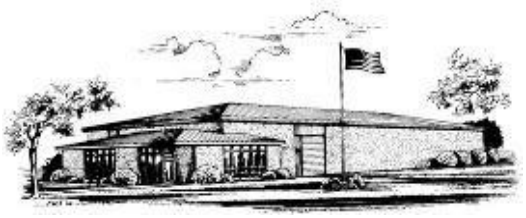

Ogle County Highway Department

Jeremy A. Ciesiel, P.E., County Engineer
1989 South IL Route 2
Oregon, IL 61061

May 10, 2022

RE: Intersection Traffic Study
Pines Road / Lowell Park Road

The intersection of Pines Road (County Highway 6) and Lowell Park Road (County Highway 35) is located in Pine Creek Township, Ogle County. Both roads are major collectors on the Ogle County highway system. Both roads are bituminous concrete surfaces with centerlines and edgelines. The intersection of the two county highways is controlled by 2-way stop signs with Pines Road being the through road and Lowell Park Rd having stop control. The nearest stop signs on Pines Road are 4.5 miles east at Ridge Road and 4.5 miles west at IL Route 26. On Lowell Park Road the nearest stop controls are a stop sign 6.4 miles north in Mt. Morris and the stop light 8.8 miles south in Dixon.

The intersection of these roads was improved in 2003 with 2 major alterations to increase sight distance at the intersection. First, the vertical alignment of the west approach was lowered approximately 3 feet and the vertical curve flattened. Second, the intersection was widened on the northeast, northwest, and southwest corners.

Along Lowell Park Road approaching the intersection, both the north and south legs have Stop Ahead warning signs emphasized with flashing yellow beacons above the signs. At the intersection, there are visible Stop signs with "Cross Traffic Does Not Stop" plaques under the signs. The Stop sign on the north side of the intersection is further emphasized with a red flashing beacon.

Along Pines Road approaching the intersection, both the east and west legs have Intersection warning signs emphasized with flashing yellow beacons. Furthermore, there are 30 MPH plaques under the intersection signs advising drivers to slow down to 30 MPH when approaching the intersection.

Although this intersection has been studied multiple times, most recently in 2006, due to a recent surge in accidents, it was judged by the Ogle County Highway Department that another study was prudent to determine if something had changed at the intersection. Furthermore, based upon the guidelines set in the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), a traffic engineering study should be performed to justify any changes.

The following details the guidelines and criteria set by the MUTCD and the Bureau of Local Roads and Streets Manual, published by the Illinois Department of Transportation (IDOT), Division of Highways. Following the guidelines and requirements, each point is considered relative to the traffic conditions with the most recent data available at the time of this report. The report concludes with a summary of the findings and the recommendations for the intersection.

Pines Road and Lowell Park Road Intersection

PART I: DATA COLLECTION

The MUTCD lists factors that should be considered for the implementation of traffic control devices. These include:

A. Vehicular, bicycle, and pedestrian traffic volumes on all approaches;
B. Number and angle of approaches;
C. Approach speeds;
D. Sight distance available on each approach; and
E. Reported crash experience.

The Ogle County Highway Department collected this information as part of this study and the results are listed below. These factors will be used to determine if 2-Way Stop signs (minor road only) or Multi-Way (4-way) Stop signs are necessary. The intersection is currently signed as a 2-Way Stop with only the minor road (Lowell Park Rd) required to stop.

A. Traffic Volumes:

IDOT measures traffic counts for routes throughout the State of Illinois approximately every 5 years. Since IDOT's last measurements were taken in 2017, Ogle County conducted its own traffic counts to corroborate IDOT's data. The results are shown in the diagram below:

Traffic Count Data:
(Vehicles/Day)
IDOT 2017

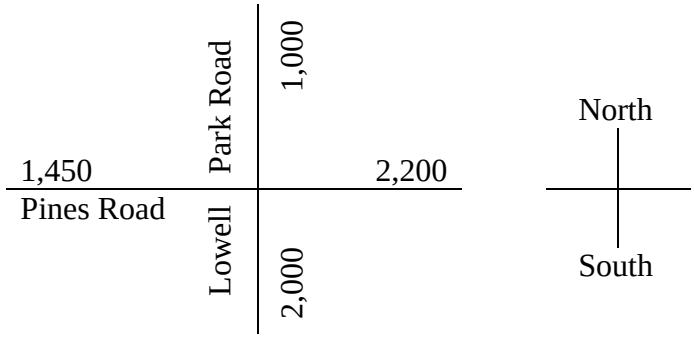

Fig. 1

Traffic Count Data:
(Vehicles/Day)
Ogle Co 2021

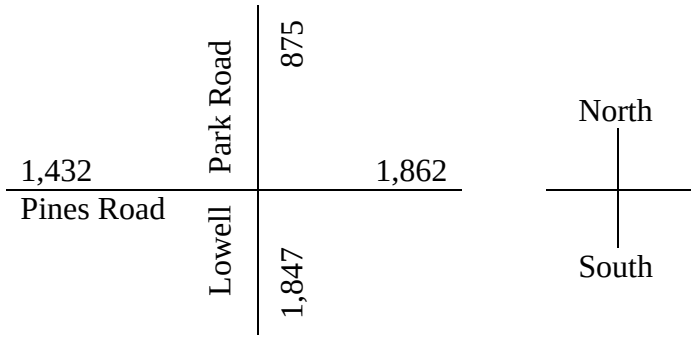

Fig. 2

B. Number and Angle of Approaches:

Pines Road and Lowell Park Road Intersection

The Pines Road and Lowell Park Rd intersection is a 4 leg intersection with all roads coming in at 90 degree angles. There are no offsets in the intersection, meaning that both legs of Lowell Park Rd are in line, and both legs of Pines Rd are in line.

C. Approach Speeds:

The statutory speed limit on both Pines Rd and Lowell Park Rd is 55 mph. There are plaques beneath the Pines Road intersection warning signs advising traffic on Pines Road to slow down to 30 mph when approaching the intersection. Measurements taken by Ogle County at these intersection warning signs indicated that the average speed approaching the intersection was 54 mph.

D. Sight Distance:

Where traffic on the minor road of an intersection is controlled by stop signs, the driver of the vehicle on the minor road must have sufficient sight distance for a safe departure from the stopped position assuming that the approaching vehicle comes into view as the stopped vehicle begins its departure. Based on a travelling speed of 55 mph, the minimum required sight distance is 610 feet. At the subject intersection, Lowell Park Road is the minor road. The measured sight distances are as follows:

1. South Side of Pines Road Looking West = 750 Feet
2. South Side of Pines Road Looking East = >1,200 Feet
3. North Side of Pines Road Looking West = 700 Feet
4. North Side of Pines Road Looking East = >1,200 Feet

E. Crash History:

Ogle County used IDOT's Safety Portal to review the accident history at the intersection of Pines Road and Lowell Park Road. Information in this database extends back to 2009. The available data provided over 13 years of accident information to review. The following is a summary of the number of all accidents by year:

Year	# of Accidents
2009	4
2010	0
2011	2
2012	0
2013	2
2014	3
2015	2

Year	# of Accidents
2016	1
2017	2
2018	0
2019	1
2020	0
2021	3
2022*	1

*Reported accidents through 4/30/2022

PART II: DATA ANALYSIS

In accordance with the Manual on Uniform Traffic Control Devices – 2009 Edition, the following procedures are outlined with responses to verify whether there is justification to change the existing Stop Sign application to a Multi-Way STOP application at the intersection of Pines Road and Lowell Park Road. The language taken from the MUTCD is presented in italics. Our responses to the guidance can be found below the MUTCD criteria.

Section 2B.04 Right-of-Way at Intersection

Support:
Section 2B.07 contains provisions regarding the application of multi-way STOP control at an intersection.

Guidance:
Once the decision has been made to control an intersection, the decision regarding the appropriate roadway to control should be based on engineering judgement. In most cases, the roadway carrying the lowest volume of traffic should be controlled.

> **Response:** Pines Road is an east-west roadway that connects Oregon, Illinois to Polo, Illinois. Lowell Park Road is a north-south oriented roadway that connects Mt. Morris, Illinois to Dixon, Illinois. Based on recent traffic counts (both IDOT and Ogle County), Pines Road carries approximately 21% more traffic than Lowell Park Road. Per the guidance, we have stop control on the appropriate roadway.
>
> Although the traffic volume is higher on Pines Rd, the current measured traffic represents a decline from the 2006 Traffic Study which indicated that Pines Road previously carried 50% more traffic than Lowell Park Road. Furthermore, traffic volume is currently highest on the east leg of Pines Road and the south leg of Lowell Park Rd. This is also a change from the 2006 study which indicated that the east and west legs of Pines Road had the highest traffic volumes. This indicates that we are seeing a shift in traffic flow at the intersection over the past 15 years.

Section 2B.07 Multi-Way Stop Applications

Support:
Multi-way stop control can be useful as a safety measure at intersections if certain traffic conditions exist. Safety concerns associated with multi-way stops include pedestrians, bicyclists, and all road users expecting other road users to stop. Multi-way stop control is used where the volume of traffic on the intersecting roads is approximately equal.

Guidance:
The decision to install multi-way stop control should be based on an engineering study.

The following criteria should be considered in the engineering study for a multi-way STOP sign installation:

A. Where traffic control signals are justified, the multi-way stop is an interim measure that can

be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal.

Response: Traffic signals are not being installed at this intersection.

B. Five or more reported crashes in a 12-month period that are susceptible to correction by a multi-way stop installation. Such crashes include right-turn and left-turn collisions as well as right-angle collisions.

Response: The current crash data available from IDOT's Safety Portal for the period from January 1, 2009 through April 30, 2022 indicates that 21 accidents occurred at the Pines/Lowell Park intersection over the last 13+ years. Of these 21 accidents, there were 18 accidents that are susceptible to correction by a multi-way stop installation. While this averages to roughly 1.5 accidents per year, the frequency of accidents has come in surges. For example, while there have been 4 accidents in the past 10 months, there have been years with no accidents.

Over the last 13+ years, 6 of the 21 accidents resulted in at least one person being transported to the hospital. Three of these accidents occurred between 2009 and 2014, and the accident reports classified these as "minor injuries". However, the remaining three accidents that resulted in hospitalizations occurred in the last 10 months. Furthermore, all 3 of these accidents involved serious injuries including one fatality.

The majority of accidents (15) occurred in the warmer weather months of April through September. All but three accidents occurred during daylight hours. One driver did mention that the rising sun affected his vision when he looked to the east. Of the 21 recorded accidents, 17 occurred in clear weather, 2 occurred in fog, 1 in rain and 1 in snow.

The accident reports indicate that the majority of the accidents (16) involved vehicles on Lowell Park Road that either failed to stop at the stop sign at Pines Road, or failed to yield to the through traffic on Pines Road after stopping at the stop sign. Each of these failures resulted in a collision with a vehicle on Pines Road. The direction of travel on Lowell Park Road and accident cause are broken down further in table below:

Direction of Travel (Lowell Park Road)	Failed To Stop	Failed to Yield after Stopping	Total Accidents
Northbound Vehicle	2 (or 3)*	6 (or 5)*	8
Southbound Vehicle	4	4	8

* One witness stated the vehicle never stopped, but driver said they did stop.

As can be seen in the table above, 6 or 7 vehicles ignored the stop signs on Lowell Park Road and entered the intersection. Given that these vehicles did not stop and attempt to view cross traffic at Pines Road, intersection sight distance is not judged to be a cause of these accidents. However, of the 9 or 10 vehicles that did stop at Pines Road prior to entering the intersection, the accidents were broken down further to assess whether a

particular direction of travel on Pines Road was more susceptible to accidents. The breakdown of these accidents is shown below:

Direction of Travel (Lowell Park Road)	Pines Road West Leg (Eastbound Traffic)	Pines Road East Leg (Westbound Traffic)
Northbound Vehicle	3 (or 4)*	2
Southbound Vehicle	2	2

* One witness stated the vehicle never stopped, but driver said they did stop.

Based on the reports, the accidents over the past 13 years the accidents were evenly split between northbound vehicles and southbound vehicles. Of the vehicles that stopped at the intersection prior to entering, there were slightly more northbound vehicles colliding with eastbound vehicles. Furthermore, there were slightly more southbound vehicles ignoring the stop sign. While the existing accident counts do not exceed five or more crashes in a 12-month period, there are three separate occasions when 4 accidents occurred in a 12-month period. The most recent of these is the past 10 months, which also included 2 or 3 drivers ignoring the Stop Signs on Lowell Park Road.

C. Minimum volumes:

1. The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day; and

Response: The average daily traffic (ADT) count entering the intersection for the major route (Pines Road) is 1,612 vehicles based on the traffic counts measured by Ogle County in 2021. The busiest 8-hour period averages 148 vehicles per hour, which is short of the required 300 vehicles per hour. Therefore, the traffic on the designated major route at the intersection does not meet this condition.

2. The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour; but

Response: The Pines/Lowell Park intersection is a rural highway and does not have designated crosswalks, sidewalks, or bike lanes for pedestrian use and no pedestrian counts were recorded or considered. The total traffic entering the intersection from the minor route was 1,377 vehicles. The traffic entering the intersection from the minor road during the same hour period from Criterion C.1 averages 122 vehicles per hour, which is short of the required 200 vehicles per hour. In addition, there has also been no record of a delay to the minor-street vehicular traffic based on the current intersection volumes and therefore does not meet this criterion.

3. If the 85th-percentile approach speed of the major-street traffic exceeds 40 mph, the minimum vehicular volume warrants are 70 percent of the values provided in Items 1 and 2.

Response: The 85th-percentile intersection approach speeds for Pines Road were 60 mph and 62 mph for the east and west approaches, respectively. Using a reduction to 70 percent of the minimum volumes noted in items 1 and 2, the intersection still does not meet this criterion based on traffic volumes and the lack of delay on the minor route.

D. Where no single criterion is satisfied, but where Criteria B, C.1, and C.2 are all satisfied to 80 percent of the minimum values. Criterion C.3 is excluded from this condition.

Response: At 80% of the original specified values, Criterion B would be met at the Pines/Lowell Park intersection since we have experienced four accidents in a 12-month period. However, Criterions C.1 & C.2 are not met at 80% of their original values due to a lack of traffic volume entering the intersection and lack of traffic delays.

While the primary criteria (A through D) was not met for a multiway Stop sign installation, the MUTCD lists other considerations. These are listed below.

Option: Other criteria that may be considered in an engineering study include:

A. The need to control left-turn conflicts;

Response: The existing condition is a rural 2-way 2-lane intersection. There is no evidence supporting the need to control of left turn conflicts, as there have only been two accidents in the past 13 years that involved turning conflicts.

B. The need to control vehicle/pedestrian conflicts near locations that generate high pedestrian volumes;

Response: The existing rural 2-way 2-lane intersection does not include additional accommodations for pedestrians, nor is it located near a pedestrian area.

C. Locations where a road user, after stopping, cannot see conflicting traffic and is not able to negotiate the intersection unless conflicting cross traffic is also required to stop; and

Response: Prior to 2003, the sight distance at the intersection was limited due to a confined intersection and an incline west of the intersection. The construction project in 2003 made improvements to both of these conditions. First, the hill west of the intersection was shaved down and the vertical alignment of the west approach was flattened in order to increase the sight distance. Second, the intersection was widened on the northeast, northwest and southwest corners to present better sight windows for vehicles. However, accidents continue to occur at the intersection and the traveling public states that sight distance issues remain. In order to verify the 2003 reconstruction design, the following sight distances were recorded from the stop locations on Lowell Park Road, using the procedures outlined in the BLRS Manual, Section 28-3 Intersection Sight Distance: Case B – Intersections with Stop Control on the Minor Road:

Pines Road and Lowell Park Road Intersection

Lowell Park Rd Northbound
Looking West – 750’

Lowell Park Road Southbound
Looking West – 700’

Lowell Park Road Northbound
Looking East – >1,200’

Lowell Park Road Southbound
Looking East – >1,200’

When calculating the minimum sight distance requirements, the existing intersection has a design speed (V_{major}) of 55 mph with a time gap ($t_{g)}$ that will be assumed at 7.5 seconds. The current approach grade on Lowell Park Road does not exceed 3% and the intersection skew is less than 30 degrees, so no grade adjustments will be made for the 2-way 2-lane rural highway.

The minimum intersection sight distance requirement for this intersection at a design speed of 55 mph (ISD = 1.47Vt) should be 610’ or greater. Based on this guideline, the intersection sight distance is met. The existing sight distance meets the requirements for vehicles traveling at 63 mph, which is twice the advised speed of 30 mph.

Since the Pines Road legs of the intersection are not stop controlled, there should be no reason for them to stop unless someone errantly enters the intersection. However, given

the number of crashes at the intersection due to drivers on Lowell Park Road failing to yield right of way or stop altogether, it was also decided to look at the Stopping Sight Distance for vehicles travelling on Pines Road. Stopping sight distance on level ground is calculated using $1.47\ Vt + 1.075\ V^2/a$ with a design speed of 55 mph, a brake reaction time (t) of 2.5 seconds, and a driver deceleration (a) of 11.2 ft/s^2, which should exceed a sight distance of 495'. However, we have a 3% downgrade for traffic approaching from the west and a 3% upgrade for traffic approaching from the east. The adjusted minimum Stopping Sight Distance for the traffic approaching from the west is 520' and for traffic approaching from the east it is 469'. The existing Stopping Sight Distance is 605' for traffic approaching from the west and over 1,200' for traffic approaching from the east. Therefore, the existing stopping sight distance exceeds the requirements for the intersection.

D. An intersection of two residential neighborhood collector (through) streets of similar design and operating characteristics where multi-way stop control would improve traffic operational characteristics of the intersection

Response: The existing condition is a rural 2-way 2-lane intersection where the residential application does not apply.

PART III: CONCLUSION

Over the years, roadways change, roadside obstructions change, driving habits change and traffic patterns change. As a highway agency, we need to adjust with these changes. The extensive geometric alteration made to the intersection in 2003 was one of those adjustments. The purpose of that project was to improve the vertical curves approaching the intersection and increased the intersection sight distance to meet our engineering principles.

Based on the results of this engineering study, the 2003 alterations accomplished what it set out to do. Per the criteria set forth in the MUTCD, the intersection does not warrant a 4-way stop. That said, the recent occurrence of 4 accidents in the past 12 months is concerning. For this reason, the results of this study have been shared with the Bureau of Safety Programs and Engineering of the Illinois Department of Transportation in Springfield. We have requested a Roadside Safety Review of the intersection.

Given that at least two of the recent accidents were the result of vehicles failing to stop on Lowell Park Rd the following steps are currently being taken:

1) LED Enhanced Stop Signs have been ordered for both the northbound and southbound traffic. These will be solar powered and can be installed upon delivery
2) ComEd has been contacted regarding the possibility of suspending a flashing beacon in the center of the intersection. The current intent of the suspended beacon, should it happen, is to flash red toward the traffic on Lowell Park Road and flash yellow toward the traffic on Pines Road. The location of such a beacon would be more in line with the vehicles traveling along the roadway. The elevated position would also make it visible for a greater distance.
3) Rumble strips on Lowell Park Road are being investigated. There are existing residences near the intersection that need to be considered. Due to the noise created by transverse rumble strips, IDOT recommends placing such strips at least 250 feet from any residence. Based on the standard layout of rumble strips, at least 6 residences would be within 250 feet of a rumble strip on the north leg of the intersection.

As we move forward with the items above, IDOT will be conducting their own review of the intersection.

Respectfully submitted,

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Ogle County Engineer