horizontal and Vertical Curves – There are five horizontal curves along the corridor graded at E (14.0 – 27.9 degrees) or F (28.0 degrees or more). Curves graded at D or lower typically would benefit from improvements. All vertical curves meet design criteria for 30-35 mph urban sections.

Figure ES-1. Study Area



Speed Limit – The speed limit varies along the route within the study area – between 30 and 30 mph, and 25 mph for the roundabout at Elrod Road. Speed data showed the 85th percentile ranges to be 47-49 mph in both locations, which is significantly higher than posted speed limits.

Traffic Volumes and Operational Analysis – Existing year (2022) average annual daily traffic (AADT) ranges from 3,600 AADT closer to KY 884 to 8,200 AADT closer to Cave Mill Road. Level of service (LOS) is a qualitative measure used to determine operational characteristics of roadways and intersections and ranges from A (free flowing) to F (severely congested). The major intersections operate at LOS D or better with the corridor at LOS C for 2022.

Crash Analysis – Historical crash data was evaluated from September 2017 to August 2022 to help identify locations and trends along roadways that could be considered high crash locations. Level of Service of Safety (LOSS) categorizes crashes from 1 to 4 with 1 indicating a substantially better safety performance and a low potential for crash reduction and 4 a substantially worse than expected safety performance and a high potential for crash reduction. There are numerous segments between Campbell Lane and Cave Mill at LOSS 3 with another segment near Lois Lane at LOSS 3.

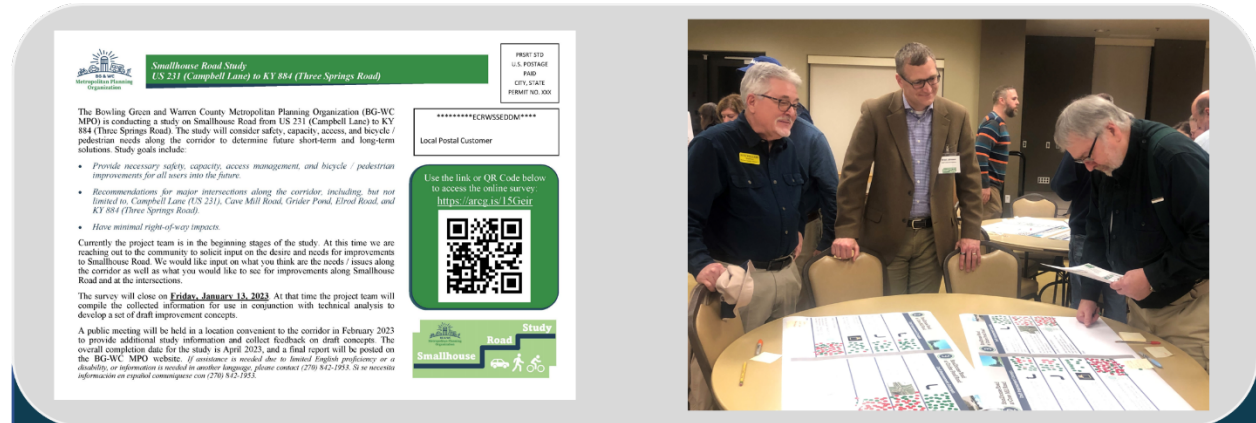
Pedestrian and Bicycle Facilities – There is no bicycle or pedestrian accommodation along the corridor within the study area. Most of the activity is east and west of the

corridor using existing sidewalks, greenways, and trail systems. North of Campbell Lane is a recently constructed shared use path along Smallhouse Road. At the southern end of the corridor is a system of trails through Basil Griffin Park.

Environmental Overview – An Environmental Overview was conducted to identify resources and issues for consideration during the development of potential improvement concepts. Items of note include karst topography throughout the corridor and prime farmland in the southern portion of the study area. There are several community resources located along or adjacent to the corridor including multiple churches, schools, and recreation facilities (Basil Griffin Park and Aviation Heritage Park). A high-level socioeconomic review found that the census tract containing Shawnee Estates has indicators for low income, less than high school education, linguistically isolated and high unemployment rate.

Community Engagement

During the study, outreach and collaborative meetings were held. These include:



Community Survey

An interactive online survey published during the beginning stages of the study to gauge the desire and needs of the local community for improvements to Smallhouse Road.

- Postcard sent by Every Door Direct Mailer to 4,229 addresses along corridor or routes adjacent
- Online survey open from December 14, 2022 – January 14, 2023
- 280 online surveys returned

Public Meeting

An open house style meeting to inform attendees about the study and provide an opportunity to collect feedback on improvement concepts.

- February 20, 2023, from 5:30 – 7:00 PM
- Holy Spirit Catholic Church
- 217 Attendees (20% with addresses directly on Smallhouse Road)
- Advertised by variable message signs / MPO website and newsletter / emails to local schools and churches / media
- 83 online surveys returned

Intersection / Spot Improvement Concepts

At the outset of the study, five priority intersections were identified for evaluation. These include US 231 (Campbell Lane), Cave Mill Road, Grider Pond Road, Elrod Road, and KY 884 (Three Springs Road). These formed the first list of locations to be considered for evaluation and development of improvement concepts. Further review throughout the corridor was performed to identify other additional minor intersections / spots with opportunity for improvements. Considerations included:

- Geometric data (horizontal or vertical curvature issues)
- EEC data (LOSS 3 or 4 locations)
- Public response (Community Survey)
- Traffic operations analysis

Four additional locations were identified through this process: Shawnee Way, curve near Cave Mill Road, curve near Elrod Road, curves by Basil Griffin Park.

With a list of possible improvement locations, the next step was to identify potential improvement concept options to address needs. Some additional analysis was performed to assist with the development: additional review of crash data / safety countermeasures; turn lane evaluation; future year traffic operations.

Planning-level cost estimates were produced for each of the improvement concepts by estimating 2023 costs of design, right-of-way acquisition, utilities, and construction. To help with the selection of recommendations, a return on investment (ROI) analysis was performed which compares the estimated safety benefit compared to the estimated project cost. The cost and ROI numbers for the recommended projects are shown in the prioritization lists.

Corridor Improvement Concepts

For the segments between the intersections, emphasis is on balancing the needs of all users (vehicle, bus, truck, bicycle, and pedestrian). A key reference for determining context-appropriate applications for improvements to the corridor is the recently developed Complete Streets, Roads, and Highways Manual (Kentucky Transportation Cabinet). An additional resource used to help form corridor improvement options is the Bowling Green -Warren County Bicycle and Pedestrian Master Plan (2022).

Combinations of typical section elements were prepared and presented to the public for their input. Being mindful of changes in context throughout the corridor, input was also requested on desired typical section based on location. For example, the character and land development changes near the Elrod Road intersection. Therefore, different typical sections may be selected to better serve needs. During any subsequent design phase, exact widths, material (i.e., asphalt / concrete), and drainage treatment (i.e. curb and gutter / ditch) will be determined.

Technical analysis, public input, and discussion with the Steering Committee resulted in narrowing down the list of potential typical sections. The results show a preference of either a sidewalk or shared use path on one side in conjunction with a two-way left-turn lane (TWLTL). The Steering Committee agreed for the northern section to be a transition from an urban to rural section with the TWLTL (from Campbell Lane to Cave Mill Road, then potentially down to Grider Pond Road / Elrod Road).

In addition to the TWLTL, the Steering Committee agreed with the recommendation of a wide sidewalk or shared use path (SUP) on one side of roadway with buffer. South of Elrod Road, a SUP with buffer for future potential widening and / or improvements to the transportation network is preferred. Regarding pavement type, runners / bicyclists in the Bowling Green area have requested pavement instead of concrete. The transition from paved to concrete SUP provides visual differentiation from the more urban portion of Smallhouse Road north of Campbell Lane.

Other options evaluated include traffic calming measures such as education, radar speed signs, and enforcement. As noted during the public meeting, an additional recommendation is to move mailboxes from one side of the road to the corresponding side with the house. This was part of the newly constructed project on Smallhouse Road north of Campbell Lane.

Study Outcomes

The Smallhouse Road Study resulted in a range of conceptual improvements for future implementation. Improvement concepts primarily focused on areas with safety, traffic operations, and multimodal (bicycle / pedestrian) needs. Utilizing additional tools including operations analysis, traffic forecasting, Steering Committee input, public input and a high-level return on investment analysis, a prioritized list of recommendations for improvements has been compiled.

Several of the short term projects target improving safety at intersections and curves throughout the corridor. The high priority projects include improvements that will help with traffic operations now at Campbell Lane and Cave Mill Road. The construction of the mini-roundabout at Shawnee Way is included as it falls in the high priority segment of corridor improvement between Campbell Lane and Cave Mill Road. The same reasoning was used to determine the priority of installing a mini-roundabout at Grider Pond Road as it will be more efficient to include improvements at this intersection in conjunction with corridor improvements between Cave Mill Road and Elrod Road.

Long term (lower priority) improvements are improvements that are needed to address traffic operations in the future (2045). As traffic grows in the area, it is suggested to monitor traffic operations and use these improvements as options to address this growth accordingly. The southern portion of corridor improvements is shown as a long term priority as modifications should be considered in conjunction with future development and other modifications to the surrounding roadway network (i.e. the I-165 interchange with Elrod Road and new Three Springs Road connection). If the Three Springs Road Connector moves forward, consideration should be given to incorporation of a SUP in the typical section, possibly in lieu of constructing the SUP along the existing corridor.

In addition to the prioritization tables, **Figure ES-2** illustrates the priority of corridor improvements.



Short Term






Location	Concept	Public Input	Planning Cost Estimate	ROI
Campbell Lane	Signal Phasing / Timing Optimization	N/A	N/A	N/A
	Add Retroreflective Backplates	For: 51 Against: 4	\$2,500	700:1 (5 Years)
Cave Mill Road	Add Retroreflective Backplates	For: 31 Against: 2	\$2,500	500:1 (5 Years)
Elrod Road	Add Additional / Enhanced Pavement Markings	For: 27 Against: 9	\$5,000	80:1 (5 Years)
	Add Enhanced Signage	For: 24 Against: 5	\$5,000	No applicable CMF
	Add Lighting	For: 90 Against: 2	\$5,000	45:1 (5 Years)
	Add Edge Rumble Strips	For: 45 Against: 1	\$5,000	35:1 (5 Years)
Curve Near Cave Mill Road	Add Chevron Signage / Enhanced Signage	For: 42 Against: 2	\$5,000	50:1 (5 Years)
	Provide Pavement Friction Management	For: 48 Against: 0	\$50,000	5:1 (5 Years)
Curve Near Elrod Road	Add Chevron Signage / Enhanced Signage	For: 28 Against: 0	\$5,000	100:1 (5 Years)
	Conduct Tree Trimming	For: 32 Against: 4	\$2,500	110:1 (5 Years)
	Provide Pavement Friction Management	For: 24 Against: 0	\$50,000	10:1 (5 Years)
Curves by Basil Griffin Park	Add Enhanced Signage	For: 39 Against: 0	\$5,000	80:1 (5 Years)
	Provide Pavement Friction Management	For: 30 Against: 1	\$50,000	10:1 (5 Years)







High Priority

Location	Concept	Public Input	Planning Cost Estimate	ROI
Campbell Lane	 Extend NB Right Turn Lane	For: 87 Against: 4	\$250,000	2:1 (5 Years)
	 Extend WB Right Turn Lane	For: 70 Against: 4	\$250,000	5:1 (5 Years)
Cave Mill Road	 Extend WB Right Turn Lane	For: 45 Against: 10	\$250,000	2:1 (5 Years)
Shawnee Way	 Construct Mini-Roundabout (in conjunction with high priority segment – Campbell to Cave Mill)	For: 5 Against: 72	\$1,090,000	1:1 (20 Years)
Corridor – Campbell Lane to Cave Mill Road	 Construct TWLTL with SUP on one side with buffer.	For: 103 Against: 14	\$4,270,000	3:1 (20 Years)

Medium Priority




Location	Concept	Public Input	Planning Cost Estimate	ROI
Campbell Lane	 Construct Dual WB Left Turn Lanes with Receiving Lane	N/A	\$2,125,000	No applicable CMF
Grider Pond Road	 Construct Mini-Roundabout (in conjunction with medium priority segment – Cave Mill to Elrod)	For: 14 Against: 61	\$1,100,000	1:1 (20 Years)
Corridor – Cave Mill Road to Elrod Road	 Construct TWLTL with SUP on one side with buffer.	For: 103 Against: 14	\$4,270,000	1:1 (20 Years)

Long Term (Low Priority)

Location	Concept	Public Input	Planning Cost Estimate	ROI
Campbell Lane	 Reroute Left Turns with New Connection at Westen Street	N/A	\$2,800,000	13:1 (20 Years)
Cave Mill Road	 Construct Roundabout (2 Lane)	For: 43 Against: 84	\$2,960,000	3:1 (20 Years)
Elrod Road	 Add Additional SB Right Turn with Yielding Bypass Lane	N/A	\$1,100,000	No applicable CMF
Curve Near Elrod Road*	 Construct Geometric Improvements / Realignment	For: 47 Against: 1	Varies	Varies
Curves Near Basil Griffin Park*	 Construct Geometric Improvements / Realignment	For: 49 Against: 0	Varies	Varies
Corridor – Elrod Road to Three Springs Road	 Construct SUP on one side with buffer.	For: 105 Against: 27	\$2,130,000	N/A

*Geometric improvements at these locations should be explored further if the new interchange / connector project does not move forward in the future.

Other

Location	Concept	Public Input	Planning Cost Estimate	ROI
Entire Study Area	 Education	For: 4 Against: 0	N/A	N/A
	 Radar Speed Sign	For: 15 Against: 2	TBD	TBD
	 Enforcement	For: 9 Against: 3	N/A	N/A

Note: For each segment of the corridor, traffic calming measures should be implemented at time of construction. This includes incorporating the mini-roundabouts at Shawnee Way and Grider Pond Road. Relocation of mailboxes to correspond to side of the roadway with the residence should also be part of the construction process during each phase.

Figure ES-2. Corridor Improvement Priorities

