TRAFFIC IMPACT STUDY

SPRING LAKE RIDGE DEVELOPMENT

October 23, 2019

Prepared for:
City of Prior Lake
17073 Adelmann Street SE
Prior Lake, MN 55372

WSB PROJECT NO. 14828-000

TRAFFIC IMPACT STUDY

SPRING LAKE RIDGE DEVELOPMENT

FOR THE
CITY OF PRIOR LAKE, MINNESOTA

October 23, 2019

Prepared By:

CERTIFICATION

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly licensed professional engineer under the laws of the State of Minnesota.

Charles T. Rickart, PE

Date: October 23, 2019 Lic. No. 26082

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INTRODUCTION / BACKGROUND

The purpose of the study is to document the impact the proposed Spring Lake Ridge development will have on the existing and future roadway network. The proposed development is located east of CSAH 17 adjacent to Spring Lake, in the City of Prior Lake. The site location is shown on ***Figure 1*** in the appendix.

The development is planned to include approximately 101 residential lots. The project is anticipated to be the initial phase in the development of the property located between CSAH 12 (170th Street) and TH 13 adjacent to CSAH 17. Access to the site will be from the existing Sunset Avenue to CSAH 12 (170th Street). The proposed site plan is shown on ***Figure 2*** in the appendix.

In 2009, Scott County prepared a Corridor Study for County Road 17 that documented the short-term and long-term vision for the corridor including the local supporting roadway network. In the area of the proposed Spring Lake Ridge development, CSAH 17 is anticipated to be upgraded in the future to a four-lane rural cross section in a 200-foot right-of-way. Base on the Scott County Transportation Plan, CSAH 17 is planned to be transferred from the County to the State and would be re-designated as a Principal Arterial. In addition, the Study identified a proposed north/south Collector roadway between CSAH 12 (170th Street) and TH 13 as part of the CSAH 17 supporting roadway network.

The traffic impacts of the proposed site development were evaluated for the existing (2019), future 2021 and future 2040 conditions. The analysis was prepared to document the existing and future transportation and access needs for the roadways adjacent to the Spring Lake Ridge development. Preliminary alternative alignments will be evaluated to determine what would provide the City and development the most efficient and beneficial roadway system for the area. The evaluation included:

- Documenting the traffic needs based on the area traffic generation
- Determining possible impacts to existing and future area properties
- Insuring that the proposed roadway network fits into the City's transportation vision for the area
- The need/benefit of a 36 foot wide roadway cross section for a Collector roadway as outlined in the City's Transportation Plan.

The following sections of this report document the traffic analysis and anticipated impacts of the proposed site development has on the adjacent roadway system.

EXISTING CONDITIONS

A. Roadway Characteristics

The existing lane configurations and traffic control, of the adjacent roadways and intersections, used to determine the impacts of the proposed site redevelopment include:

CSAH 12 (170th Street) is a Scott County east/west Major Collector roadway running from TH 13 on the east side to west of CSAH 15 in the City of Shakopee. The roadway has a two-lane (one lane in each direction) cross section with paved shoulders and turn lanes at primary intersections. Access on CSAH 12 (170th Street) in the area of the proposed site is from local streets and direct residential driveways. The speed limit in the vicinity of the site was recently reviewed by Scott County and MnDOT. The current posted speed limit in the vicinity of the site is 35 mph, however the speed is being recommended to be raised to 40 mph. The current Average Daily Traffic on CSAH 12 (170th Street) is 2,120 vehicles per day(vpd) east of CSAH 17.

Sunset Avenue is a north/south City of Prior Lake street running from CSAH 12 (170th Street) south approximately 2000 feet. Approximately 30 feet south of CSAH 12 (170th Street) is the intersection of Shoreline Boulevard. The roadway has a two-lane cross section (one lane in each direction. Direct driveway access from the residential properties is provided from this street. The speed limit posted on Sunset Avenue is 30 mph. The current Average Daily Traffic 260vpd.

The intersection of CSAH 12 (170th Street) at Sunset Avenue is currently un-signalized with stop control. The following is a summary of the existing conditions at the intersection:

<u>CSAH 12 (170th Street) at Sunset Avenue:</u>

- Side Street Stop Control
- 40 MPH on CSAH 12 (170th Street)
- 30 MPH on Sunset Avenue
- Lane Configuration:
  - SB Business Driveway – one right/through/left
  - NB Sunset Avenue – one right/through/left
  - EB CSAH 12 (170th St) – one right, one through, one left
  - WB CSAH 12 (170th St) – one right/through, one left

B. Traffic Counts

Weekday peak hour turning movement counts and daily approach counts were conducted during the week of September 23, 2019. It is understood that CSAH 12 (170th Street) was being used as a detour route for area construction at the time of the count, however, it is assumed that the turning volumes into and out of Sunset Avenue were not affected.

The CSAH 12 (170th Street) counts were adjusted using the 2018 ADT counts. Based on historical data between 2010 and 2018 traffic has increased on average by 6% / year. The 2018 counts (2000 ADT) was increased by 6% to determine the 2019 projected traffic conditions (2120 ADT). The projected traffic volume was compared to the counted volume (2700 ADT). Based on this comparison, the peak hour through traffic volumes on CSAH 12 (170th Street) were reduced by 21%. These adjusted counts were used as the existing baseline conditions for the area. ***Figure 3*** shows the adjusted existing 2019 ADT, AM peak hour and PM peak hour traffic volumes.

C. Crash History

Existing crash data was reviewed using the Minnesota Crash Mapping Analysis Tool (MnCMAT) developed by MnDOT. The database includes crashes reported to MnDOT by local law enforcement agencies. Based on the review of the available data, no report crashes have occurred in the past 10 years at the intersection of CSAH 12 (170th Street) and Sunset Avenue. It should be noted that the MnCMAT database does not include crashes that resulted in damages under $1000 in the results.

TRAFFIC PROJECTIONS

In order to analyze any anticipated lane configuration and/or traffic control needs, projected traffic volumes were determined for the area. Traffic forecasts were prepared for the future year 2021 at which time the site, if approved could be fully developed and occupied and; for the 2040 conditions which represents the City Comprehensive Plan and 20-year design time frame.

The forecasted no-build and build conditions were determined to evaluate the change in traffic conditions associated with the proposed site and future area development. The following sections outline the traffic generation, as well as the traffic distribution and anticipated projected traffic volumes.

A. Background (Non-Development) Traffic Growth

Traffic growth in the vicinity of a proposed site will occur between existing conditions and any given future year due to other development within the region. This background growth must be accounted for and included in future year traffic forecasts. To determine the background growth in traffic the existing traffic volumes were compared to the 2040 projected traffic volumes from the Met Council Regional Model and the City's 2040 Transportation Plan Update. Based on this comparison a factor of 3.1% per year was used to project traffic from the 2019 adjusted counts to the 2021 and 2040 analysis years for traffic on CSAH 12 (170th Street).

B. Development Site Trip Generation

The trip generation used to estimate the existing and proposed site traffic and the future area development traffic is based on rates for other similar land uses as documented in the Institute of Transportation Engineers *Trip Generation Manual, 10th* Edition.

The proposed Spring Lake Ridge development is planned to include 101 low density residential units. For the analysis it is assumed that the development would be fully completed by 2021 as a worst-case condition.

The future area development traffic was determined based on the City's 2040 Comprehensive Plan Land Use for the area east of CSAH 17 and south of the proposed Spring Lake Ridge Development. The 2040 Future Land Use Plan shows that this area will include both Urban Low Density and Urban Medium Density residential uses that would use the future north/south minor collector roadway to CSAH 12 (170th Street). Based on information provided by City staff it was assumed that the low-density residential use would have a density of 2.7 units/acre and the medium density residential use would have a density of 6.0 units/acre.

The table below shows the estimated Daily, AM peak hour and PM peak hour trip generated for each specific use.

Table 1 - Estimated Existing Site Trip Generation

Use	Size (Units)	ADT			AM Peak			PM Peak		
		Total	In	Out	Total	In	Out	Total	In	Out
Low Density Residential (Proposed Site)	101	954	477	477	75	19	56	100	63	37
Low Density Residential (Future Development)	64	604	302	302	47	12	35	63	40	23
Medium Density Residential (Future Development)	90	658	329	329	41	11	30	50	31	19
Existing Total Trips		2,216	1,108	1,108	163	42	121	213	134	79

Source: Institute of Transportation Engineers Trip Generation Manual, 10th Edition

C. Traffic Distribution

Site-generated trips were distributed to the adjacent roadway system based on: the anticipated origins and destinations for specific land use (i.e. location of commercial uses in relationship to residential); existing travel patterns, and; the current Met Council Transportation Plan model.

The generated trips for the proposed Spring Lake Ridge development and future area development were assumed to arrive or exit the site using the existing Sunset Avenue to CSAH 12 (170th Street). Based on these parameters the following general traffic distribution was used to distribute the projected traffic volumes from the anticipated uses:

- 60% to/from the east on CSAH 12 (170th Street) during the AM peak hour
- 40% to/from the west on CSAH 12 (170th Street) during the AM peak hour
- 25% to/from the east on CSAH 12 (170th Street) during the PM peak hour
- 75% to/from the west on CSAH 12 (170th Street) during the PM peak hour

D. Projected Traffic Volumes

The traffic forecasts were prepared by adding the projected annual background traffic growth on CSAH 12 (170th Street) to the existing 2019 adjusted traffic counts to determine the “No-Build” traffic conditions. The anticipated Spring Lake Ridge site and future area development traffic was then added to the no-build to determine the “Build” traffic conditions. ***Figures 4 - 7*** shows the projected 2021 and 2040 No-Build and Build ADT, AM peak hour and PM peak hour traffic volumes.

TRAFFIC IMPACT ANALYSIS

Existing and/or forecasted traffic operations were evaluated for the intersection of CSAH 12 (170th Street) and Sunset Avenue. This section describes the methodology used to assess the operations and provides a summary of traffic operations for each analysis year.

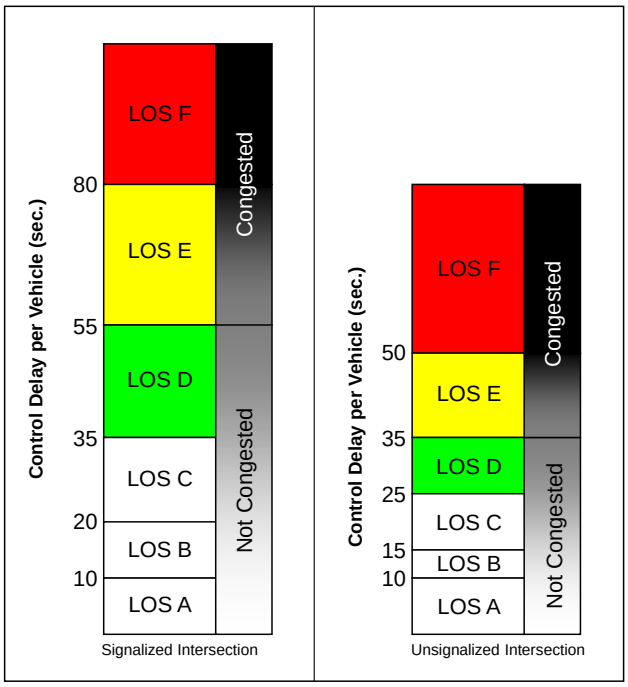
A. Methodology

The traffic operations analysis is derived from established methodologies documented in the *Highway Capacity Manual 2000* (HCM). The HCM provides a series of analysis techniques that are used to evaluate traffic operations.

Intersections are given a Level of Service (LOS) grade from "A" to "F" to describe the average amount of control delay per vehicle as defined in the HCM. The LOS is primarily a function of peak traffic hour turning movement volumes, intersection lane configuration, and the traffic controls at the intersection. LOS A is the best traffic operating condition, and drivers experience minimal delay at an intersection operating at that level. LOS E represents the condition where the intersection is at capacity, and some drivers may have to wait through more than one green phase to make it through an intersection controlled by traffic signals. LOS F represents a condition where there is more traffic than can be handled by the intersection, and many vehicle operators may have to wait through more than one green phase to make it through the intersection. At a stop sign-controlled intersection, LOS F would be characterized by exceptionally long vehicle queues on each approach at an all-way stop, or long queues and/or great difficulty in finding an acceptable gap for drivers on the minor legs at a through-street intersection.

The LOS ranges for both signalized and un-signalized intersections are shown in ***Figure 8***. The threshold LOS values for un-signalized intersections are slightly less than for signalized intersections. This variance was instituted because drivers' expectations at intersections differ with the type of traffic control. A given LOS can be altered by increasing (or decreasing) the number of lanes, changing traffic control arrangements, adjusting the timing at signalized intersections, or other lesser geometric improvements. LOS also changes as traffic volumes increase or decrease.

Figure 8 - Level of Service Ranges for Signalized and Un-signalized Intersections



SOURCE: Level of Service thresholds from the Highway Capacity Manual, 2000.

LOS, as described above, can also be determined for the individual legs (sometimes referred to as "approaches") or lanes (turn lanes in particular) of an intersection. It should be noted that a LOS E or F might be acceptable or justified in those cases where a leg(s) or lane(s) has a very low traffic volume as compared to the volume on the other legs. For example, improving LOS on such low-volume legs by converting a two-way stop condition to an all-way stop, or adjusting timing at a signalized intersection, could result in a significant penalty for the many drivers on the major road while benefiting the few on the minor road. Also, geometric improvements on minor legs, such as additional lanes or longer turn lanes, could have limited positive effects and might be prohibitive in terms of benefit to cost.

Although LOS A represents the best possible level of traffic flow, the cost to construct roadways and intersection to such a high standard often exceeds the benefit to the user. Funding availability might also lead to acceptance of intersection or roadway designs with a lower LOS. **LOS D is generally accepted as the lowest acceptable level in urban areas.** LOS C is often considered to be the desirable minimum level for rural areas. LOS D or E may be acceptable for limited durations or distances, or for very low-volume legs of some intersections.

The LOS analysis was performed using Synchro/SimTraffic:

- Synchro, a software package that implements Highway Capacity Manual (HCM) methodologies, was used to build each signalized intersection and provide an input database for turning-movement volumes, lane geometrics, and signal design and timing characteristics. In addition, Synchro was used to optimize signal timing parameters for future conditions. Output from Synchro is transferred to SimTraffic, the traffic simulation model.
- SimTraffic is a micro-simulation computer modeling software that simulates each individual vehicle's characteristics and driver behavior in response to traffic volumes, intersection configuration, and signal operations. The model simulates drivers' behaviors and responses to surrounding traffic flow as well as different vehicle types and speeds. It outputs estimated vehicle delay and queue lengths at each intersection being analyzed.

B. Existing Level of Service Summary

Table 2, below, summarizes the existing movement, approach and overall level of service and delay based on the current lane geometry, traffic control and 2019 traffic volumes. The table shows that the intersection is operating at an overall LOS A during both the weekday AM and PM peak hours with all movements operating at LOS A.

Table 2 – Existing (2019) Level of Service

Intersection	Appr	AM Peak Hour					PM Peak Hour				
		Movement			Appr	Overall	Movement			Appr	Overall
		L	T	R			L	T	R		
CSAH 12 (170th St) at Sunset Ave	**NB**	4 (A)	0 (A)	2 (A)	3 (A)	0 (A)	3 (A)	0 (A)	2 (A)	3 (A)	1 (A)
	WB	2 (A)	0 (A)	0 (A)	0 (A)		2 (A)	0 (A)	0 (A)	0 (A)	
	SB	0 (A)	0 (A)	0 (A)	0 (A)		6 (A)	0 (A)	2 (A)	3 (A)	
	EB	0 (A)	0 (A)	0 (A)	0 (A)		2 (A)	1 (A)	0 (A)	1 (A)	

XX – Delay in seconds per vehicle, (X) – Level of Service Source: WSB

C. Forecasted Traffic Operations

A capacity and LOS analysis was completed for the intersection for 2021 which is the year after the proposed site development could be completed and; for the 2040 conditions which represents a 20-year design time frame. The results of the analysis are discussed below and shown in ***Tables 3 - 6***.

Table 3 and ***Table 4 – Forecasted No Build***, shows that with no site development and existing roadway geometrics and traffic control the intersection will continue to operate at overall LOS A with all movements at LOS A in both the AM and PM peak hours in 2021 and 2040.

Table 3 – Forecasted 2021 No-Build Level of Service

Intersection	Appr	AM Peak Hour					PM Peak Hour				
		Movement			Appr	Overall	Movement			Appr	Overall
		L	T	R			L	T	R		
CSAH 12 (170th St) at Sunset Ave	NB	5 (A)	0 (A)	2 (A)	3 (A)	0 (A)	3 (A)	0 (A)	2 (A)	3 (A)	1 (A)
	WB	1 (A)	0 (A)	0 (A)	0 (A)		1 (A)	0 (A)	0 (A)	0 (A)	
	SB	0 (A)	0 (A)	0 (A)	0 (A)		5 (A)	0 (A)	2 (A)	3 (A)	
	EB	0 (A)	0 (A)	0 (A)	0 (A)		2 (A)	1 (A)	1 (A)	1 (A)	

XX – Delay in seconds per vehicle, (X) – Level of Service Source: WSB

Table 4 – Forecasted 2040 No-Build Level of Service

Intersection	Appr	AM Peak Hour					PM Peak Hour				
		Movement			Appr	Overall	Movement			Appr	Overall
		L	T	R			L	T	R		
CSAH 12 (170th St) at Sunset Ave	NB	6 (A)	0 (A)	2 (A)	4 (A)	0 (A)	3 (A)	0 (A)	2 (A)	3 (A)	1 (A)
	WB	2 (A)	0 (A)	0 (A)	0 (A)		2 (A)	0 (A)	0 (A)	0 (A)	
	SB	0 (A)	0 (A)	0 (A)	0 (A)		3 (A)	0 (A)	2 (A)	2 (A)	
	EB	0 (A)	1 (A)	1 (A)	1 (A)		2 (A)	1 (A)	0 (A)	1 (A)	

XX – Delay in seconds per vehicle, (X) – Level of Service Source: WSB

Table 5 and Table 6 – Forecasted Build, shows that similar to the no-build conditions, assuming the proposed development with the exiting lane configuration and traffic control the intersection will continue to operate at overall LOS A with all movements at LOS A in both the AM and PM peak hours in 2021 and 2040.

However, the analysis results show that: in 2021 the northbound maximum queue would back up past the Shoreline Boulevard intersection by approximately one vehicle in both the AM and PM peak hours; in 2040 the northbound average queue in the AM peak hour would back past Shoreline Boulevard by approximately one vehicle, and; in 2040 the northbound maximum queue would back up past the Shoreline Boulevard intersection by approximately two vehicles in both the AM and PM peak hours. The maximum queue represents the peak queue that could be anticipated (5% of the time) and the average queue represents the queue that could occur on average over the peak period (50% of the time).

Table 5 – Forecasted 2021 Build Level of Service

Intersection	Appr	AM Peak Hour					PM Peak Hour				
		Movement			Appr	Overall	Movement			Appr	Overall
		L	T	R			L	T	R		
CSAH 12 (170th St) at Sunset Ave	NB	6 (A)	0 (A)	3 (A)	4 (A)	1 (A)	5 (A)	0 (A)	3 (A)	5 (A)	1 (A)
	WB	2 (A)	0 (A)	0 (A)	0 (A)		2 (A)	0 (A)	0 (A)	0 (A)	
	SB	0 (A)	0 (A)	0 (A)	0 (A)		4 (A)	0 (A)	3 (A)	3 (A)	
	EB	0 (A)	1 (A)	0 (A)	1 (A)		2 (A)	1 (A)	1 (A)	1 (A)	

XX – Delay in seconds per vehicle, (X) – Level of Service Source: WSB

Table 6 – Forecasted 2040 Build Level of Service

Intersection	Appr	AM Peak Hour					PM Peak Hour				
		Movement			Appr	Overall	Movement			Appr	Overall
		L	T	R			L	T	R		
CSAH 12 (170th St) at Sunset Ave	NB	7 (A)	0 (A)	4 (A)	5 (A)	2 (A)	7 (A)	0 (A)	3 (A)	6 (A)	2 (A)
	WB	2 (A)	0 (A)	0 (A)	0 (A)		3 (A)	0 (A)	0 (A)	1 (A)	
	SB	0 (A)	0 (A)	0 (A)	0 (A)		0 (A)	0 (A)	2 (A)	1 (A)	
	EB	0 (A)	1 (A)	1 (A)	1 (A)		3 (A)	2 (A)	2 (A)	2 (A)	

XX – Delay in seconds per vehicle, (X) – Level of Service Source: WSB

ROADWAY CONFIGURATION / SITE PLAN REVIEW

The proposed development site plan, shown in ***Figure 2***, was reviewed for the appropriate roadway configuration, function (i.e. local or collector) and traffic control through the Spring Lake Ridge development now and in the future. The following sections discuss the existing conditions, roadway configuration and traffic control alternatives.

A. Existing Conditions

The existing Sunset Avenue was constructed in 2013. The street consists of a two-lane cross section with a 32-foot width from the intersection of CSAH 12 (170th Street) for approximately 800 feet, and; 28 feet in width for the remaining 1200 feet. The existing roadway is constructed in a 50 foot right of way.

The street provides access to 25 existing residential lots. The average daily traffic counted in September 2019 was 260 vehicles per day(vpd). Based on the Cities *Draft Transportation Plan Table 4, Planning-Level Roadway Capacities by Facility Type*, a two-lane urban street similar to Sunset Avenue, would have a capacity ranging from 2,000vpd to 10,000vpd. With the existing volume the street is operating at a Level of Service A.

B. Proposed Roadway Configuration

The proposed development site plan includes a new north/south roadway street connecting to the existing Sunset Avenue approximately 650 south of CSAH 12 (170th Street). The proposed street concept shows an urban two-lane cross section with a 36-foot width and parking on one side in a 66 foot right of way. The proposed roadway configuration from the south property line to the point it connects to the existing Sunset Avenue is consistent with the Cities *Draft Transportation Plan Table 8, Prior Lake Right-of-Way Guidelines.* The existing Sunset Avenue from CSAH 12 (170th Street) to where the new street begins does not meet the right of way or street width guidelines.

The proposed street is anticipated to provide access to the proposed Spring Lake Ridge development and future area development south to the south. Approximately 16 lots on the existing Sunset Avenue will not be impacted by the proposed new Collector street. Based on the traffic analysis the projected traffic volume on the new roadway is anticipated to be 1,200vpd in 2021 with just the proposed site development and 2,400vpd in 2040 with the proposed site development and future area development. The 2040 traffic projections assume that the new street would have a connection to TH 13 to the south. Based on the projected traffic volumes the roadway would be functioning at a level more than a local City street which has typical volumes of 1000vpd or less.

Based on the Cities *Draft Transportation Plan Table 4, Planning-Level Roadway Capacities by Facility Type*, a two-lane urban street would have a capacity ranging from 2,000vpd to 10,000vpd. The proposed new Collector street would be operating at a Level of Service A in 2021 and Level of Service B in 2040.

C. Traffic Control Options

As part of the proposed Spring Lake Ridge development, traffic control options can be considered at two intersections; CSAH 12 (170th Street) at Sunset Avenue and Sunset Avenue at the New Collector Street. The traffic control options that could be considered include: all-way stop; traffic signal, or; roundabout. Each is discussed below:

<u>All-Way Stop Control</u>
Part 2B of the Minnesota Manual on Uniform Traffic Control Devices (MnMUTCD) contains information pertaining to the all-way stop control with criteria relating to vehicular volumes and crash history that define the minimum conditions under which installing an all-way stop could be justified. For both these intersections all-way traffic volumes warrants would not be met.

Traffic Signal Control

Part 4 of the MnMUTCD contains information pertaining to highway traffic signals, including a series of traffic-signal warrants that define the minimum conditions under which installing a traffic signal could be justified. These traffic signal warrants are considered national guidelines to promote continuity of traffic control devices and to maximize the benefit of traffic signals by selecting the appropriate intersections. Based on review of the traffic volumes both intersections do not meet traffic signal warrants.

Roundabouts

Roundabouts are becoming more popular based on the multiple opportunities to improve safety and operational efficiency and provide other benefits. Roundabouts are not always feasible and do not always provide the optimal solution for every problem. The benefits of roundabout intersections, and some constraining factors include:

Traffic Safety – Numerous studies have shown significant safety improvements at intersections converted from conventional forms to roundabouts. The physical shape of roundabouts eliminates crossing conflicts that are present at conventional intersections, thus reducing the total number of potential conflict points and the most severe of those conflict points. The most comprehensive and recent study showed overall reductions of 35 percent in total crashes and 76 percent in injury crashes [4]. Severe, incapacitating injuries and fatalities are rare, with one study reporting 89-percent reduction in these types of crashes [5] and another reporting 100-percent reduction in fatalities [6].

Operational Performance – When operating within their capacity, roundabouts typically have lower overall delay than signalized and all-way stop-controlled intersections. The delay reduction is often most significant during non-peak traffic periods. These performance benefits can often result in reduced lane requirements between intersections. When used at the terminals of freeway interchanges, roundabouts can often reduce lane requirements for bridges over or under the freeway, thus substantially reducing construction costs. However, as yield-controlled intersections, roundabouts do not provide priority to specific users such as trains, transit, or emergency vehicles.

Environmental Factors – Roundabouts often provide environmental benefits by reducing vehicle delay and the number and duration of stops compared with signalized or all-way stop-controlled alternatives. Even when there are heavy volumes, vehicles continue to advance slowly in moving queues rather than coming to a complete stop. This can reduce noise and air quality impacts and fuel consumption significantly by reducing the number of acceleration/deceleration cycles and the time spent idling.

Access Management – Because roundabouts can facilitate U-turns, they can be a key element of a comprehensive access management strategy to reduce or eliminate left-turn movements at driveways between major intersections.

Traffic Calming – Roundabouts can have traffic calming effects on streets by reducing vehicle speeds using geometric design rather than relying solely on traffic control devices.

Pedestrian Safety – Due to the reduction of vehicle speeds in and around the intersection, roundabouts can improve pedestrian crossing opportunities. Additionally, the splitter island refuge area provides the ability for pedestrians to focus on one traffic stream at a time while crossing. However, pedestrians with visual impairments may not receive the same level of information at a roundabout as at a typical signalized intersection, and they may require additional treatments, such as pedestrian signalization. Specific design treatments for enhancing accessibility for visually impaired pedestrians are receiving continued study [7].

Aesthetics – The central island and splitter islands offer the opportunity to provide attractive entries or centerpieces to communities through use of landscaping, monuments, and art, provided that they are appropriate for the speed environment in which the roundabout is located.

Land Use – Roundabouts can provide a transition area between high-speed rural and low-speed urban environments. They can also be used to demarcate commercial areas from residential areas.

Ongoing Operations and Maintenance – A roundabout typically has lower operating and maintenance costs than a traffic signal due to the lack of technical hardware, signal timing equipment, and electricity needs. Roundabouts also provide substantial cost savings to society due to the reduction in crashes, particularly fatal and injury crashes, over their service life. As a result, the overall life cycle costs of a roundabout can be significantly less than that of a signalized intersection.

Approach Roadway Width – A roundabout may reduce the amount of widening needed on the approach roadways in comparison to alternative intersection forms. While signalized or stop-controlled intersections can require adding lengthy left-turn and/or right-turn lanes, a roundabout may enable maintaining a narrower cross section in advance of the intersection. However, roundabouts usually require more space for the circulatory roadway, central island, and sidewalks than the typically rectangular space inside traditional intersections. Therefore, roundabouts often have greater right-of-way needs at the intersection quadrants compared with other intersection forms.

Two types of roundabouts can be considered. A standard roundabout has a typical diameter of 120 feet to 160 feet while a mini-roundabout has a diameter of 75 feet to 100 feet. The primary differences between a standard roundabout and mini-roundabout are:

1. A standard roundabout can accommodate large (semi-trucks) better than a mini-roundabout. While mini-roundabouts are designed to accommodate trucks, when a semi-truck travels through the mini-roundabout it will take up the entire roadway.

2. The visibility approaching a mini-roundabout is not as clear as a standard roundabout. A standard roundabout will have vegetation or some type of visual que, a mini-roundabout's center island is all pavement in order to provide for the large truck turning movements. This issue can be reduced with the design of the approaches to the intersection.

Although neither intersection would justify a roundabout now or with the anticipated traffic in 2040, roundabouts may be considered in the future if traffic conditions and/or safety warrants a traffic control change keeping in mind the advantages and disadvantages discussed above. The intersection of CSAH 12 (170th Street) at Sunset Avenue would require coordination with Scott County.

CONCLUSIONS / RECOMMENDATIONS

Based on the analysis documented in this memorandum, WSB has concluded the following:

- The proposed Spring Lake Ridge development is planned to include 101 low density residential units. For the analysis it is assumed that the development would be fully completed by 2021. The future area development west of CSAH 17 and south of the proposed Spring Lake Ridge Development is planned to include 64 low-density residential units and 90 medium-density residential units that would use future north/south collector to CSAH 12 (170th Street).

- The proposed Spring Lake Ridge development and future area development is anticipated to generate 2,216 ADT, 163 AM peak hour and 213 PM peak hour trips. It was assumed that the Spring Lake Ridge development is anticipated to be fully completed by 2021 as a worst-case condition and the full development of the area by 2040.

- Existing traffic operations analysis shows that based on the current lane geometry, traffic control and 2019 traffic volumes the intersection is operating at an overall LOS A during both the weekday AM and PM peak hours with all movements operating at LOS A.

- Intersection traffic operations for the future no-build condition shows that with no site development and existing roadway geometrics and traffic control the intersection will continue to operate at overall LOS A with all movements at LOS A in both the AM and PM peak hours in 2021 and 2040.

- Intersection traffic operations for the future build condition shows that similar to the no-build conditions, assuming the proposed development with the exiting lane configuration and traffic control the intersection will continue to operate at overall LOS A with all movements at LOS A in both the AM and PM peak hours in 2021 and 2040.

- Based on the vehicle queuing analysis during the build condition in 2021 the northbound maximum queue would back up past the Shoreline Boulevard intersection by approximately one vehicle in both the AM and PM peak hours; in 2040 the northbound average queue in the AM peak hour would back past Shoreline Boulevard by approximately one vehicle, and; in 2040 the northbound maximum queue would back up past the Shoreline Boulevard intersection by approximately two vehicles in both the AM and PM peak hours.

- The proposed Collector street concept plan and site plan were reviewed with the following conclusions:

    - The existing Sunset Avenue is designed and is operating consistent with the Cities *Draft Transportation Plan* as a local street.

    - Based on the projected traffic volumes of 1,200vpd in 2021 and 2,400vpd by 2040 the roadway would be functioning at a level more than a local City street which has typical volumes of 1000vpd or less.

    - The proposed new Collector street configuration from the south property line to the point it connects to the existing Sunset Avenue is consistent with the Cities *Draft Transportation Plan.* The existing Sunset Avenue from CSAH 12 (170th Street) to where the new street begins does not meet the right of way or street width guidelines. The proposed new Collector street would be operating at a Level of Service A in 2021 and Level of Service B in 2040.

- Traffic control options can be considered at two intersections; CSAH 12 (170th Street) at Sunset Avenue and Sunset Avenue at the New Collector Street. The traffic control options that could be considered include: all-way stop; traffic signal, or; roundabout.
    - For both intersections all-way traffic volumes warrants would not be met.
    - Based on review of the traffic volumes both intersections do not meet traffic signal warrants.
    - Both intersections could be considered for roundabouts in the future if traffic conditions and/or safety warrants a traffic control change. The intersection of CSAH 12 (170th Street) at Sunset Avenue would require coordination with Scott County.

Based on these conclusions, the traffic analysis and review of the proposed Collector street concept and site plan the following is recommended:

1. Construct the proposed Collector street as shown on the Site plan to a 36-foot cross section with parking on one side in a 66-foot right-of-way (***Figure 2***).

2. Widen the existing Sunset Avenue from CSAH 12 (170th Street) to where the new street begins from 32 feet to 36 feet, allowing parking on one side.

3. Provide an additional 16 feet of right of way on the existing Sunset Avenue from CSAH 12 (170th Street) to where the new street begins.

4. As traffic continues to increase on the new Collector street and Sunset Avenue review the operation and safety at the intersections of Sunset Avenue at the Collector street and CSAH 12 (170th Street) at Sunset Avenue for future traffic control changes. Specifically, if traffic congestion, crashes or speed of traffic become issues roundabouts may be considered.

5. As development continues south of the Spring Lake Ridge development to TH 13 update the traffic analysis to ensure that the operation and safety of the Collector street is maintained.

APPENDIX

Spring Lake Ridge Development
Traffic Impact Study
Prior Lake, Minnesota

Figure 1

Project Location

Date: Printed: 10/9/2019
WSB Filename: K:\014828-000\Cad\Exhibits\014828-000 Figure 1 Project Location.dgn

GROSS AREA = 2,833,703 SF (65.05 AC)

NET AREA = GROSS AREA – WETLAND–FLOODPLAIN– COUNTY ROAD ROW
2,833,703 SF –651,277 (WET/FLOOD) –42,544 ROW = 2,139,882 SF
(49.12 ACRES)

PUBLIC OPEN SPACE AREA = 1,314,828 SF (30.20 AC)

CREDIT FOR ADDITIONAL 25' COUNTY ROAD ROW
42,544 SF (0.98 AC)

CREDIT 2538 LF of EXTRA 11' MINOR COLLECTOR ROW
27,918 SF (0.64 AC)

ADDITIONAL OPEN SPACE = 31,331 SF (0.719 AC)

TOTAL OPEN SPACE 1,414,795 SF (32.48 ACRES) = 50.00%

32.52 ACRES REQUIRED

41 – 86' WIDE, 86'X140' – 12,000 SF LOTS
8 – VARIABLE SUNSET LOTS, 8,100 SF LOTS
42 – 65' WIDE, 65'X120' LOTS – 7,800 SF LOTS
13 – 75' WIDE STREET C, 75'X130' – 9,750 SF LOTS
17 – 75' WIDE COLLECTOR STREET, 75'X120' – 9,000 SF LOTS

101 PROPOSED HOMES

SITE DATA:

EXISTING ZONING: R–1
EXISTING GUIDE PLAN: R–LD URBAN LOW DENSITY 0–4 UNITS/ACRE
PROPOSED ZONING: PUD
PROPOSED GUIDE PLAN: R–LD URBAN LOW DENSITY 0–4 UNITS/ACRE

SHORELAND OVERLAY DATA:
SPRING LAKE IS A GENERAL DEV. LAKE
1893 LF OF SHORELINE
1 BOAT SLIP PER 18.75' OF SHORELINE
(1893/18.75) =100.96 SLIPS ALLOWED

GENERAL DEVELOPMENT LAKE REQUIREMENTS:
LOT AREA: 12,000 SF
LOT WIDTH: 86' AT FRONT SETBACK AND LAKE FRONTAGE
STRUCTURE SETBACK FROM OHW: 100'

WETLAND BUFFER REQUIREMENTS
(NO LOT IN BUFFER)
25' AVERAGE
20' MINIMUM

0 75 150 300
GRAPHIC SCALE IN FEET

PIONEER engineering
CIVIL ENGINEERS LAND PLANNERS LAND SURVEYORS LANDSCAPE ARCHITECTS
2422 Enterprise Drive
Mendota Heights, MN 55120
(651) 681-1914
Fax: 681-9488
www.pioneereng.com

Revisions

Date 2-27-19
Designed NAF
Drawn NJK

SITE PLAN - Minor Collector 4

WINKLER DEVELOPEMNT
10519 165th Street West
LAKEVILLE, MINNESOTA 55044

SPRING LAKE RIDGE
PRIOR LAKE, MINNESOTA

1 OF 1

119034

Date: Printed: 10/9/2019
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Spring Lake Ridge Development
Traffic Impact Study
Prior Lake, Minnesota

Figure 2

Site Plan

CITY OF PRIOR LAKE MINNESOTA

Spring Lake Ridge Development
Traffic Impact Study
Prior Lake, MN

Figure 3. 2019 Existing Traffic Volumes

CITY OF PRIOR LAKE MINNESOTA

Spring Lake Ridge Development
Traffic Impact Study
Prior Lake, MN

Figure 4. 2021 No Build Traffic Volumes

CITY OF PRIOR LAKE MINNESOTA

Spring Lake Ridge Development
Traffic Impact Study
Prior Lake, MN

Figure 5. 2021 Build Traffic Volumes

CITY OF PRIOR LAKE MINNESOTA

Spring Lake Ridge Development
Traffic Impact Study
Prior Lake, MN

Figure 6. 2040 No Build Traffic Volumes

Spring Lake Ridge Development
Traffic Impact Study
Prior Lake, MN

Figure 7. 2040 Build Traffic Volumes