EXECUTIVE SUMMARY

The Kentucky Transportation Cabinet (KYTC) in partnership with the City of Bowling Green, WKU, Bowling Green / Warren County Metropolitan Planning Organization (MPO), and Barren River Area Development District initiated the *Kentucky and Adams Street (US 68X) Improvement Study.* The goal of the study is to identify and evaluate potential traffic operational changes which are compatible with land use and increase safety for all modes of travel.

The study area includes the one-way couplet of Kentucky and Adams Streets (US 68X) from the northeast split at the Kentucky Street intersection with 6th Avenue/Veterans Memorial Lane to the southwest split at the University Boulevard intersection with Old Morgantown Road/College Heights Boulevard. The total corridor length is approximately 1.2 miles.

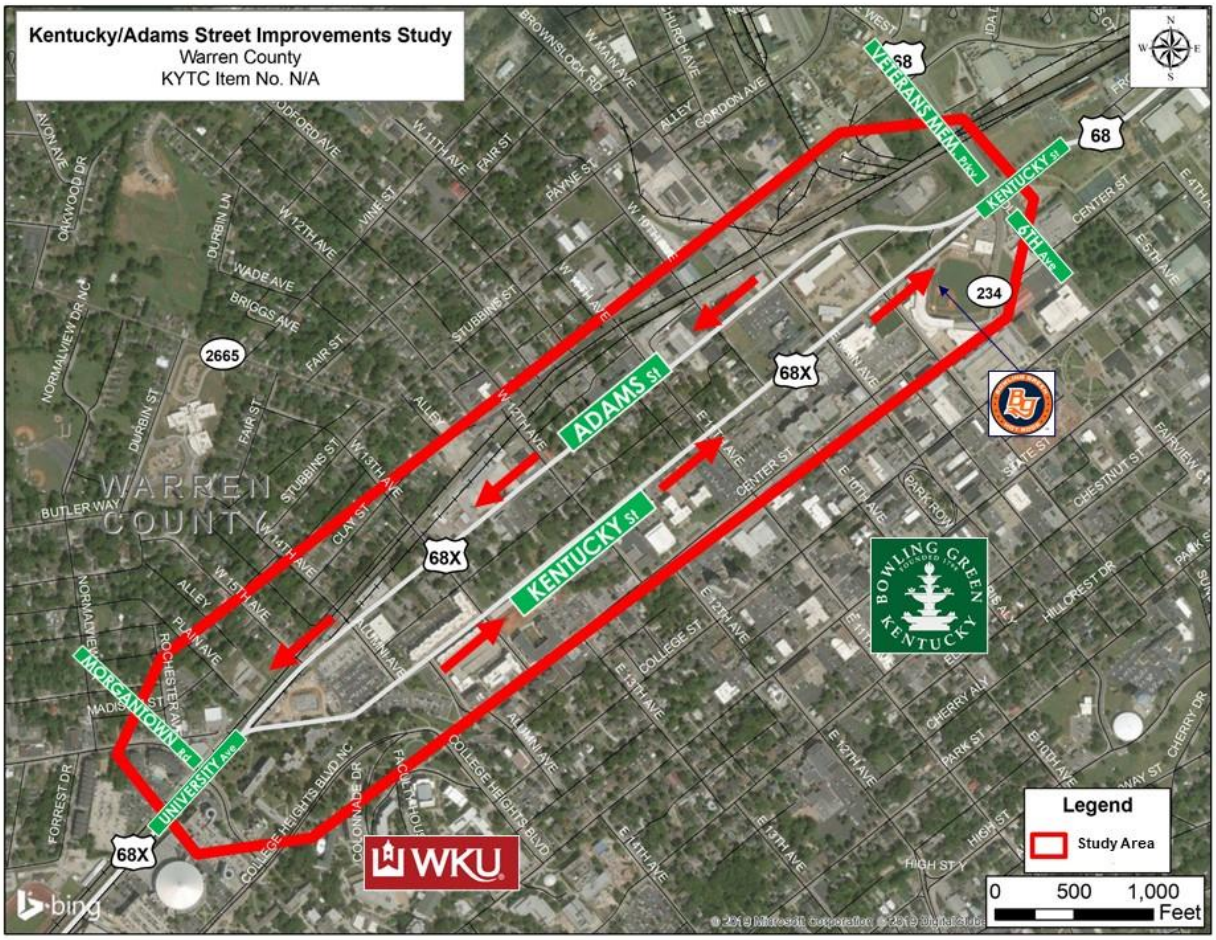

Figure ES-1: Study Area

In 2014, the *Downtown Bowling Green Traffic Circulation Study* included among its many recommendations a concept to convert Kentucky and Adams Streets to two-way traffic and to widen Adams Street to accommodate a five-lane section. This one-way couplet serves a number of important destinations including downtown Bowling Green as well as Western Kentucky University (WKU). The presence of student housing, university parking, and a

pharmacy on the north side of Kentucky Street results in a diverse array of roadway users and modes of travel and compels the need to encourage compliance of traffic control devices, particularly those related to pedestrian safety. Specifically, operational changes are desired to encourage more attentive driving, a reduction in speed, a reduction in crashes, and a greater tendency for motorists to yield to pedestrians. Opportunities to enhance multimodal facilities such as bike lanes are also desired.

EXISTING AND FUTURE CONDITIONS

Existing conditions of the transportation network were examined including current roadway facilities and geometrics, crash history, and traffic volumes within the study area. *The Downtown Bowling Green Traffic Circulation Study* TransModeler simulation model (2014) was used as the source for the Base Year (2020) simulation model to develop scenarios for the improvement concepts. Both an Environmental Red Flag Summary and a Socioeconomic Study were performed as part of the existing conditions analysis.

Future conditions in the years 2030 and 2045 were estimated to evaluate the prospective effectiveness of potential transportation improvement concepts. In addition to the existing model updates, a 2030 Existing plus Committed (E+C) network was also created which includes two project recommendations from the Study. The first is an intersection improvement project at the Russellville Road intersection with University Drive which includes widening of northbound University Drive to add a new left-turn onto westbound Russellville Road, widening of southbound University Drive to add an additional southbound through lane, and restriping of the eastbound Russellville Road approach lanes from a single left / dual-right to a dual-left / single-right. The second project is a new traffic signal at the College Street intersection with 7th Avenue.

To evaluate the adequacy of study area intersections and roadway segments, outputs from the simulation model were used to determine level of service (LOS). For signalized intersections, LOS is determined by the average total vehicle delay. In urban areas such as this, LOS D or better is desirable. The LOS results for the E+C network indicate that there is plenty of capacity in 2030. The six signalized intersections on Kentucky Street and Adams Street in the middle of the study area are expected to operate at LOS A while the two larger intersections on either end of the study area (University Avenue at Old Morgantown Road / University Heights Boulevard and Kentucky Street at Veterans Memorial Lane / 6th Avenue) will operate at LOS D in the PM. For all the scenarios during both peak periods, the larger intersections on either end of the study area inherently act to meter traffic traveling through Kentucky Street and Adams Street.

IMPROVEMENT CONCEPT DEVELOPMENT AND EVALUATION

Improvement concepts were developed based on a combination of input from the project team, a review of existing conditions, simulation model traffic analyses, and field reconnaissance. The project team studied several improvement concepts.

The first three concepts involved various configurations for converting both Kentucky and Adams Streets to two-way and severing Kentucky Street at the southwestern segment south of Alumni Avenue and at the northeastern segment north of 8th Avenue as shown in **Figure ES-2**.

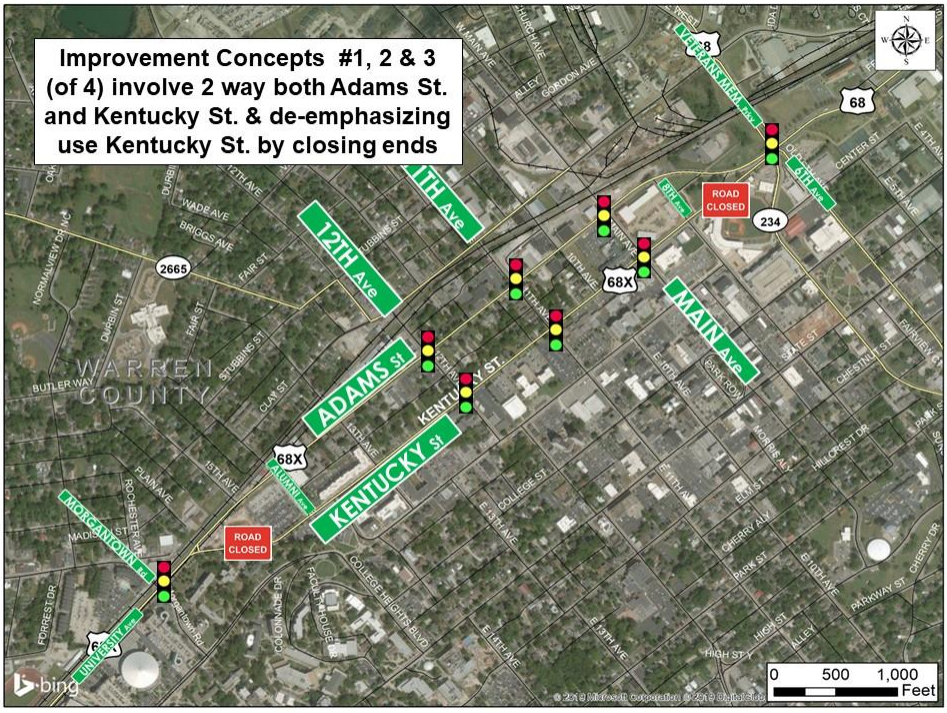

Figure ES-2: Two-Way Conversion of Kentucky and Adams, severing end segments of Kentucky Street

The fourth improvement concept involves retaining the existing one-way operation of both Kentucky and Adams Streets but reconfiguring the lanes of traffic from two to one and adding bike lanes. It is envisioned that should any of the four concepts be implemented, the reconfiguration would coincide with scheduled 2021 repaving for Kentucky and Adams Streets.

The four improvement concepts are summarized as follows:

- Improvement Concept 1 – An example of the potential lane configuration is shown on **Figure ES-3** which depicts the conversion of Kentucky and Adams Streets to two-way with no left-turn lanes at the signalized intersections, and the severing of Kentucky Street at the southwestern and northeastern ends.

Figure ES -3: Improvement Concept 1: Two-way without left-turn lanes

- Improvement Concept 2 – An example of the potential lane configuration is shown on **Figure ES-4** which depicts the conversion of Kentucky and Adams Streets to two-way with the addition of left-turn lanes by widening the approaches at the signalized intersections on Adams Street and the severing of Kentucky Street at the southwestern and northeastern ends.

Figure ES-4: Improvement Concept 2: Two-way with left-turn lanes at traffic signals on Adams Street

- Improvement Concept 3 – An example of the potential lane configuration is shown on **Figure ES-5** which depicts the conversion of Kentucky and Adams Streets to two-way with a center two-way left-turn lane (TWLTL) on the Adams Street corridor, the addition of left-turn lanes by widening the approaches at the signalized intersections on Kentucky Street, and the severing Kentucky Street at the southwestern and northeastern ends.

Figure ES-5: Improvement Concept 3: Three-lane widening on Adams Street

- Improvement Concept 4 – An example of the potential lane configuration is shown on **Figure ES-6** which depicts one-way, one-lane operation on Kentucky and Adams Streets with bike lanes.

Figure ES-6: Improvement Concept 4: One-way, one-lane with bike lanes on Kentucky and Adams

Based on input from the project team, Improvement Concept 4 was ultimately revised. Due to very little demand for parking on Adams Street, it was determined that the existing parking lane

could be restriped as a buffered bike lane while retaining the two one-way vehicular travel lanes, as shown in **Figure ES-7**.

Figure ES-7: Revised Improvement Concept 4 for Adams Street

The 2030 E+C simulation model was used as a basis for the development of models depicting each of the improvement concepts for the AM and PM peak periods. The improvement concepts were reviewed to help with the evaluation process and provide the project team with information that was used to make a final recommendation.

During the PM peak for Concept Improvement 1, the three signalized intersections on Adams Street in the middle of the study area failed to operate at a reasonable level of service (LOS) due to the queuing of vehicles including queues extending over 700 feet at 12th Street. Queuing occurs when a vehicle(s) waiting to turn left blocks vehicles traveling through the intersection because of the lack of a separate left-turn lane. The LOS and travel times for all other improvement concepts were acceptable for both the AM and PM peak hours. Concept Improvement 3 would require additional right-of-way acquisition and substantial utility relocation resulting in significantly higher cost to widen Adams Street to a three-lane corridor. A summary and comparison of all improvement concepts is shown in the evaluation matrix in **Table ES-1.**

Project Goals	Existing	Concept 1 (2-way, no left turn lanes)	Concept 2 (2-way w/ left turn lanes on Adams)	Concept 3 (2-way, 3 lane section on Adams & left turn lanes on Kentucky)	Concept 4 (1-way, road reconfiguration with bike lanes)
Est. Construction Cost	**$0**	**$$**	**$$$**	**$$$$**	**$**
Improves safety	✗	✗	✓	✓	✓
Provides opportunites to enhance multimodal facilities	✗	○	○	○	✓
Provides cost efficient alternative	✗	✓	○	✗	✓
De-emphasizes Kentucky St.	✗	✓	✓	✓	○
Accommodates 2030 traffic demand	✓	✗	✓	✓	✓
Key: ✓ Issue is completely addressed; ○ Issue is somewhat addressed; ✗ Significant issue that is not addressed					
Cost Key: $ = Very cheap, $$ = Minimal Cost, $$$ = Modest Cost, $$$$ = Significant Cost					

Table ES-1: Improvement Concept Comparison Matrix

Improvement Concept 2 and Improvement Concept 4 either completely or somewhat address all the project goals. Concept 2 does not provide bike lanes and has a higher cost due to the

widening needed to add left-turn lanes at the signalized intersections. Concept 4 partially de-emphasizes Kentucky Street by restriping it as a single lane for traffic.

CONCLUSIONS

Considering the technical data and results from the comparison matrix, the project team recommended the revised Improvement Concept 4 with one lane including a bike lane on Kentucky Street and two lanes with a separated bike lane on Adams Street. The parking lane on Adams Street will be replaced with a buffered bike lane. The LOS results for the E+C network indicate that there is plenty of capacity in 2030. Therefore, for the revised Improvement Concept 4 during both peak hours, the signalized intersections on Adams Street will operate at LOS A, and the signalized intersections on Kentucky Street will still operate at LOS B or better despite the reduction in lanes. Travel times on both Adams Street and Kentucky Street are expected to be similar to the E+C results of approximately 3 to 3.5 minutes. Reducing Kentucky Street to one lane will maintain a desired LOS through the study area while encouraging more attentive driving, reducing traffic speed, reducing the potential for crashes, and increasing the tendency for motorists to yield to pedestrians. This can all be accomplished within the existing right-of-way at low cost if completed with the next scheduled repaving project.

Reducing Kentucky Street to one lane will improve pedestrian safety by: 1) eliminating the multiple threat scenario which occurs on multi-lane approaches in the same direction; and 2) decreasing the distance that pedestrians are exposed to vehicular traffic in the crosswalk from 27 to 14 feet. Vehicle compliance (stopping) may also be improved with the addition of conspicuous ground-mount STATE LAW YIELD TO PEDESTRIANS (MUTCD R1-6) signs at marked crosswalks. There are three unsignalized pedestrian crosswalks on Kentucky Street within three blocks as shown in **Figure ES-7**. All three are MUTCD compliant, but these treatments are inconsistent as shown in the figure. It is recommended that the treatments for the pedestrian crosswalks be consistent for Kentucky Street.

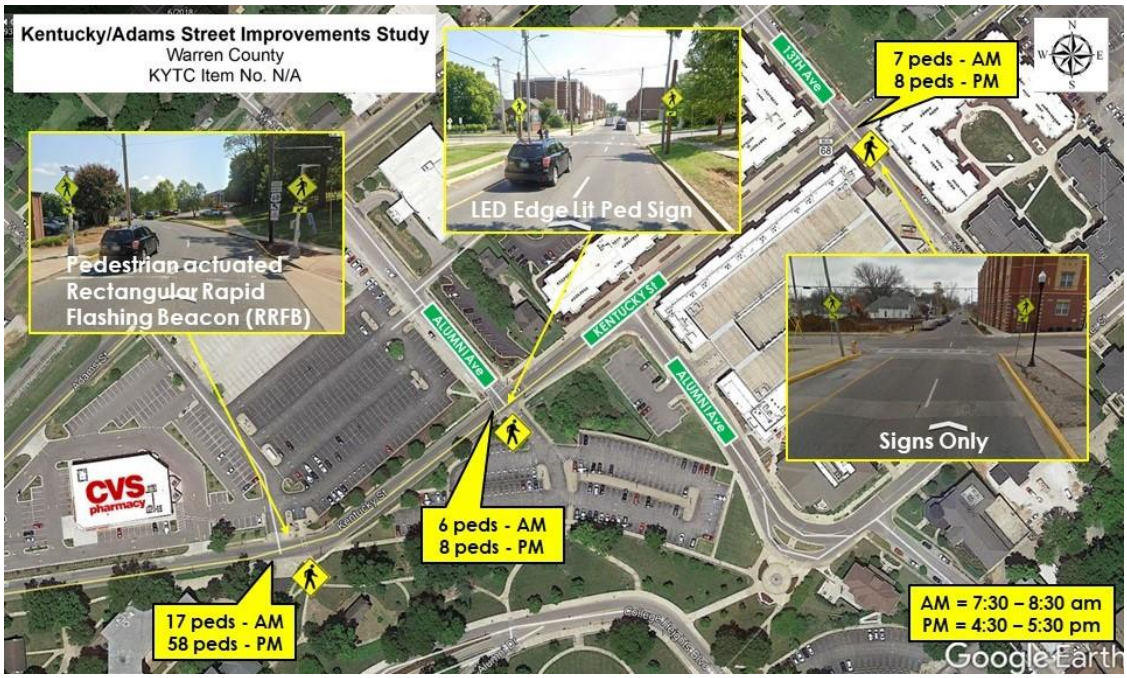

Figure ES-7: Existing Pedestrian Crosswalks at Unsignalized Intersections on Kentucky Street