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MEMORANDUM

Date: 5/1/2025

To: City of Northfield

From: Bryan T. Nemeth, P.E., PTOE

Subject: Woodley Street and Spring Creek Road
Traffic Safety and Warrant Analysis Update
City of Northfield, Minnesota
Project No.: 24X134891000

Introduction

The City of Northfield, Minnesota, has proposed improvements for Spring Creek Road including road reconstruction and the Mill Towns State Trail enhancements, which include upgrades of the street to a paved surface and the addition of sidewalk, trail, and utility infrastructure. The reconstruction area includes the southern leg of the intersection of County State Aid Highway (CSAH) 28/Woodley Street and Spring Creek Road. With this being a major intersection in the area and previous citizen input on safety concerns, there is a focus to identify and document safety issues and identify what improvements may increase traffic safety and provide acceptable operations. This memorandum includes an analysis of traffic safety and the traffic control needs of the intersection based on current conditions and outlines potential improvements for implementation.

Scope of Analysis

- **Traffic Safety:** Review five-year history of crashes at locations, analysis of sight lines at the stop - controlled intersection, and review of speed data to provide insights into safety trends and concerns.
- **Warrant Analysis:** Analyze a potential change from Two-Way Stop control to All-Way Stop control at the intersection.

Study Intersection

The intersection of Woodley Street and Spring Creek Road is controlled by stop signs on Spring Creek Road as a Two-Way Stop Controlled intersection. Woodley Street is a minor arterial with a posted speed limit of 35 mph, while Spring Creek Road is a local roadway with a posted speed limit of 30 mph on the north leg. The south leg of Spring Creek Road is not currently posted with a speed limit and the Speed Limit of 55 mph would be applicable in accordance with State Statute. Spring Creek Road is currently a gravel road approximately 150 feet south of Woodley Street and is once again a paved section approximately 2,000 feet south of Woodley Street. Woodley Street is a three-lane roadway (two-lane roadway that also features a two-way left turn lane) and Spring Creek Road is a two-lane roadway. The intersection is located on a horizontal curve of Woodley Street.

Data Collection

Existing traffic turning movement counts including vehicles, bicyclists, and pedestrians at the intersection were collected on Tuesday October 29, 2024. Traffic speed data was collected at two locations on October 30, 2024. Intersection turning movement data is included in **Appendix A**.

Pedestrian and bicyclist data was collected as part of the turning movement counts. The volume of pedestrians and bicyclists for each crossing of the intersection are indicated in **Table 1**.

Table 1: Pedestrian/Bicyclist Volume Using Each Crossing

Intersection	Time of Day	Pedestrian + Bicyclist Volume			
		North Crossing	South Crossing	East Crossing	West Crossing
Woodley Street and Spring Creek Road	AM Peak Hour (7:15-8:15 AM)	7	0	2	1
	PM Peak Hour (4:15-5:15 PM)	4	2	0	1
	Pedestrian Peak Hour (3:00-4:00 PM)	21	2	15	1
	Daily	65	8	19	8

Currently, the highest used crossing is the north side. This connects the current multiuse trail on the NE and NW quadrants of the intersection.

Crash Review

Crashes available from the Minnesota Crash Mapping Analysis Tool (MnCMAT2) from 2019 to 2023 were reviewed to determine the types of crashes that have occurred at the intersection and to determine potential mitigation measures if needed. A crash rate higher than the critical crash rate (critical index > 1.0) indicates a need for mitigation to reduce crashes. A critical index less than 1 indicates that the intersection is operating within the normal range as compared to similar intersections statewide and there is not an immediate need for mitigation. The intersection has had no crashes in the last five years or the crashes may not have been recorded or reported to the city. **Table 2** shows the intersection crash rate.

Table 2: Crash Rate and Critical Index

Intersection	Traffic Control	All Severities				Fatal and Serious Injury Crashes (K+A Crashes)			
		Total Crashes	Crash Rate (per MEV)	Critical Crash Rate (per MEV)	Critical Index	K+A Crashes	K+A Crash Rate (per 100 MEV)	K+A Critical Crash Rate (per 100 MEV)	K+A Critical Index
Woodley Street and Spring Creek Road	Two-Way Stop	0	0.14	0.68	0.00	0	0.35	14.39	0.00

While the crash history indicates that the intersection is performing within the “normal” range, this does not indicate that safety improvements should not be incorporated into the project and additional conditions should be evaluated as there is likely to be an increase in vehicle, bicyclist, and pedestrian volume through the intersection due to the project enhancements.

Intersection Sight Distance Analysis (Sight Lines)

To identify potential sight-line obstructions for vehicles and pedestrians making movements from stop-controlled approaches, intersection sight distance analysis was completed at the stop-controlled intersections following guidance in the *AASHTO Policy on Geometric Design of Highways and Streets*. This analysis evaluated departure distances for the north-south stop-controlled approaches to Woodley Street assuming side street stop control. Woodley Street was evaluated with the speed limit of 35 mph.

This analysis was performed using two different assumptions:

- **Conservative analysis** – this assumes that a driver's eye is 14.5 feet from the edge of the major road traveled way which would be typical for motorists that are stopped behind an adjacent sidewalk.
 - Analysis results for the conservative analysis are summarized in **Table 3**.
- **Typical driving behavior** – this assumes that a driver's eye is 6.5 feet from the edge of the major road traveled way (i.e. pulling closer to Woodley St to evaluate sight lines as allowed by state law).
 - Analysis results for the typical driving behavior analysis are summarized in **Table 4**.

Table 3: Sight Line Analysis – Assuming Driver's Eye is 14.5 feet from Edge of Woodley Street

Intersection	Approach	Movement	
		Left Turn	Right Turn
Woodley Street and Spring Creek Road	Northbound	Trees on SE Quadrant	No Obstructions
	Southbound	Roadway Curve Foliage/Utility Boxes	Roadway Curve Bushes

Table 4: Sight Line Analysis – Assuming Driver's Eye is 6.5 feet from Edge of Woodley Street

Intersection	Approach	Movement	
		Left Turn	Right Turn
Woodley Street and Spring Creek Road	Northbound	No Obstructions	No Obstructions
	Southbound	Roadway Curve No Obstructions	Roadway Curve No Obstructions

The sight line analysis for the intersection is attached in **Appendix B**.

The northbound approach has some minor sight line obstructions including trees and bushes on the SE corner under the conservative analysis but it is not considered to be a major concern since it can be remedied through the vehicle advancing forward of the stop sign but not impacting crossing traffic and the approach is on the outside of the curve.

Due to the roadway geometrics with the horizontal curve, power poles, utility boxes, and multiple bushes and trees on the NE and NW corners of the intersection, the southbound traffic from Spring Creek Road entering Woodley Street has poor sight lines where motorists cannot advance adequately to provide clear sight lines without impacting Woodley Street traffic. Assuming the driver's eye at 6.5 feet from the edge of Woodley Street would still have sight-line issues due to the curve (angle of driver's view), when looking west and east but is not considered to be a significant concern if the driver pulls ahead adequately. If higher speeds are experienced from the west, the sight line may end up being a concern.

While the roadway curve sightline impacts have not currently caused crashes, with an anticipated increase in volume on Spring Creek Road, this may be a concern. When warranted, changing the intersection control to all-way stop or roundabout control may be considered as traffic control options given the sight line issues at the intersection if they cannot be rectified through geometric improvements.

Speed Data Review

Elevated traffic speeds can increase both crash potential and the likelihood that a crash will result in serious injuries, especially for pedestrians and bicyclists. To understand existing traffic speeds, speed data was collected at two separate locations in the study area. Speeds were collected both east and west of Woodley Street and Spring Creek Road along Woodley Street within the 35-mph zone. The collected data is summarized in **Table 5**.

Table 5: Field-Collected Speed Data

Location	Median Speed	85th Percentile Speed	Posted Speed
West to Spring Creek Road	33 to 34 mph	37 to 39 mph	35 mph
East to Spring Creek Road	38 mph	43 mph	35 mph

*Multiple speeds listed above indicate different speed measurements in each direction

Speed data indicates that traffic speeds at both locations exceed the 35-mph posted speed limit. Ideally 85th percentile speeds would match the speed limit. If this is not achieved, the roadway features should be designed to the speeds wanted or the speed limit should be increased. The speed data indicates that speeds are higher than the speed limit and appropriate speed limit should be approximately 40 mph.

This data also indicates that the sight line analysis may be further impacted with the higher speeds, with more obstructions with the higher speed. In recognition that the roadway should be designed to best indicate to motorists that the appropriate speed is 35 mph or less, options to reduce motorist speed would be recommended. Given the current lane layout and features at the intersection a reasonable option may be reduce lane width to get some reduction in speeds. A dynamic speed feedback sign (DSFS) may also be appropriate for westbound traffic as that is the direction where speeding appears to be a higher issue. According to a Department of Transportation, National Highway Traffic Safety Administration, Office of Behavioral Safety Research study from 2021, DSFS's can be effective in reducing the speed of drivers when they are driving over posted speed limits in a range of contexts when activated. "Overall, reductions of 4 mph at the DSFS were detected as a result of DSFS installation for passenger cars, and reductions between 2 and 4 mph at the DSFS were detected across all vehicle

types in the different contexts assessed.” It was noted any reduction in speed can improve traffic safety. Lowering speeds by 2 mph from 40 to 38 mph can reduce fatal vehicle-pedestrian strikes by 20 percent; lowering speeds by 4 mph, for example from 42 to 38 mph, can reduce the risk of fatal vehicle-pedestrian strikes from 50 percent to 37 percent.”

Street lighting would also be recommended to light up all four corners where pedestrians or bicyclists may be present.

Warrant Analysis

The traffic volumes and crash history were analyzed at the intersection for All-Way Stop. The data is used to determine if the intersection meets the all-way stop warrant from the Minnesota Manual on Uniform Traffic Control (MnMUTCD).

- Woodley Street and Spring Creek Road
 - Traffic volumes do not currently meet the all-way stop warrant.
 - Crash history indicates that there have been no crashes at the intersection for the past five years.
 - All-way stop control warrant is not met based on crashes or volumes.

All-way stop warrant analysis for the intersection is provided in **Appendix C**.

- However, sight-line analysis indicates that there may be a potential need for measures to improve sight lines in the absence of all-way stop control.
 - When warranted, all-way stop control may be considered if other options are not feasible.
 - While an all-way stop in a rural area may be unexpected by motorists, an all-way stop, when warranted, in this area given the homes in the immediate vicinity would not be an unusual traffic control device in this transition from a rural land use to one that is urbanizing.

Additional Considerations

- If the sight line considerations could largely be rectified for motor vehicles, the sight line issues are likely to continue to be present for pedestrians and bicyclists due to their lower speeds in crossing the intersection and the horizontal curve.
 - In consideration of the above and the potential for a significant increase in pedestrian and bicyclist volume, it is recommended that enhancements for non-motorized crossing movements be provided in accordance with Minnesota’s Best Practices for Pedestrian and Bicycle Safety. This includes implementation of high visibility crosswalk markings, adequate nighttime lighting levels, crosswalk warning signs, advance stop for pedestrian signs and crosswalk warning signs, and given the measured speeds (if all-way stop not implemented) a pedestrian hybrid beacon. As current volumes do not justify a pedestrian hybrid beacon in accordance with the MnMUTCD, a rectangular hybrid beacon may be appropriate given the speed limit considering the transition to an urbanized area.
 - Measures to decrease speeds to the speed limit is highly encouraged.

- The implementation of all-way stop may be justified under the warrants in MnMUTCD when traffic volumes increase.
 - The roadway and trail improvements are anticipated to draw additional traffic to the intersection, resulting in an increase due to traffic diversion from other routes.
 - Continued development growth in the SE corner of the city would be anticipated to increase the volume of traffic using Spring Creek Road and Woodley Street.
 - The trail and sidewalk improvements and connection of the Mill Towns State Trail will increase pedestrian and bicyclist traffic along Spring Creek Road.
- A roundabout would be an appropriate traffic control option given the roadway curvature and traffic volumes. A mini-roundabout would be appropriate, but a single-lane roundabout would also be acceptable, but not necessary given the speeds and volumes.

Conclusion

The crash review reveals that there have been no crashes observed in past five years at the intersection, indicating overall acceptable conditions.

The intersection of Woodley Street and Spring Creek Road does not meet the criteria for All-Way Stop Warrants based on traffic volumes or crash history. Sight-line analysis identified sight line issues for vehicles, bicyclists, and pedestrians, almost exclusive from the north leg (southbound approach) due to vegetative obstructions at the intersection and the roadway curvature. The speed study shows that speeds near the intersection along Woodley Street is higher than the posted speed limit, increasing the crash risk and indicating that sight lines are even longer.

Overall, the findings support the following proposed safety improvements to enhance accessibility and reduce risk for all users at the intersection of Spring Creek Road and CSAH 28/Woodley Street:

- Review intersection lighting to provide adequate nighttime lighting levels.
- Improve the pedestrian crossing planned for the east side of the intersection to include high visibility crosswalk markings, crosswalk warning signs, advance stop for pedestrian signs, and advance crosswalk warning signs.
- Maintain the two-way stop control and trim or remove bushes and trees to improve sight lines.
- Implement a Rectangular Rapid Flashing Beacon (RRFB) for the pedestrian crossing if two-way stop control is maintained.
- Implement a dynamic speed feedback sign (DSFS) for the westbound direction in advance of the intersection.
- Implement all-way stop or roundabout control when warranted due to a traffic volume increase or if there is a decrease in safety that could be rectified by a change in traffic control.

Name: Woodley Street and Spring Creek Road: Traffic Safety and Warrant Analysis

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Appendix A – Turning Movement Counts

Woodley St E & Spring Creek Rd S, Northfield, MN
Tuesday, October 29, 2024

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL	
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	Vehicle Approach Total	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	Vehicle Approach Total	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	Vehicle Approach Total	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	Vehicle Approach Total		
12:00 AM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
12:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
12:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
12:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Hourly Total	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
1:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	
1:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	
1:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	
2:00 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	2	
2:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	
2:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	
3:00 AM	0	0	2	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0	0	0	5	
3:15 AM	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2	
3:30 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	2	
3:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Hourly Total	0	0	2	0	0	2	0	0	3	0	0	0	0	0	3	0	1	0	0	0	0	3	0	0	3	
4:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	
4:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	
5:00 AM	0	0	1	0	0	1	0	1	2	1	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:15 AM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	3	
5:30 AM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	1	0	0	0	0	0	1	0	0	0	6	
5:45 AM	0	0	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	3	0	0	0	5	
Hourly Total	0	0	1	1	0	2	0	1	9	1	0	11	0	0	1	0	0	0	1	0	1	4	0	0	5	
6:00 AM	0	0	0	1	0	1	0	0	5	0	0	5	0	0	0	5	0	0	0	0	0	0	0	0	9	
6:15 AM	0	0	0	1	0	1	0	1	3	0	0	4	0	0	1	3	0	0	0	0	0	0	0	0	6	
6:30 AM	0	0	0	0	5	0	0	1	12	0	0	13	0	0	0	0	0	0	0	0	1	3	0	0	22	
6:45 AM	0	0	1	3	0	4	0	2	10	0	1	12	0	0	0	2	0	0	0	0	2	1	0	0	23	
Hourly Total	0	0	1	10	0	11	0	4	30	0	1	34	0	0	4	0	0	0	4	0	4	6	1	0	60	
7:00 AM	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	14	0	1	5	1	0	7	0	0	23	
7:15 AM	0	0	2	6	0	8	0	4	20	0	0	24	0	0	1	3	0	0	4	0	3	2	0	0	41	
7:30 AM	0	0	3	6	1	9	0	11	23	0	0	34	0	0	3	2	1	0	6	0	2	7	2	0	60	
7:45 AM	0	0	0	2	0	2	0	5	27	1	0	33	0	0	8	4	2	0	14	0	1	9	1	1	60	
Hourly Total	0	0	5	14	1	19	0	20	84	1	0	105	0	0	13	14	4	0	0	31	0	8	18	3	1	29
8:00 AM	0	0	2	6	6	8	0	6	18	1	2	25	0	0	4	1	1	0	6	0	5	10	0	0	54	
8:15 AM	0	2	1	4	1	7	0	2	15	1	0	18	0	0	1	3	0	0	4	0	1	6	0	0	38	
8:30 AM	0	1	4	1	0	6	0	1	20	0	0	21	0	0	0	4	0	0	4	0	5	10	0	0	46	
8:45 AM	0	0	0	6	2	6	0	2	17	0	1	19	0	0	1	2	0	0	3	0	1	9	0	0	38	
Hourly Total	0	3	7	17	9	27	0	11	70	2	3	83	0	0	6	10	1	0	0	17	0	12	35	2	0	49
9:00 AM	0	0	0	5	0	5	0	1	9	0	0	10	0	0	1	2	1	1	4	0	2	9	0	1	11	
9:15 AM	0	1	0	3	0	4	1	0	5	1	0	7	0	0	2	1	0	0	3	0	2	5	0	1	7	
9:30 AM	0	1	1	2	0	4	0	0	8	0	0	8	0	0	5	3	1	0	9	0	3	7	0	0	10	
9:45 AM	0	0	2	3	0	5	0	0	11	0	0	11	0	0	3	1	0	0	5	0	5	9	2	0	16	
Hourly Total	0	2	3	13	0	18	1	1	33	1	0	36	0	0	11	7	3	1	21	0	12	30	2	2	44	
10:00 AM	0	2	0	5	0	7	0	1	10	0	0	11	0	0	1	3	0	0	4	0	0	8	1	0	31	
10:15 AM	0	0	1	2	0	3	0	0	13	0	0	13	0	0	0	2	0	0	2	0	3	7	0	0	28	
10:30 AM	0	0	1	2	2	3	0	1	12	0	0	13	0	0	1	2	0	0	4	0	0	2	12	0	0	35
10:45 AM	0	0	0	2	4	1	6	0	0	13	0	0	13	0	0	4	2	0	0	6	0	5	10	0	0	40
Hourly Total	0	2	4	13	4	19	0	2	48	0	0	50	0	0	6	9	1	0	16	0	10	37	2	0	49	
11:00 AM	0	0	2	3	2	5	0	0	13	0	0	13	0	0	2	1	0	0	3	0	3	16	2	0	21	
11:15 AM	0	0	1	3	0	4	0	1	11	0	0	12	0	0	2	2	0	0	4	0	0	11	3	2	14	
11:30 AM	0	0	3	3	1	6	0	0	16	0	0	16	0	0	3	0	2	0	5	0	6	16	3	0	25	
11:45 AM	0	1	0	7	0	8	0	0	12	1	0	13	0	0	1	0	0	0	1	0	6	15	1	0	22	
Hourly Total	0	1	6	16	3	23	0	1	52	1	0	54	0	0	4	4	5	0	0	13	0	15	58	9	2	82
12:00 PM	0	0	1	2	2	3	0	0	8	0	0	8	0	0	1	1	1	0	3	0	1	19	0	0	20	
12:15 PM	0	0	1	6	2	7	0	1	8	0	0	9	0	0	2	1	0									

6:45 PM	0	1	2	2	0	5	0	5	9	0	0	9	0	1	3	1	0	5	0	2	20	3	0	25	44
Hourly Total	0	1	10	17	0	28	0	5	45	0	1	50	0	4	5	6	0	15	0	10	70	7	1	87	180
7:00 PM	0	1	1	3	0	5	0	2	9	1	0	12	0	2	0	2	0	4	0	2	10	0	0	12	33
7:15 PM	0	0	1	3	0	4	0	3	9	0	0	12	0	0	0	2	0	2	0	2	10	0	0	12	30
7:30 PM	0	0	0	1	0	1	0	0	4	0	0	4	0	0	2	1	0	3	0	4	12	4	0	20	28
7:45 PM	0	0	1	3	0	4	0	0	6	0	0	6	0	0	2	1	0	3	0	3	12	1	0	16	29
Hourly Total	0	1	3	10	0	14	0	5	28	1	0	34	0	2	4	6	0	12	0	11	44	5	0	60	120
8:00 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	2	1	0	3	0	1	8	2	0	11	17
8:15 PM	0	0	1	0	0	1	0	0	4	0	0	4	0	0	0	1	0	1	0	3	8	0	0	11	17
8:30 PM	0	0	1	0	0	1	0	0	2	0	0	2	0	0	1	1	0	2	0	1	7	0	0	8	13
8:45 PM	0	0	0	1	0	1	0	0	1	0	0	1	0	0	0	1	0	1	0	2	12	0	0	14	17
Hourly Total	0	0	2	1	0	3	0	0	10	0	0	10	0	0	3	4	0	7	0	7	35	2	0	44	64
9:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	2	6	1	0	9	11
9:15 PM	0	0	0	1	0	1	0	0	4	0	0	4	0	0	0	1	0	1	0	2	8	0	0	10	16
9:30 PM	0	0	2	0	0	2	0	1	2	0	0	3	0	0	0	0	0	0	0	1	3	0	0	4	9
9:45 PM	0	0	1	1	0	2	0	0	1	0	0	1	0	1	0	0	0	1	0	0	1	1	0	2	6
Hourly Total	0	0	3	2	0	5	0	1	7	0	0	8	0	1	1	2	0	4	0	5	18	2	0	25	42
10:00 PM	0	0	0	2	0	2	0	0	1	0	0	1	0	0	1	1	0	2	0	0	2	0	0	2	7
10:15 PM	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	1	0	2	0	0	0	2	5
10:30 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	1	0	0	1	0	1	1	0	0	2	5
10:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
Hourly Total	0	0	1	2	0	3	0	0	4	0	0	4	0	0	2	2	0	4	0	1	7	0	0	8	19
11:00 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
11:15 PM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
11:30 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	2
11:45 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Hourly Total	0	0	1	0	0	1	0	0	3	0	0	3	0	0	0	0	0	0	0	1	0	0	0	0	5
DAILY TOTAL	0	20	110	224	65	354	1	88	737	17	20	843	0	106	118	79	8	303	1	197	769	82	9	1049	2549
Cars	0	20	107	222	58	349	1	85	725	16	19	827	0	104	113	78	8	295	0	195	761	80	7	1036	2507
Heavy Vehicles	0	0	3	2	7	5	0	3	12	1	1	16	0	2	5	1	0	8	1	2	8	2	2	13	42
Heavy Vehicle %	0.00%	0.00%	2.73%	0.89%	10.77%	1.41%	0.00%	3.41%	1.63%	5.88%	5.00%	1.90%	0.00%	1.89%	4.24%	1.27%	0.00%	2.64%	100.00%	1.02%	1.04%	2.44%	22.22%	1.24%	1.65%

Woodley St E & Spring Creek Rd S, Northfield, MN
Tuesday, October 29, 2024

Time	Southbound					Westbound					Northbound					Eastbound					VEHICLE TOTAL			
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	Vehicle Approach Total	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	Vehicle Approach Total	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	Vehicle Approach Total						
7:15 AM	0	0	2	6	0	8	0	4	20	0	24	0	1	3	0	0	4	0	3	2	0	5	41	
7:30 AM	0	0	3	6	1	9	0	11	23	0	34	0	3	2	1	0	6	0	2	7	2	0	60	
7:45 AM	0	0	0	2	0	2	0	5	27	1	33	0	8	4	2	0	14	0	1	9	1	1	60	
8:00 AM	0	0	2	6	6	8	0	6	18	1	25	0	4	1	1	0	6	0	5	10	0	0	54	
Peak Hour Total	0	0	7	20	7	27	0	26	88	2	2	116	0	16	10	4	0	30	0	11	28	3	1	215
PHF	0.000	0.000	0.583	0.833	0.292	0.750	0.000	0.591	0.815	0.500	0.250	0.853	0.000	0.500	0.625	0.500	0.000	0.536	0.000	0.550	0.700	0.375	0.250	0.896

Time	Southbound					Westbound					Northbound					Eastbound					VEHICLE TOTAL				
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	Vehicle Approach Total	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	Vehicle Approach Total	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	Vehicle Approach Total							
4:15 PM	0	0	4	7	0	11	0	3	10	0	0	13	0	5	3	1	1	9	0	5	26	3	34	67	
4:30 PM	0	1	1	4	2	6	0	2	11	2	0	15	0	4	1	2	0	7	0	4	26	1	0	59	
4:45 PM	0	0	5	6	0	11	0	1	13	1	0	15	0	3	4	3	1	10	0	6	16	3	0	61	
5:00 PM	0	2	2	4	2	8	0	4	21	0	0	25	0	1	3	2	0	6	0	5	18	5	0	67	
Peak Hour Total	0	3	12	21	4	36	0	10	55	3	0	68	0	13	11	8	2	32	0	20	86	12	1	118	254
PHF	0.000	0.375	0.600	0.750	0.500	0.818	0.000	0.625	0.655	0.375	0.000	0.680	0.000	0.650	0.688	0.667	0.500	0.800	0.000	0.833	0.827	0.600	0.250	0.868	0.948

   	Total Vehicles On Leg 686									
	Vehicles Entering Intersection	354	Vehicles Exiting Intersection	332						
	Southbound									
	Cars	107	20	0						
	Heavy	2	0	0						
Total			224	110	20	0	55			
Daily Volumes										
   	Cars 16									
	Heavy 1									
	Total 17									
	Vehicles Entering Intersection 737									
	Vehicles Exiting Intersection 88									
Northbound										
   	Cars 725									

Name: Woodley Street and Spring Creek Road: Traffic Safety and Warrant Analysis

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Appendix B – Sight Line Analysis





Name: Woodley Street and Spring Creek Road: Traffic Safety and Warrant Analysis

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Appendix C – Warrant Analysis

Traffic Signal Warrant Analysis

Woodley Street and Spring Creek Road **Multi-Way Stop Warrants**

Project Name	Spring Creek Road Reconstruction
Project/File #	24X134891000
Scenario	Existing Condition

Intersection Information			
Major Street (E/W Road)	Woodley Street E	Minor Street (N/S Road)	Spring Creek Rd S
Analyzed with	1 approach lane	Analyzed with	1 Approach Lane
Total Approach Volume	1891 vehicles	Total Approach Volume	657 vehicles
Total Ped/Bike Volume	29 crossings	Total Ped/Bike Volume	73 crossings
Right turn reduction of	0 percent applied	Right turn reduction of	0 percent applied

No high speed or isolated community reduction applied to the Multi-Way Stop Warrant thresholds.

Condition A - Traffic Signal Warrant	
Condition Satisfied?	Not Satisfied
Criteria*	Traffic Signal Warranted & Justified

* Multi-way stop control may be used as an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal.

Condition B - Crash Experience	
Condition Satisfied?	Not satisfied
Required values reached for	less than 4 correctable crashes
Criteria - Crash Experience	5 or more correctable crashes in 12-month period

Condition C - Intersection Volume & Delay	
Condition Satisfied?	Not Satisfied
Required values reached for	0 hours & 45 sec. average delay/veh
Criteria - Major Street (veh/hr)	300 for any 8 hours of an average day
Criteria - Minor Street (total vol-veh, ped, & bikes/hr)	200 for the same 8 hours of an average day
Criteria - Delay (average sec/veh)	30 during the highest hour

Condition D - Combination Volume, Crash Experience, & Delay	
Condition Satisfied?	Not Satisfied
Required values reached for	0 hours, less than 4 crashes, & 45 sec. average delay/veh
Criteria - Major Street (veh/hr)	240 for any 8 hours of an average day
Criteria - Minor Street (total vol-veh, ped, & bikes/hr)	160 for the same 8 hours of an average day
Criteria - Crash Experience	4 or more correctable crashes in 12-month period
Criteria - Delay (average sec/veh)	24 during the highest hour