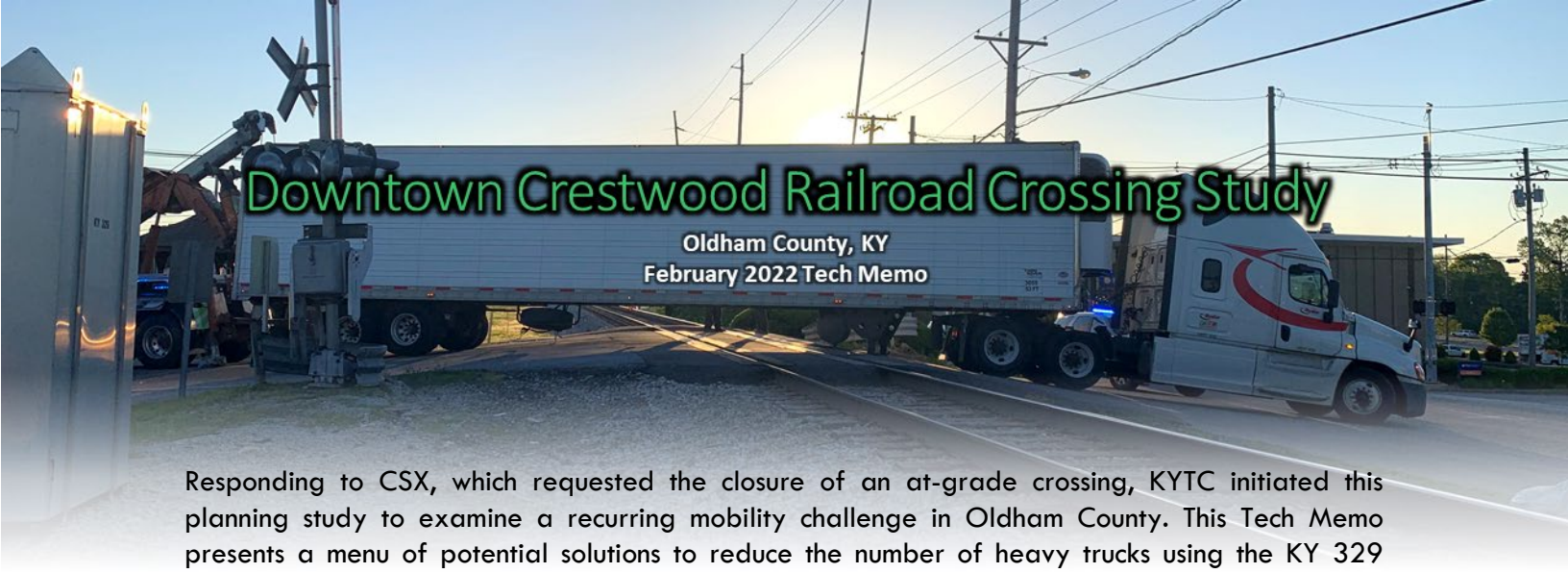


Responding to CSX, which requested the closure of an at-grade crossing, KYTC initiated this planning study to examine a recurring mobility challenge in Oldham County. This Tech Memo presents a menu of potential solutions to reduce the number of heavy trucks using the KY 329 (Railroad Avenue) crossing—including likely impacts to the local transportation network.

Existing Conditions

Regionally, KY 329 is an urban minor arterial south of its interchange with I-71, an urban minor collector south of its intersection with the KY 329B bypass, and an urban local street south of KY 22. KY 329B (Veterans Memorial Boulevard) forms a bypass of downtown Crestwood, designated an urban minor arterial for its entirety. KY 22 and KY 146 also provide east-west minor arterial connections through the area.

Figure 1 presents a map of functional classifications for state-maintained highways in the area.

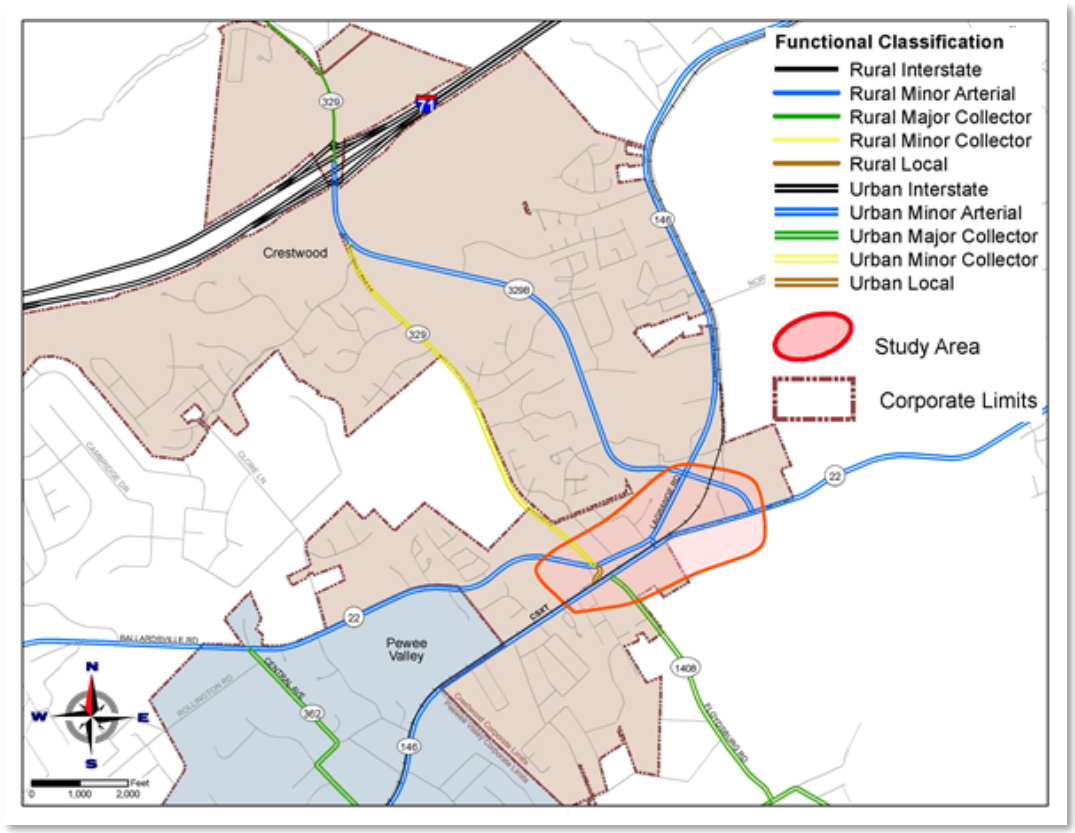


Figure 1: Functional Classification Map

A CSX rail line runs east-west through Crestwood, with three local options to cross the tracks:

KY 329
Railroad Ave.

KY 22/KY 146
by Reardon's

KY 329B Bypass

The KY 329 (Railroad Avenue) at-grade rail crossing is steep (**Figure 2**), with grades up to 15% between the tracks and nearby KY 146 (LaGrange Road). Approaching the crossing from the north, the downgrade is less visible from a distance. The steep drop causes low-clearance vehicles, particularly semi-trucks, to become stuck on the tracks.

The grade issue has gradually worsened over time as the elevation of the tracks increased due to routine maintenance. Trains operate at the peak efficiency when the tracks are uniformly level/graded. Routine rail maintenance includes "surfacing," whereby lasers collect elevation data and then the tracks are raised by tamping ballast under the ties to smooth the track profile.

Tracks will almost always be raised—rarely lowered—during surfacing, so it is safe to assume the elevation of the rail line will continue to increase over time. In turn, the grade to reach KY 146 will continue to get steeper over time unless the highway is also raised.

Access-by-permit control along KY 146 south of the railroad complicates raising the highway elevation; thus, the problem will continue to gradually worsen over time.

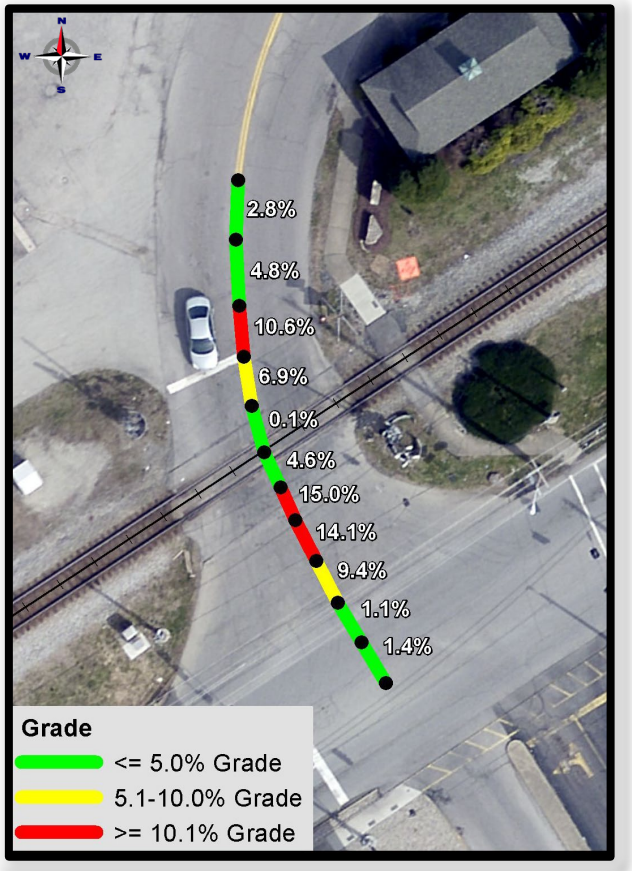


Figure 2: KY 329 Crossing Grades

Traffic

Traffic counts acquired during March 2021 showed 4,200 vehicles using the Railroad Avenue crossing during a 12-hour period, including 1.4% trucks. Factored, this represents 5,200 vehicles per day (vpd). Additional counts obtained at nearby KY 22/KY 146 crossing carries 6,700 vpd, with 2.8% truck traffic.

Inventory data from the Federal Railroad Administration (FRA) estimated 10 trains per day use this section of track; input from local residents suggests the FRA estimate may be low. March 2021 counts showed four trains during the 12-hour count, averaging 143 cars in length, that blocked crossings about 4 to 5 minutes each time.

Safety

CSX records showed at least 170 unique incidents where trucks became stuck at the KY 329 crossing between January 2016 and January 2021. Only13% of these incidents occurred while one or more lanes of I-71 were closed due to an incident, suggesting regional detours do not play a significant role in these trends. Changing the functional class designation from Urban Minor to Urban Local in July 2017 has not noticeably reduced the number of incidents.

Advance warning signs are located throughout Crestwood, approaching the KY 329 crossing from every direction. As shown in **Figure 3**, most groupings include one of two common Manual on Uniform Traffic Control Devices (MUTCD) standard warning signs. In addition, the City has installed two large-scale, non-standard warning signs with flashers on the fence approaching the KY 329 crossing from KY 22 (Ballardsville Road).

RECENT STUCK TRUCKS

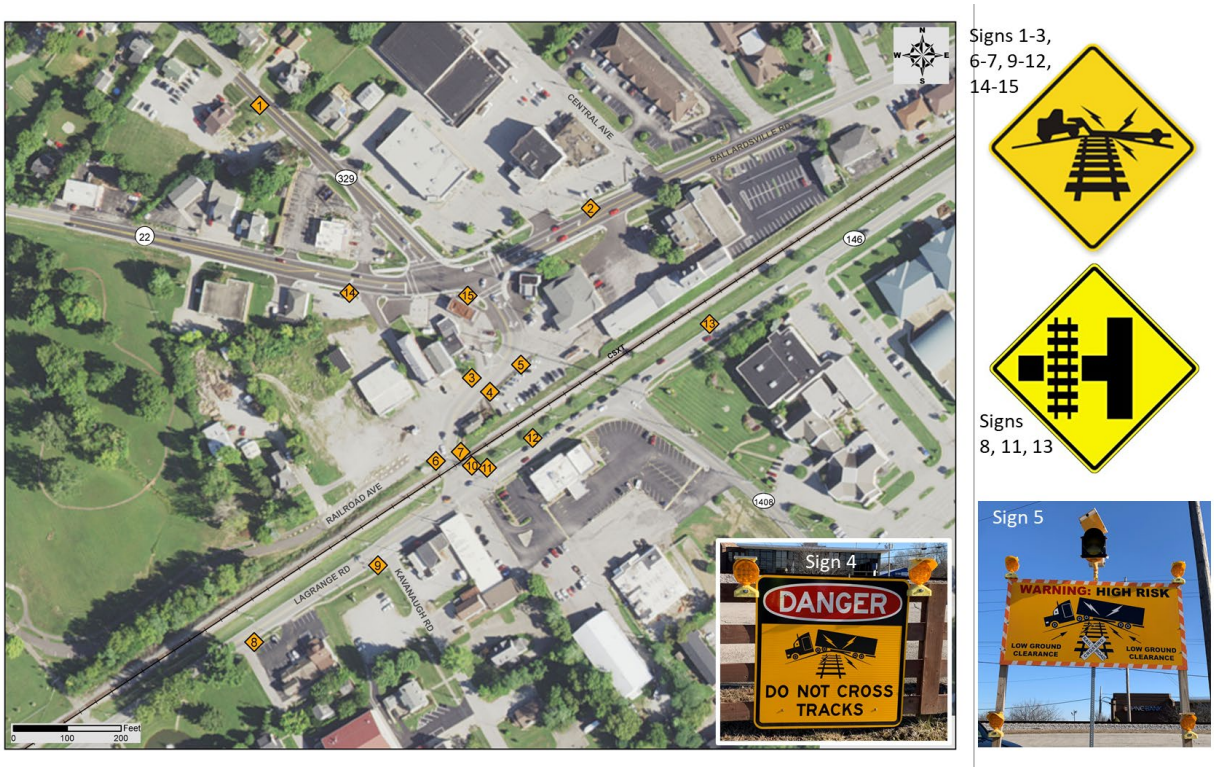
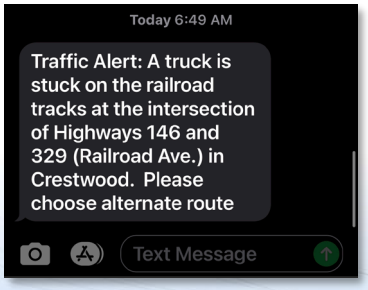


Figure 3: Advance Warning Signs in Vicinity

When a truck is stuck on the tracks, the road must be closed until the truck can be removed by a specialized tow truck, sometimes taking 30 to 60 minutes. The County subscribes to an automated warning system to distribute text messages to warn the traveling public, as shown below.



TEXT ALERT

KY 329 RAILROAD AVE. SOUTHBOUND

Menu of Options

This Tech Memo presents a menu of potential solutions to reduce the number of heavy trucks using the KY 329 Railroad Avenue crossing—including likely impacts to the local transportation network. Potential solutions suggested over the course of the study are summarized in **Table 1**. Concepts, costs, and impacts are presented over the following pages. Several measures could be combined to define a more holistic solution.

Table 1: Menu of Potential Solutions

Lower Cost Solutions	Construction-Based Solutions
Redesignate KY 329 Routing	Truck Escape Route
Truck Chime for Low-Clearance Warning	One-way KY 329 Crossing
Legislative Truck Prohibition	Close KY 329 Crossing
U-Turn off KY 329 Railroad Ave.	

Redesignate KY 329 Routing

Some drivers may experience confusion choosing between KY 329 and KY 329B; "B" could represent "bypass" or "business." One option is to redesignate the route numbering along KY 329.

- Renumbering KY 329 between KY 329B and KY 146 (milepoint [MP] 7.226 to MP 8.935) to a four-digit designation could discourage truck drivers from using this route as four-digit routes tend to provide less mobility.
- Renumbering KY 329 between KY 22 and KY 146 (MP 8.840 to MP 8.935) to a four-digit number could help discourage trucks from using the crossing.

KY 329B could be redesignated as KY 329 to reduce confusion. Note: KY 329 north of KY 22 does not have a local name; renumbering the route would impact addresses for an estimated 35 properties. Either option requires redesignating KY 329 milepoints countywide. Neither would physically inhibit trucks from using the crossing. As free navigation apps default to shortest path routing solutions, renumbering may not result in substantive changes. This option is not recommended unless combined with other solutions.

Truck Chime for Low-Clearance Warning

Oldham County has expressed interest in a mast arm setup, similar to the setup in **Figure 4**, to discourage low-clearance trucks from using KY 329 southbound from KY 22. Their intent is to install the pole in the southwest quadrant of the KY 22/KY 329 intersection, in the curbed island in front of the Sunoco gas station. Coordination with utilities indicated the presence of a clear 5-foot-square area large enough to accommodate the 3-foot-square foundation needed to support the structure. Materials are estimated at $25,000.

Figure 4: Sample Truck Chime

While the truck chime represents a highly visible warning, it would not physically inhibit trucks from using the crossing and would not warn trucks crossing northbound from KY 146. Because it is based on vehicle height rather than length/undercarriage, box trucks that could safely cross would be discouraged as well.

Legislative Truck Prohibition

A legal mechanism exists to prohibit trucks from using specific highway links via 603 KAR 5:250, which allows for legislative deletions to the 15-mile/5-mile buffers along the National Truck Network. While these are rare, exceptions have been granted including at the KY 146 CSX railroad crossing in Anchorage, KY. STAA trucks can be prohibited for "significant, clearly evident safety problems."

By itself, the legislation would not physically inhibit trucks from using the crossing.

However, it can be effective—especially after implementation with targeted enforcement. The prohibition has proven to be effective on KY 146 in Anchorage although truckers need time to learn the regulation.

U-Turn off KY 329 Railroad Avenue

Today, there is no viable exit strategy for southbound trucks on Railroad Avenue approaching the railroad crossing; turning around involves an intricate series of back-and-forth maneuvers in adjacent parking lots that can block the street for 30 minutes or more. A series of decorative stones were installed along the Maples Park entrance in 2017 to constrict its use as a turnaround. Without another option, southbound trucks opt to continue south over the tracks and hope for the best.

Figure 5 (page 7) illustrates a low-cost option to designate a U-turn for southbound semi-trucks. The orange path shown lies within existing state right-of-way and city-owned parcels. While some of the stones and display sheds would have to be relocated, minimal infrastructure investments beyond signing and striping could provide a quick fix.

To reduce wear and tear, repaving the affected footprint to ensure full-depth pavement is estimated to cost $280,000. While the U-turn would provide an escape option for southbound trucks, it would not physically inhibit them from using the crossing and would not impact trucks crossing northbound from KY 146.

VIEW WEST FROM RAILROAD AVE. TOWARDS MAPLES PARK ENTRANCE

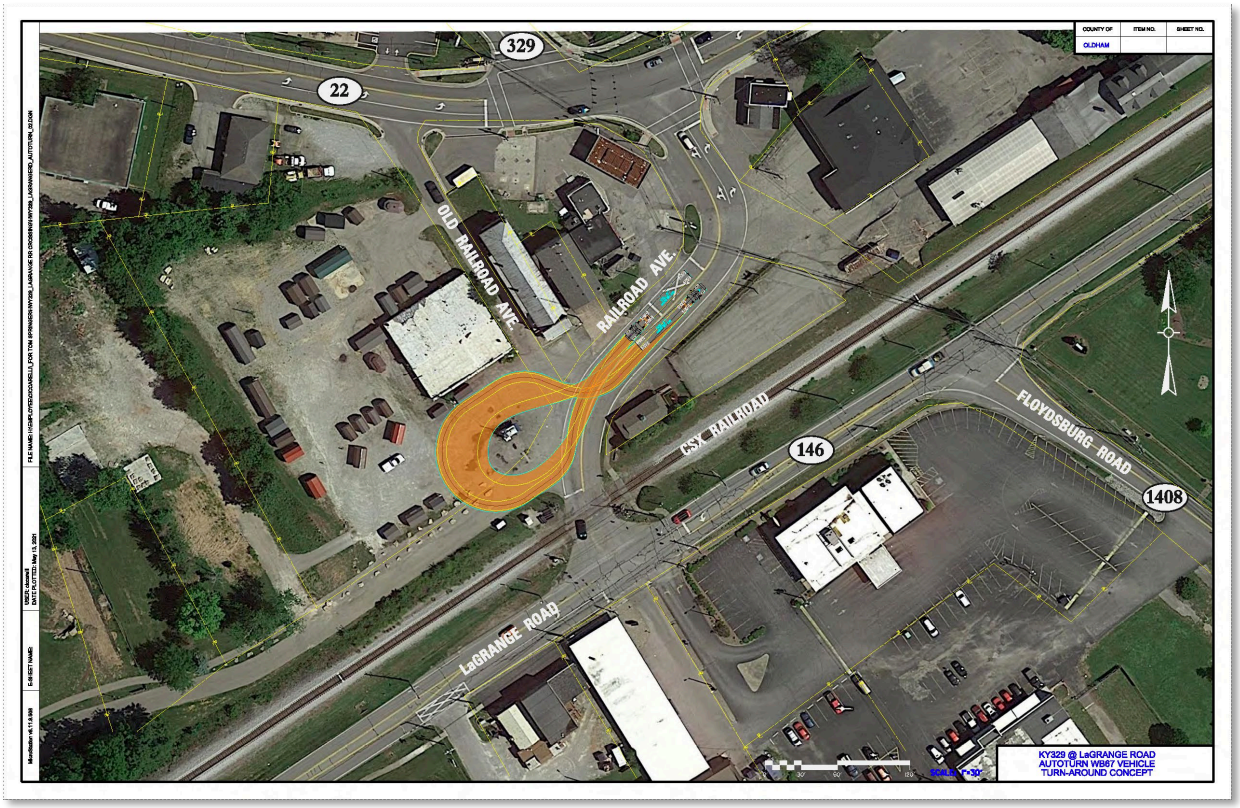


Figure 5: Designated U-Turn on Public Right-of-Way

KYTC generally supports this option; core samples in the parking lot are recommended to assess paving needs. Signing for the U-Turn is critical to notify trucks of the turnaround option. Supplemental protection for the ice vendor inside the proposed loop may be beneficial.

Truck Escape Route

The Truck Escape Route is similar to the U-turn concept above, providing a detour allowing southbound Railroad Avenue trucks to exit Railroad Avenue without crossing the tracks (**Figure 6**). The green path demonstrates a navigable path whereby a semi with a 53-foot trailer could follow a newly created gravel connection through an overflow parking lot for Maples Park.

As shown, a turnaround via city-owned Old Railroad Avenue (orange at right) is not viable without impacting the adjacent building; the connection to KY 22 would not fit turns to the east within existing pavement.

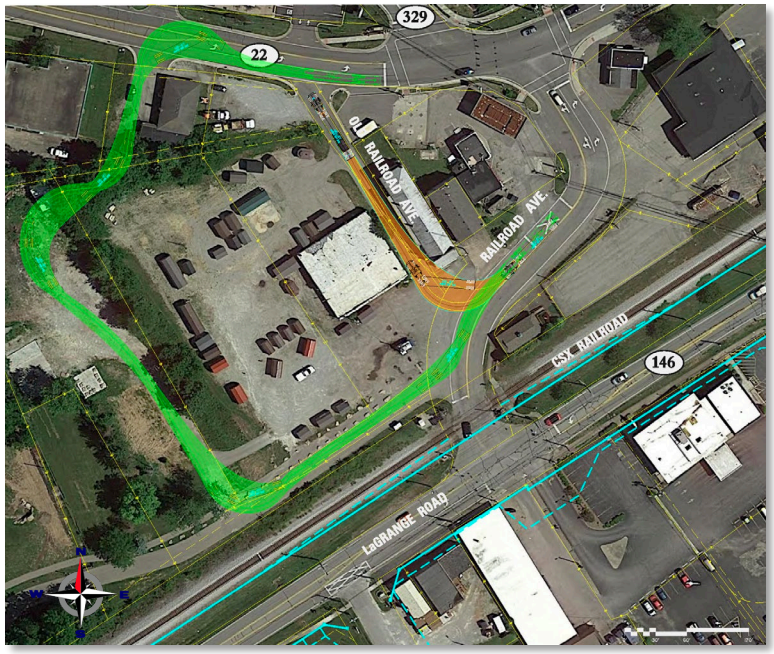
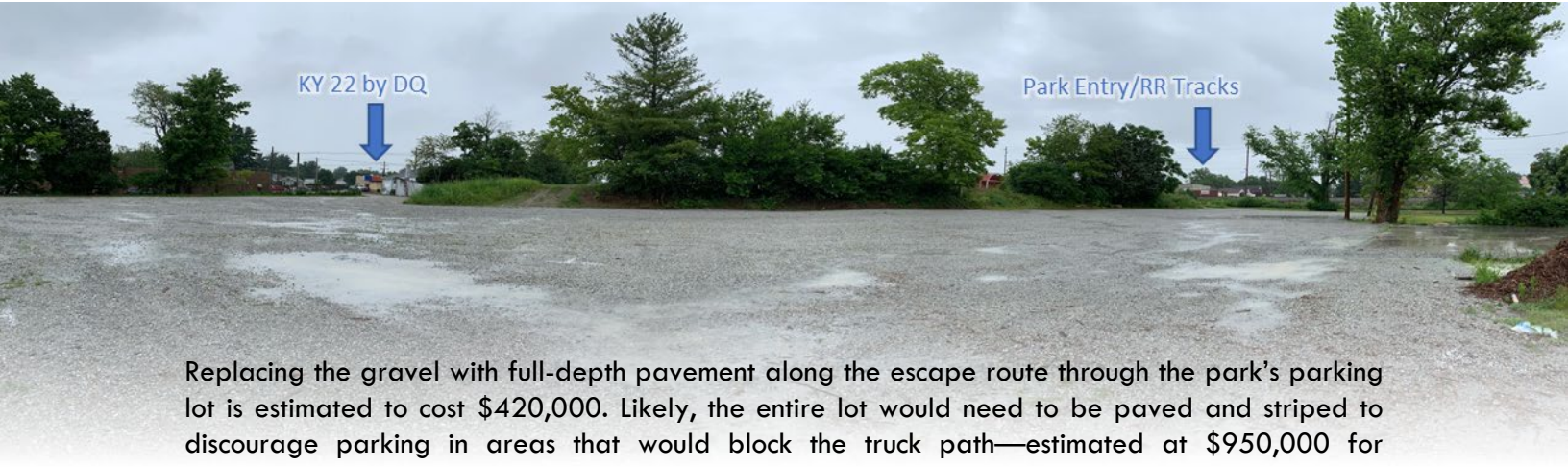


Figure 6: Truck Escape Route Concept



Replacing the gravel with full-depth pavement along the escape route through the park's parking lot is estimated to cost $420,000. Likely, the entire lot would need to be paved and striped to discourage parking in areas that would block the truck path—estimated at $950,000 for construction. Geometric improvements to soften curves while keeping the escape route on city-owned right-of-way would simplify the connection for drivers.

While this connection provides an escape for southbound trucks, it would not physically inhibit them from using the KY 329 crossing and would not impact trucks crossing northbound from KY 146. With higher costs than the U-Turn option presented above and likely impacts to park operations, this option is not recommended to advance.

One-way KY 329 Crossing

A variety of scenarios that close KY 329 (Railroad Avenue) to all southbound traffic were examined to understand traffic impacts on the local street network.

The Kentuckiana Regional Planning and Development Agency's (KIPDA) travel demand model predicts that the total number of cross-railroad trips will remain constant over a 24-hour period. Vehicles using the KY 329 crossing southbound today shift to other crossings: redistributed between the KY 22/KY 146 (Reardon's) crossing and the KY 329B bypass underpass. Some cross-rail traffic also shifts to Pewee Valley, increasing from 2,300 vpd at Central Avenue to 3,600 vpd with the one-way closure at Railroad Avenue.

Improvements would be needed to handle increased traffic at the KY 22/KY 146 (Reardon's) at-grade crossing. In each option, turn lanes towards the crossing would need to be added at the northern KY 22/KY 146 intersection and the existing signal at KY 329/KY 146 would be eliminated. Variations between scenarios occur at the southern KY 22/KY 146 intersection by the school driveway, noted with an orange circle in **Figure 7**.

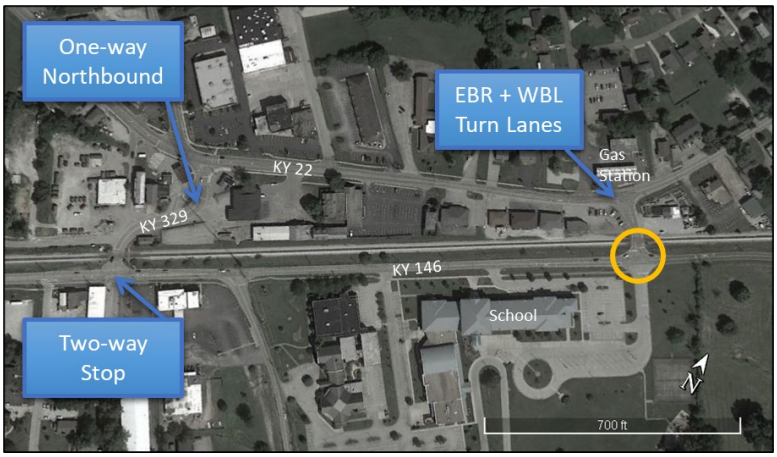


Figure 7: Improvements for One-Way Options

- **Option 1**: Preserve the existing four-way stop control to the south of the Reardon's crossing (by the school entrance) and two-way stop control to the north (by the Shell gas station).
- **Option 2**: Install coordinated traffic signals at intersections north and south of the Reardon's crossing. Eastbound left- and westbound right-turn lanes are added at the southern

intersection (by the school entrance), separating turn movements towards the crossing from through movements.

- **Option 3**: Create a mini-roundabout south of the Reardon's crossing; the intersection to the north (by the Shell station) continues to operate as a two-way stop.

Improvements at the northern KY 22/KY 146 intersection represent an opportunity to better define access at the adjacent gas station. Planning-level cost estimates for each of these three options are summarized by phase in **Table 2**.

Table 2: Cost Estimates for One-Way KY 329 Options

Cost in 2020 dollars	Option 1: Stops	Option 2: Signals	Option 3: Roundabout
Design	$30,000	$90,000	$50,000
Right-of-Way	$120,000	$120,000	$60,000
Utilities	$150,000	$150,000	$100,00
Construction	$260,000	$870,000	$440,000
Total	**$560,000**	**$1,230,000**	**$650,000**

Vissim microsimulation software was used to calculate peak period traffic operations for each of these three options. **Appendix A** contains the Traffic and Microsimulation Report for the study, presenting a more comprehensive traffic discussion. **Table 3** and **Table 4** summarize peak hour volumes (AM and PM, respectively) at each of the three local railroad crossings alongside 2021 observed trends.

Table 3: AM Peak Hour Volumes Crossing Railroad Tracks by Scenario

Scenario	Railroad Ave.		Reardon's		Bypass		TOTAL	
	SB	NB	SB	NB	SB	NB	SB	NB
AM Peak								
Existing	110	150	220	250	80	500	410	900
	260		470		580		1,310	
Option 1: One-way, Stops	0	160	180	200	250	450	430	810
	160		380		700		1,240	
Option 2: One-way, Signals	0	170	330	220	100	460	430	850
	170		550		560		1,280	
Option 3: One-way, Roundabout	0	160	170	230	250	460	420	850
	160		400		710		1,270	

Table 4: PM Peak Hour Volumes Crossing Railroad Tracks by Scenario

Scenario	Railroad Ave.		Reardon's		Bypass		TOTAL	
	SB	NB	SB	NB	SB	NB	SB	NB
PM Peak								
Existing	190	200	340	260	400	290	930	750
	390		600		690		1,680	
Option 1: One-way, Stops	0	170	360	240	600	290	960	700
	170		600		890		1,660	
Option 2: One-way, Signals	0	180	460	230	500	290	960	700
	180		690		790		1,660	
Option 3: One-way, Roundabout	0	170	350	250	610	300	960	720
	170		600		910		1,680	

Figure 8 shows level of service (LOS) at each of six key study intersections. As shown, most intersections operate at LOS D or better during the peak hours. The exceptions are the four-way stop-controlled intersection by the school driveway and the signalized KY 146/KY 329B intersection in the PM peak hour. Discussed further in the following subsection (page 11), the one-way option with the mini-roundabout provides the best LOS at the Reardon's crossing.

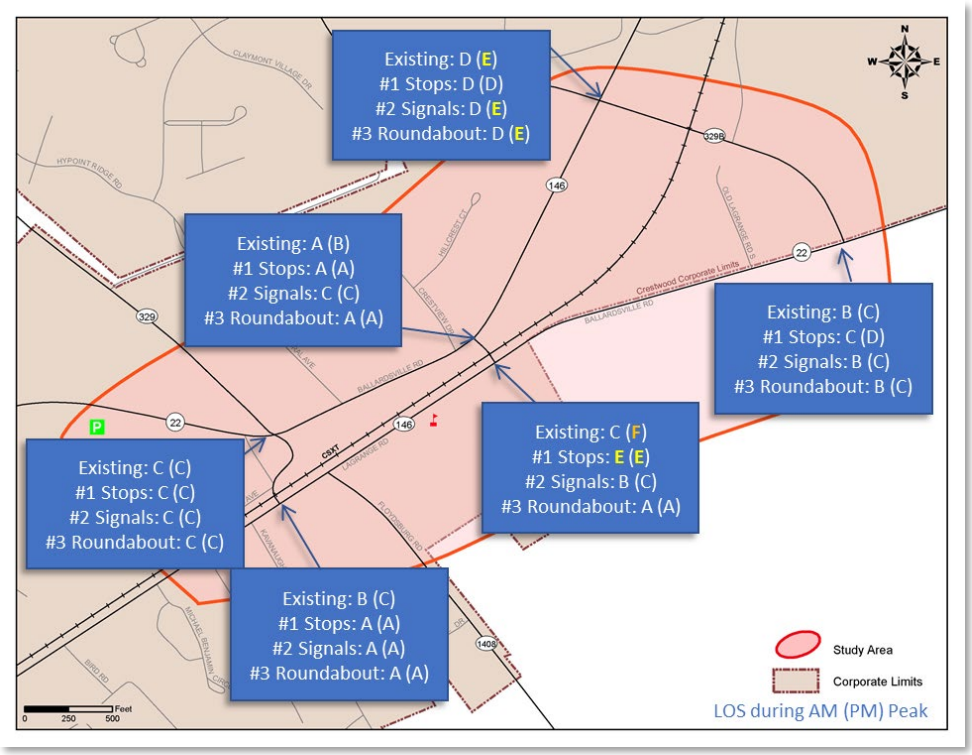
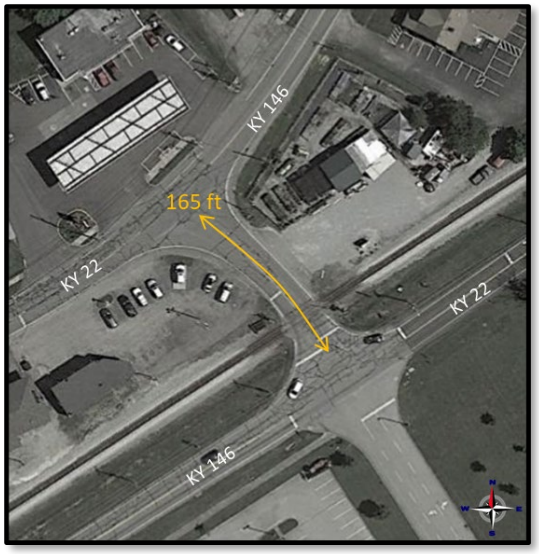


Figure 8: AM (PM) Peak Hour LOS for One-Way Options

Beyond LOS, queue lengths at the Reardon's crossing are another key metric to consider. There is approximately 165 feet of storage between cross streets at the KY 22/ KY 146 crossing—including space for the railroad crossing itself, which is clearly not intended for queue storage.

Table 5 presents northbound and southbound queue lengths for this link for the AM and PM peaks. Average queue length is the average for the one-hour analysis period; max queue represents the longest instantaneous backup during the one-hour period. Red text highlights values greater than available storage lengths, suggesting upstream spillbacks would occur.



165 Feet between Highways

Table 5: Queue Lengths in Feet at KY 22/KY 146 Crossing

Scenario	Southbound		Northbound	
	Avg	Max	Avg	Max
AM Peak				
Existing	22	150	19	216
Option 1: One-way, Stops	12	143	14	115
Option 2: One-way, Signals	12	164	14	95
Option 3: One-way, Roundabout	4	126	0	83
PM Peak				
Existing	41	178	29	240
Option 1: One-way, Stops	62	286	16	154
Option 2: One-way, Signals	30	167	14	132
Option 3: One-way, Roundabout	13	218	2	89

The Mini-Roundabout Option

For a planning level concept, the mini-roundabout was developed to fit within existing pavement to minimize costs and impacts. While passenger cars and even buses follow the curvature around the roundabout's central island, larger trucks track through it. As they do today, semis would encroach into oncoming traffic lanes beyond the intersection. **Figure 9** (next page) highlights eastbound and southbound left-turn paths for a WB-67 design vehicle.

Semi turning left in Mini Roundabout

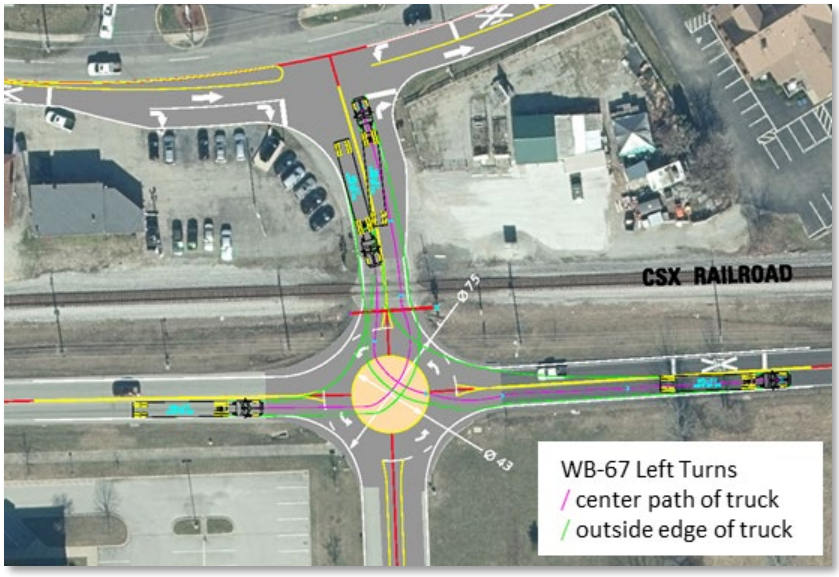


Figure 9: Left-Turn Path for Semi-Trucks through Mini-Roundabout

During the March 2021 traffic counts, 35 multi-unit trucks were observed traveling through the southern KY 22/KY 146 intersection during a 12-hour period. While most were through movements, there were six eastbound left turns and one southbound left turn.

For reference, **Appendix B** contains additional turning movement diagrams from the AutoTURN software package: left- and right-turn paths for a bus, an SU-40 box truck, and the WB-67 semi. During future phases of project development, alignments could be tweaked to balance performance, impacts, and costs—e.g., adding truck aprons or shifting the intersection south would increase right-of-way requirements within school property but could better accommodate truck turns. Any modifications requiring reconstruction of the railroad crossing gate in the northeast quadrant would substantially increase costs and implementation timelines.

CROSSING GATE

It should be noted the 5-lane railroad underpass on KY 329B is only 0.6 mile from the KY 22/KY 146 intersection. Wayfinding signs could be used to encourage use of that route over navigating the Reardon's crossing.

Close KY 329 Crossing

A variety of scenarios that close KY 329 (Railroad Avenue) to all traffic were also examined to understand traffic impacts on the local street network. KIPDA's travel demand model predicts how trips redistribute through the network if this link is closed: Pewee Valley crossings more than double

to 4,700 vpd, KY 22/KY 146 (Reardon's) picks up an additional 4,300 vpd, and the KY 329B bypass picks up the remaining 1,600 vpd.

Despite spot improvements and changes in traffic controls, most scenarios resulted in network failures with widespread gridlock; the existing network of two-lane highways is not adequate to support the redistributed traffic loads. Installing a system of coordinated traffic signals north and south of the KY 22/KY 146 crossing—similar to Option 2 presented above—provides adequate capacity. As shown in **Figure 10**, turn lanes towards the crossing are added at both KY 22/KY 146 intersections and the existing signal at KY 329/KY 146 is eliminated.

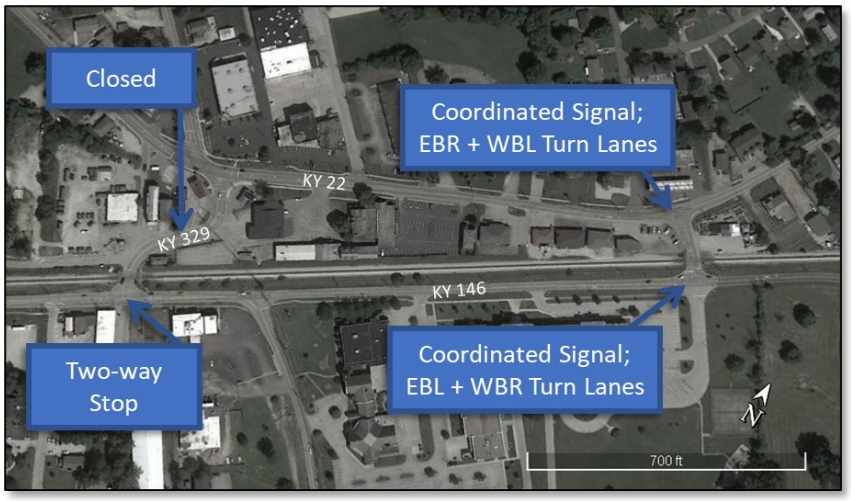


Figure 10: Improvements for Closed Option

Vissim calculated AM and PM peak hour volumes at each of the three local railroad crossings alongside 2021 observed trends, reported in **Table 6**. Corresponding LOS is shown in **Figure 11**; all six study intersections operate at LOS C or better except KY 146/KY 329B, which mimics existing operations.

Table 6: Peak Hour Volumes Crossing Railroad Tracks

Scenario	Railroad Ave		Reardon's		Bypass		TOTAL	
	SB	NB	SB	NB	SB	NB	SB	NB
AM Peak								
2021 Existing	110	150	220	250	80	500	410	900
	260		470		580		1,310	
Closed, Signals	0	0	340	390	100	460	440	850
	0		730		560		1,290	
PM Peak								
2021 Existing	190	200	340	260	400	290	930	750
	390		600		690		1,680	
Closed, Signals	0	0	460	410	490	290	950	700
	0		870		780		1,650	

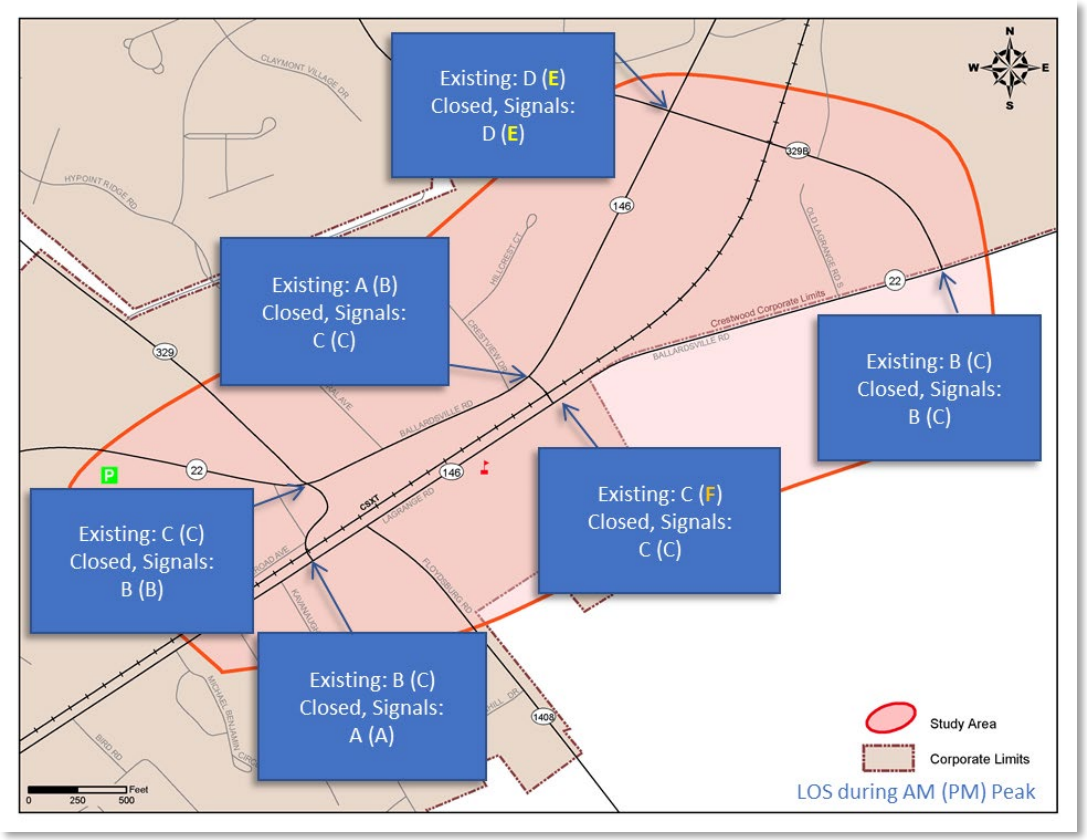


Figure 11: AM (PM) Peak Hour LOS, Full Closure

Maximum KY 22/KY 146 crossing queue lengths during the peak hour (**Table 7**) exceed available storage capacity. Analyses showed that options closing both local crossings quickly failed with network-wide gridlock.

Table 7: Queue Lengths in Feet at KY 22/KY 146 Crossing

Scenario	Southbound		Northbound	
	Avg	Max	Avg	Max
AM Peak				
Existing	22	150	19	216
One-way, Signals	11	165	59	219
PM Peak				
Existing	41	178	29	240
One-way, Signals	36	278	3	218

Coordination Efforts

Over the course of the study, the project team—including KYTC District 5, Central Office, KIPDA, and the consultant team—met twice at key milestones. During July and August 2021, the team reached out to the Oldham County Judge/Executive, the county engineer, and Mayor of Crestwood to discuss the menu of options presented above. Summaries of each coordination meeting are included in **Appendix C.**

Generally, county representatives support the mini-roundabout concept and favor a full closure of the KY 329 (Railroad Avenue) crossing. While an ever-increasing number of small scale, short-term fixes could be implemented to cumulatively reduce the number of trucks crossing at KY 329, county and KYTC representatives at the July 7 meeting agreed this study represents an opportunity to implement a larger scale solution to address this problem directly and improve existing operational issues at the KY 22/KY 146 intersections.

Alternatively, the mayor supports implementing small-scale, short-term solutions and opposes any closures, full or directional. He agreed to shift the boulders/sheds to provide clearance for the U-Turn off KY 329 (Railroad Avenue) option within existing pavement. He supports pursuing a legislative truck prohibition and believes larger scale improvements are warranted at intersections adjacent to the Reardon's crossing—independent of proposed closures at the KY 329 crossing—with longer turn lanes along KY 146 and KY 22. He also noted the MUTCD-standard "low boy" signs should be replaced by box truck-style warnings to reduce driver confusion.

For reference, **Table 8** (next page) presents a side-by-side comparison of options discussed with detailed project sheets included in **Appendix D**.

"Low Boy" (left) vs Box style (right) truck signs

Next Steps

This technical memorandum, including the comparative matrix above and project sheets in **Appendix D**, identifies the range of potential solutions considered for the KY 329 (Railroad Avenue) at-grade crossing in Crestwood. KYTC will coordinate 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.

Table 8: Comparison of Potential Solutions

Menu of Options	Construction Cost	Pro	Con	Supported By		
				City	County	D-5
Redesignate KY 329 Routing	N/A	Reduces confusion with KY 329/KY 329B	Does not physically block trucks; Not effective with free navigation apps	○	○	○
Truck Chime	$25,000	Low cost; Locally initiated project	Does not physically block northbound trucks; Placement could be challenge; Restricts based on height no clearance	●	●	○
Legislative Truck Prohibition	N/A	Low cost; Proven effective in Anchorage; Enforceable; Generally followed by the trucking industry	Does not physically block trucks	●	●	◖
U-Turn off KY 329 Railroad Ave.	$280,000	Low cost; Within existing right-of-way or city-owned land	Does not physically block trucks; Requires local monitoring to keep area clear	●	●	●
Truck Escape Route	$950,000	Within existing right-of-way or City-owned land	Impacts parking for Maple Park with safety concerns with park goers; Does not physically block trucks; Truck turns into oncoming traffic to reach KY 22 eastbound	○	○	○
One-way KY 329 Crossing	$260,000-$870,000	Physically blocks southbound trucks (majority of incidents); Other operational benefits for network	Does not physically block northbound trucks; Potential queue length concerns at Reardon's crossing; Increased traffic through Pewee Valley; Requires investment in local roadways	◖*	◖*	◖*
Close KY 329 Crossing	$870,000	Physically blocks trucks	Potential queue length concerns at Reardon's crossing; Increased traffic through Pewee Valley; Requires investment in local roadways	○	◖	●

● = support | ◖ = partial support | ○ = do not support

* *supportive of intersection improvements but not partial closure*