

EXECUTIVE SUMMARY

The purpose of this interchange modification is to improve connectivity and safety between the major regional commercial development areas in Florence, Kentucky, and the Interstate System.

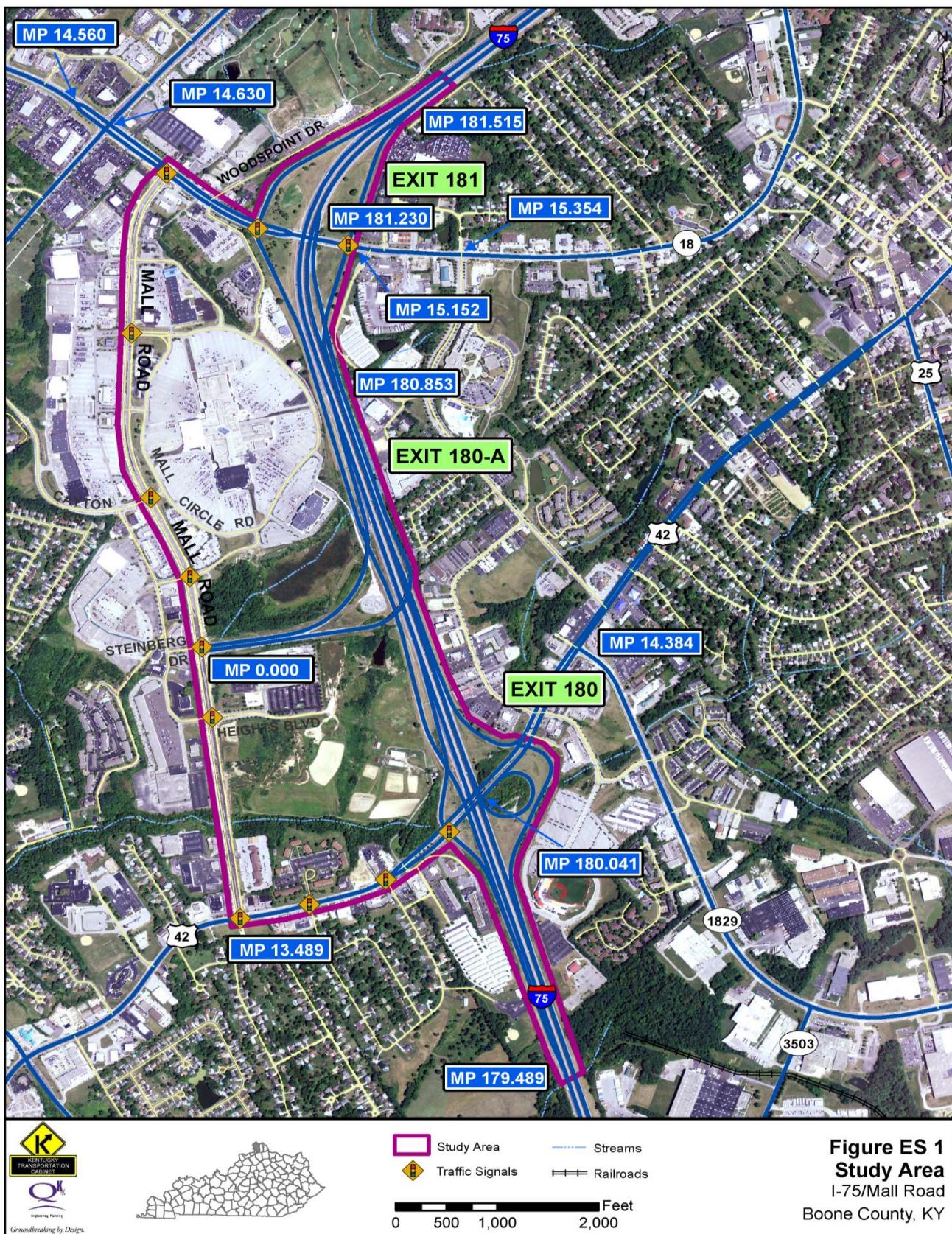
As shown in Figure ES1, the I-75 interchange with Mall Road is currently a partial interchange. Motorists traveling Mall Road have access only to northbound I-75 via Exit 180-A (MP 180.853). For I-75 northbound motorists, there is not a northbound exit ramp at Exit 180-A to Mall Road. Motorists on Mall Road wishing to travel south on I-75 currently have two options:

- Travel south on Mall Road to US 42, then travel east on US 42 to either the southbound or northbound I-75 ramps via Exit 180 (MP 180.041).
- Travel north on Mall Road, turn east onto KY 18, and enter the northbound or southbound I-75 via Exit 181 (MP 181.230).

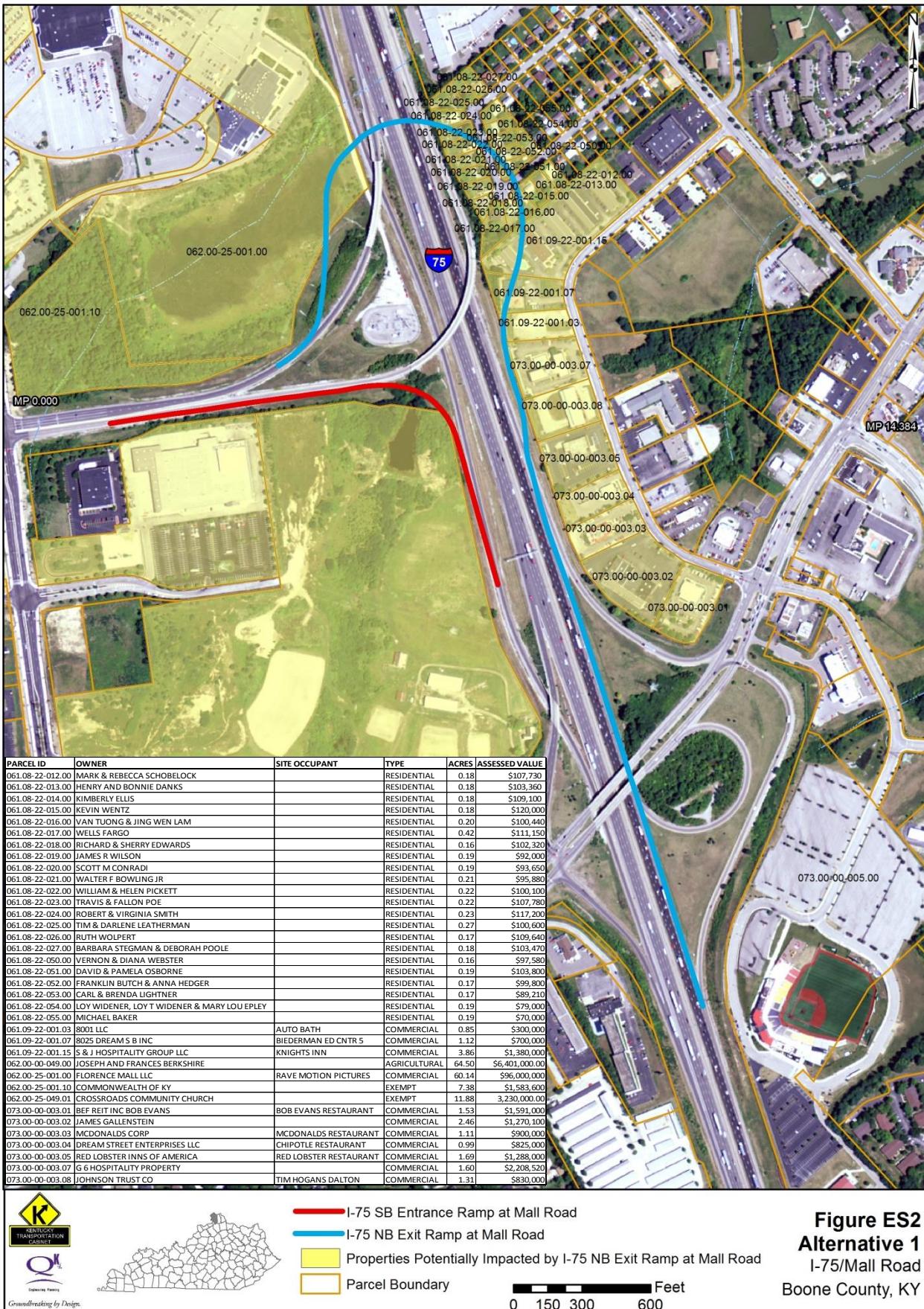
Travelers using either existing option encounter congested intersections and numerous traffic signals. There are seven traffic signals located along Mall Road within the project area. In addition, there are three signals located on US 42 east from Mall Road to the I-75/US 42 southbound ramps and one traffic signal located at the Mall Road and I-75/KY 18 southbound ramp intersection. Therefore, area traffic could travel through as many as five signalized intersections to reach I-75 to travel southbound. Each signalized intersection has a minimum of 32 potential conflict points. Additional conflict points occur at individual entrances between those signalized intersections. Existing intersection delays range from 15.5 seconds/vehicle for a level of service C (LOS C) in the AM Peak Hour to 237 seconds/vehicle (LOS F) in the PM Peak Hour. For KY 18, US 42, and Mall Road, crash rates are above the average for similar type roadways in Kentucky. The many access points along these roadway segments are contributing to the crashes and congestion.

Three build alternatives (with three northbound off ramp alternatives) at Mall Road and I-75 were studied for this Interchange Modification Report (IMR):

- Alternative 1 (Figure ES 2) – provides for a full interchange at Mall Road (Exit 180-A) by adding a northbound off ramp (Alternative 1, 1A, or 1B (Figures ES 2A, 2B, and 2C, respectively)) and a southbound on ramp via a collector distributor road;
- Alternative 2 (Figure ES 3) – provides a southbound on ramp via a collector distributor road with a design speed of 35 mph; and
- Alternative 3 (Figure ES 4) - provides a southbound on ramp via a collector distributor road with a design speed of 45 mph.



IMR Mall Road/I-75 (Exit 180-A)



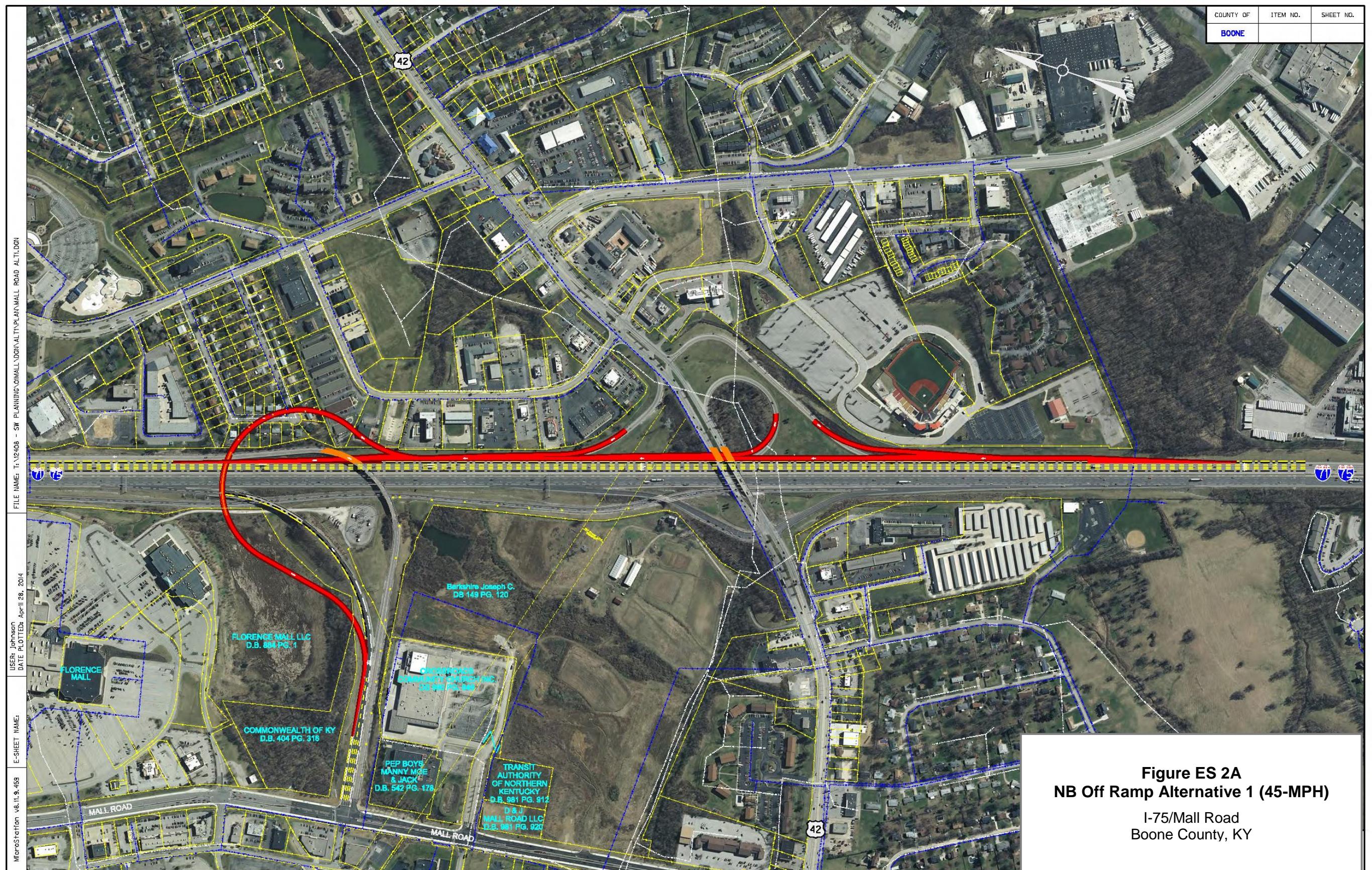
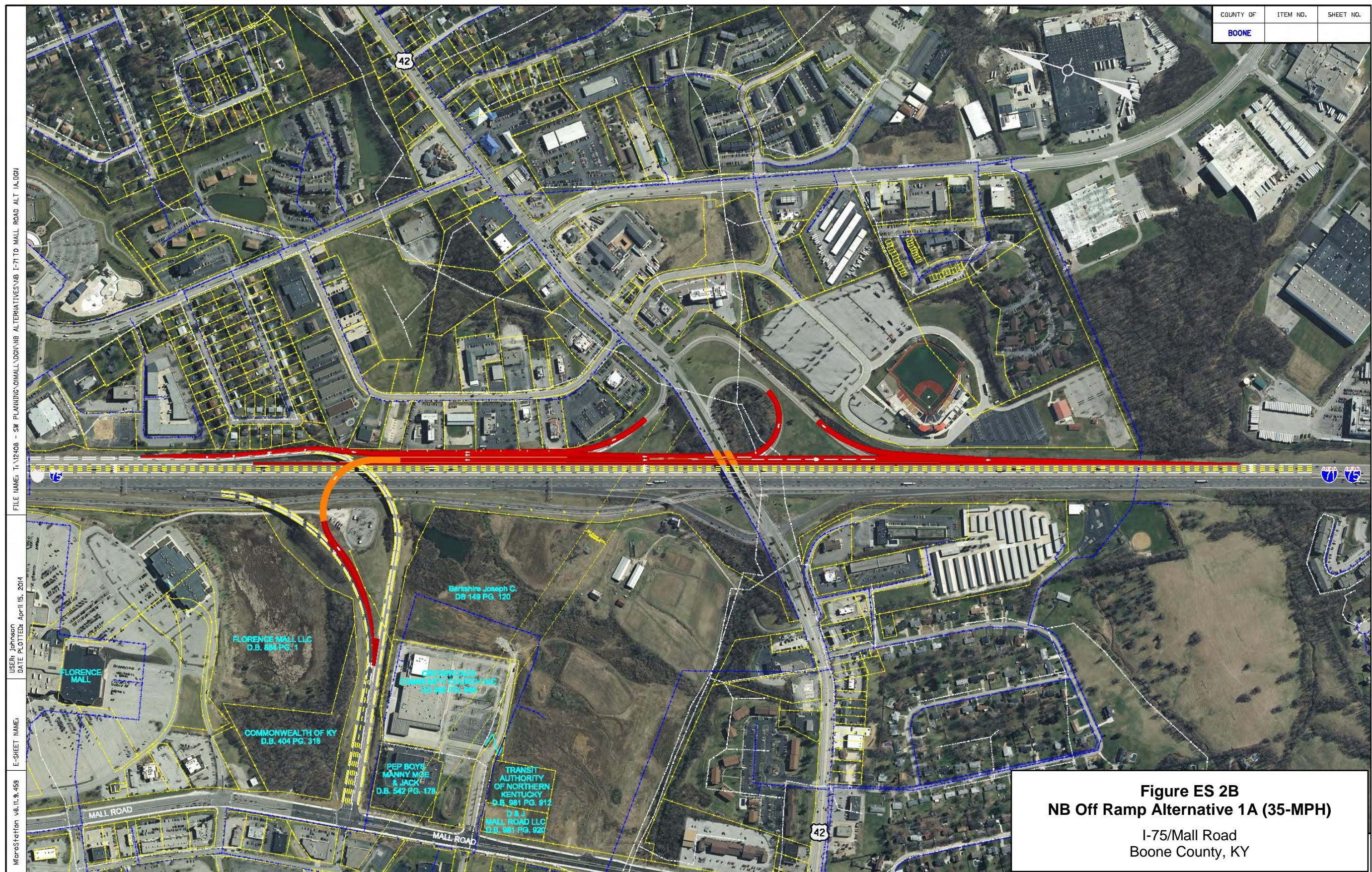
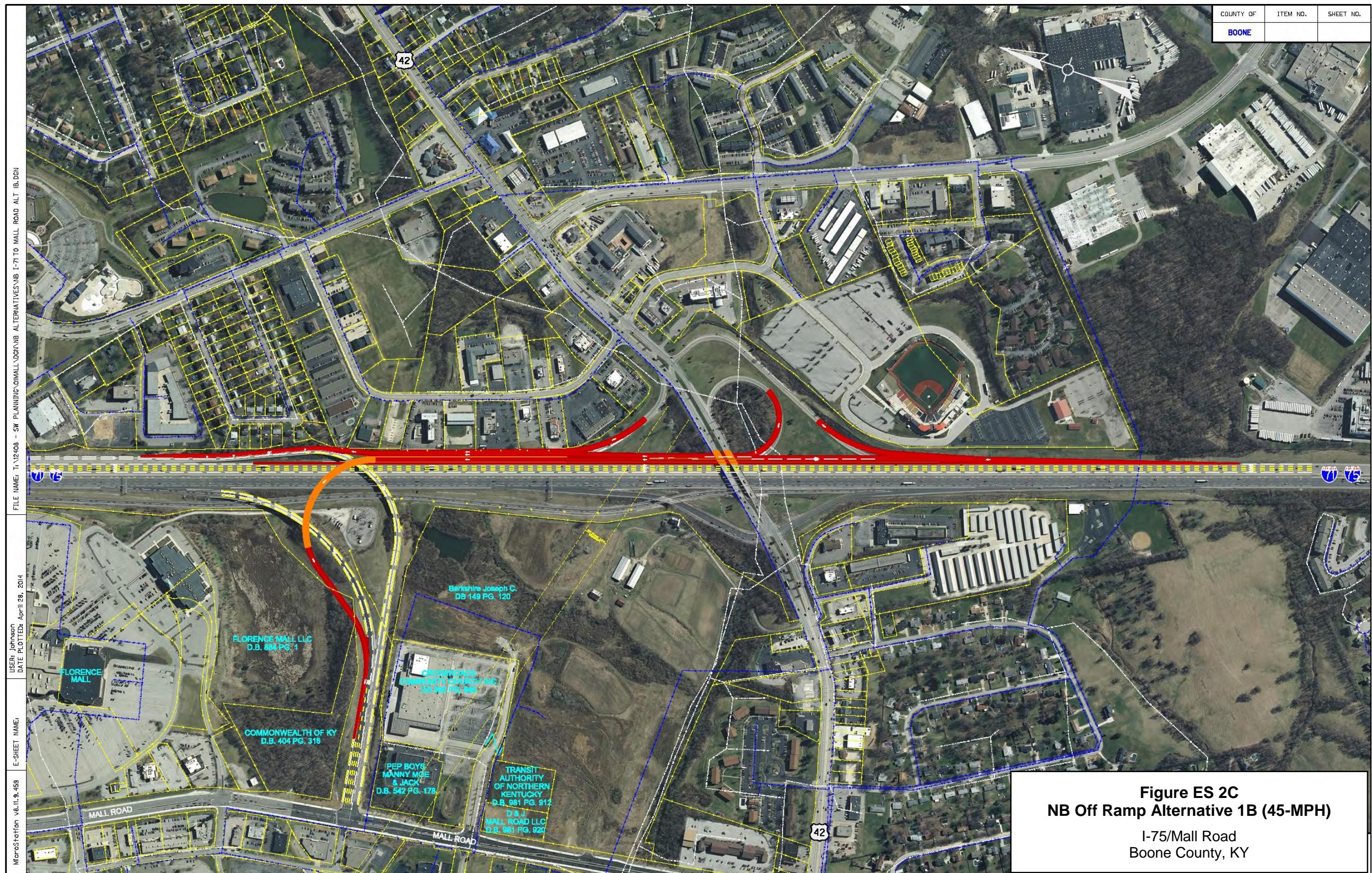


Figure ES 2A
NB Off Ramp Alternative 1 (45-MPH)

I-75/Mall Road
Boone County, KY





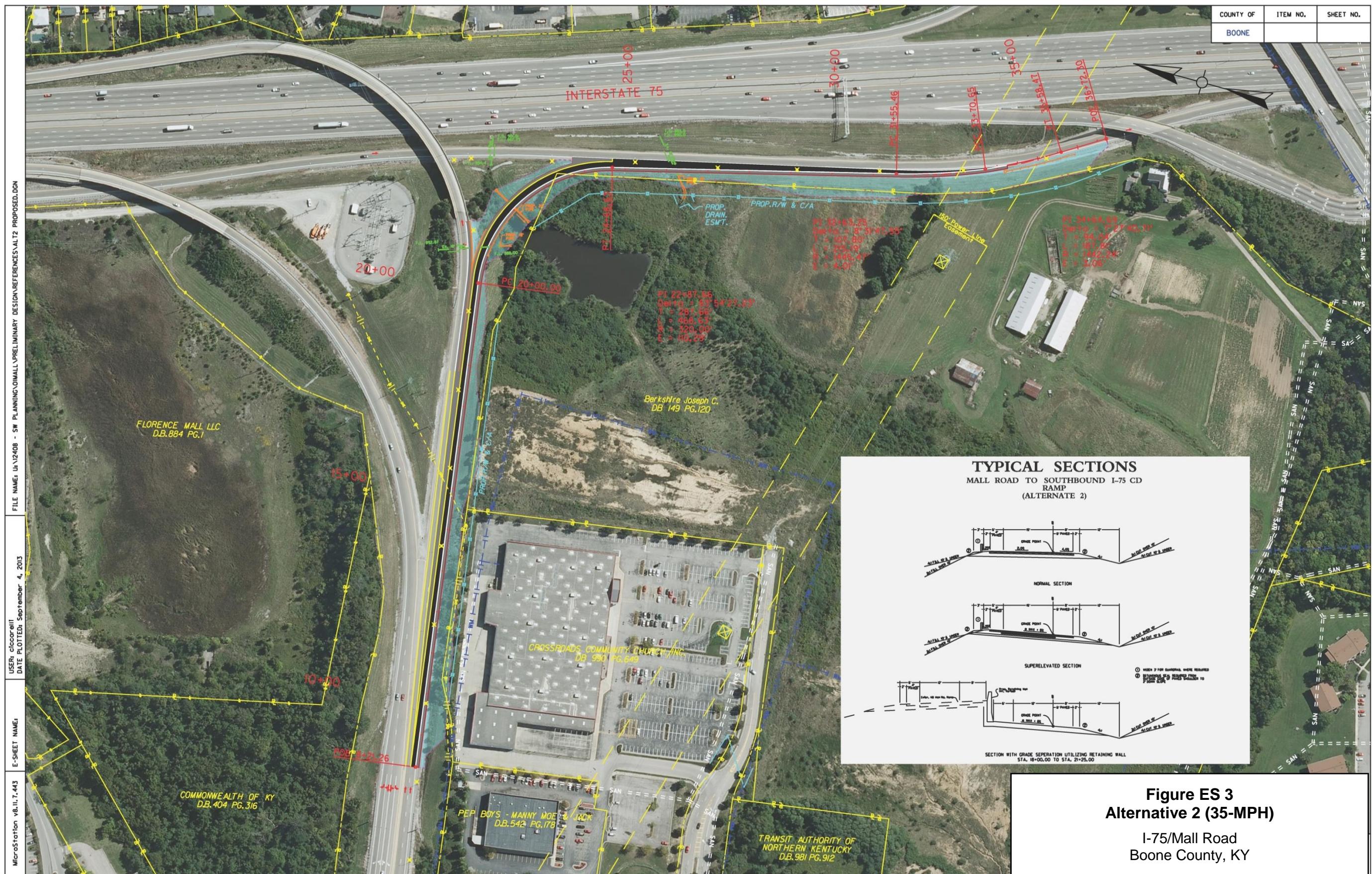
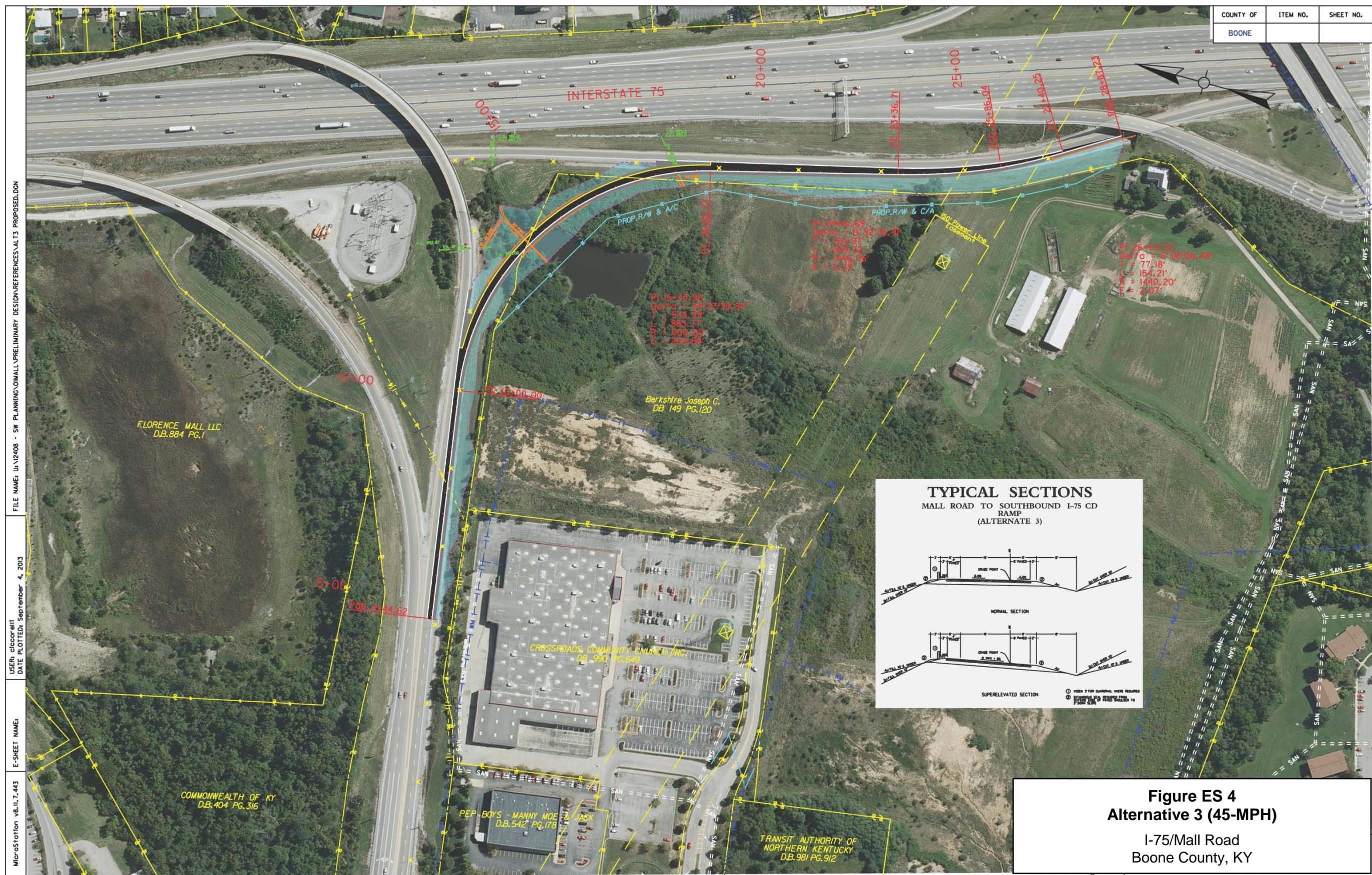


Figure ES 3 Alternative 2 (35-MPH)



A full interchange at Mall Road (Alternative 1) with any of the northbound off ramp alternatives (1, 1A and 1B) requires a northbound flyover exit ramp from I-75 to Mall Road. Extensive development along the east side of I-75 would be directly impacted by a northbound off-ramp to Mall Road from the south (between 21 and 27 parcels for a total value between \$15M and \$28M). Northbound Ramp Alternative 1 provides for a very short weave for the movement from I-75 NB from US 42 to I-75. Northbound ramp alternatives 1A and 1B also:

- enter existing Mall Road ramp on the left causing motorists traveling westbound to change multiple lanes to exit right to travel to Florence Mall (a major traffic generator);
- do not allow US 42 motorists entering I-75 to travel NB to exit at Mall Road;
- motorists entering I-75 N from US 42 will no longer be able to exit at KY 18.

And lastly the combination of full interchange alternatives has a total cost with all phases ranging from \$44 and \$55M. Due to the business and residential impacts, the impacts to I-75, current traffic patterns discussed above, and KYTC budget constraints, the northbound off ramp alternatives at Mall Road 1, 1A and 1B were eliminated from additional consideration and not carried forward. They are shown in Table ES1 for informational purposes only.

Table ES1: Preliminary Cost Estimates for Alternatives

Phases	Alternative No-Build	Full Interchange (NB Off Ramp Alternatives 1 & 3)	Alternative 1 NB Off Ramp	Alternative 1A NB Off Ramp	Alternative 1B NB Off Ramp	Alternative 2 (I-75 SB On Ramp at Mall Road) 35-mph	Alternative 3 (I-75 SB On Ramp at Mall Road) 45-mph
# of Affected Parcels	0	28	26	21	27	2	2
Design	\$0	\$1,527,000	\$1,392,000	\$1,866,000	\$2,014,000	\$150,000	\$135,000
Right of Way	\$0	\$27,849,800	\$27,425,000	\$21,870,000	\$14,700,000	\$436,000	\$424,800
Utilities	\$0	\$296,800	\$232,000	\$311,100	\$355,700	\$159,900	\$64,800
Construction	\$0	\$12,654,400	\$11,604,000	\$15,554,100	\$16,784,100	\$706,600	\$1,046,400*
Contingencies	\$0	\$12,300,500	\$12,195,900	\$11,880,400	\$10,150,100	\$435,800	\$104,600
TOTAL	\$0	\$54,624,500	\$52,848,900	\$51,481,600	\$43,983,900	\$1,888,300	\$1,775,600

*provided by KYTC

The goals for the remaining Alternatives 2 and 3 designs were to minimize costly right-of-way impacts and provide a safe and efficient design, without encroaching upon the C/D road underpass of the I-75 southbound exit ramp to US 42. Because the 45 mph (Alternative 3) design provides a safer and more desirable design, is comparable to the design of the existing I-75 northbound on-ramp at Mall Road, avoids encroachment on the underpass, and considering all phases is actually less expensive (see Table ES1) than the 35-mph design, the project team selected Alternative 3 as the preferred alternative.

Before a change to the Interstate Highway network is advanced, the State must obtain approval from the Federal Highway Administration (FHWA). Such approval is gained through FHWA's positive review of an "Interstate System Access Change Request" hereinafter referred to as an Interchange Modification Report or IMR. The FHWA policy Interstate System Access Information Guide dated August, 2010 identified eight requirements to meet for new or revised access points to the existing Interstate System. Each of these requirements is briefly summarized in the following

- ***Policy Requirement 1: Existing Facilities Capability***

Existing intersection delays along Mall Road range from 15.5 seconds/vehicle for a level of service C (LOS C) in the AM Peak Hour to 237 seconds/vehicle (LOS F) in the PM Peak Hour. US 42 and KY 18 are also very congested at present. KY 18 is six lanes in a highly developed area with each intersection having multiple existing turn lanes. The US 42 and KY 18 intersections in the study area are operating at a level of service at or near capacity with peak hour intersection delays at LOS E and LOS F in both years 2012 (current) and 2040 (design year).

- ***Policy Requirement 2: Transportation System Management***

KY 18 is currently six lanes in the project area with multiple turn lanes at each intersection and the adjacent properties are nearly built out. There is little room for Transportation System Management (TSM) improvements, except for access management opportunities.

Although the area around US 42 (a four-lane facility in the project area) is not completely built out, providing for six lanes on US 42 would be very costly and would likely attract additional vehicles to the I-75 ramps. There is a project in the Ohio Kentucky Indiana Regional Council of Governments (OKI) 2030 Regional Transportation Plan to widen US 42 to six lanes in the area of influence; however, this project is not currently funded.

Neither ramp metering onto I-75 nor High Occupancy Vehicle (HOV) lanes on I-75 would satisfy the purpose of the project, which is to improve connectivity and safety between the major regional commercial development areas in Florence, Kentucky, and the Interstate System. The proposed improved connection to I-75 from the Mall Road development area would satisfy the project's purpose.

In the study area, I-75 consists of only general purpose lanes—four in each direction. No special use lanes, such as High Occupancy Vehicle (HOV) or High Occupancy Toll (HOT) lanes, exist within the study area, the encompassing Northern Kentucky Area, or any portion of I-75 in Kentucky.

Metered ramps, per say, are not allowable traffic control devices in Kentucky, as no state enabling legislation exists to permit their use. Other such devices, including workplace time shift management, are not feasible options to address the traffic needs, as they are governed by market demands and, per coordination with local officials, are already in use at some of the industrial sites.

- ***Policy Requirement 3: Operational Analysis***

I-75

Adding a southbound I-75 entrance ramp at Mall Road to the C/D road shows I-75 will continue to operate at the same level of service as the No-Build scenario in both the existing and design years.

Because I-75 is at or near capacity during peak hours, many of the merge and diverge movements are at LOS F in the design year for both the No-Build and Build scenarios. There are two changes in levels of service between the No-Build and Build scenarios in 2012.

- I-75 southbound to US 42 improves from LOS E to LOS D in both the AM and PM Peak Hours.
- The movement from I-75 southbound to KY 18 reduces from LOS A to LOS B in the AM Peak Hour.

Ramps

A new southbound ramp will tie into a C/D road that will have a flow rate of 1,989 vehicles per hour (vph) during the most congested 2040 PM peak hour. The capacity for a single lane ramp with a 45 mph design speed is 2,100 passenger cars per hour (pc/hr). This proposed ramp will not reach capacity until after Year 2040. It should also be noted that, with the addition of the southbound auxiliary lane between US 42 and KY 536, which is currently in the right of way acquisition phase, the existing KY18/US 42/new ramp merge will no longer exist.

The HCM analysis shows in the PM Peak Hour, the I-75 southbound ramp to Mall Road will reach capacity in year 2030. The Mall Road/I-75 intersection delay can be improved by adjusting the signal timing to provide additional green time for the I-75 Mall Road ramp.

All signals located on Mall Road are maintained by the city of Florence. KYTC will work with them to retime these signals to minimize delay and improve efficiency along this corridor at the completion of this project. Also, when US 42 is widened,

providing an additional right-turn lane at Mall Road would be beneficial to the overall operation of the route.

Collector / Distributor (C/D) Road - KY 18/US 42 to I-75 SB

With the addition of the proposed I-75 southbound on-ramp at Mall Road, the number of vehicles entering the existing C/D Road has not really changed, just the location at which those vehicles are entering the C/D Road. The capacity of a one-lane ramp roadway with a speed of over 50 mph is 2,200 pc/hr. In the design year 2040 PM Peak Hour (heaviest movement), this C/D Road will not reach capacity until after Year 2040. The proposed southbound on-ramp acceleration length provided in the proposed design is in accordance with the *2011 A Policy on Geometric Design of Highways and Streets* and KYTC policies and the movement will be a yield condition.

It should be noted that, with the addition of the southbound auxiliary lane between US 42 and KY 536, which is currently in the right of way acquisition phase, the existing C/D Road merge movement directly to I-75 will no longer exist because that traffic will have a “dedicated” lane (the new auxiliary lane). This KYTC project was implemented for design prior to this IMR.

Local

The local intersection network analysis shows that the overall delay (seconds per vehicle) 2012 Build scenario improves over the No-Build scenario in the AM Peak Hour by 0.4% and the PM Peak Hour by 3.4%. The overall 2040 Build scenario shows an improvement of 1.0% in the AM Peak, and a slight increase of 2.0% in the PM Peak. This increase was considered acceptable for the peak hour. Actual movement delays and the supporting HCM analyses are located on the enclosed C/D (Appendix D and E), respectively.

Safety

The merge length from US 42 to northbound I-75 is considered deficient. The current acceleration length is 1,200 feet. According to *A Policy on Geometric Design of Highways and Streets 2011*, the minimum acceleration length needed for accelerating from 30 m.p.h. to 70 m.p.h. is 1,350 feet. However, there is not a crash history at this location; therefore, this deficiency was not considered significant. I-75 did not have any CCRF greater than 1.0. Therefore, further analysis was not warranted. US 42, KY 18, and Mall Road exhibit crash issues with CCRFs greater than 1.0 for the 0.1-mile and 0.3-mile spots and the 1.0-mile segments.

That analysis showed that many of the crashes along KY 18, US 42, and Mall Road were attributed to access management related issues. In early 2012 Mall Road was converted to a divided facility with access points at strategic locations.

This access management improvement is expected to reduce the crash rates along this route. However, at the time of this request there were not enough data to make a statistically significant analysis to determine whether a reduction in crashes has occurred.

As shown in Appendix A, Exhibit 16, the additional ramp will require four new signs: one in each direction on Mall Road at the Mall Road/I-75 ramp intersection, and two signs on the I-75 ramp before the northbound/southbound split. No new signs are required on the I-75 mainline. Minor, additional yellow merge warning signs should be considered at the following locations:

- On the existing C/D Road prior to the proposed I-75 southbound on ramp via the C/D Road warning motorists of the pending merge;
- On the proposed I-75 southbound on ramp prior to it joining the existing C/D Road warning travelers from Mall Road of the impending merge;
- The existing merge warning should stay in place for the US 42 merge onto the existing C/D Road warning C/D motorists of the merge onto I-75;
- Where the C/D Road will eventually merge with the southbound auxiliary lane from KY 536 to US 42 that is currently in the right of way phase, informing motorists of the added lane (when constructed).

- ***Policy Requirement 4: Access Connections and Design***

Three alternatives were studied for this IMR: Alternative 1 – a full interchange with all moves considering three northbound off ramp alternatives (1, 1A, and 1B); Alternative 2 – a southbound on ramp designed at 35 mph; and Alternative 3 – a southbound on ramp designed at 45 mph. All southbound ramps would tie to an existing collector distributor road. Due to KYTC budget constraints, and the extensive development along the east side of I-75 that would be directly impacted by a northbound off-ramp to Mall Road from the south, a northbound exit ramp was eliminated from further consideration and the operational analysis. Alternatives 2 and 3 were advanced to the operational analysis.

Alternative 3 was selected as the preferred alternative and would involve constructing a southbound ramp in the southwest quadrant of the current partial interchange to I-75 via an existing C/D road. The proposed access would be designed and built to current KYTC and FHWA design standards.

- ***Policy Requirement 5: Transportation and Land Use Plans***

The addition of an I-75 southbound on-ramp at Mall Road (Alternative 2 or 3) was identified as a priority in the Boone County Transportation Plan 2030, was a recommended project in the County Planning Commission's 2012 Mall Road District Study, was identified in the OKI 2040 Regional Transportation Plan, and was ranked #5 in the Highway District-6 Transportation Plan (October 2011) and is

consistent with the Northern Kentucky Planning Commission's 2035 Land Use Plan.

- ***Policy Requirement 6: Comprehensive Interstate Network Study***

No other interchange additions are foreseen by any long-range plan of OKI, the Northern Kentucky Area Development District, or KYTC.

- ***Policy Requirement 7: Coordination with Transportation System Improvements***

During the planning processes, this interchange modification went through the Statewide Transportation Improvement Program (STIP) and the OKI TIP (# 6-409) public comment period. KYTC met with local elected officials as a part of the District-6 Transportation Plan. The 2012 Highway Plan also went through a public comment period.

- ***Policy Requirement 8: Status of Planning and NEPA***

The preferred alternative recommended in this report will be included as an alternative in the required environmental evaluation, review, and processing. Currently this project is expected to be accomplished with state funds; however, because it will require Federal approval, an environmental document will be required by FHWA. The expected level of NEPA action is a CE-1 due to minimal right of way affected, no relocations, and overall minimal expected impacts.

In summary, a southbound on-ramp via the current C/D road to I-75 southbound is a low cost addition that will provide better connectivity to and from the Mall Road development area and will distribute the traffic to three separate interchanges. I-75 in the area of influence exhibits LOS E in the current year and LOS F in the design year 2040 for the No-Build scenario. Adding a southbound I-75 entrance ramp at Mall Road to the C/D road shows I-75 will continue to operate at the same level of service as the No-Build scenario. The overall average delay between Build and No-Build scenarios for the existing intersections in the area of influence, decreases in the year 2012 by 0.4% in the AM Peak Hour, and 3.4% in the PM Peak Hour.

Those same intersections' overall average delay between Build and No-Build scenarios for the existing intersections in the area of influence decreases in the year 2040 by 1.0% in the AM Peak Hour, and increases only 2.0% in the PM Peak Hour. This increase was considered acceptable and will not adversely impact I-75 in the project area.