



Engineers, Surveyors, Planners, Scientists

MEMO

Date: August 26, 2021
To: Adam Gove, PE, PS
From: Abby Cueva, PE
Subject: Lexington-Springmill Road Safety Study
Copies: Kevin Payne, PE, PS

Introduction

The Richland County Engineer's Office (RCEO) invited EMH&T to investigate crash trends along a three-mile segment of Lexington-Springmill Road from Cockley Road to Marion Avenue Road. RCEO and the Richland County Regional Planning Commission (RCRPC) identified the segment as an area of focus due to the crash frequency and operational concerns at some of the intersections along the corridor. From 2017 to 2019, the study area experienced 95 crashes with the majority being rear end crashes near intersections. Rear end type crashes are over-represented in the study area when compared to the statewide averages for rural, two-lane roadways. One (1) fatal crash was recorded at the Cockley Road intersection in 2017, and five (5) serious injury crashes were recorded during the study period. In addition, approximately 25% of the crashes during this three year period were animal related. Based on crash trends and the operational conditions of the existing intersections, EMH&T examined potential countermeasures along the corridor in an effort to assist the County with developing both short-term and long-term goals for improvements along the corridor.

The Ohio Department of Transportation's (ODOT) Economic Crash Analysis Tool (ECAT) was used to analyze the Potential for Safety Improvement (PSI) throughout the corridor. A PSI of greater than zero indicates that a location is experiencing more annual crashes than predicted based on similar intersections or segments across the state under its existing conditions. A PSI score of less than zero indicates that an intersection or segment is experiencing less crashes than predicted based on its peer locations around the state. A PSI score is often used for reference in funding applications for safety related projects. In addition to an existing condition comparison of crash experience, proposed countermeasures can be input into the ECAT tool to get a prediction of crashes per year under the proposed conditions – giving us a metric to use when gauging a proposed safety improvement.

Another metric used in this memo is the Benefit Cost ratio (B/C), often used in funding applications to measure the benefit of the improvements compared to the cost of the project. In general, projects that score over a one (1) are deemed to be more beneficial than their expense. However, many projects are funded at less than one when considering the safety performance of the intersection, the frequency of the crashes occurring, and the severity of the crashes. The latest metrics used in safety applications score projects higher if they average more than three (3) crashes/year and if 30% or more of the crashes resulted in injury.

Capacity deficiencies are often related to crash trends and safety concerns. Therefore, in addition to studying the crash trends, existing operational capacities were investigated for each intersection including turn lane warrants and signal warrants.

Our goal with this memo is that the County gains a better understanding of how the intersections and segments along this corridor compare to other similar intersections around the state; their options for safety improvements; the current operations based on traffic volumes; an understanding of how proposed countermeasures will compete with other projects when pursuing funding; and a general guide to prioritizing improvements along the corridor from a safety perspective.

Data Used

Crash Information: Collision diagrams were prepared by extracting crash data from ODOT's GIS Crash Analysis Tool (GCAT). This information was then uploaded into ODOT's Crash Analysis Module (CAM) Tool and data was generated for each crash including type of crash, road conditions, time of day, and severity.

Traffic Volumes: RCEO provided record turning movement counts and additional counts were obtained by EMH&T as needed to complete the intersection evaluations. Based on input from RCRPC, a growth rate of 0.5% was assumed for the entire corridor and used to forecast Opening Year (2023) and Horizon Year (2043) traffic volumes. Capacity analysis was completed for the AM and PM Peak Hours using HCS7.

The following items were investigated and used to develop countermeasures and to aid in the prioritization of improvements for each intersection or segment along the corridor:

- Crash summary – frequency, types, severity statistics
- Potential for Safety Improvement (PSI), from ECAT
- Existing Operational Capacity
- Turn Lane Warrants
- Signal Warrants
- Benefit Cost Analysis for potential countermeasures

The approximately three-mile corridor of Lexington Springmill Road from Cockley Road to Marion Avenue Road performs better than corridors of a similar type, according to ECAT statistical analysis. While the PSI for the entire corridor has a PSI of -2.1, several problem areas exist from a safety and capacity standpoint. Below is a summary of findings and recommendations based on safety and capacity analysis results.

INTERSECTIONS ALONG THE CORRIDOR

Cockley Road

Crash Summary

The Cockley Road and Lexington Springmill Road intersection and immediately adjacent roadway sections experienced 12 non-animal related crashes between 2017 and 2019, including one (1) fatality in 2017 and two (2) additional injury crashes. The intersection averages 4 crashes/year and a 25% injury rate.

Crash reports indicate that many of the incidents are the result of northbound (3) and southbound (4) vehicles turning onto Cockley Road or one of the driveways directly across from Cockley Road. ECAT analysis of the existing conditions of the road shows a PSI of **-0.15**, indicating the intersection operates *slightly* better than similar intersections around the state from a safety perspective.

Operations

Cockley Road operates with an acceptable LOS C (19-22 second delay) in the existing condition. The 2043 AM scenario predicts a LOS D (32 sec) and the 2043 PM scenario reaches a LOS E (46 sec delay), with a 100' queue.

Turn lane warrants indicate that a northbound left (NBLT) turn lane and southbound right (SBRT) turn lane are warranted in 2023 under the existing conditions. Neither of these turn lane additions will address the future capacity issues predicted for Cockley Road, but would provide a significant safety benefit when considering the current crash patterns described above.

In addition, a traffic signal is warranted at the intersection under the Ohio Manual of Uniform Traffic Control Devices (OMUTCD) Warrants 1, 2 and 3 in 2023 (Opening Year), operating with a Level of Service (LOS) B across all scenarios using the existing lane configurations. However, a NBLT and SBRT should be considered for the safety benefit even if operationally not a necessity with a signal. Roundabout analysis indicates a single lane roundabout will operate within LOS A across all analysis scenarios. The safety analysis below describes the benefit for a signal option, turn lanes without a signal, and the roundabout option.

Safety Analysis

Signal

- The addition of a signal at the intersection with a 225' NBLT and a 295' SBRT is estimated to cost approximately \$908k for construction, right-of-way, and engineering costs and returns a B/C ratio of **1.38**, with an expected decrease in crashes of 2.4/year.

NBLT and SBRT Lanes

- The addition of a NBLT *and* a SBRT without a signal is estimated to cost approximately \$615k and returns a B/C ratio of **1.45**, with an expected reduction in crashes of 1.7/year.
- The addition of a NBLT without a signal is estimated to cost approximately \$550,000 for construction, right-of-way, and engineering costs and returns a B/C ratio of **1.37**, with an expected decrease in crashes of 1.4/year.
- The addition of a NBLT (or a NBLT and SBRT), without the installation of a signal, would address the rear-end crashes which make up the majority of crashes at the intersection. Although it will not address the long-term issue of future delay experience on Cockley, it would serve as an improvement along the rural corridor without the addition of a signal. Additionally, a turn lane project could be designed with a future signal in mind.

Roundabout

- A single-lane roundabout here is estimated to cost approximately \$1,325,000 for construction, right-of-way, and engineering costs and returns a B/C ratio of **1.13**, with an expected decrease in crashes of 2.5/year.
- The geometry of the intersection, specifically the alignment of Cockley Road as it approaches Lexington Springmill, will make the geometry for a roundabout very challenging without impacting the structure over the Clear Fork River. This would make the project more costly, thereby reducing the B/C and making a signal or turn lane addition even more competitive.

Additionally, any proposed improvements will encroach into both FEMA Zone A and Zone AE Special Flood Hazard Areas (100-year floodplain) in unincorporated Richland County. Coordination with the Richland County Floodplain Administrator, including submittal of a floodplain permit application would be required. The proposed work does not appear to encroach into a FEMA designated floodway;

therefore preparation and submittal of a hydraulic analysis with a "no rise" result should not be required. Regardless of the floodplain permit requirements, consideration should be given to maintaining existing flood routes and overflow locations in design of the improvements.

Due to the more rural nature of this intersection, a roundabout here would be ideal. However, the alignment of the Cockley Road approach and nearby floodplain make this solution challenging. Although a signal is warranted at the intersection, adding a NBLT and a SBRT appear to address the majority of the crashes at this intersection, without the addition of a signal until it is needed for future capacity concerns on the Cockley Road approach. This solution returns the best B/C (1.45) of all the alternatives considered and is expected to decrease crashes by 1.7/year. The turn lanes could be added and designed with a future signal taken into consideration. In addition, some coordination with the adjacent property owners is recommended to investigate the potential of consolidating some of the driveways that allow ingress and egress to the property.

Hanley Road

Crash Summary

The intersection of Hanley Road and Lexington Springmill Road experienced eight (8) crashes between 2017 and 2019, two (2) of which were animal related, and all eight (8) crashes were coded as non-injury.

Crash reports indicate that four (4) of the crashes occurred near the PM peak (4-6 PM) where drivers on Hanley Road failed to yield to traffic on Lexington Springmill. As further detailed below, there are significant levels of delay and long queue lengths on Hanley in the PM peak hour, which is likely leading to drivers becoming impatient and attempting to make turns between less than ideal gaps in traffic. ECAT analysis of the existing conditions of the intersection returns a PSI of **0.26**, indicating the intersection is performing slightly below its peer locations.

Operations

Traffic on the existing stop controlled Hanley Road approach experiences LOS F in the Opening Year PM Peak hour with an average delay of 110 seconds for vehicles attempting to turn left.

Looking at the existing stop-controlled intersection, a northbound right turn (NBRT) lane is warranted on Lexington Springmill Road in the AM and PM Peak of the Opening Year and Design Year. A traffic signal is also warranted according to OMUTCD Warrants 1, 2 and 3 in the Opening Year. All movements operate at LOS A or B under the signalized condition with or without the NBRT lane.

The NBRT does help with queueing at the signal with the AM queue reaching 275' without the NBRT and 165' with the NBRT. However, there doesn't appear to be any crash pattern of rear ends in the northbound direction that make the addition of the NBRT a high priority. A single lane roundabout will also operate at LOS A or B across all analyzed scenarios.

Safety Analysis

Traffic Signal

- A traffic signal could be installed for an estimated cost of \$260k with no changes to the existing roadway geometry, and returns a B/C ratio of **1.97** with an expected reduction in crashes of 1.0/year.
- The addition of a traffic signal with a NBRT lane increases the cost to approximately \$573k and returns a B/C ratio of **1.05** with an expected reduction in crashes of 1.2/year.

Roundabout

- The roundabout alternative has an estimated cost of \$1.4M and returns a B/C ratio of **0.74** with an expected reduction in crashes of 1.7/year.
- It is important to note that even with the significant difference in costs of the signal and roundabout alternatives, the B/C ratio is nearly the same. This is a testament to the safety of roundabouts and their ability to significantly reduce injury crashes.

Additionally, any proposed improvements will encroach into both FEMA Zone A and Zone AE Special Flood Hazard Areas (100-year floodplain) in unincorporated Richland County. Coordination with the Richland County Floodplain Administrator, including submittal of a floodplain permit application would be required. The proposed work does not appear to encroach into a FEMA designated floodway; therefore preparation and submittal of a hydraulic analysis with a "no rise" result should not be required. Regardless of the floodplain permit requirements, consideration should be given to maintaining existing flood routes and overflow locations in design of the improvements.

The Hanley Road intersection has undergone improvements in the past in the form of realignment and the addition of left turn lanes. The crash pattern of vehicles on Hanley Road failing to yield as they turn onto Lexington Springmill is likely related to the significant delay experienced on the approach. A traffic signal installation is estimated to cost approximately \$260,000 with a B/C of 1.97 and estimated crash reduction of 1.0/year, while a roundabout costs \$1.1M more than a signal and returns a B/C of 0.74 and estimated crash reduction of 1.7/year. A signal installation here certainly makes the most sense as left turn lanes already exist for both the southbound approach and the Hanley Road approach, making it a low cost solution to the operational deficiencies on Hanley Road. As discussed above, a NBRT does help to minimize queueing at the signal although there isn't a pattern of northbound rear end crashes that make the addition of the NBRT a high priority. Given the NBRT reduces the B/C from 1.97 to 1.05, adds \$300k in costs, and only reduces crashes by an additional 0.2/year, our recommendation would be to plan for it in the future if it's needed, but install just the signal as an initial low cost countermeasure. A roundabout shows the best reduction in crashes, but the crash pattern here of less than three (3) a year and no injury crashes would not likely make it a high priority location for this magnitude of a safety fund request.

Owens Road

Crash Summary

The Owens Road and Lexington Springmill Road intersection had six (6) crashes between 2017 and 2019, five (5) of which were rear end crashes in the NB direction. Four (4) of the rear end crashes were coded as injury, meaning 67% of the total crashes at this intersection resulted in injury.

Crash reports confirmed the rear ends occurred to vehicles heading NB and waiting to make a left turn onto Owens Road. ECAT analysis of the existing intersection shows a PSI of **-0.30**, indicating the intersection operates slightly better than similar intersections.

Operations

Owens Road operates at an acceptable LOS C (19 sec delay) in the AM and a LOS D (34 sec delay) in the PM for the Opening Year. However, the Owens Road approach begins to approach a LOS F in the Design Year PM Peak with a LOS E (48 sec delay).

Turn lane warrants show that a NBRT is warranted across all analyzed scenarios. Based on the crash pattern discussed above, the addition of this turn lane will greatly improve safety and serve as a

general capacity improvement. A traffic signal is not warranted for the intersection under all scenarios.

Safety Analysis

Northbound Left Turn Lane

- The addition of a 225' northbound left turn lane has an estimated cost of approximately \$535k for construction, right-of-way, and engineering costs and returns a B/C ratio of **0.96** with an expected reduction in crashes of 1.0/year.

Although a signal is not warranted at the Owens Road intersection, a NBLT lane is warranted in the AM and PM Peak in the Opening Year and Design Year. The NBLT lane would directly address the crash pattern at the intersection for nearly 100% of the crashes. Most concerning at this intersection is the high rate of injury accidents – four (4) of the five (5) northbound rear ends resulted in injury which likely means high speeds at impact. The NBLT returns a solid B/C of 0.96 and due to the high injury crashes, this improvement would likely fare well for safety funds. Although not deficient in sight distance, there is a slight crest in the road as you approach the intersection from the south that may be leading to driver error. In addition to a NBLT, signage for the cross street could be improved to include a “watched for stopped traffic” plaque as a low cost option. Although a signal is not currently warranted at the intersection, Design Year LOS for Owens reaches a LOS E. If a signal is warranted in the future at this location, the NBLT would be in place, making it a lower cost to install.

Cook Road

Crash Summary

The intersection of Cook Road and Lexington Springmill Road experienced four (4) crashes between 2017 and 2019, one (1) of which was animal related. Two (2) of the crashes were coded as injury crashes, one being a southbound rear end crash and the other a failure to yield angle crash. ECAT analysis of the existing conditions of the intersection return a PSI of **-1.26**, meaning this intersection performs substantially better than similar intersections in the state from a safety perspective. The intersection averages 1.3 crashes/year and is currently showing a 50% injury rate.

Operations

Traffic on the existing stop controlled Cook Road approach experiences LOS F (57 sec delay) in the Opening Year PM Peak hour with an estimated 130' queue length. In the Design Year the queue on Cook Road is estimated to near 200' with an average of 110 second delay in the PM Peak period.

Under existing conditions, a northbound right turn lane (NBRT) on Lexington Springmill is warranted across all design year scenarios and a southbound left turn lane (SBLT) is warranted for the PM Peak scenarios. Neither of these turn lane additions will address the failing movements on Cook Road, but would provide a safety benefit.

A traffic signal is warranted according to OMUTCD Warrants 1, 2 and 3 in the Opening Year. All movements operate at LOS A or B under the signalized condition for all scenarios, however, the full safety benefit of signalization would be better achieved with the dedicated NBRT to support the higher turning volumes (132 vehicles in 2023 PM Peak), particularly when Lexington Springmill is on green. Due to the lower volume of southbound lefts, 12 vehicles in 2023 PM Peak, the SBLT provides minimal benefit from an operations perspective, but makes a difference when analyzing the safety benefit, as summarized below. A single lane roundabout will also operate at LOS A or B across all analyzed scenarios.

Safety Analysis

Signal

- The addition of a traffic signal at the intersection with a 295' NBRT and 225' SBLT is estimated to cost approximately \$1M for construction, right-of-way, and engineering costs and returns a B/C ratio of **1.46** with an expected crash reduction of 2.9/year.
- The installation of a traffic signal with only a 295' NBRT is estimated to cost \$580k and returns a B/C ratio of **1.86** with an expected crash reduction of 2.1/year.

Roundabout

- With an estimated cost of \$1.5M for construction, right-of-way, and engineering costs, a roundabout alternative receives a B/C ratio of **1.21** with an expected crash reduction of **3.0**/year.
- It should be noted that a Mansfield water treatment plant is located directly across from Cook Road. The plant has a fence that is about 30 feet from the edge of the roadway. This doesn't eliminate the option of a roundabout in this location, but it does require some further investigation should the option be considered.

A signal is warranted at the Cook Road intersection with an Opening Year LOS F for the Cook Road approach. Although crashes at this intersection are relatively low and the intersection performs better compared to its peer locations from a safety perspective, the degrading operations will likely only worsen safety over time. A signal and roundabout are predicted to reduce crashes by nearly the same amount per year and the signal has a better B/C for both turn lane scenarios. Given that the frequency of crashes at this intersection are on the low end (1.3/year), the least expensive option of a signal with a NBRT lane, is our recommendation when other priorities are addressed along the corridor. A roundabout would have its challenges with the proximity to the water treatment plant and the home on the northeast corner of the intersection, although a great solution for the rural nature of the intersection. An exhibit is included for both options at this intersection in the attached appendices. The roundabout exhibit is intended to give the County an idea of the "footprint" of a roundabout at this location.

Home Road

Crash Summary

The Home Road intersection is the worst performing intersection in the corridor from a safety perspective. Sixteen (16) crashes occurred at the intersection from 2017 to 2019, with five (5) being coded as injury. The intersection averages 5.3 crashes/year with a 31% injury rate. Of the 16 crashes, 10 were failure to yield crashes from vehicles attempting to maneuver from Home Road and onto Lexington Springmill. Similar to the situation at the Hanley Road intersection discussed previously, long delays and queue lengths will lead to impatient drivers failing to yield to traffic on Lexington Springmill when attempting to complete their turns. There were two (2) southbound rear end crashes from vehicles waiting to turn left onto Home Road. Immediately north of the intersection the speed limit on Lexington Springmill increases to 50 MPH and field observations indicate that drivers generally drive over the speed limit through the entire corridor, and likely begin picking up speed knowing the 45MPH zone ends just north of Home Road. ECAT analysis of the existing conditions of the intersection return a PSI of **0.47**, meaning this intersection is not performing as well as its peer locations.

Operations:

Vehicles on the Home Road approach experience LOS E (40 sec delay) in the Opening Year PM Peak and are predicted to reach a LOS F (69 sec delay) in the Design Year PM Peak. In addition, queueing is currently over 125' in the PM Peak and predicted to be 200'+ in the Design Year.

Under existing conditions, a northbound right turn lane (NBRT) is warranted across all scenarios in the existing condition and a southbound left turn lane (SBLT) is not warranted under any scenario due to the small percentage of southbound vehicles that turn left. Neither of these turn lane additions will address the failing movements on Home Road, but would provide a safety benefit.

A traffic signal is warranted in the Opening Year according to OMUTCD Warrants 1, 2 and 3. HCS7 analysis indicates the signalized Home Road intersection will operate within acceptable levels of delay in the Horizon Year under the existing lane configurations, however, the full safety benefit of signalization would be better achieved with the dedicated NBRT to support the higher turning volumes, particularly when Lexington Springmill is on green. The signalized option was analyzed with and without a SBLT and there was found to be very minimal differences in operations and queue lengths due to the low volume of left turn vehicles, but a safety benefit is seen with the SBLT as summarized below. All individual movements and approaches operate at LOS A or B under the signalized condition in the Horizon Year, while a roundabout operates at LOS A across all movements with single lane approaches.

Safety Analysis

Signal

- The addition of a traffic signal at the intersection with a 320' NBRT and 285' SBLT is estimated to cost approximately \$1.4M for construction, right-of-way, and engineering costs and returns a B/C ratio of **1.05** with an expected reduction in crashes of 2.8/year.
- The installation of a traffic signal at Home Road with the NBRT *only* is estimated to cost \$900k and returns a B/C ratio of **1.16** with an expected reduction in crashes of 2.0/year.

Roundabout

- With an estimated cost of \$1.56M for construction, right-of-way, and engineering costs a roundabout alternative returns a B/C ratio of **1.12** and is expected to reduce crashes by 2.9 crashes/year.

It should be noted that the culvert crossing, the stream that runs along the east side of Lexington Springmill, and the Shared Use Path that crosses just north of the intersection will make any improvements here more challenging than some of the other locations. If the stream is impacted (more likely with the widening/signal option), the quality of the stream would need to be assessed to determine the level of permitting based on our impacts. The Shared Use Path will need to be rebuilt and realigned as it approaches the roundabout as shown in the exhibit.

With an average of 5.3 crashes/year, a 31% injury rate, and operational failure approaching for Home Road – the Home Road intersection is the highest priority of the corridor from a safety perspective. The signal alternative and the roundabout alternative both score very favorably, with the B/C for the roundabout at 1.12. With the stream that runs along the east side of Lexington Springmill in this area, the roundabout alternative allows us to reduce impacts to the stream and keep the footprint of the project compact. The Shared Use Path would need to be rebuilt to cross the roundabout safely, but the crossing would be in the low speed area of the roundabout, improving the condition of the existing crossing. The roundabout option gives excellent safety benefit, calms traffic in the non-peak hours without forcing them to stop, allows traffic on Home

Road to enter safely, and better fits the rural nature of this intersection. We have included an exhibit to show the "footprint" of a roundabout at this intersection in the attached documentation.

Marion Avenue Road

Crash Summary

There were eight (8) crashes at the Lexington Springmill Road and Marion Avenue Road four-way stop intersection between 2017 and 2019. Five (5) of the crashes were rear end crashes, two (2) of which were coded as injury. The remaining three (3) crashes were failure to yield angle crashes, none of which were injury crashes. The intersection averages 2.7 crashes/year with a 25% injury rate. The existing conditions of the intersection return a PSI of **-1.32**, indicating the intersection actually performs much better than similar four-way stops around the State.

Crash reports indicate almost all of the crashes experienced at the intersection are a result of vehicles on Lexington Springmill not coming to a full stop at the intersection. It should be noted that this is the first intersection where vehicles are expected to stop on Lexington Springmill for over a mile for southbound traffic, and over 3 miles for northbound traffic.

Operations

Capacity analysis shows the intersection operates at LOS A and B in the Opening Year and Design Year, however, it should be noted that queueing on the northbound and southbound approaches are up to ten times as long as the Marion Avenue approaches. The low volumes on Marion Avenue are likely leading to the "roll through" stops that appear to be a crash trend as all the angle crashes are non-injury. EMH&T performed a multi-stop control warrant pursuant to the requirements set forth in OMUTCD §2B.07 to see if the existing all-way stop configuration of the intersection is warranted and based on crash history and traffic volumes, all-way stop control is actually *not warranted* for the Marion Avenue and Lexington Springmill Road intersection. A traffic signal is also not warranted at the intersection under any analyzed scenario.

Safety Analysis

The intersection could benefit from upgrading the existing standard stop signs to flashing LED stop signs, replacing the existing small "4-WAY" signs with the standard 18"x6" "ALL WAY" plaque (R1-3P), and restriping the stop bars for increased visibility. EMH&T analyzed the conversion of standard stop signs to LED flashing stop signs in ECAT. While there is only a very minor reduction in predicted crash frequency, it is a low-cost countermeasure (\$28k) which returns an outstanding B/C ratio of **23.8**.

Given the four-way stop is not warranted at the intersection due to the low volumes on Marion Avenue, removing the stop condition on Lexington Springmill is an option. However, this would be an unusual proposal in the realm of safety upgrades given the condition has existed for a couple of decades and would invite the potential for higher injury angle crashes. A traffic calming roundabout would be an ideal option at the intersection, although not likely to score high based on the current crash pattern. The intersection is also not deemed to be in the top half of priorities for the corridor. Our suggestion would be to upgrade the existing signage as discussed above and continue to monitor the intersection.

SEGMENTS ALONG THE CORRIDOR

In general the corridor from Cockley Road to just south of the Home Road intersection has 12' lanes with 8' paved shoulders, although the east side paved shoulders appear to be in much better condition than the shoulders on the west side. North of Home Road the shoulders virtually disappear and the lanes narrow to 11' with less than a 1' shoulder.

Four (4) crashes occurred along the 1,200' segment of Lexington Springmill Road between Cockley Road and Hanley Road with one (1) being animal related. Two (2) crashes appear to be from southbound vehicles failure to control and leaving the traveled way. It is important to note that the existing horizontal curve between the intersections is designed at close to the maximum allowable degree of curve for the design speed. A high friction surface course is an option for this segment, however, the treatments of the intersections on each end of the segment could serve to lower speeds and make any improvements potentially unnecessary.

Nine (9) crashes occurred along the 2,300' segment between Hanley Road and Owens Road between 2017 and 2019, five (5) of which were animal related. There were also two (2) failure to control fixed object crashes in the segment.

One (1) crash occurred along the 850' segment between Owens Road and Cook Road between 2017 and 2019. The crash was coded as a failure to stop rear end crash where a northbound vehicle was attempting to turn left into a driveway on Lexington Springmill Road.

Six (6) crashes occurred along the 2,100' segment between Cook Road and Home Road, three (3) of which were animal related. Two (2) rear end crashes occurred, with one (1) being coded as injury. Based on the crash reports, the rear ends appear to have occurred to vehicles slowing or waiting to turn into driveways along the segment.

Seventeen (17) crashes occurred on the 1.4 mile segment of Lexington Springmill between Home Road and Marion Avenue Road from 2017 to 2019, nine (9) of which were animal related. There was one (1) animal crash coded as injury, the only injury crash on the segment. Several rear end crashes occurred and crash reports indicate these were a result of vehicles failing to stop for drivers turning into one of the driveways along Lexington Springmill. There were also several out of control fixed object crashes. The paved shoulders on Lexington Springmill reduce to 1' just north of Home Road and vegetation is very close to the road in certain areas. Trimming back vegetation and providing larger paved shoulders (suggest a minimum of 4') can provide drivers with more time to react in the event an animal approaches or enters roadway. Considering the length of this segment, an improvement of this nature would be in the \$1M range. We ran the ECAT on a shoulder improvement project and get a B/C of **0.2** with an expected reduction in crashes of 0.4/year.

General Discussion

Speed

With most of the corridor having a speed limit of 45mph, and 50mph north of Home Road, lowering the speed further is not deemed a practical countermeasure. However, *enforcement* of the speed limit for a period of time may be helpful. The corridor is very rural in nature and based on our field visit, vehicles appear to travel above the speed limit on a pretty consistent basis.

Typical Section

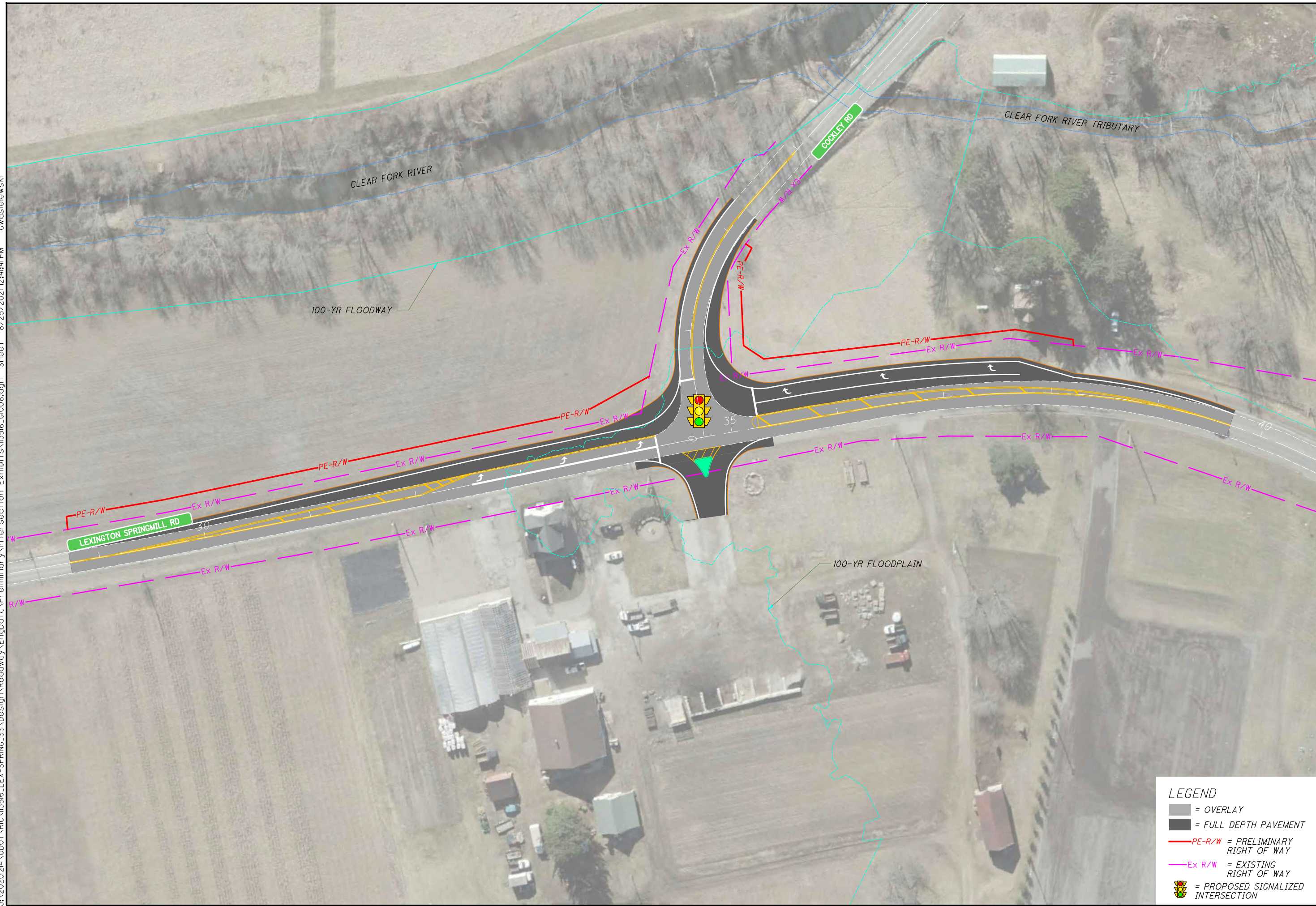
For the most part, the improved stretch of Lexington Springmill from Cockley to Home Road is a solid typical section for the rural route. Extending these improvements to Marion Avenue would intuitively serve a benefit from a safety perspective, although not really captured in the ECAT with a predicted reduction in crashes of only 0.4/year. However, ECAT removes animal crashes in its

analyses and this segment recorded over 50% (9 out of 17) of the crashes as animal crashes – therefore, the benefit is likely understated.

Animal Crashes

Out of the 95 crashes total along the corridor, 25% of them were animal crashes. Of the 22 animal crashes, 16 of them (73%) occurred during the months of November, December, and January. The highest incident rates occur just north of Hanley Road and from Home Road to Marion Avenue. Clearing the brush all the way to the right-of-way line on the segment north of Home Road and widening the shoulders will allow for more space and time to react as deer approach the roadway. However, another strategy to consider is a focused effort to modify driver behavior along the corridor. Drivers tend to become immune to deer crossing signs, which are present north of Home Road in each direction. The County may consider putting up Dynamic Message Signs (DMS) in early to mid-October for 30 days to call attention to the increased activity of the deer in the area. In one study, this type of targeted signage was shown to decrease driver speed by 4-5mph.

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HORIZONTAL
SCALE IN FEET

**COCKLEY ROAD
SIGNAL ALTERNATIVE**

**LEX-SPRINGMILL RD
SAFETY STUDY**

LEGEND

- = OVERLAY
- = FULL DEPTH PAVEMENT
- PE-R/W = PRELIMINARY RIGHT OF WAY
- Ex R/W = EXISTING RIGHT OF WAY
- = PROPOSED SIGNALIZED INTERSECTION

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HORIZONTAL SCALE IN FEET

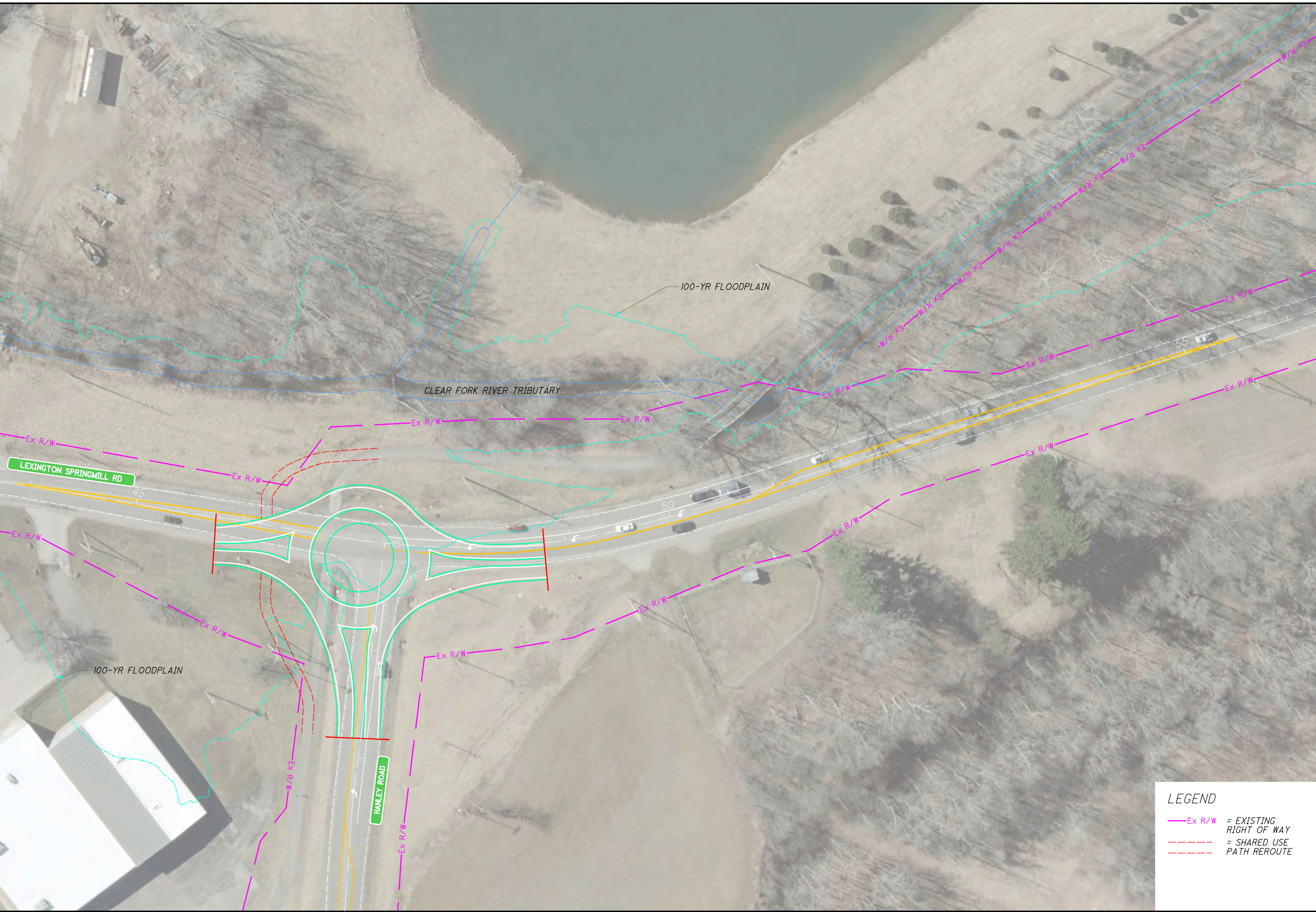
**HANLEY ROAD
SIGNAL ALTERNATIVE**

**LEX-SPRINGMILL RD
SAFETY STUDY**

LEGEND

- = FULL DEPTH PAVEMENT
- = PATH RECONSTRUCTION
- Ex R/W = EXISTING RIGHT OF WAY
- = PROPOSED SIGNALIZED INTERSECTION

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CHECKED	MJR

0 40 80
HORIZONTAL SCALE IN FEET

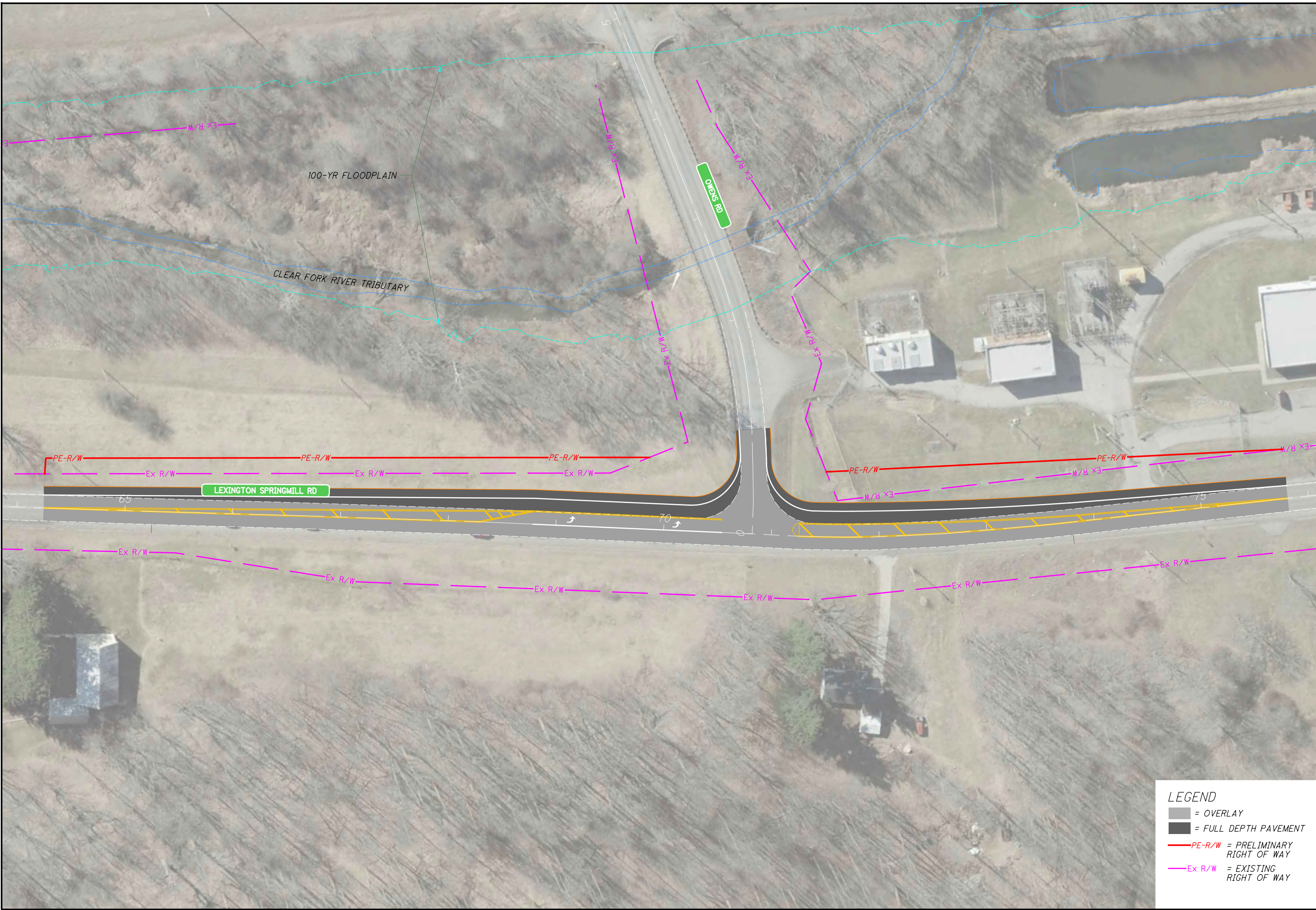
**HANLEY ROAD
ROUNDABOUT ALTERNATIVE**

**LEX-SPRINGMILL RD
SAFETY STUDY**

- LEGEND**
- Ex R/W = EXISTING RIGHT OF WAY
 - - - = SHARED USE
 - - - = PATH REROUTE



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CALCULATED
JDK
CHECKED
MJR

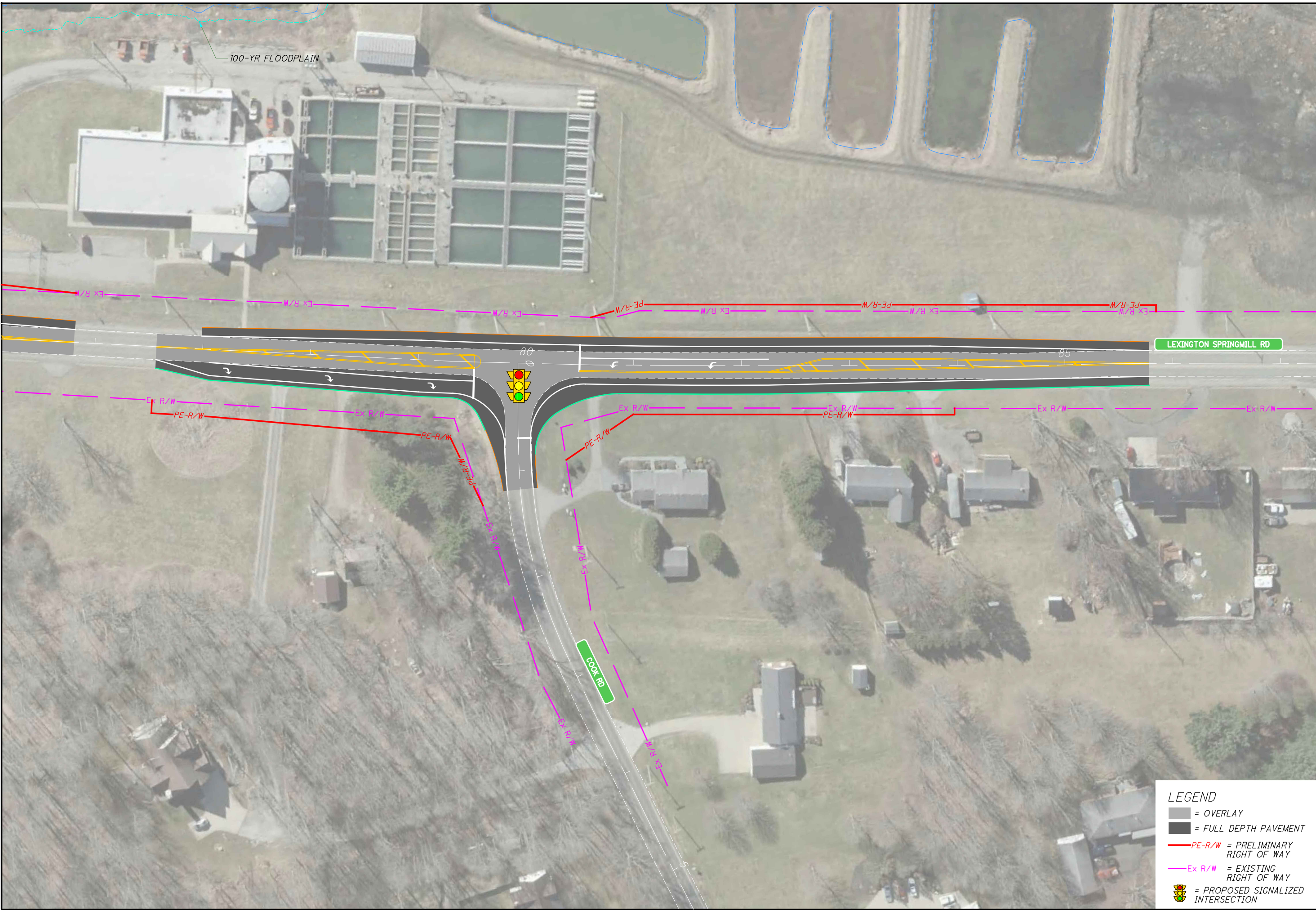
OWENS ROAD WIDENING ALTERNATIVE

LEX-SPRINGMILL RD SAFETY STUDY

4
8

- LEGEND**
- = OVERLAY
 - = FULL DEPTH PAVEMENT
 - PE-R/W = PRELIMINARY RIGHT OF WAY
 - Ex R/W = EXISTING RIGHT OF WAY

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100-YR FLOODPLAIN

LEXINGTON SPRINGMILL RD

COOK RD

LEGEND

-  = OVERLAY
-  = FULL DEPTH PAVEMENT
-  PE-R/W = PRELIMINARY RIGHT OF WAY
-  Ex R/W = EXISTING RIGHT OF WAY
-  = PROPOSED SIGNALIZED INTERSECTION

CALCULATED
JDK
CHECKED
MJR

0 40 80
HORIZONTAL
SCALE IN FEET

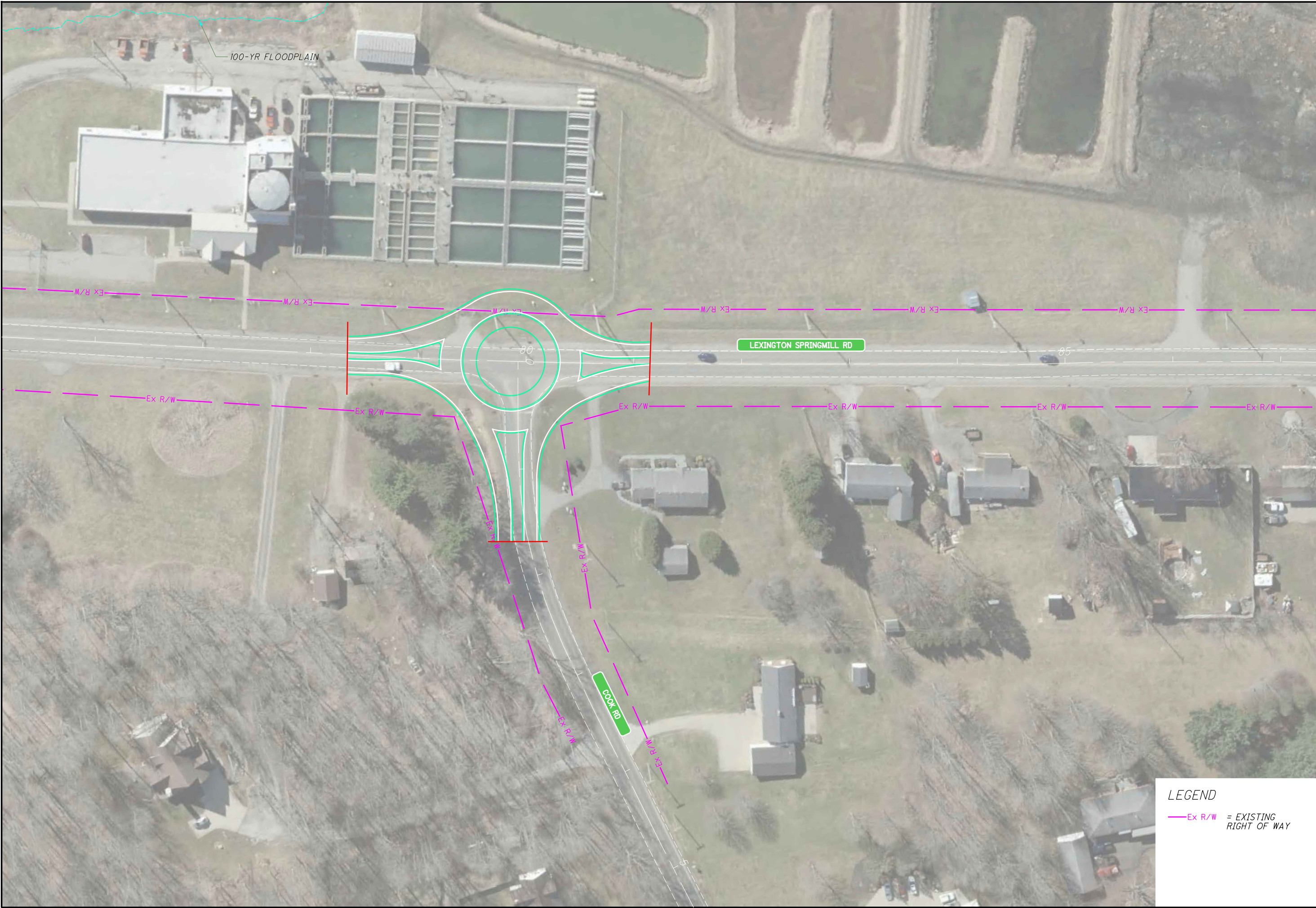


**COOK ROAD
SIGNAL ALTERNATIVE**

**LEX-SPRINGMILL RD
SAFETY STUDY**



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100-YR FLOODPLAIN

LEXINGTON SPRINGMILL RD

COOK RD

LEGEND
— Ex R/W = EXISTING
RIGHT OF WAY



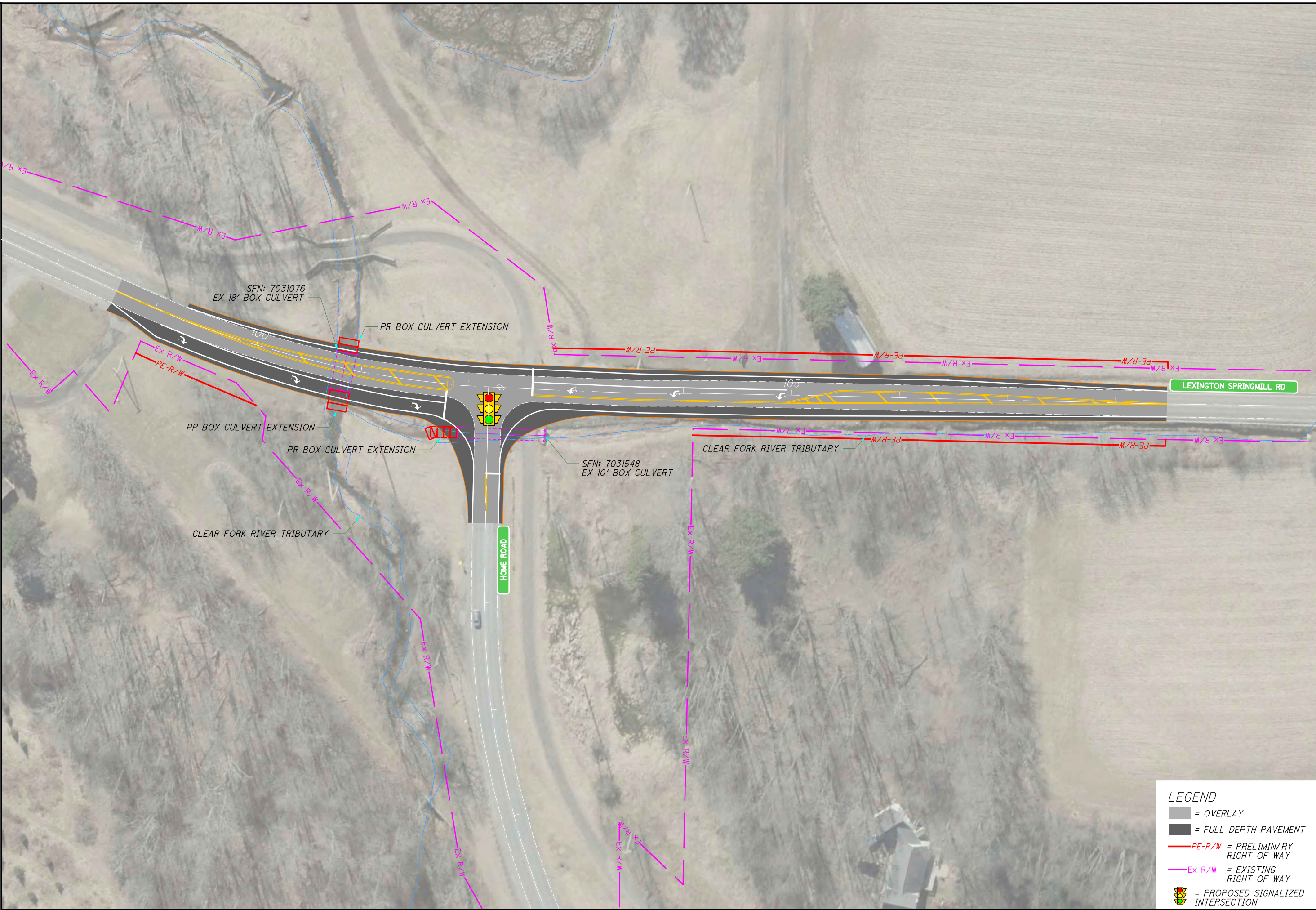
CALCULATED
JDK
CHECKED
MJR

COOK ROAD
ROUNDABOUT ALTERNATIVE

LEX-SPRINGMILL RD
SAFETY STUDY



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CALCULATED
JDK

CHECKED
MJR

0 20 40 80
HORIZONTAL
SCALE IN FEET

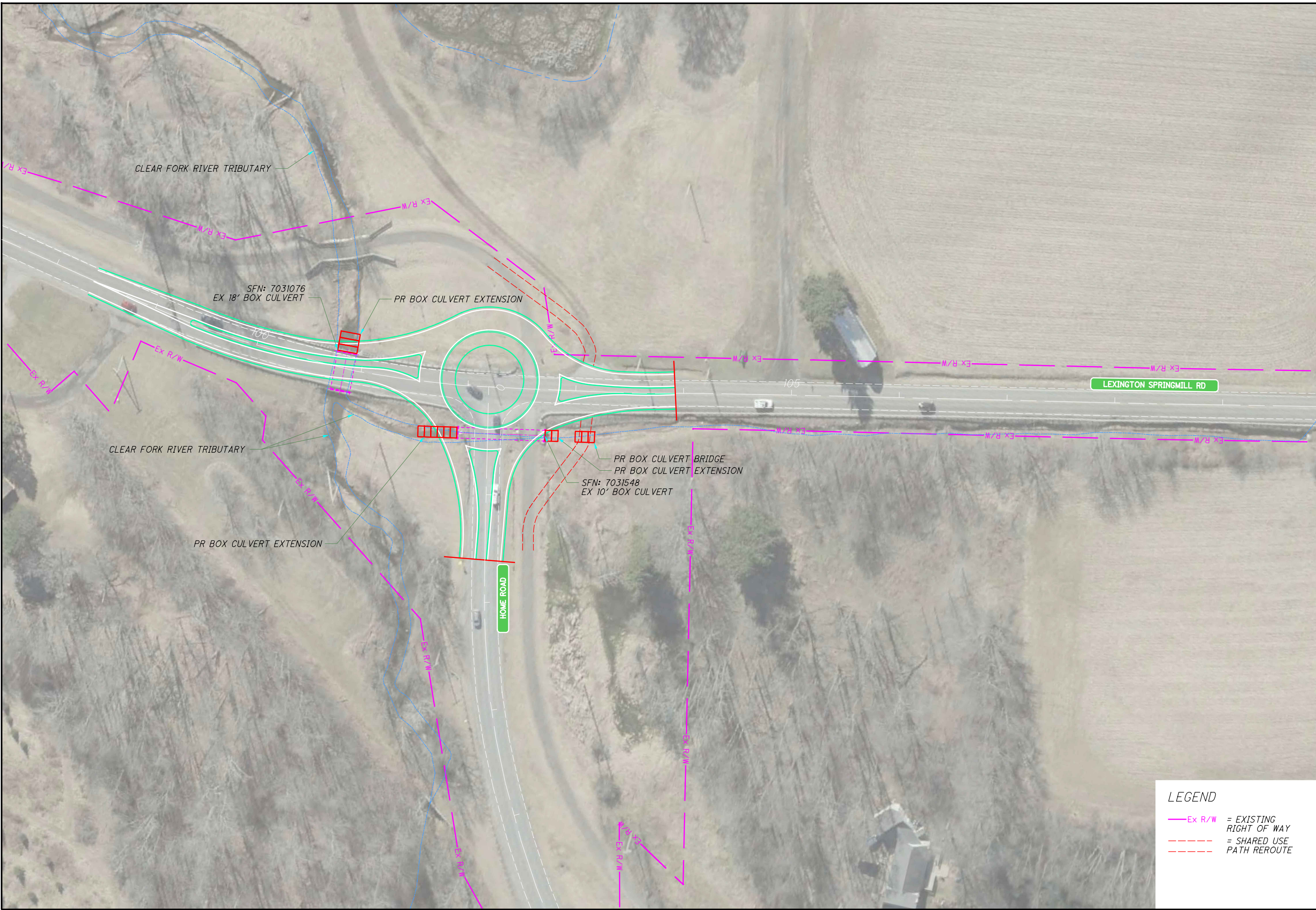
**HOME ROAD
SIGNAL ALTERNATIVE**

**LEX-SPRINGMILL RD
SAFETY STUDY**

LEGEND

- = OVERLAY
- = FULL DEPTH PAVEMENT
- PE-R/W = PRELIMINARY RIGHT OF WAY
- Ex R/W = EXISTING RIGHT OF WAY
- = PROPOSED SIGNALIZED INTERSECTION

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LEGEND

- Ex R/W = EXISTING RIGHT OF WAY
- - - = SHARED USE PATH REROUTE

CALCULATED
JDK

CHECKED
MJR

0 40 80
HORIZONTAL SCALE IN FEET

HOME ROAD ROUNDABOUT ALTERNATIVE

LEX-SPRINGMILL RD SAFETY STUDY