The Kentucky Transportation Cabinet (KYTC) initiated this KY 92 Programming Study to evaluate the impact of a new development on Penny Lane in southern Williamsburg, immediately west of the KY 92 interchange with I-75 (Exit 11) in Whitley County.

Existing Conditions

KY 92 is an urban minor arterial, providing access to Walmart, gas stations, fast food restaurants, and other commercial developments along the southern boundary of the study area. The University of the Cumberlands and residential portions of the city are located north/east of the interstate. **Figure 1** summarizes the key challenges in the study area:

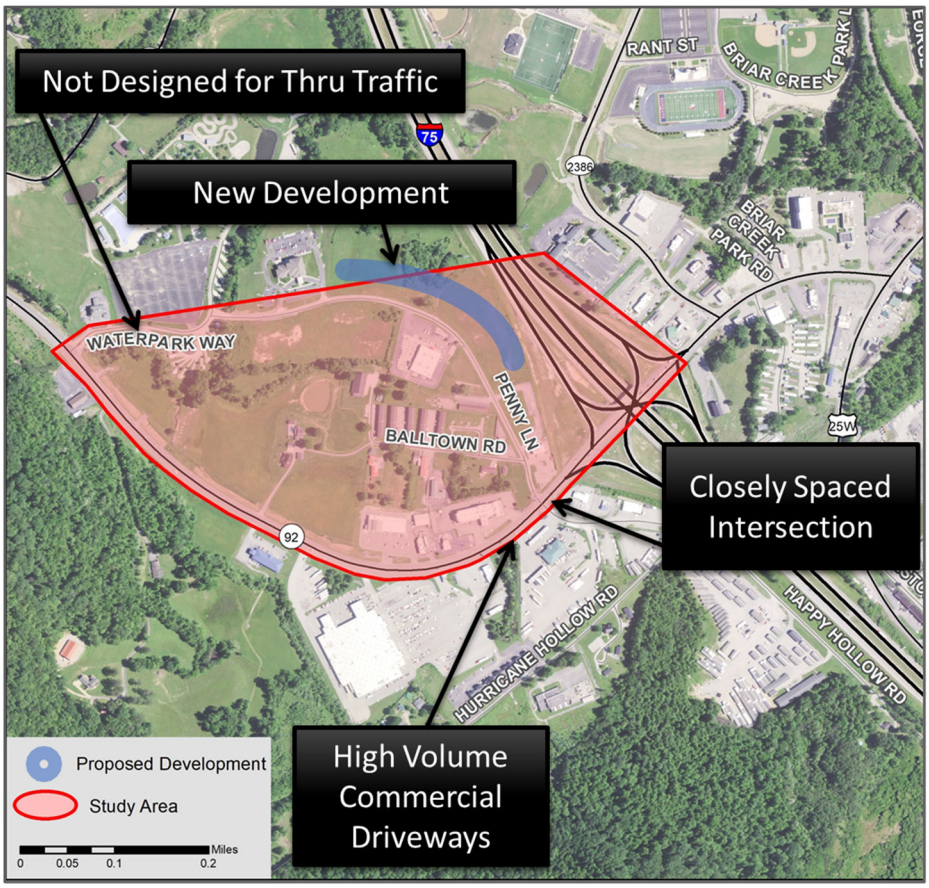

Figure 1: Key Study Area Challenges

- **Closely Spaced Intersection:** The KY 92 intersection with Penny Lane (a city street) and Happy Hollow Road (a county route) is immediately west of the single-point urban interchange (SPUI) at I-75 exit 11. The southbound off-ramp ties to KY 92 about 400 feet east of Penny Lane; the southbound on-ramp begins about 250 feet east of Penny Lane. The KY 92/Penny Lane intersection operates as a two-way stop.

- **High-Volume Commercial Access Points**: Many large trucks travel between the SPUI and Happy Hollow Road to access the Pilot Station. The westbound left turn movement from KY 92 onto Happy Hollow Road queues up throughout the day as vehicles wait for a clear gap in traffic to turn.

- **New Development**: In 2020, Keeneland and Kentucky Downs began developing a new gaming facility with access from Penny Lane. Current plans include an off-track betting facility, sports bar/lounge, bistro, grill, and office space. Projections anticipate 1,800 visitors plus 150 full-time staff on a typical weekday. The additional traffic will exacerbate existing safety and capacity issues at the KY 92/Penny Lane intersection.

- **Not Designed for Thru Traffic (Waterpark Way)**: Penny Lane begins at KY 92 and ends at city-owned Waterpark Way, dropping down a steep grade to cross Briar Creek. Waterpark Way provides access to the Kentucky Splash Waterpark and campground; these adjacent land uses are incompatible with high volumes of thru traffic on this route.

KY 92 at Penny Ln looking northeast towards SPUI with WBL queue


View east along Penny Lane at Briar Creek

Beyond the scope of this programming study, it was also noted that KY 92 has many closely spaced driveways south/west of the I-75 interchange and a gap exists in pedestrian connectivity through the interchange itself that could be addressed in the future.

Crash History

During the four-year analysis period (2017-2020), 43 crashes were reported within 250 feet of the KY 92/Penny Lane intersection (**Figure 2**, next page). There were no fatalities but seven injury collisions occurred within the 250-foot radius. Based on manner of collision, 46% of these crashes were angle or opposing left turn collisions, followed by same direction sideswipes (32%). It should be noted that 100+ parking lot crashes were reported along this stretch of KY 92 during the four-year analysis period though they have been omitted from the analyses.

Excess Expected Crashes (EEC), a methodology defined in the *Highway Safety Manual*, 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). LOSS categories 1 and 2 represent sites with fewer than anticipated crashes, up to categories 3 and 4, which have more crashes than expected. Because LOSS 4 sites experience such elevated excess expected crashes, there is a higher probability that safety countermeasures at these locations will result in larger improvement. LOSS 3 sites have a moderate to high potential for crash reduction.

- Individual KY 92 segments between Waterpark Way and the I-75 interchange exhibit a LOSS of 3 or 4 based on 2015-2019 distributions for both severe and non-severe crashes.

- The KY 92/Penny Lane intersection is LOSS 3 based on severe crashes and LOSS 4 based on non-severe.

- KY 92 intersection with the southbound on-ramp is LOSS 4 for both severe and non-severe crashes.

- KY 92 intersection with the southbound off-ramp is LOSS 4 for non-severe crashes but does not show an elevated rate for severe crashes.

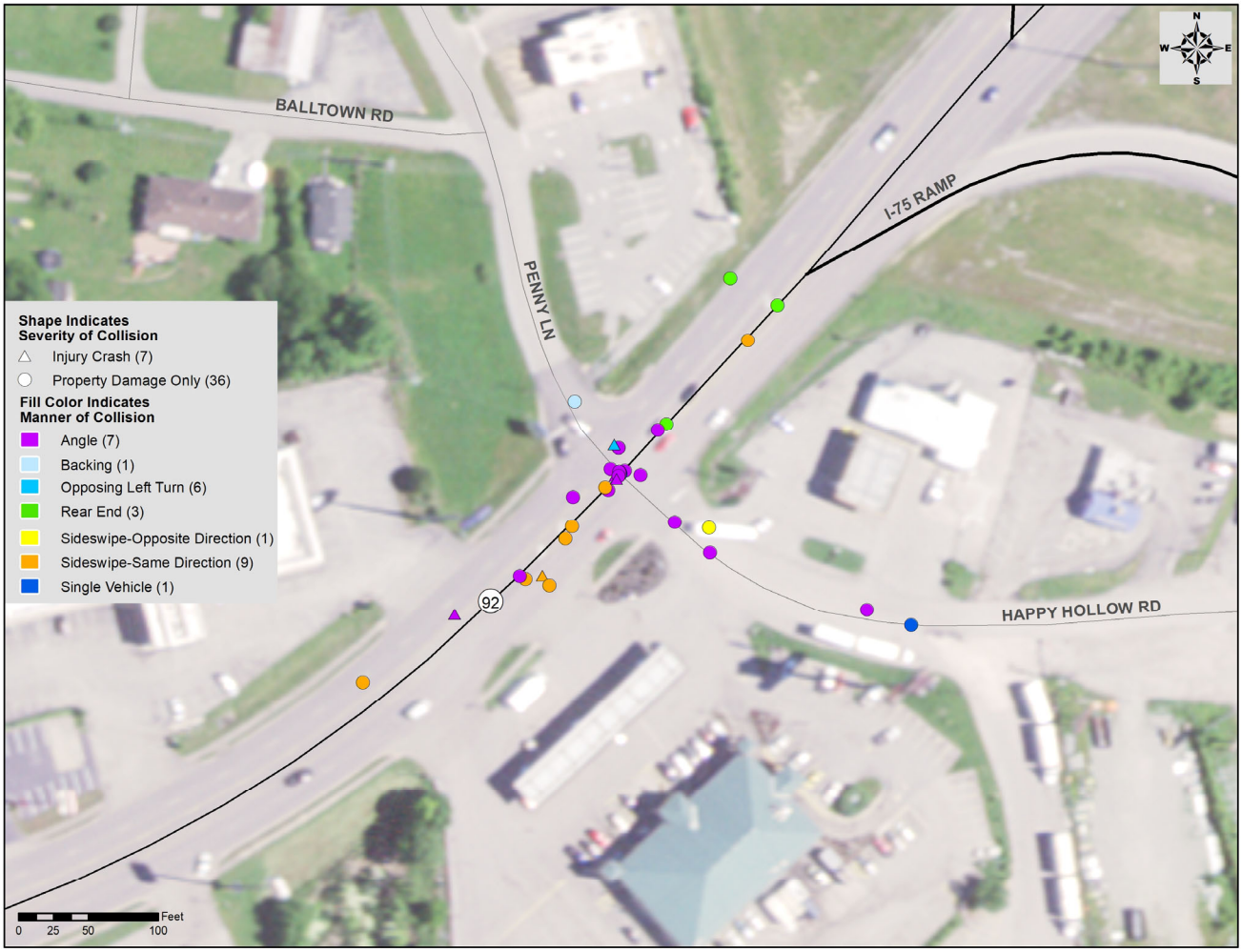

Figure 2: 2017-2020 Crashes within 250 ft of KY 92/Penny Lane Intersection

Traffic Volumes and Operations

As of 2021, KY 92 carries 15,400 vehicles per day (vpd) just west of the I-75 interchange, dropping to 4,700 vpd at milepoint 9.9 (beyond the commercial stretch). Average daily traffic (ADT) volumes are summarized in **Figure 3**. Turning movement counts were collected during September 2021 for key study intersections; additional traffic information is presented in **Appendix A**.

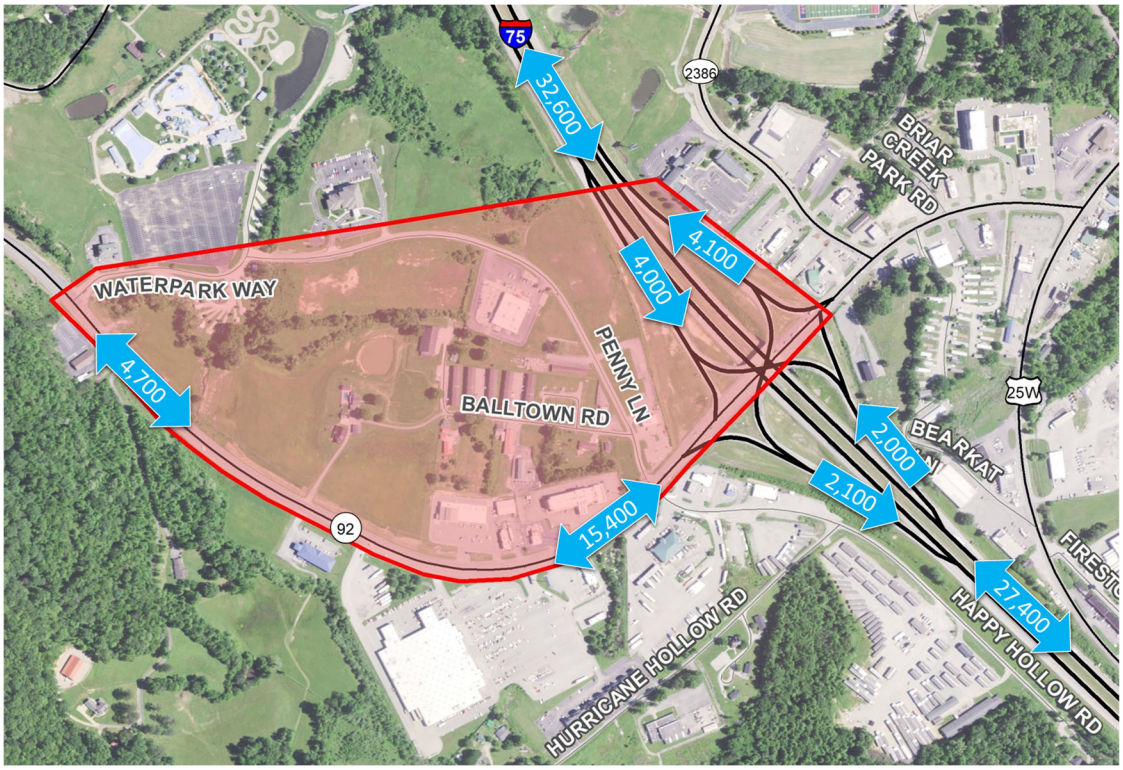

Figure 3: 2021 ADT Volumes

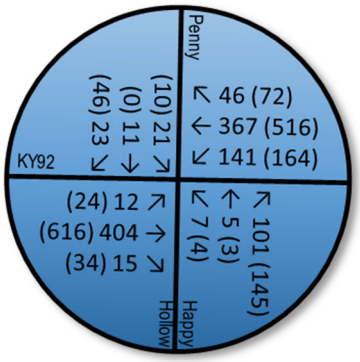

Figure 4: 2021 Existing AM (PM) Peak Hour Volumes

September 2021 AM and PM peak hour turning movements at the KY 92/Penny Lane intersection are shown in **Figure 4**.

Vissim microsimulation software was used to calculate peak period traffic operations for the signalized SPUI and KY 92/Penny Lane intersections. Existing conditions analysis shows that both intersections operate at Level of Service (LOS) C or better during both peak hours. LOS describes driver comfort on a graded scale, with LOS A (free-flow conditions) representing the best case through LOS F (gridlock) representing the worst. The westbound left onto Happy Hollow Road operates at LOS B during the PM peak hour with a 250-foot maximum queue length, compared to 150 feet of available storage in the turn lane.

By study year 2045, traffic volumes increase with continued development in the area—including the Keeneland facility—and operations degrade. For comparison, corresponding 2045 No-Build peak hour turning movements are shown in **Figure 5**. While the SPUI continues to operate at LOS C or better during peak hours, the Penny Lane approach to KY 92 degrades to LOS F in the PM peak if no improvements are made. Maximum queue lengths for the westbound left onto Happy Hollow Road approach 700 feet in the PM peak hour.

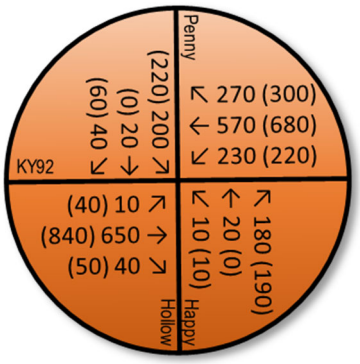

Figure 5: 2045 No-Build AM (PM) Peak Hour Volumes

Improvement Concepts Considered

The goal of the proposed improvement concepts is to reduce the number of crashes and safely accommodate expected future traffic at the KY 92/Penny Lane intersection in Williamsburg. A range of improvement concepts were developed to address the traffic and safety needs identified above.

Concepts promote two key elements:

- Creating a second connection between KY 92 and Penny Lane and
- Encouraging traffic to use the new connection to improve safety and traffic flow near the I-75 interchange.

New Alignment Connector

Two similar concepts for a new alignment connector were developed: Options 1 and 2 shown in **Figure 7** and **Figure 8** on the following pages. Each concept assumes two 12-foot lanes, curb/gutter, and 5-foot sidewalks on both sides, separated from the roadway by a 4-foot-wide grassy strip. The outer blue lines provide a preliminary approximation of right-of-way limits although footprints are likely to vary as engineering details are refined during any future design efforts. Alignments shown represent an effort to minimize impacts to the Briar Creek floodplain, earthwork, and nearby residences.

Option 1 creates a four-leg intersection opposite the western driveway to the health department on Penny Lane. Option 2 creates a gentle curve along Penny Lane, eliminating the existing vehicular connection west to Waterpark Way.

Either converts a 1,000-foot-long section of Penny Lane to one-way (northbound only) north of the Dairy Queen driveway. **Figure 6** presents the approximate limits of the one-way section. Traffic turning onto Penny Lane from the Dairy Queen driveway or Balltown Road could turn right or left, accessing either direction of Penny Lane. However, all traffic entering/exiting from the new Keeneland/Kentucky Downs development will have a right turn only restriction and must continue north to the new connector to return to KY 92.

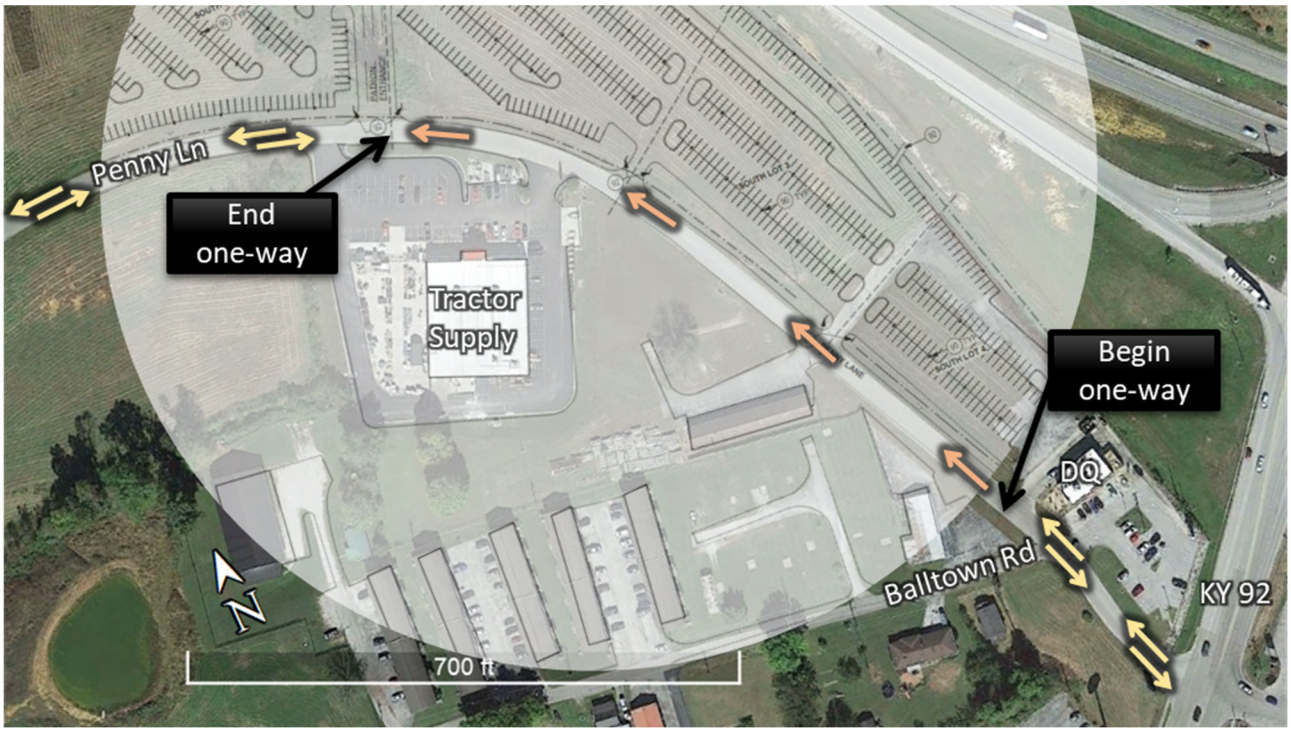

Figure 6: Proposed Penny Lane Operations

Figure 7: Penny Lane Connection Option 1

Figure 8: Penny Lane Connection Option 2

Costs are nearly identical for each, as summarized in **Table 1**. Construction estimates are based on 2019 KYTC District 11 average bid prices with a 30% contingency; right-of-way and utility phase costs were provided by District 11.

Table 1: Connector Cost Estimates by Phase (2021 dollars)

	Design	Right-of-Way	Utilities	Construction	Total
Option 1	$140,000	$1,270,000	$60,000	$1,320,000	**$2,790,000**
Option 2	$140,000	$1,180,000	$90,000	$1,330,000	**$2,740,000**

KY 92/Penny Lane Intersection

Three configurations at the existing KY 92/Penny Lane intersection were considered in combination with the new alignment connector.

- Option A includes no changes at KY 92/Penny Lane; all turning movements allowed today are available in the build scenario.
- Option B restricts the Penny Lane approach to right-in/right-out/left-in traffic only. Thru movements and left turns from Penny Lane are eliminated. This configuration is shown in **Figure 9**. It should be noted that the KY 92 westbound right turn onto Penny Lane accommodates a box truck but not a semi-truck; the existing layout only accommodates a semi-truck if it swings into the unoccupied southbound lane on Penny Lane.

Figure 9: KY 92/Penny Lane, Option B

- Option C restricts Penny Lane and Happy Hollow Road to right-turn only movements for traffic trying to access KY 92. Lefts onto Penny Lane and onto Happy Hollow Road remain. This configuration is shown in **Figure 10**.

Option C also illustrates an add-on to consolidate the Pilot gas station entrances immediately south of the intersection, reducing the number of conflict points. With the middle driveway eliminated, adequate space remains for a pickup with a trailer to enter, access the pumps, and return to KY 92. This add-on could be combined with any of the intersection options shown.

Figure 10: KY 92/Penny Lane, Option C

Options A, B, and C fit within the existing roadway footprint. Construction costs are summarized in **Table 2**.

Table 2: Construction Costs for Intersection Options (2021 dollars)

Scenario	Construction Cost
Option A	N/A
Option B	$40,000
Option C	$240,000*
Driveway closure (add-on)	$65,000

** includes driveway add-on shown*

Potential Impacts to the Environment

Figure 11 presents environmental red flag concerns identified in the study area. While direct impacts are likely limited to habitat for threatened/endangered bat species, potential proximity impacts to nearby resources—including a residence over 50 years in age and a likely environmental justice population cluster—may warrant consideration in future project development phases if a build alternative is selected for implementation requiring federal funding or permitting.

The potential hazardous materials sites noted are based on programs overseen by the US Environmental Protection Agency. A National Pollutant Discharge Elimination System (NPDES) permit is for site runoff, often associated with a construction project. The *Resource Conservation and Recovery Act* (RCRA) designation applies to sites handling monitored solid wastes, ranging from a simple underground storage tank to a facility that generates, treats, transports, and/or disposes of hazardous chemicals. The Permit Compliance System (PCS) and Integrated Compliance Information System (ICIS) are databases that track issued permits, likely associated with the construction of the SPUI in this instance. None of the potential hazmat sites shown are within the proposed footprint of any of the improvement concepts considered.

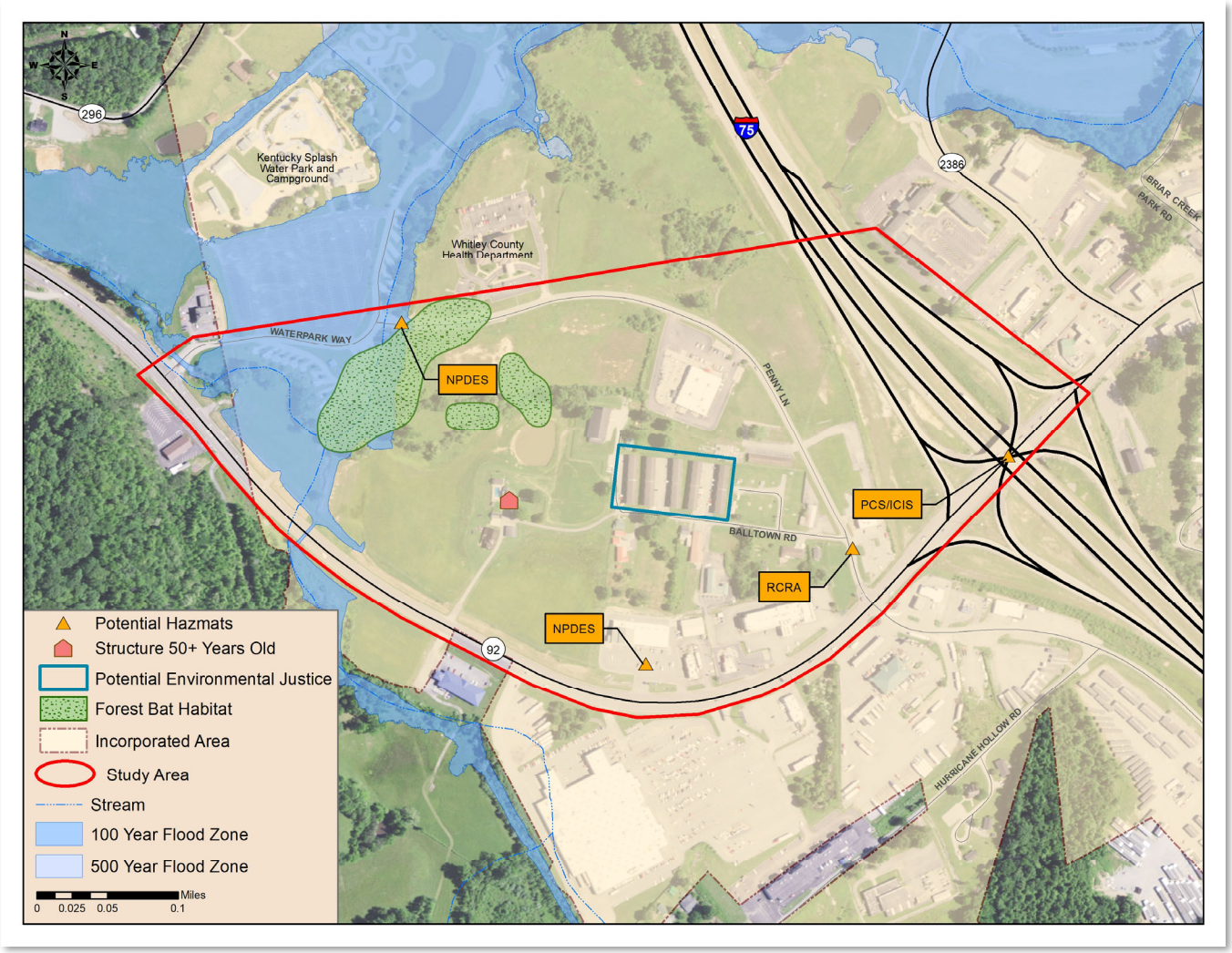

Figure 11: Environmental Red Flags

Potential Impacts to Existing Utilities

Coordination with utility companies identified a city water line on the north side of Penny Lane and city sewer through the field north of the pond. A Delta Gas line comes from the east along Penny Lane to the health department. There is also a gas line and water line running along the north side of KY 92.

Costs to raise the overhead lines along KY 92 are included in the estimates above; the overhead transmission line crossing to the west could likely be avoided.


Overhead lines running on north side of KY 92

Build Traffic

Table 3 compares 2045 No-Build and Build traffic operations during the AM and PM peak hours. As shown, neither the No-Build nor Option A (preserve existing layout at KY 92/Penny Lane intersection) provide adequate capacity to handle increased traffic volumes using Penny Lane once the new gaming facility is open. By restricting turning movements from minor approaches, Options B and C streamline operations at KY 92/Penny Lane although a few movements continue to operate at LOS E or F in one or both peak hours.

In each of the build scenarios, maximum queue lengths for the KY 92 westbound left onto Happy Hollow Road approach 800 feet in the PM peak though average queue lengths are substantially shorter, around 120-150 feet.

Table 3: Comparison of 2045 Traffic Operations

2045 Scenario	AM LOS	PM LOS	Movements at LOS E/F
No-Build (includes Keeneland)	SPUI: B Penny: A-B Happy Hol.: A-C	SPUI: C Penny: F Happy Hol.: B-C	SPUI: WBL Penny/Happy Hollow: SBL, SBR
Option 1A or 2A One-way section of Penny Ln with Existing Layout at KY 92/Penny Ln	SPUI: C Penny: A-C Happy Hol.: C-E Connector: B	SPUI: C Penny: A-F Happy Hol.: B-D Connector: C	SPUI: WBL, NBL Penny/Happy Hollow: WBL, NBT, SBL
Option 1B or 2B One-way section of Penny Ln with KY 92/Penny Ln Right-In/Right-Out	SPUI: C Penny: A Happy Hol.: C-F Connector: C	SPUI: C Penny: A Happy Hol: C-D Connector: C	SPUI: WBL, NBL Penny/Happy Hollow: WBL, NBT Connector: SBL
Option 1C or 2C One-way section of Penny Ln with Penny Ln & Happy Hollow Rd Turn Restrictions*	SPUI: C Penny: A Happy Hol.: B Connector: C	SPUI: C Penny: A Happy Hol.: B Connector: C	SPUI: WBL, NBL Penny/Happy Hollow: WBL Connector: SBL

** Option C eliminates northbound and southbound left and thru movements from cross streets*

The new connector is assumed to be a two-lane facility, connecting to KY 92 with the new southbound approach stop-controlled. Options B and C divert more traffic to the new KY 92/Connector intersection; during the PM peak hour, the southbound left turn onto KY 92 operates at LOS E in either of these scenarios.

Coordination

The project team—including KYTC District 11, Central Office Planning, Central Office Highway Design, and the consultant—met twice during this study to discuss content presented herein. Meeting summaries are included in **Appendix B**.

Additionally, District 11 staff met with the Mayor of Williamsburg in late September to preview improvement concepts 1, 2, and C. He preferred Option 2 over 1 but was interested in preserving the Briar Creek culvert currently carrying Penny Lane to maintain a pedestrian link. He also noted concerns with limiting turn movements at the KY 92/Penny Lane intersection. This intersection provides the only KY 92 access for Happy Hollow and Hurricane Hollow roads today, providing access to 30-40 commercial and residential properties. A mobile home dealership relies on this intersection to access KY 92 to the west; with their large vehicles, they would have less flexibility than passenger cars to make a downstream U-turn. Beyond the scope of this current study, the mayor suggested a future project could connect Hurricane Hollow Road and KY 92 at a new location.

Next Steps

No funding for future project development phases has been identified at this time. Project sheets for each build concept are included in **Appendix C**. If a build option is selected for implementation requiring federal funding or permitting, environmental analyses and public involvement activities should be completed alongside preliminary engineering efforts.