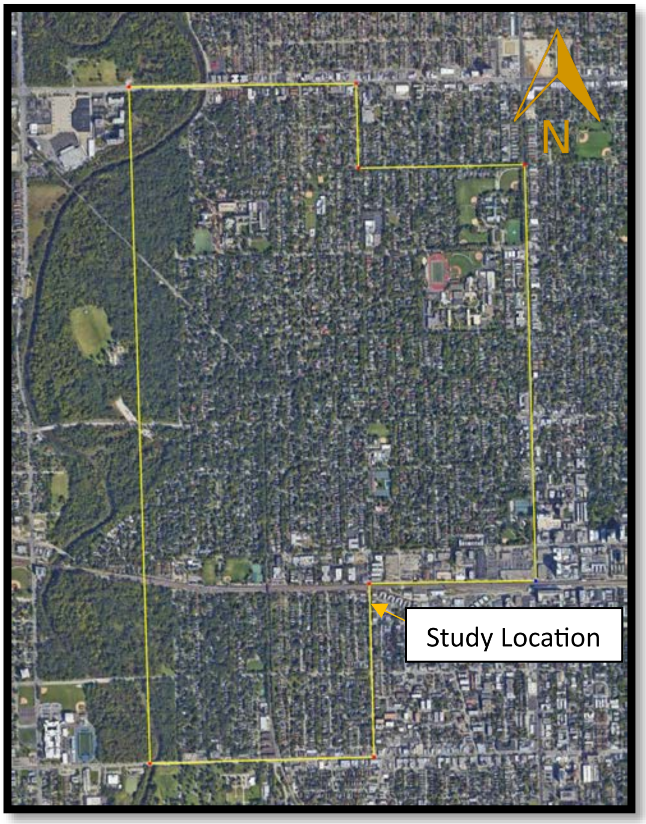
VILLAGE-WIDE TRAFFIC STUDY

for

River Forest, IL
Cook County



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service at the highest grade

Prepared for:

RIVER FOREST
Proud Heritage • Bright Future

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Contents

Introduction

The purpose of this Village-wide traffic study was to form a comprehensive outlook on traffic patterns and traffic safety within the Village and to identify areas for further study or recommendations based on engineering expertise. The study was centered around data acquired using volume & speed counts, crash analysis, survey feedback, and locations flagged by the Village (Two-Block Spans, Washington Blvd Corridor Study). In addition to this analysis, Thomas Engineering Group (TEG) developed a Traffic Calming Toolbox (Appendix A). A capacity analysis model was developed using Synchro traffic modeling software and is provided to the Village. All counted intersections are included within this model.

Locations selected for further individual review were identified through coordination with the Village and based on the results of initial data analysis. The selected locations were: Two-Block Spans, Washington Blvd Corridor Study, and Thatcher Ave Speed Study. Each analysis had different levels of review based on the data available and the proposed scope of the study. TEG performed a representative speed study at a two-block span location and made recommendations based off the findings within the single corridor reviewed. A similar level of analysis was utilized for the Thatcher Ave Speed Study where a small representative corridor was analyzed. The Washington Blvd Corridor had an in-depth corridor study including the creation of exhibits showing proposed improvements and alternatives. Due to the wide scope of this study, many locations reviewed were identified for review in smaller more focused studies.

Commonly Used Terms

Throughout this report common terminology may be used without explanation. Definitions to these terms can be found within this section to help give context to the analysis.

General

<u>Roadway Functional Classification</u>: The way roads are categorized by the Illinois Department of Transportation (IDOT). TEG used road classifications throughout this document to discuss the general size and character of roads being studied. Please see Functional class exhibit within Appendix H.01: Functional Class Exhibit for a full breakdown of road classifications within the Village.

<u>Interstate</u>: Roads connected with long distance travel in mind. Interstates are designated by the Secretary of Transportation. (*none within study area*)

<u>Freeway/Expressway</u>: roads in this classification have directional travel lanes that are usually separated by some type of physical barrier, and their access and egress points are limited to on- and off-ramp locations. these roadways are designed and constructed to maximize their mobility function, and abutting land uses are not directly served by them. (*none within study area*)

<u>Other Principal Arterial</u>: These roadways serve major centers of metropolitan areas, provide a high degree of mobility and can also provide mobility through rural areas. Unlike their access-controlled counterparts, abutting land uses can be served directly. (North Ave & Harlem Ave)

Minor Arterial: These roads provide service for trips of moderate length, serve geographic areas that are smaller than their higher Arterial counterparts and offer connectivity to the higher Arterial system. In an urban context, they interconnect and augment the higher Arterial system, provide intra-community continuity and may carry local bus routes. (Lake St & Madison St)

Collector: Collectors serve a critical role in the roadway network by gathering traffic from Local Roads and funneling them to the Arterial network.

Major Collector: Generally, longer in length with limited driveway connectivity compared to minor collectors. Could have more travel lanes. (All 'primary' Village roads such as Thatcher Ave, Division St, and Washington Blvd)

Minor Collector: Generally, only two lanes of traffic and smaller than major collectors. (none within study area)

Local Road or Street: Roads not intended for long-distance travel. Local roads tend to have direct access to the abutting land.

NE Quadrant: The area of the Village previously studied by others and excluded from this study. Defined as the area bounded by North Ave to the north, Lathrop Ave to the west, Harlem Ave to the east, and Greenfield St to the south.

Study Road Type: This study utilized a combination of IDOT Road Classification and road characteristics to categorize all roads withing the Village into three types:

Arterial Road: Roads within the Village posted as 30 mph. North Ave and Harlem Ave

Primary Road: All roads within the Village that are classified as Collector or Minor Arterial. In addition, Augusta St is also included in this classification although it is classified as a Local Road.

Local Road: Roads within the Village classified by IDOT as Local Roads. These routes are generally low volume with minimal roadway features. Often no center striping and few businesses along the road.

Study Intersection Type: This study utilized traffic control type to categorize all intersections withing the Village into three types:

Signalized Intersection: Any intersection controlled by a traffic signal.

All-Way Stop Intersection: Intersections where all legs of traffic are expected to stop and yield right-of-way to traffic arriving at the intersection first. All legs have a stop sign with no direction having priority.

Minor-Stop Intersection: An intersection where the minor-leg is stopped using a stop sign. At these intersections, the major route always has priority while the minor route must stop for oncoming traffic.

Signal Warrant: Criteria or guidelines used by traffic engineers and transportation authorities to determine whether the installation of a traffic signal at a particular intersection is justified or warranted. Installing traffic signals at intersections without meeting specific warrants can lead to inefficient traffic flow, increased congestion, and potential safety hazards. There are nine signal warrants, and meeting one or more of these warrants is required before a traffic signal can be installed. Meeting a warrant does not necessitate the installation of a new signal.

- Warrant 1, Eight-Hour Vehicular Volume
- Warrant 2, Four-Hour Vehicular Volume
- Warrant 3, Peak Hour
- Warrant 4, Pedestrian Volume
- Warrant 5, School Crossing
- Warrant 6, Coordinated Signal System
- Warrant 7, Crash Experience
- Warrant 8, Roadway Network
- Warrant 9, Intersection Near a Grade Crossing

All-Way Stop Warrant: Criteria or guidelines used by traffic engineers and transportation authorities to determine whether the installation of a multi-way stop sign at an intersection is justified or warranted. These warrants help ensure that stop signs are placed at intersections where they are truly necessary for safety and traffic control. The primary goal is to prevent unnecessary stops, reduce driver confusion, and improve traffic flow. Similar to signal warrants, meeting a warrant does not necessitate the installation of a new all-way stop control intersection.

Level of Traffic Stress (LTS): an approach that quantifies the amount of discomfort that people feel when they bicycle close to traffic.

LTS 1: Bike routes suitable for children

LTS 2: Bike routes suitable for most adults

LTS 3: Bike routes suitable for “enthusiastic and confident” cyclists

LTS 4: Bike routes suitable for “strong and fearless” cyclists

Sharrow: a road marking in the form of two inverted V-shapes above a bicycle, indicating which part of a road should be used by cyclists when the roadway is shared with motor vehicles.

Crash Terms

Injury Type: The highest level injury caused as a result of a crash.

K-injury: A fatal crash is a traffic crash involving a motor vehicle in which at least one person dies within 30 days of the crash.

A-injury: Any injury, other than a fatal injury, which prevents the injured person from walking, driving, or normally continuing the activities he/she was capable of performing before the injury occurred. This includes severe lacerations, broken/distorted limbs, skull injuries, chest injuries, abdominal injuries

B-injury: Any injury, other than a fatal or incapacitating injury, which is evident to observers at the scene of the crash. This includes lumps on the head, abrasions, bruises, minor lacerations.

C-injury: Any injury reported or claimed which is not listed above. This includes momentary unconsciousness, claims of injuries not evident, limping, complaints of pain, nausea, hysteria.

Property Damage (PD): A crash with no physical injury to the involved parties but may result in vehicular damage or damage to nearby property.

Crash Type:

Rear End: Any collision involving two vehicles where the rear of one vehicle comes into the contact with the front of another vehicle. This type of crash is most common at stop and signalized locations.

Angle: Crash at an intersection (or driveway) involving two vehicles that were on separate perpendicular (or angled) routes, commonly referred to as a “T-Bone”. Either vehicle may be proceeding straight or left at the intersection.

Sideswipe Same Direction: Collisions involving two drivers heading in the same direction where one or both drivers leave their lane and impact the side of another vehicle with the side of their own vehicle. Often these crashes happen in similar situations to those that result in rear end crashes. In some cases, a driver avoids a rear end crash and in the process, causes a sideswipe same direction crash.

Sideswipe Opposite Direction: A crash between drivers heading in opposing directions. Sideswipe opposite direction crashes is a result of a lane departure and these crashes have the potential to result in a head on crash.

Turning Left: A type of crash resulting when two vehicles enter the intersection from opposite directions, with one of the vehicles turning left and the other proceeding straight.

Turning Right: Right turning crashes are a type of perpendicular crash where one driver is entering a roadway by turning right where they are struck from the side/rear prior to completing the turn.

Fixed Object: A single vehicle collision involving a road user and an immoveable object. Parked cars are not considered fixed objects since they can be moved.

Overturned: A single vehicle collision (often roadway departure) resulting in a driver’s vehicle to flip over.

Head On: A crash type resulting from one or both drivers leaving their lane and crashing into the front end of the other driver. Generally resulting in severe injuries due to the opposing directions and combined speeds of both drivers involved.

Pedestrian: Any crash involving a pedestrian and a vehicle. High potential for severe injuries due to the exposed nature of pedestrians using roadways.

Other Object: A collision involving a moveable object. Oftentimes these crashes are between road users and parked cars. Additionally, crashes can involve road debris or any other non-living object that may cause an obstruction in the road. For the purposes of this study unspecified other-objects will be considered parked cars.

Animal: Any collision between a vehicle and an animal.

Pedalcyclist: Crashes involving a cyclist and a vehicle. Similar to pedestrian crashes cyclists are exposed and unprotected when in the road leading to a high potential for severe crashes.

Other Non-Collision: Incidents along the road involving a vehicle and not resulting in a collision i.e. driving off-road and rolling a vehicle.

Correctable Crash: Any crash type that could be prevented by the installation of a stop sign or signal.

Capacity

Level of Service (LOS): The average amount of delay experienced by a driver as they navigate an intersection. Measured in seconds.

LOS A: Free flow traffic conditions - users are practically unaffected by the presence of other drivers. Signalized: Under 10 seconds of delay. Unsignalized: Under 10 seconds of delay.

LOS B: Steady traffic conditions - presence of other vehicles begins to effect driver behavior. Signalized: 10-20 seconds of delay. Unsignalized: 10-15 seconds of delay.

LOS C: Steady but limited traffic conditions - choice of speed is limited by traffic and maneuvering requires vigilance. Signalized: 15-25 seconds of delay. Unsignalized: 20-35 seconds of delay.

LOS D: Steady traffic at high density - reduced speeds and maneuverability. Drivers may wait through more than one signal cycle at signalized locations. Signalized: 35-55 seconds of delay. Unsignalized: 25-35 seconds of delay.

LOS E: Traffic at saturation - low but uniform speed and reduced maneuverability. Signalized: 55-80 seconds of delay. Unsignalized: 35-50 seconds of delay.

LOS F: Congestion - unstable speed with the formation of waiting lines at several points. Cycles of stop and departure with no apparent pattern. Signalized: More than 80 seconds of delay. Unsignalized: More than 50 seconds of delay.

Saturation Flow Rate: The maximum number of cars that can utilize a lane within one hour. Typically assumed to be 1,900 under ideal conditions.

Average Daily Traffic (ADT): A key metric used in transportation planning and traffic engineering to describe the average number of vehicles that pass a specific point on a road or highway over a 24-hour period. Defined as a standard weekdays traffic volume (Tuesday-Thursday).

Speed

85th Percentile Speed: The speed at which 85% of drivers use the road. Drivers traveling above the 85th percentile speed are considered to be exceeding the safe and reasonable speed for road and traffic conditions. Oftentimes speed limits are set based on 85th percentile. In speed studies, an 85th percentile speed significantly over the posted speed limit is indicative that there is a speed issue.

Village Survey Analysis

To gain a better understanding of the priorities and preferences of Village residents, Thomas Engineering Group (TEG) created a survey with a broad range of questions related to Traffic and Safety in the Village. The goal of the survey was to better guide TEG's approach to Village improvements and to help identify locations where there is a perception of unsafe conditions that may not currently result in elevated crashes or poor level of service (LOS). The survey had a total of 31 questions and not all respondents were given all the questions. Not all questions/responses will be directly utilized in this study as some were included for potential future use or indirectly utilized to gain a better understanding of resident preferences.. The questions can be divided into several categories:

- General Respondent Information: Initial questions to locate respondents within the Village and gain an understanding of how respondents use the roads.
  - Questions 1 & 2
- Local and Village-wide speed survey: Questions to gauge respondents' feelings about speeds on their local roads as well as primary roads in the Village.
  - Questions 3 & 4
- Local stop survey: Questions about respondent impression of stop sign usage along their roads. Large numbers of drivers not obeying stop signs indicate potential operational concerns.
  - Questions 5 & 6 (open ended)
- Cut-through traffic impressions: These questions were to gauge respondent impression of drivers using residential Village roads specifically to avoid traffic on larger non-residential streets. This was something noted as a concern by the Village prior to the start of the study.
  - Questions 7 & 8 (open ended)
- Road features and operation survey: Questions asking respondent opinions on road improvements, signing in the Village, sight conditions, and lane configurations. These questions helped to gain a deeper insight into respondent preferences and impressions of areas TEG flagged as potential areas of concern.
  - Questions 9-12, 25-27
- Washington Blvd survey: These questions were only answered by road users who answered that they regularly used Washington Blvd or lived on or near the street. All responses were incorporated into the Washington Blvd Corridor Study.
  - Questions 13-21
- Bike survey: Questions about cyclists' impression of roadways in the Village. This gave TEG a better idea of if a resident would be comfortable starting to use a bike as a local mode of transportation or if it was seen as dangerous.
  - Questions 22-24

- NE Quadrant opinions: Questions allowing respondents to give opinions on the NE Quadrant improvements previously performed by the Village including an open-ended response section. Response data was conveyed to the Village, but not analyzed within this study due to that area of the Village being excluded from this study.
    - Questions 28-30
- Open response: An open-ended response for respondents to give opinions not addressed within the survey.
    - Question 31

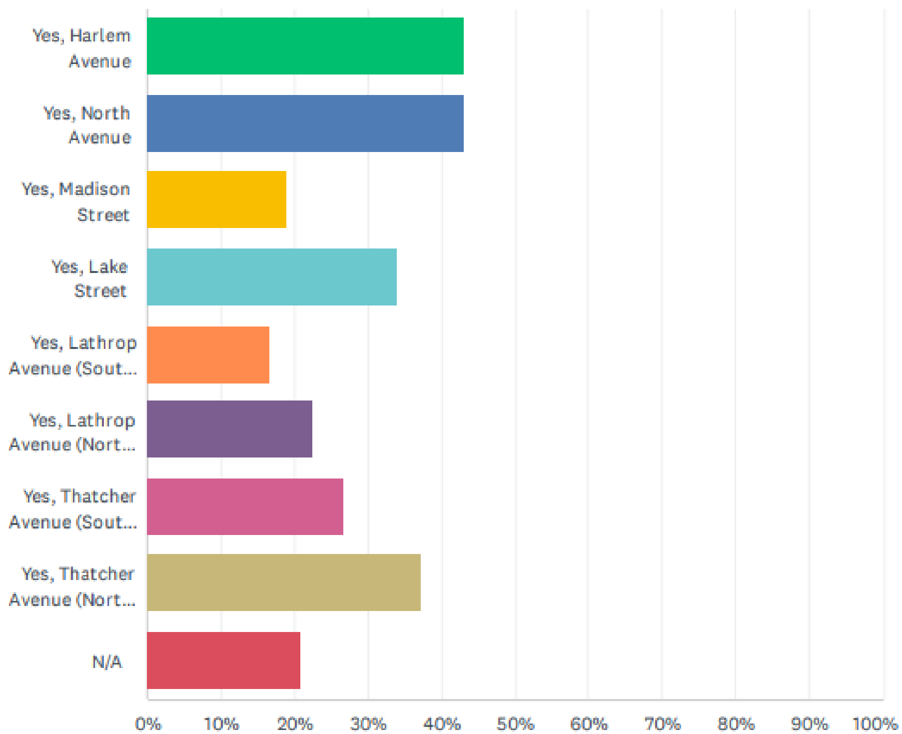
A total of 1,032 residents responded to the survey. This accounted for nearly 10% of the Village population and shows a high level of community investment from Village residents. This is encouraging for future education and outreach plans seeing that so many residents took the survey and often gave detailed open-ended responses when given the opportunity.

Below is a brief summary of several questions response data to highlight TEG's findings that may not be detailed elsewhere in the report. A complete summary of all response data can be found in Appendix B.01: Survey Response Graphs and Data.

SPEEDS ON MAJOR ROADWAYS

Q4 Do you feel speed is an issue on any of the major roadways within the Village? (Select all that apply)

Answered: 962 Skipped: 70



TEG wanted to see which major roads in the Village were most known for speeding. The two largest arterials in the Village, North Ave and Harlem Ave were expected to get a large number of responses due to their characteristics. Additionally, the northern half of Thatcher Ave and Lake St both had elevated response rates. This data along with individual responses helped TEG to select Thatcher Ave as a location for individual review.

Traffic Calming Options

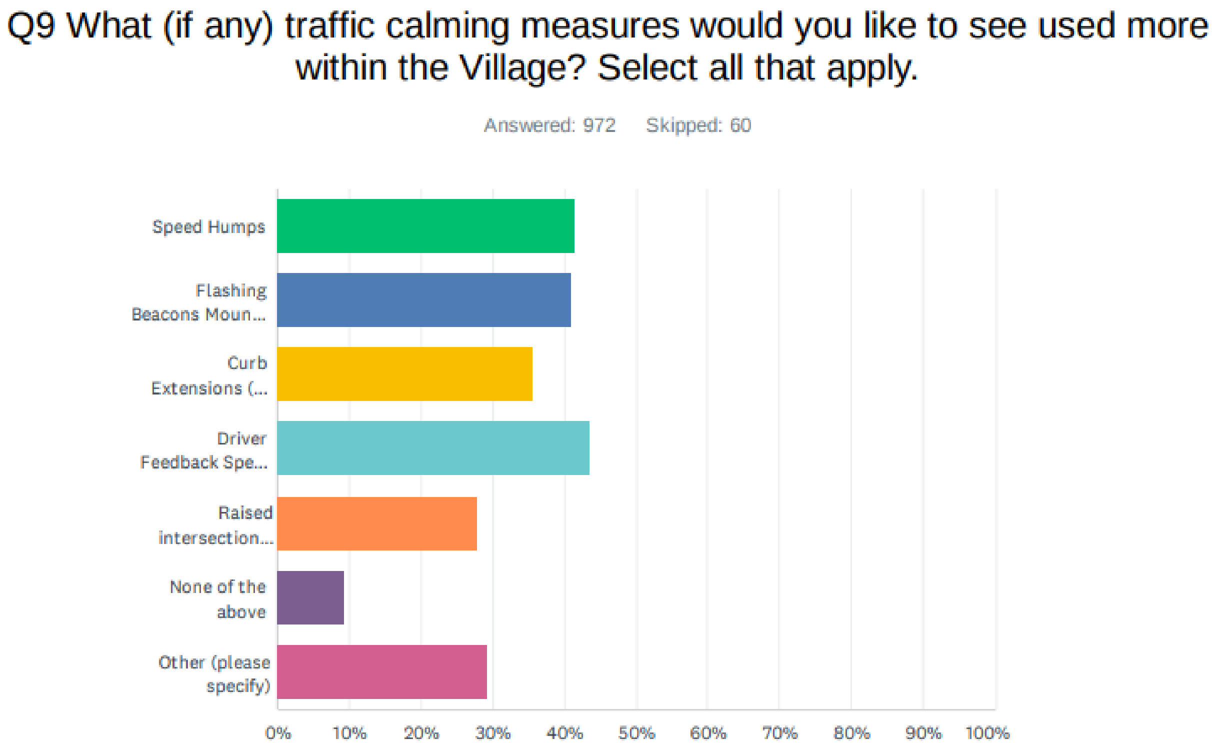


Figure 1. Responses: Wat if any traffic calming measures would you like to see used more within the Village?

TEG wanted to gauge the popularity of traffic calming implements that are being considered throughout the Village. It was reassuring that less than 10% of respondents selected "None of the above" and many respondents gave additional feedback in the open-ended response area. From the data, it is apparent that most respondents would like to see more forms of traffic calming used within the Village. TEG agrees and would recommend using a variety of traffic calming measures in order to achieve the best effect along the improved route.

It was noted that more residents wanted to see speed humps than raised intersections even though both countermeasures achieve a similar effect. TEG believes this could be due to a lack of knowledge about raised intersections are implemented that could be addressed using outreach programs. TEG found in many of the open responses, respondents would mention not wanting curb extensions because of the effect they have on cyclists. While this can be true, it is possible to design curb extensions with bike lane pass-throughs or other design variations that incorporate bike lanes. Knowing this is a concern TEG will consider bike facilities in any areas where curb extensions are being proposed.

TEMPORARY ONE-WAY LOCATIONS

Q10 Several Village roads near schools are marked as one-way roads during school hours. Do you feel there is confusion around when two-way traffic is allowed on these roads?

Answered: 976 Skipped: 56

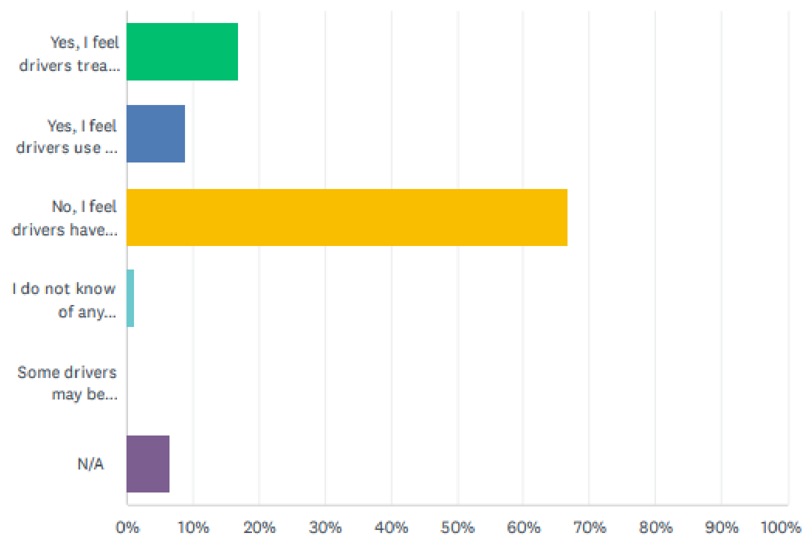


Figure 2. Responses: Do you feel there is confusion around when two-way traffic is allowed on these roads?

Q11 At temporary one-way locations do you feel signage could be improved to make it more clear when the roads are operating as one-ways

Answered: 253 Skipped: 779

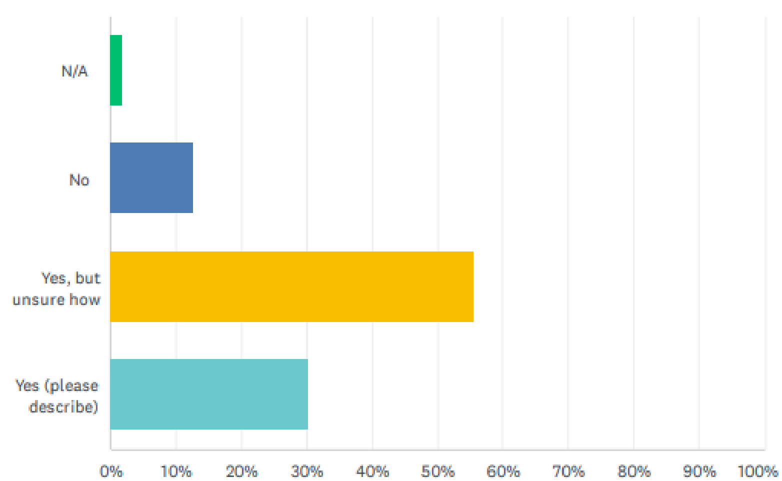


Figure 3. Responses: At temporary one-way locations do you feel signage could be improved to make it more clear when the roads are operating as one-ways?

TEG noted that overwhelmingly respondents in question 10 believed residents were accustomed to the temporary one-way locations. In the next question, residents who did feel the temporary one-ways were confusing were asked if signage could be improved. Most of these respondents said signage could be improved, and within the open response section many respondents suggested larger signs or blocking the roads. TEG agrees that signing could be improved at these locations, and suggests that the one-way restriction be changed from 'on school days' which is ambiguous for those not aware of school schedules to 'all weekdays'. This would remove ambiguity from the location and makes the locations safer for kids in summer programs who may be used to one-way traffic in the area.

Thatcher Turn Opinions

Q27 Thatcher Avenue north of Chicago Avenue has an imbalanced lane configuration with two southbound lanes and one northbound lane. Due to the unique lane configuration, the curving road, and speed issues reported in the past, the Village would like to get an idea of how safe drivers feel turning onto Thatcher Avenue from the side roads. Please rate your level of comfort turning onto Thatcher Avenue in the section between North Avenue and Chicago Avenue?

Answered: 960 Skipped: 72

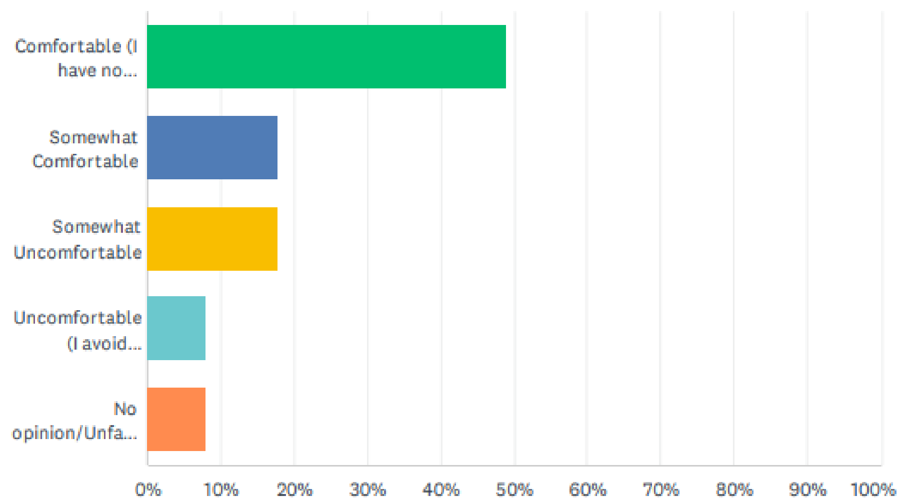


Figure 4. Responses: Please rate your level of comfort turning onto Thatcher Ave in the section between North Ave and Chicago Ave?

It was surprising that most drivers were comfortable turning onto Thatcher Ave. While studying the location for the individual study, TEG found significant speeding that we believed would result in driver discomfort entering Thatcher Ave from the side streets. Seeing this is not the case supports the hypothesis that drivers have gotten used to the speeding along Thatcher.

Despite drivers being comfortable turning onto Thatcher Ave, TEG found that there were elevated rates of injuries when crashes did occur. More study may be necessary to understand diver behaviors in this area.

Results

TEG created multiple exhibits using survey data that will be seen elsewhere within this report. Survey responses were kept in mind prior to making recommendations. Open ended responses were reviewed and considered in final recommendations but due to the wide variety of answers and varying amounts of detail/information given TEG decided to not review those responses here. The volume of respondents was far exceeding the expected response rate for a community of this size. While this was beneficial to get as many opinions as possible it made concise analysis of open-ended responses impossible.

Capacity Analysis

Thomas Engineering Group (TEG) was tasked with creating a traffic model of the Village including all existing traffic counts and any traffic counts performed as part of the Village-wide Traffic Study. The traffic model allows the Village to simulate new lane configurations or intersection layouts prior to implementation in the Village to get an idea how changes will impact the system. The advantage of a complete Village-wide traffic model over individual intersection modeling is the ability to see how intersections interact with each other.

The model was created using Synchro 11 Traffic modeling software. The traffic model is set up as an overlay on an aerial of the Village showing all primary roads and any other roads with recent traffic counts. Currently there are 35 counted locations and an additional 24 uncounted intersections within the model. The system is set up in a way that the Village can continue to add to and maintain the model to eventually have a functional simulation of all roads within the Village and how they interact during peak hours. This helps the Village identify traffic issues and bottlenecks to implement more effective countermeasures. This also allows the Village to avoid making changes that will push traffic towards routes operating near capacity. TEG modeled a new signalized intersection within the Crash Analysis and modeled lane changes within the Washington Blvd Corridor Study and Thatcher Ave Speed Study. Results are discussed within those sections of this report.

The model allows TEG to assess the level of service (LOS) at all counted intersections to assure drivers are not waiting too long to pass through an intersection during peak hours. A failing LOS is any intersection with a LOS below D. All intersections with failing LOS within the study area are shown below:

AM Peak Hour:

- Lathrop Ave @ Division St: LOS E

PM Peak Hour:

- None

It was noted that all but one location with a failing LOS was in the NE Quadrant of the Village which is excluded from this Village-Wide Traffic Study. TEG modeled the area using traffic data collected as part of the Northeast Neighborhood Traffic Study (2022). These intersections that are not within TEG's study area are not included in this discussion due to changing conditions in the Northeast Quadrant.

The intersection between Lathrop Ave and Division St was identified within TEG's crash analysis as a top 10% crash location. TEG performed a signal warrant and Warrant Five and Seven were met. Meeting a signal warrant does not require that the Village install a new signalized intersection at this location, but TEG would strongly recommend the Village consider new signal installation based on crashes and surrounding land use with nearby school facilities. A more detailed review of this intersection and corresponding recommendations can be found in the Crash Analysis section of this report.

In the PM peak hour conditions, the intersection between Lathrop Ave and Division St has a LOS of D, which is nearly failing. TEG modeled the intersection using the existing lane configuration as a signalized intersection and found LOS improved to a B (See Appendix C.03: Alternate Volumes & Level of Service – AM and See Appendix C.04: Alternate Volumes & Level of Service - PM).

TEG concluded the analysis of the counted locations determining that most roads in the Village are operating smoothly at existing traffic volumes. There were several locations where individual movements were failing. Generally, failing individual movements were seen at minor leg stop locations or locations with high numbers of left turns, but in these cases the overall intersection was still operating properly.

A full breakdown of all analyzed intersections can be found in Appendix C.01: Volumes & Level of Service – AM and Appendix C.02: Volumes & Level of Service – PM.

Crash Analysis

Thomas Engineering Group (TEG) was tasked with compiling and analyzing the crash data for every segment and intersection within the Village of River Forest (excluding the NE quadrant where a study has already been conducted). Crash data was originally collected for the years 2016-2020 but as TEG was processing the initial data the 2021 crash year became available. Since the 2016 data was already processed, TEG decided to include the 2021 data and complete the crash analysis using six years as opposed to the standard five. The additional year should only improve the overall analysis, especially since 2020 crash year was skewed by the COVID-19 Pandemic. Crash data during this time is still applicable but crash patterns may be different from pre/post-pandemic crash patterns.

TEG used our proprietary in-house crash processing program to organize crashes based on segment/intersection. Crashes were then compiled and analyzed based on crash type, crash year, injury type, and any on-road conditions such as wet pavement of nighttime crashes. This allows us to observe crash patterns from year to year and cross reference Google Earth imagery to verify the years when changes were made. Sometimes, simple changes like a new sign will result in a high crash rate intersection having a significant reduction in total crashes after the improvement was placed. Spotting these changes is important to prevent recommending unnecessary further improvements to a road that has already implemented countermeasures to address a crash problem. At all intersections, TEG provided a crash diagram showing the direction and orientation of vehicles involved in crashes.

Crashes were analyzed based on raw crash data provided by IDOT. Individual crash reports were not analyzed due to lack of available reports from the state. When analyzing an intersection, TEG looked for recurring crashes or crash patterns. TEG takes any crashes that appear to have a common cause and uses factors like the time of day, driver direction, and drivers stated intention (going straight, turning left, etc.) to link the crashes together and find a common solution. Crash analysis is the first stage in taking locations that may have existing issues and finding the best path forward to identify and eventually address the cause of the recurring crashes.

After crashes were processed each location was given a weighted score based on the number of crashes and the severity of injuries. We utilized a common industry practice of assigning 1, 2, 5, 10 and 25 points, to Property Damage Only, C-injury, B-injury, A-injury and Fatal crashes, respectively. The top 10% of all intersections and segments received a full crash analysis, while the remaining locations only received the initial screening and crash score. This equated to nine segment locations and 12 intersection locations for a total of 21 locations The threshold score for intersections was 27 and for segments was five. Crash summaries and crash diagrams (for intersections) for these top 10% locations are provided in Appendix D.01: Top 10% - Segment Crashes & Appendix D.02: Top 10% - Intersection Crashes.

Just because a location met the minimum threshold for detailed analysis does not indicate any changes will be needed or that there are any crash patterns that need addressing. Elevated crash rates or injury rates are required to meet the threshold for analysis, but they do not inherently indicate a persistent crash pattern.

Segment Crash Analysis

Segments were divided into 3 peer groups: Local, Primary, and Arterial. Arterial roads consist of the segments on Harlem Ave and North Ave. These segments were not included in the analysis due to the routes being owned and maintained by the state which limits improvement options for the Village. Additionally, the speed limit of 30 mph on both roads gave them a different character and faster operating speed than any other road in the Village. Primary and Local roads were identified in the initial phases of the project. A more comprehensive explanation can be found in the Commonly Used Terms section. The peer groups were used to prevent any one segment type from becoming too prevalent in the top 10% locations. When reviewing, we wanted to look at the top 10% of both the Local and Primary segments to gain a better understanding of all Village roads. It can clearly be seen in the table below that Local segments had much lower crash scores compared to the Primary segments.

Route	From	To	# Crashes	PG	Score	PG Rank
Madison St	Forest	Park	9	Primary	29	1
Madison St	Franklin	Ashland	18	Primary	25	2
Thatcher Ave	Augusta	Division	6	Primary	20	3
Division St	Monroe	Bonnie Brae	3	Primary	15	4
Forest Ave	Madison	Vine	1	Local	10	1
Oak Ave	Forest	Park	2	Local	7	2
Edgewood Pl	Lake	Thatcher	1	Local	5	3
Clinton Pl	Quick	Oak	1	Local	5	3
Ashland Ave	Lake	Oak	1	Local	5	3

Table 1. Top 10% segment crash locations.

Individual segment analyses are listed below:

Madison St: Forest Ave to Park Ave: 9 Crashes 1 A-injury, 2 B-injuries, 3 C-injuries

4 Rear End: 2 C-injury

2 Turning Right: 1 C-injury

1 Fixed Object: 1 A-injury

1 Turning Left: 1 B-injury

1 Pedalcyclist: 1 B-injury

This segment of Madison St contains one lane per direction and a center two way left turn lane. Within the segment on the south side of Madison there is an entrance to Concordia Cemetery and Van Buren St intersection. East of the entrances and Van Buren St, there is an at grade train crossing with gates for cars but not pedestrians. Nearby land use is primarily multi-family housing north of Madison St and south of Madison is primarily businesses. On-street parking is not provided in the segment. The areas where parking would be provided currently have diagonal striping and act as an eight foot paved shoulder. The eastern terminus at Park Ave has existing curb extensions.

The segment has multiple points where a driver may stop either for a train or to turn into one of the southern driveways. It is likely the four rear end crashes were a result of drivers stopping to turn or to wait for a train and the driver behind them not reacting quickly enough resulting in a crash.

Two-thirds of all crashes involved an eastbound driver (five crashes exclusively involving eastbound drivers and two including northbound drivers). The remaining two crashes involved either only northbound drivers or northbound and southbound drivers. There were no crashes involving westbound drivers within the segment.

The high rate of injuries in this segment suggests drivers may be colliding at high speeds. Most crashes occurred at the railroad crossing or at Van Buren St (including the pedalcyclist crash). Based on TEG field visits, it was observed Van Buren St traffic has difficulty seeing eastbound traffic while stopped at the stop sign. It is possible that eastbound traffic is either moving too fast for drivers on Van Buren to safely find gaps on Madison St or high vehicle volume is causing drivers to attempt to fit into small gaps in traffic. Since there are only nine total crashes through the segment (one to two crashes per year), it is difficult to establish a definitive pattern. At this time TEG would not recommend taking any action in this segment.

<u>Madison St: From Franklin St to Ashland Ave: </u>17 Crashes 1 B-injury, 2 C-injuries

5 Angle: 1 B-injury

4 Turning Right

3 Other Object

2 Turning left: 1 C-injury

2 Sideswipe Same Direction

1 Pedestrian: 1 C-injury

This segment of Madison St is along a business lined corridor and serves as a transition point from the more residential area to the west to a business district in the east. The road runs east and west with one lane per direction and a signalized intersection in the center of the segment. There are several parking lots with driveways entering the road, multiple auxiliary turn lanes, street parking, and curb extensions throughout the corridor. It is a high-volume segment with lots of opportunity for drivers to enter or exit Madison St. South of Madison St (outside the Village) Jackson Blvd is located in the center of the segment and is a signalized intersection. This segment had the most crashes in the Village but had the second highest score due to lower crash severity.

Despite the lack of severe injuries, the segment has seen high rates of angle crashes and crashes involving drivers turning right onto Madison St. It was noted that angle crashes were primarily between northbound and eastbound drivers where the northbound driver was turning left; four of the five angle crashes follow this pattern. These crashes may be occurring away from the signalized intersection involving drivers turning from commercial driveways. Due to the constrained conditions of the corridor with buildings set between 6-15’ back from the road, sightlines for drivers sitting at driveways may be compromised. Increasing sightlines without major construction on the buildings may be difficult or impossible. High volumes along Madison St exacerbate the problem as drivers waiting to turn have fewer and shorter gaps between vehicles.

The large number of driveways coupled with poor sight conditions due to buildings being too close to the road is an existing condition the Village cannot easily change. Improving visibility of oncoming traffic at the driveways as much as is possible with the nearby buildings or restricting left turns onto Madison St may help to reduce the number of angle crashes within this segment. It seems that crashes peaked in 2018 with eight out of the total 17 crashes occurring in that year. TEG did not see evidence of roadway changes in historical imagery, but it is possible changes downstream impacted traffic along this segment. Since angle crashes primarily occurred between drivers on the south leg (outside the Village), there are limits to what can be done outside of informing Forest Park (responsible municipality) of the situation. At this time TEG recommends no further action along this segment.

Thatcher Ave: From Augusta St to Division St: 6 Crashes 1 A-injury, 1 B-injury, 1 C-injury,

3 Rear End: 1 B-injury

2 Fixed Object: 1 A-injury

1 Other Object: 1 C-injury

This segment of Thatcher Ave was analyzed on its own as part of a speed study in the area. An in depth analysis of this location and its bounding intersections' crashes can be found in the Thatcher Ave Speed Study section of this report.

Division St: From William St to Bonnie Brae: 3 Crashes 3 B-injuries

1 Rear End: 1 B-injury

1 Other Object: 1 B-injury

1 Sideswipe Same Direction: 1 B-injury

This segment of Division St is a two-way street with striped bike markings for shared lane usage (aka 'sharrow') and parking on both sides. The road has center striping and striped parking lanes. Concordia University and Fenwick High School have facilities south and north of Division St respectively. Grace Lutheran school is located at the east end of the segment on Bonnie Brae. Division St is a collector with an average daily traffic (ADT) of 6,500 and ends at Thatcher Ave to the west. Division St also provides access to Dominican University near the intersection with Thatcher Ave. The large number of schools and school facilities (especially high schools and universities where students may have personal vehicles they need to park) will result in high traffic volumes and high parking utilization during specific parts of the day.

Division St has seen three total crashes in the six years of crash data studied suggesting that there are no recurring crash patterns. All three crashes resulting in B-injuries were surprising, considering the speed limit is reasonably low at 25 mph and the types of crashes were not the more dangerous head on or perpendicular crash types (Angle). With the knowledge that this segment of Division St has a considerable number of facilities for kids/young adults who are of driving age, it is possible that more prevalent speeding through the corridor resulted in more severe crashes than would otherwise have occurred. Since crash frequency is relatively low, there is no reason to make any changes or commit to further study. If crash rates along any part of Division St begin to spike, TEG recommends a speed study as a first recourse to see if speed conditions are resulting in more severe crashes or higher crash rates in general.

<u>Forest Ave: From Madison St to Vine St:</u> 1 Crashes 1 A-injury

1 Turning left: 1 A-injury

This segment of Forest Ave is primarily residential with single-family housing on the west side of the road and multi-family units along the east side of the road. There is a business in the southwest portion of the segment and the public works building is in the northeast corner of the segment across from Vine St. The road accommodates one lane of traffic per direction. Parking is allowed on the west side of the road but is not striped. Based on existing conditions in the segment TEG did not spot any apparent deficiencies. The one A-injury crash appears to have happened near the public works building.

While the A-injury is considered serious, it was an isolated instance and does not warrant any changes to the segment.

<u>Oak Ave: From Forest Ave to Park Ave:</u> 2 Crashes 1 B-injury, 1 C-injury

2 Fixed Object: 1 B-injury, 1 C-injury

This section of Oak Ave is a residential road designated as a bike route. The segment is lined with residential driveways, trees, and utility poles in the easement. Only four residences line this segment, but driveways/alleyways appear to give additional access to garages for residents on Forest Ave and Park Ave without frontage on Oak Ave. Directly in the center of the segment there is a rail bridge crossing over the road with 12'-2" of clearance.

Both fixed object crashes occurred at night. It is impossible to determine what was hit due to so many trees and other objects lining the segment. The railroad bridge supports are too close to the traveled way, but it is unlikely that reconstruction of the supports would be economically feasible with the infrequency of crashes along the segment. Shielding the bridge supports with guardrail would result in a fixed object (guardrail end terminal) even closer to the road and extending beyond the bridge supports existing footprint. Additionally, installing a guardrail will need to extend into the traveled way to properly protect the bridge supports located directly behind the back of curb. Based on the two existing fixed object crashes TEG cannot verify what object was struck as mentioned above. Without this verification or more than two fixed object crashes in a 6 year period, TEG recommends no action is taken at this time.

<u>Edgewood Pl: From Lake St to Thatcher Ave:</u> 1 Crash 1 B-injury

1 Fixed Object: 1 B-injury

<u>Clinton Pl: From Quick St to Oak Ave:</u> 1 Crash 1 B-injury

1 Fixed Object: 1 B-injury

<u>Ashland Ave: From Lake St to Oak Ave:</u> 1 Crash 1 B-injury

1 Other Object: 1 B-injury

The final three 10% locations all had a single B-injury crash giving them a score of five. These locations will be discussed together due to similar crash and roadway characteristics between all three. It is impossible to establish a crash pattern with a single crash so no recommendations will be made. The fact that these three locations were within the top 10% of all local roads suggests that overall, the Village's local segments are not experiencing high crash rates.

The segments were located along two-way roads with no pavement markings and parking allowed on both sides. Land usage is primarily residential along Ashland Ave and Clinton Ave. Along Edgewood Pl the east side of the road is residential, and the west side is a forest preserve. There were trees and other various fixed objects along all three roads that could pose a hazard as a fixed object.

Intersection Crash Analysis

The Village's intersections had far more crashes to analyze than the segments. This was expected primarily due to intersections having a lot more conflict points between drivers who are either stopping, turning, or continuing straight at every intersection. Since intersections behave very differently depending on what traffic control is used, TEG broke intersections into four peer groups that were scored using the same severity weighted scoring but ranked separately just like the segment locations. The four peer groups were: All Way Stop (AWS), Minor Stop – 3 leg, Minor Stop – 4 leg, and Signalized. The reason minor leg stop had three leg intersections separated from four leg was because the four leg intersections had an additional stopped leg where drivers are attempting to turn onto the uncontrolled route. This meant a four-leg intersection would have more potential conflict points than the three-leg version. Other intersection types had uniformity of traffic control type on all legs, so the addition or lack of an intersection leg was not considered as important in the scoring. The table below shows the top 10% locations separated by peer group. While all-way stop and signalized intersections generally had higher scores there is more variability between peer groups than what was observed with the segment locations.

On residential roads it is common for local drivers to feel comfortable and not drive as defensively or as alert as they would normally be. As a result, unexpected events may surprise drivers – an intersection that normally has no waiting cross-traffic having a driver entering from the minor road or a road that cyclists don't normally use suddenly having a cyclist taking the lane. These common occurrences may result in crashes simply due to drivers on the main road not expecting conditions different from what they see on most days.

Street 1	Street 2	# Crashes	PG	Score	PG Rank
Thatcher Ave	Washington Blvd	28	AWS	56	1
Ashland Ave	Lake St	26	Minor Stop - 4 Leg	54	1
Thatcher Ave	Chicago Ave	24	Signalized	50	1
Chicago Ave	William St	11	AWS	46	2
Lathrop Ave	Division St	19	AWS	40	3
Washington Blvd	Ashland Ave	21	Minor Stop - 4 Leg	38	2
Thatcher Ave	Greenfield St	8	Minor Stop - 3 Leg	34	1
Thatcher Ave	Division St	18	Minor Stop - 3 Leg	32	2
Hawthorne Ave	Keystone Ave	7	Minor Stop - 3 Leg	31	3
Washington Blvd	Gale Ave	14	Minor Stop - 4 Leg	29	3
Madison St	Lathrop Ave	20	Minor Stop - 3 Leg	29	4
Lake St	Keystone Ave	13	Minor Stop - 4 Leg	27	4
Chicago Ave	Jackson Ave	13	Minor Stop - 4 Leg	27	4

Table 2. Top 10% intersection crash locations.

Individual intersection analyses are listed below:

Thatcher Ave @ Washington Blvd: 28 Crashes 1 A-injury, 4 B-injuries, 3 C-injuries

17 Angle: 1 A-injury, 2 B-injuries, 1 C-injury

4 Sideswipe Same Direction

3 Rear End: 1 B-injury, 1 C-injury

2 Pedalcyclist: 1 B-injury, 1 C-injury

1 Fixed Object

1 Head On

The intersection between Washington Blvd and Thatcher Ave was analyzed as part of the Washington Blvd Corridor Study. For an in-depth analysis of all intersections and segments along Washington Blvd please refer to 'Crash Analysis' portion of the Washington Blvd Corridor Study section of this report.

Ashland Ave @ Lake St: 26 Crashes 1 A-injury, 4 B-injuries, 3 C-injuries

15 Angle: 1 A-injury, 3 B-injuries, 1 C-injury

6 Rear End: 2 C-injuries

3 Other Object: 1 B-injury

2 Sideswipe Same Direction

The intersection between Ashland Ave and Lake St is a minor stop intersection where north-south (Ashland Ave) traffic is stop controlled. The existing roadway has crosswalks on all four legs and centerline striping on Lake St. The east leg has an in-street pedestrian crossing sign telling drivers to stop for pedestrians in the crosswalk. Lake St has curb extensions on the east and west legs of the intersection. South of Lake St, the land usage is primarily mixed use with rental units on the upper floors. North of Lake St it is primarily residential usage with Saint Luke School on the northeast corner. Street parking is permitted on all legs but is restricted in front of the school and business entrances.

The north leg of the intersection is restricted to one-way traffic northbound on school days from 7:00AM-4:30PM. Since the leg is one-way to the north it does not impact any turning movements at the intersection other than eliminating southbound traffic from the north leg during those time periods.

The intersection has elevated angle crash rates (15) with four injury crashes in the six-year study period. This number of angle crashes along a low-speed residential road generally indicates an underlying issue at the intersection. Since there were no apparent geometric deficiencies, TEG started by analyzing whether the temporary one-way was impacting crashes in the area.

Based on field visits TEG was skeptical that drivers followed the one-way designation during the day. This was supported by feedback received in the Village-wide survey. To determine if this was the case TEG looked at all crashes involving southbound vehicles on the north leg and compared the time and date of the crashes to see if they occurred on a school day during the one-way restriction. It was found that in six out of eight instances with a southbound driver it was during the temporary one-way times. TEG felt that enforcing 'school days' (Monday through Friday from early-August to mid-June) was too ambiguous for drivers without children in school and does not specify if summer programs count as school days. One of the six crashes occurred during temporary one-way times in mid-summer. TEG was uncertain if two-way traffic was allowed during these time periods but felt that the signs were too ambiguous for drivers not familiar with the Village. Even if residents are informed about the exact dates one-way enforcement is applicable it is still potentially confusing to an outsider trying to use Village roads.

Drivers using the north leg to go south during one-way operation times could be disorienting for traffic on Lake St who are not expecting a southbound car to pull out from the intersection. This is supported by the fact that five of the eight southbound crashes were angle crashes including one A-injury and two B-injuries. It seems that while some drivers are following the temporary one-way rules, there are other drivers who either disregard or are unaware that the road is meant to operate as a one-way during school hours. To improve conditions at this intersection TEG would recommend some physical barrier at the entrance to the segment (the intersection of Ashland Ave and Oak Ave) to make it obvious to southbound drivers that continuing straight during these time periods is not allowed. The sign or cones would not need to block northbound drivers from continuing forward but should adequately block the lane southbound drivers would normally use. This barrier should only be in place during school hours (7:00AM-4:30PM), so it is apparent when one-way traffic is in effect. In addition to these changes TEG would recommend changing the temporary one-way dates to be effective on weekdays year-round instead of only on school days. This prevents confusion from outsiders or residents without schoolchildren who are not aware of academic calendars or if one-way restrictions are implemented in the summer months for summer programs. TEG would also recommend enlarging sign panels that display the one-way hours per feedback received as part of the Village-wide survey.

While unexpected southbound drivers may explain some of the angle crashes at the intersection there were nine angle crashes remaining that were all involving drivers headed north from the south leg. Seeing that seven of the nine angle crashes were between drivers heading north being hit by a westbound driver it became clear that westbound traffic was behaving differently from eastbound traffic. Based on traffic volumes collected at the intersection to the east (Lathrop Ave at Lake St) it appears traffic volumes are evenly split both east and west with slightly more drivers headed eastbound during both peak hour time periods. It is possible westbound drivers are speeding more often coming from the more commercial area east of Lathrop Ave, but this is speculation. TEG field engineers noticed that during peak hours eastbound traffic waiting at the signal on Lathrop Ave would periodically back up to the intersection with Ashland Ave and in these cases northbound drivers would weave through standing traffic to go straight or complete their left turn. This greatly limits the visibility of oncoming traffic for the northbound vehicles which may result in angle crashes. It is unclear if these conditions persist throughout the day, but in review it was noted seven of the 15 total angle crashes were during rush hour times. Without more data or an apparent cause for the elevated number of angle crashes (especially between northbound and westbound drivers) TEG does not feel comfortable recommending countermeasures at this time. However, we believe speed data and volume data would give a fuller picture of how the intersection operates and help to enact more effective countermeasures.

Since this intersection is one of the highest scoring crash locations in the Village, TEG recommends further study is conducted to determine the appropriate countermeasures that can be recommended. Knowing driver speeds, as well as vehicle volumes at the intersection – including how many drivers illegally drive south on the north leg during school hours – is vital information since the existing intersection has no apparent geometric deficiencies. Depending on the findings, either northbound or westbound traffic may need to be modified. For example, high northbound volumes trying to cross lake street during peak hour times for school pickup/drop-off may justify an all-way stop or reconsideration of how school pickup and drop-off operates. In contrast if drivers are excessively speeding westbound from the intersection with Lathrop Ave, then countermeasures may need to be focused towards traffic on Lake St.

The sideswipe same direction, rear end, and fixed object crashes are at low enough rates that TEG does not believe there are any recurring problems. These crashes occurred along Lake St and with only one to two non-angle crashes per year did not present as a pattern.

Thatcher Ave @ Chicago Ave: 24 Crashes 6 B-injuries, 2 C-injuries

10 Rear End: 2 B-injuries, 2 C-injuries

6 Angle: 2 B-injuries

4 Turning Left: 2 B-injuries

2 Fixed Object

1 Pedalcyclist

1 Animal

The intersection between Thatcher Ave and Chicago Ave is a signalized intersection with protected/permissive left turns on Thatcher and unprotected left turns on Chicago Ave. All four legs are striped with one lane per direction and a dedicated left turn lane. Sidewalks and ADA pads are provided on all corners except the northwest corner. The south and east legs have striped crosswalks and corresponding pedestrian signal heads and push buttons. The west leg of the intersection has two westbound receiving lanes even though there is only one westbound through lane east of the intersection. North of the intersection Thatcher Ave has two southbound lanes where the inner lane turns into a dedicated left turn lane at the intersection with minimal warning.

Truck traffic is not permitted to continue east along Chicago Ave and bicycle pavement markings (sharrow) are striped on the east leg in both directions. On-street parking is allowed on the east leg of the intersection only. Land-use is primarily residential and forest preserve. There is a trailside museum southwest of the intersection with a driveway opening onto Thatcher Ave.

Seeing the intersection had six angle crashes with two B-injuries suggested that drivers were running red lights. Since one direction of traffic should always be stopped; to cause an angle crash one of the drivers would have to continue forward while they had a red light. To determine if any one direction was more likely to run the light, TEG looked at the directions of drivers involved in angle crashes and found that five of the six crashes involved a southbound driver. It was noted that southbound traffic is almost 400 vehicles higher when looking at the combined southbound peak hour through movement compared to the combined northbound peak hour through movement. While this may not directly contribute to running red lights, the combination of having more southbound drivers trying to switch into or out of the inner southbound lane/left turn lane at the intersection may create small delays that incentivize drivers to cross the intersection during expiring yellow lights or the start of the red signal phase.

North of this intersection TEG conducted a speed study that found the 85th percentile speed of drivers on Thatcher Ave was 41 mph. Based on this TEG would recommend installing an intersection warning sign for both Thatcher Ave approaches and considering a raised intersection at this location. It would effectively calm southbound traffic on Thatcher Ave, while also addressing drivers who may be speeding eastbound into the Village on Chicago Ave. A raised intersection at this location would be more efficient than placement at a three-legged intersection.

Rear end crashes were the most prevalent crash type at the intersection which is expected at signalized intersections. Looking at the distribution of rear end crashes through the years, there were one to three rear end crashes per year which appeared to be isolated instances occurring in all directions with no apparent directional bias. There were four left turning crashes at the intersection with an even split between north-south and east-west vehicle directions. Since there is no directional bias and there have not been any more left turning crashes since 2018, TEG does not believe there is a recurring pattern of left turn crashes at the intersection.

The remaining crashes (fixed object, animal, and pedalcyclist) were in too few numbers to establish a pattern. The pedalcyclist crash occurred at night, but without further crash details the exact road conditions cannot be determined. Since there have not been any more cyclist crashes since 2017, TEG does not believe the intersection is hazardous for cyclists to navigate.

<u>Chicago Ave @ William St:</u> 11 Crashes 1 A-injury, 6 B-injuries, 2 C-injuries

3 Rear End: 1 B-injury, 1 C-injury

2 Pedalcyclist: 2 B-injury

2 Fixed Object: 2 B-injuries

2 Angle: 1 B-injury

1 Turning Left: 1 A-injury

1 Pedestrian: 1 C-injury

The intersection between Chicago Ave and William St is an all way stop intersection located within a residential section of River Forest. All stop signs are double sided for increased visibility. Chicago Ave is a major collector and William St is a local road. At the intersection there are crosswalks provided on all four legs and parking is permitted along both routes. Along Chicago Ave center striping is provided with additional parking striping and bicycle pavement markings (sharrow). Nearby land use at the intersection is exclusively residential. Based on a recent traffic count, it was observed that Chicago Ave had an ADT of nearly 9,000 and William St had an ADT of roughly 1,000 vehicles. This is a major volume differential between the two roads. Currently, all-way stop control is not warranted per IDOT criteria. Traffic on the minor leg is not sufficient to install a stop sign along Chicago Ave. Installing stop signs in areas where they are not warranted may result in drivers not respecting the traffic control and may cause higher crash rates than not having a stop sign.

No individual crash type occurred with enough frequency to indicate a pattern. The most common crash type, rear end crashes, occurred once every two years which is not frequent enough to establish a pattern. The primary issue at the intersection is that nine of the 11 total crashes resulted in an injury. Having a high severity across all crash types including rear end as well as three pedestrian or cyclist crashes suggests drivers are driving at high speeds which increases the likelihood a crash will result in severe injury. All four legs coming to a stop should result in any crashes that do occur at the intersection being at lower speeds and less likely to result in an injury, but if it is always the case that there is never or very seldom cross traffic on William St drivers may begin to come to a rolling stop and then accelerate forward unsafely to get back up to speed. All crashes involved drivers along the east-west road with no obvious directional split. Only the two angle crashes included drivers from William St (1 SB vs EB and 1 NB vs WB in each case the far lane).

It is apparent there is a crash problem at the intersection, But the reason for the crash problem is not apparent. Based on the injuries and high number of pedestrian conflicts TEG would suggest gathering speed data on the east and west approaches to the intersection. As an interim (and potentially on-going) solution, TEG suggests providing targeted enforcement in the area. Since the majority of crashes exclusively involve drivers on Chicago Ave, it would suggest that the problem is with how traffic on Chicago Ave interact with the intersection (not obeying stop signs).. Once additional data is gathered TEG would recommend reevaluating the traffic control. From a traffic engineering standpoint, the Village may wish to consider removing the AWS control. However, the Village should consider potential safety and liability implications of "lessening" the traffic control. If traffic control is removed the Village should consider installing traffic calming measures per criteria found in the Traffic Calming Toolbox developed as part of this project.

Lathrop Ave @ Division St: 19 Crashes 5 B-injuries, 1 C-injury

16 Angle: 4 B-injuries, 1 C-injury

3 Rear End: 1 B-injuries

This intersection is currently an all-way stop between two major collector streets. Both roads have one lane per direction without auxiliary turn lanes. The current ADT is 6,500 vehicles for Division St and 4,800 vehicles on Lathrop Ave. The existing conditions include striped crosswalks on all four legs, striped centerlines, and double backed stop signs. The stop signs all currently have flashers installed on them to bring even more attention to the stop location. Both roads have painted bike markings (sharrow) and on-street parking permitted on all legs with parking restrictions on the north leg in front of the school. Adjacent land usage is primarily residential, along with Trinity High School on the northeast corner of the intersection. There are no apparent visibility issues on any of the legs of the intersection.

Based on the excessive number of angle crashes and high rate of injuries, the first step TEG took was to run a signal warrant and all-way stop warrant. These warrants are defined by the Manual on Uniform Traffic Control Devices (MUTCD) and at least one warrant must be met prior to installing new traffic control. Warrants being met does not necessarily require the installation of a signalized intersection, but it gives engineers the opportunity to recommend a new signal. At this intersection, Warrant Five and Seven were met. Warrant Five (School Crossing) was met based on the number of school children crossing in the area. Warrant Seven (Crash Experience) required five 'correctable' crashes in one year and minimum volumes being met for eight hours of the day. In the existing conditions, the minimum crash numbers were met based on the number of correctable crashes in 2017 and 2018, in which there were 5 correctable crashes in each year. The volume component of the warrant required a total of 8 hours where the major road had a volume over 400 vehicles and the minor road had a volume of 120 vehicles. This was met for seven of the eight required hours. It was noted that two additional hours were within 10% of the required volumes. Based on our engineering judgement, we recommend that Warrant Seven be considered as met.

It was apparent that the intersection had a breakdown in operation seeing that 16 of the 19 total crashes were a single crash type – specifically one that should not be occurring at an AWS intersection. For an angle crash to occur at an all way stop one or both drivers need to disregard the stop sign or perform a 'rolling stop' A rolling stop is dangerous because slowing down makes it appear the driver is complying with the stop sign and immediately accelerating back up to speed does not give oncoming drivers on the cross-street time to react to the lack of a complete stop. Looking at the crash details there is no apparent directional split between intersection legs.

TEG recommends installing a traffic signal at this location – it is apparent the intersection has been identified in the past for crash issues since sometime in 2019 flashers were installed on all four signs. Since that time angle crashes appear to have dropped off (two angle crashes since 2019), but this was in 2020 and 2021 when the pandemic was significantly altering driver behaviors. In 2019 (the year flashing signs were installed) there were 6 angle crashes with 2 B-injuries. Based on this, TEG believes in future years the number of angle crashes will likely return to the numbers seen in 2019 as traffic patterns return to normal.

If the all-way stop is to remain, TEG would recommend targeted police enforcement to address the issue. TEG does not have speed data along Division St or Lathrop Ave, but it is likely drivers on one or both roads are speeding in the approach segments. TEG recommends conducting a speed analysis to determine if more traffic calming is applicable. If drivers are speeding in the segments, it is unlikely a single stop sign (or series of stops) will influence their speed through the corridor. There are three other all way stop locations along the corridor and in all three cases the minor route traffic volumes are substantially below Division St volumes. Drivers may be used to not seeing any cross traffic at other stop signs not realizing that Lathrop Ave and Division St have similar volumes resulting in a much higher chance that there will already be a driver waiting as another approaches. Traffic calming should be implemented throughout the corridors and not just at the intersection.

At this intersection TEG recommends installing a new traffic signal and performing a speed study to verify whether additional traffic calming is justified.

Washington Blvd @ Ashland Ave: 21 Crashes 4 B-injuries, 1 C-injury

13 Angle: 3 B-injuries, 1 C-injury

4 Rear End: 1 B-injury

2 Other Object

1 Fixed Object

1 Turning Left

The intersection between Washington Blvd and Ashland Ave was analyzed as part of the Washington Blvd Corridor Study. For an in-depth analysis of all intersections and segments along Washington Blvd please refer to 'Crash Analysis' portion of the Washington Blvd Corridor Study section of this report.

Thatcher Ave @ Greenfield St: 8 Crashes 1 Fatal, 2 C-injuries

4 Rear End: 2 C-injuries

2 Fixed Object: 1 Fatal

1 Turning Left

1 Angle

The intersection between Thatcher Ave and Greenfield St is a three-leg intersection with minor leg stop control for east-west traffic (Greenfield St). At the intersection, Thatcher Ave has two southbound lanes and one northbound lane. On-street parking is allowed along the east side of Thatcher Ave and there is restricted parking both sides of Greenfield St (no parking 8:00AM – 5:00PM Monday through Friday). There is a striped crosswalk on the east leg crossing Greenfield St and center striping provided along Thatcher Ave. Land use west of Thatcher Ave is Forest Preserve owned land and east of Thatcher Ave is primarily residential with Dominican University southeast of the intersection. Curvature along Thatcher Ave may make it difficult for a waiting driver on Greenfield St to see oncoming traffic.

The reason this location had a high score is due to the fixed object crash resulting in a fatal injury. It is unclear what was hit due to a variety of fixed objects being present in the area. As there was only one other fixed object crash in the study period, TEG does not believe there are any unprotected fixed objects in need of shielding causing a pattern of fixed object crashes.

All other crashes seem to be isolated events and do not present as a pattern that can be addressed. Therefore, TEG does not recommend any improvements at this time.

Thatcher Ave @ Division St: 18 Crashes 1 A-injury, 1 B-injury, 1 C-injury

4 Fixed Object

4 Turning Left

3 Rear End: 1 C-injury

3 Other Object

1 Head On: 1 A-injury

1 Angle: 1 B-injury

1 Turning Right

1 Other Non-Collision

The intersection between Thatcher Ave and Division St was analyzed on its own as part of a speed study in the area. An in-depth analysis of this location along with the segment and intersection to the south can be found in the Thatcher Ave Speed Study section of this report.

Hawthorne Ave @ Keystone Ave: 7 Crashes 1 Fatal

2 Fixed Object: 1 Fatal

2 Other Object

1 Rear End

1 Sideswipe Same Direction

1 Sideswipe Opposite Direction

The intersection between Hawthorne Ave and Keystone Ave is a complex offset intersection consisting of a minor stop along Keystone Ave south of Hawthorne Ave at the east intersection and a three-leg all way stop west intersection where Keystone Ave continues to the north. On-street parking is permitted on the south leg of Keystone Ave and the north side of Hawthorne Ave. Parking along Hawthorne Ave is striped and is paid parking for the Metra line. The north leg of Keystone Ave leads under a rail bridge with a Metra station located on top of the bridge to the west. Stop signs are placed on each side of the bridge and parking is restricted in the underpass. The east intersection has a crosswalk striped across the south leg. The western intersection has two crosswalks striped crossing Hawthorne Ave on the east and west legs.

Despite the complexity of the intersection there is a relatively low number of crashes. Out of the seven crashes, only three involve two vehicles with the rest being either fixed objects or other objects (parked cars). The singular fatal crash is the driving factor bringing this location into the top 10%. Upon reviewing news sources around the time of the crash TEG discovered the concrete bridge embankment is what was struck, and the driver was coming from a local bar at 2AM. Since there were only two fixed object crashes in the area TEG does not feel this constitutes a pattern. The concrete bridge structure is not realistic to move but the Village may want to consider shielding the structure if there are further fixed object injuries at the intersection in the future.

Washington Blvd @ Gale Ave: 14 Crashes 3 B-injuries, 3 C-injuries

11 Angle: 2 B-injuries, 2 C-injuries

1 Rear End: 1 B-injury

1 Pedalcyclist: 1 C-injury

1 Animal

The intersection between Washington Blvd and Gale Ave was analyzed as part of the Washington Blvd Corridor Study. For an in-depth analysis of all intersections and segments along Washington Blvd please refer to 'Crash Analysis' portion of the Washington Blvd Corridor Study section of this report.

Madison St @ Lathrop Ave: 20 Crashes 2 B-injuries, 1 C-injuries

7 Rear End

5 Sideswipe Same Direction

3 Other Object

2 Angle: 1 B-injury, 1 C-injury

2 Fixed Object: 1 B-injury

1 Turning Left

The intersection between Madison St and Lathrop Ave is a unique three-leg minor stop intersection where the north leg of Lathrop Ave is the stopped leg. One complicating factor is the presence of a signal-controlled intersection at Madison St and Des Plaines Ave, located approximately 100 feet to the east. This close distance can lead to visibility challenges for drivers on the minor leg. Additionally, it can make it difficult for drivers to find a safe gap in traffic. Cars turning westbound from Des Plaines Ave reach the Lathrop Ave intersection almost immediately, giving drivers at the stop sign limited time to accurately judge the gap and react to approaching vehicles.

On-street parking is allowed on the south side of Madison St. Near the intersection along Lathrop Ave parking is restricted, due to the nearby business entrances. The land use at the intersection is entirely commercial with residences further north. A crosswalk is provided on the north leg and bike facilities are striped on Lathrop Ave (sharrow). Along Madison St, centerline striping is provided. A dedicated left turn lane is striped along Madison St from Thatcher Ave to Des Plaines Ave.

Two intersections in such close proximity may have resulted in crashes at the intersection between Madison St and Des Plaines Ave being attributed to the studied intersection. This would help to explain the seven rear end crashes and five sideswipe same direction crashes (crashes commonplace at signalized intersections). Nine of the 12 total same-direction crashes involved drivers on Madison St heading eastbound and were likely associated with the signalized intersection. In five of those crashes the listed traffic control was the signalized intersection at Des Plaines Ave. Due to the way crashes are reported the remaining four crashes may be associated with intersection traffic but may not be listed as occurring at the traffic signal.

The three other object crashes at the intersection are unclear as to what was being hit. Seeing that there were no injuries associated with the crashes and since they occurred on average less than once per year TEG did not feel they presented a recurring problem at the intersection. In most cases an 'other object' is listed when a driver hits a parked car. Due to the close proximity of two parking lots on the east and west corner of Lathrop Ave to the studied intersection TEG theorizes crashes occurring within the lots were picked up within the crash data and attributed to the intersection. The crash data locations that we are able to review are based on how they are plotted in IDOT's GIS system, and there is a margin of error in how accurately the crashes plot. This would help explain the elevated other object collisions in the area compared to other similar intersections. The two angle crashes both resulted in injuries but seeing that there were only two over the course of the six years studied suggested the crashes were isolated occurrences. Due to a number of small, fixed objects near the traveled way TEG is uncertain what was struck in the fixed object crashes. The cramped nature of the corridor limits the ability to move fixed objects away from the road, and since there were only two fixed object crashes over the six years studied, TEG does not recommend any countermeasures to address this crash type. The remaining left turning crash was an isolated incident and did not justify any countermeasures.

Lake St @ Keystone Ave: 13 Crashes 3 B-injuries, 2 C-injuries

6 Rear End: 1 B-injury, 2 C-injuries

4 Angle: 1 B-injury

1 Turning Left: 1 B-injury

1 Turning Right

1 Other Object

The intersection between Keystone Ave and Lake St is a minor stop-controlled intersection where Keystone Ave is the stopped route. The intersection has striped crosswalks on all four legs and centerline striping along Lake St. Lake St has curb extensions and pedestrian crossing signs equipped with rapid flashing rectangular beacons at the intersection. On-street parking is allowed on all legs but is restricted to three-hour parking on weekdays 6AM-2PM. Keystone Park is located on both the east and west side of the south leg of the intersection. North of the intersection, land use is primarily residential with the Mosaic Montessori Academy on the northwest corner of the intersection. Based on the land use around this intersection, it is expected that there is a large number of pedestrians using the intersection to get to or from the park.

The primary type of crash and injuries at the intersection are rear end crashes. TEG assumed most of these crashes would be on the stopped leg (north-south) but after looking at the directional breakdown it was seen that rear end crashes exclusively happened on Lake St (east-west). This was unexpected because generally rear end crashes are prevalent in areas where cars either stop or slow down. Based on the existing conditions it is likely that drivers get in rear end accidents while stopping for pedestrians in the crosswalks or when preparing to turn left/right from Lake St when the driver behind them is not expecting to stop. Since this crash happened infrequently, on average once per year, countermeasures are not appropriate at this time.

The four angle crashes do not appear to have any obvious directional split. Looking at the years and dates TEG noted that three angle crashes were in 2018 with one in 2019. The three 2018 angle crashes occurred within a three-month period. This may be a result of on-street conditions in that time period (possibly a result of construction that may not show up in historic imagery). It is uncertain if this is the case, but the lack of more recent angle crashes suggests that there is not currently an issue with angle crashes at the intersection. The remaining three crashes are all different types and do not show any recurring pattern in the area.

Chicago Ave @ Jackson Ave: 13 Crashes 3 B-injuries, 2 C-injuries

8 Angle: 2 B-injuries, 2 C-injuries

1 Pedestrian: 1 B-injury

1 Rear End

1 Other Object

1 Fixed Object

1 Turning Left

The intersection between Chicago Ave and Jackson Ave is a minor stop intersection where Jackson Ave is the stopped route. The intersection has continental striped crosswalks on all four legs and along Chicago Ave centerline striping, shared bike markings (sharrow), and striped parking lanes are provided. There is a pavement legend for westbound traffic west of the intersection that says "SCHOOL XING". Parking is permitted on all four legs, but the south leg has permit parking on the west side of the road that is in effect school days 7:30AM-4:00PM and parking on the east side is restricted to three-hour parking during school days near Roosevelt Middle School. Parking lanes on Chicago Ave have landscaped curb extensions provided on both legs. Adjacent land usage is primarily residential with Centennial Park on the southwest corner of the intersection. South of Centennial Park is Roosevelt Middle School. Both facilities serve as a major draw for pedestrians to the area.

The south leg of the intersection is a temporary one-way southbound street during school days from 7:30AM-4:00PM. This should not impact turn movements at the intersection other than removing northbound traffic from the intersection for most of the day. All other legs can continue to operate as they normally would. Knowing that the similar temporary one-way at Ashland Ave and Lake St had issues with drivers improperly using the temporary one-way resulting in large numbers of angle crashes TEG checked the time, day and directions of drivers involved in angle crashes. Upon review there was no directional bias between drivers heading north or south and getting into an angle crash (three drivers headed north, five drivers headed south). If anything, southbound drivers were more at risk of an angle crash than northbound drivers. Of the three northbound crashes two were during temporary one-way times. This suggests that while some drivers are not obeying the one-way times, they are not the primary cause of elevated angle crash rates at the intersection. Despite northbound drivers not being the primary cause of elevated angle crashes at this location the Village should consider the same improvements recommended along other temporary one-way locations to prevent further northbound drivers getting into crashes during the one-way restriction in the future.

Since angle crashes had no clear directional bias TEG began to consider operational characteristics that would impact drivers in all directions. It seems drivers on the minor legs may have compromised sightlines due to large trees in the parkway and on-street parking potentially blocking the view of oncoming traffic. While sight distance may have an effect, TEG feels it is likely that driver speed or high traffic volumes combined with limited sight distance along Chicago Ave result in driver difficulty finding large enough gaps to turn or cross the intersection. The elevated injury rate suggests that drivers are traveling at a high rate of speed at the intersection. TEG would suggest verifying speed issues before using the traffic calming toolbox to guide countermeasure selection. If drivers are speeding along Chicago Ave the intersection becomes less safe for all drivers. Addressing potential speeding will help reduce the number and severity of injuries for all crash types. A gap study can also be conducted at the same time to establish whether speed or lack of gaps to turn into is the primary issue. If lack of gaps along Chicago Ave is the issue, TEG recommends restricting turn movements allowed from the minor legs.

The remaining crashes do not present as a recurring pattern and two of the five remaining crashes are between drivers and fixed objects/parked cars. The single pedestrian crash which resulted in an injury was between a driver heading westbound and a pedestrian. The lack of further pedestrian crashes suggests the area is generally safe for the pedestrians going to or from the school and park. TEG does suggest upgrading the crosswalk striping from the continental to a more appropriate high-visibility ladder style school crossing for the legs most used by students.

Conclusion

Below, two tables have been assembled with overall recommendations from TEG. In many cases additional study is the recommendation as is beyond the scope of this study. TEG views crash problems as a symptom of a dysfunctional intersection/segment. To make appropriate recommendations the dysfunctional aspect of the location needs to be identified through a combination of field observation and more data acquisition.

TEG hypothesized speed issues may be the primary factor resulting in crashes along streets that had high rates of injuries, or that sight distance issues might be the cause of elevated angle crash rates. While these hypotheses may be proven correct with more data it is important to verify the root cause of the issues before attempting to correct the problem. i.e. installing traffic calming will not help reduce crashes in an area where sight distance is the primary factor resulting in crashes.

Basing project locations off areas with existing crashes is a reactive approach to network improvements. After the Village addresses existing locations with crash problems, TEG recommends incorporating a proactive approach. The next step is identifying similar locations across the Village to perform system-wide improvements. Due to the semi-random nature of crashes some locations did not have enough crashes to be brought to TEG's attention. This does not mean there are no existing issues – crashes are just one symptom of a dysfunctional road, and a lack of crashes may be indicative of lower driver volumes rather than a safe and functional intersection.

Please refer to the tables on the following page as a comprehensive list of all recommendations made within this crash analysis.

Primary Route	From	To	Recommendation(s)
Madison St	Forest Ave	Park Ave	None
Madison St	Franklin Ave	Ashland Ave	None – most crashes are on the non-Village leg.
Thatcher Ave	Augusta St	Division St	Refer to Thatcher Ave Speed Study for recommendations.
Division St	Monroe Ave	Bonnie Brae	Speed Study
Forest Ave	Madison St	Vine St	None
Oak Ave	Forest Ave	Park Ave	None
Edgewood Pl	Lake St	Thatcher Ave	None
Clinton Pl	Quick Ave	Oak Ave	None
Ashland Ave	Lake St	Oak Ave	None

Table 3. Top 10% Segment Recommendations

Street 1	Street 2	Recommendation(s)
Thatcher Ave	Washington Blvd	Refer to Washington Blvd Corridor Study for recommendations.
Ashland Ave	Lake St	Speed & Volume Study
Thatcher Ave	Chicago Ave	Raised intersection – Recommendation is due to the results of the Thatcher Ave speed study.
Chicago Ave	William St	Speed Study
Lathrop Ave	Division St	Speed study – To verify speed issues Signalization – Recommendation is based on the intersection meeting a signal warrant.
Washington Blvd	Ashland Ave	Refer to Washington Blvd Corridor Study for recommendations.
Thatcher Ave	Greenfield St	None
Thatcher Ave	Division St	Refer to Thatcher Ave Speed Study for recommendations.
Hawthorne Ave	Keystone Ave	None
Washington Blvd	Gale Ave	Refer to Washington Blvd Corridor Study for recommendations.
Madison St	Lathrop Ave	None
Lake St	Keystone Ave	None
Chicago Ave	Jackson Ave	Speed Study Upgrade crosswalk striping for crossings associated with the school.

Table 4. Top 10% Intersection Recommendations