SRF No. 14929

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National Grid Renewables

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Date: January 19, 2022

Subject: Proposed Solar Development Traffic Analysis
CSAH 11 and Becker Township Business Park, Minnesota

Introduction

SRF has completed a traffic study for the Sherco solar project proposed by Xcel Energy, a portion of which will be in Becker Township located south of Highway 10 and west of County State Aid Highway (CSAH) 11 (see Figure 1: Project Location). Becker Township has expressed concerns about the solar project and the impacts it would have on the Township's ability to create traffic solutions that would make the Business Park more accessible for users. The study includes two intersections: the Highway 10/CSAH 11 intersection and the CSAH 11/149th Street SE intersection. The main objectives of the study are to evaluate the existing operations at the two study intersections, identify any transportation impacts associated with the proposed development, identify the impacts the proposed development has on the accessibility of the Business Park, and recommend improvements to address any issues, if necessary. The following information provides the assumptions, analysis, and study recommendations offered for consideration.

Executive Summary

As documented throughout this memorandum, a traffic analysis has been completed to better understand the existing and projected future operational issues at the study intersections, the impact the proposed development has on the accessibility of the Becker Township Business Park, and potential strategies to improving the Business Park accessibility. The following describes a summary of the results from this analysis:

- There are operational issues today on 149th Street SE, but these issues are caused by the lack of northbound approach lanes on CSAH 11 at Highway 10 and the BNSF railroad crossing.
- The proposed development will have minimal impact on the Business Park accessibility during the development's construction or after the construction. However, as traffic volumes increase over time, the operational issues present at the study intersections under existing conditions will worsen.
- The previous *Highway 10/CSAH 11 Intersection Study* conducted by Sherburne County indicated that a grade separated interchange would significantly improve operations at the two study

intersections. The County is currently pursuing funding opportunities for implementing improvements at Highway 10/CSAH 11.

- The township expressed interest in providing an alternative exit to 137th Street via a new local roadway extension. Thus, an evaluation of a new local roadway was completed. While the new roadway would provide an option for traffic exiting the Business Park going west on Highway 10, those vehicles would still have to cross the BNSF railroad at 137th Street or at Liberty Lane. Based on the traffic volumes, this roadway would only serve a relatively low amount of traffic.
- A return-on-investment evaluation and benefit-cost analysis was completed for this study. From this evaluation, the benefit-cost ratio for the new interchange is 1.8, and the benefit-cost ratio for the new roadway is 0.8. These results indicate that the new interchange is a cost-effective solution, and the new roadway is not a cost-effective solution.
- The new interchange fits within the long-term vision for the Highway 10 corridor as there is currently another grade separated interchange being designed on the west side of Becker for the *Highway 10 and Highway 25/County Road 52 Interchange Study*. This interchange study west of Becker is being conducted to address similar accessibility and delay issues at that intersection.

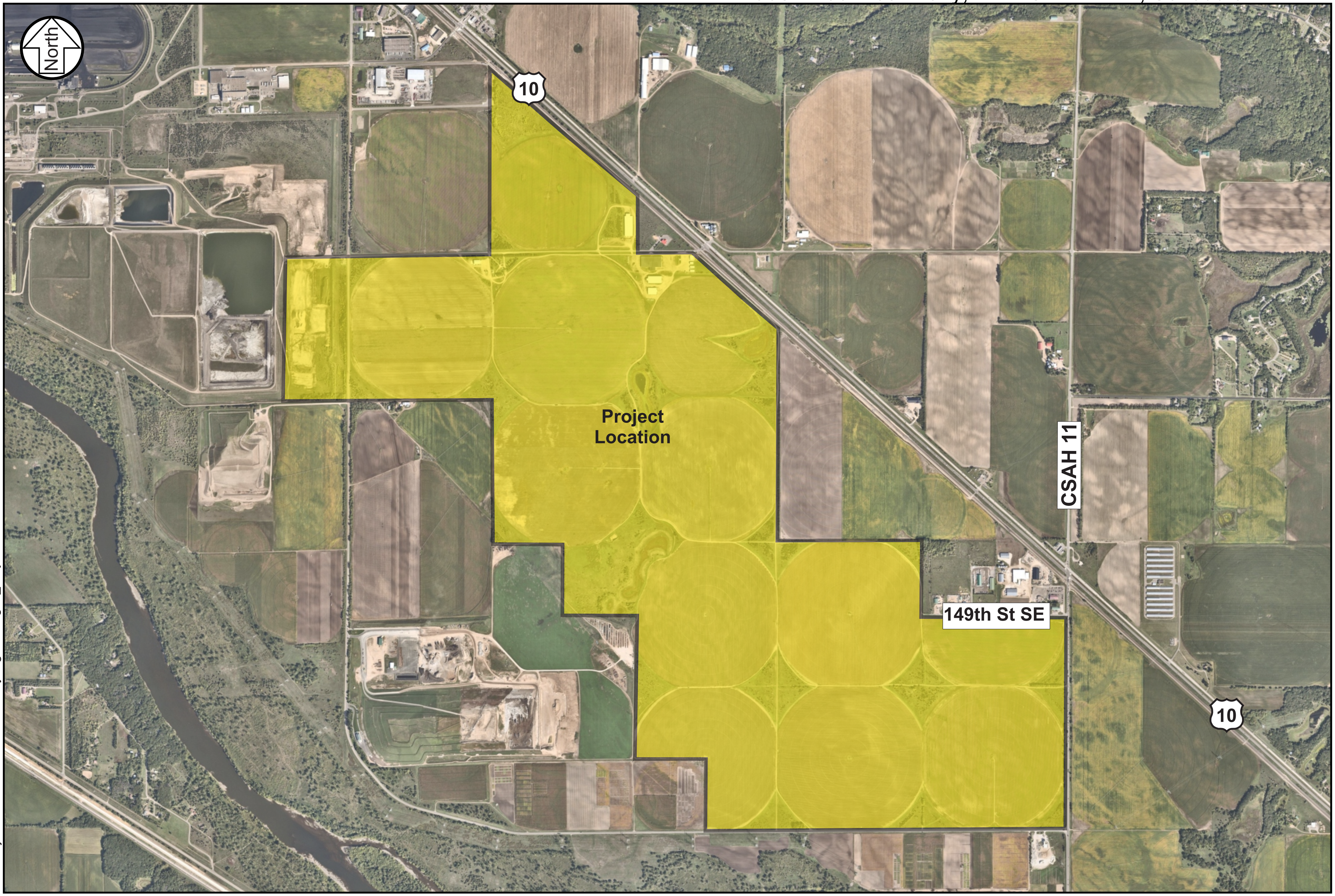
Previous Area Studies

The *Highway 10 and CSAH 11 Intersection Study* was completed by SRF Consulting Group in March 2020. The study was initiated by Sherburne County and focused on the operational and safety issues that are currently experienced at the Highway 10 and CSAH 11 intersection. The study identified several future improvement alternatives that would result in significant operational and safety benefits. The County is currently pursuing funding for future improvements at this location. Traffic data and modeling files from the *Highway 10 and CSAH 11 Intersection Study* were utilized for the study summarized in this report.

The *Highway 10 and Highway 25/County Road 52 Interchange Study* is a current project along Highway 10 on the west side of Becker, nearby the proposed solar development. This study is being initiated by Sherburne County to evaluate the transportation needs at the intersection and to proactively plan for the projected growth in the area. There are currently safety issues and accessibility and delay issues at this intersection. Interchange options will be evaluated based on their ability to address the existing issues, to accommodate the projected growth, and their impacts to the area. It is important to understand the long-term vision for the Highway 10 corridor in the area, and the *Highway 10 and Highway 25/County Road 52 Interchange Study* indicates that there are plans for the corridor to be grade separated.

Existing Conditions

Existing conditions were reviewed to establish a baseline to identify any future impacts associated with the proposed development. The evaluation of existing conditions includes a review of traffic volumes entering and exiting the Becker Township Business Park as well as the traffic using the Highway 10 and CSAH 11 intersection, associated roadway characteristics, and an intersection capacity analysis, which are summarized in the following sections.



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Project Location

Becker Township Business Park and Solar Development Traffic Analysis
Sherburne County

Figure 1

Study Intersections

The following study intersections represent the primary focus of the traffic analysis. These intersections were identified during discussions between Xcel Energy and Becker Township as having existing issues with back-ups that cause access issues for the existing Business Park. Thus, the following locations were identified for further study:

- Highway 10 and CSAH 11
- CSAH 11 and 149th Street SE (access to the Becker Township Business Park)

Traffic Data

New intersection turning movement count data was collected for the CSAH 11 and 149th Street SE intersection, which is the entrance and exit for the Becker Township Business Park. Traffic data for the Highway 10 and CSAH 11 intersection was available from the previous study.

Roadway Characteristics

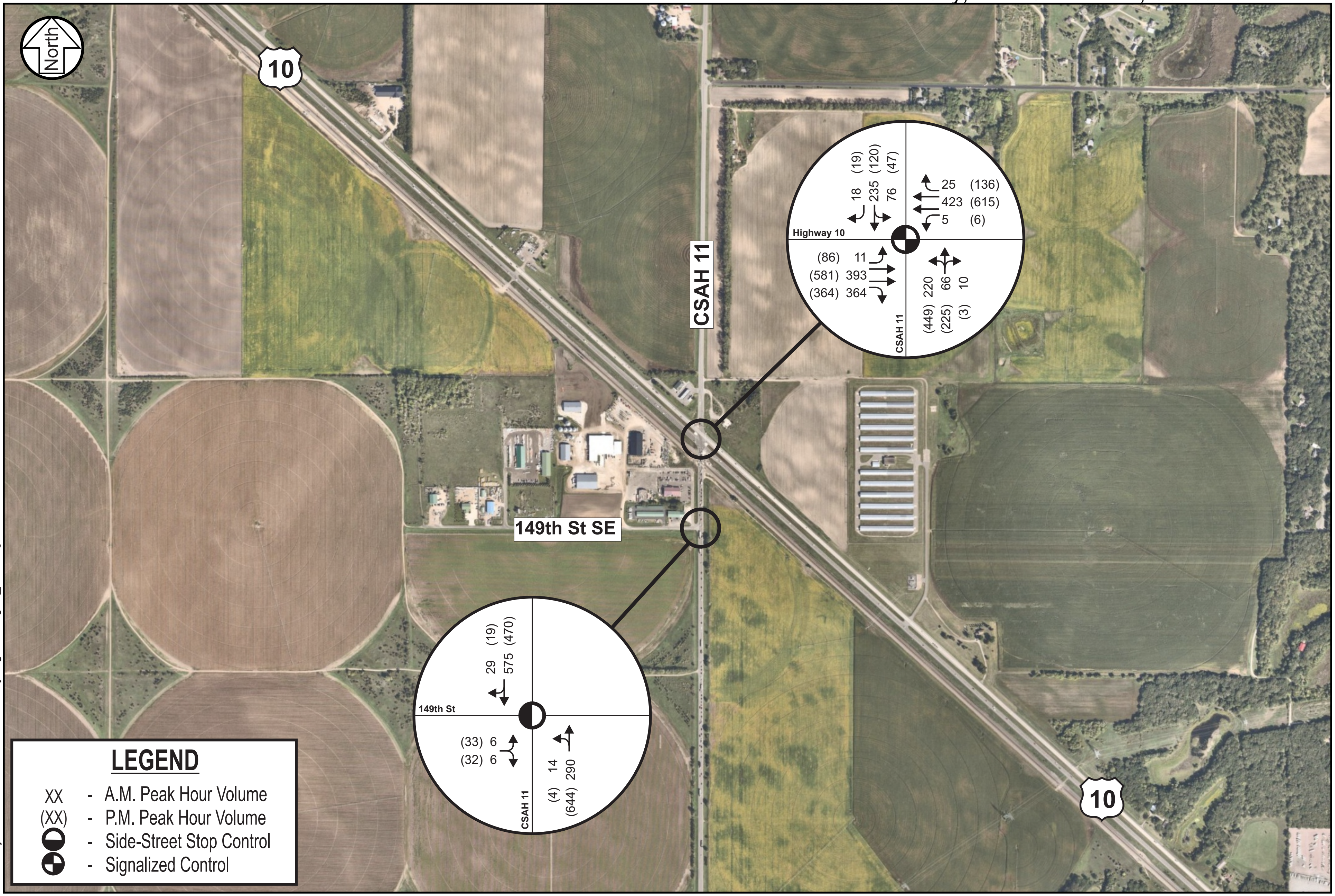
A field assessment was completed to identify various roadway characteristics for the study area, such as number of lanes, turn lanes and posted speed limits. From a traffic control perspective, the Highway 10/CSAH 11 intersection is controlled with a traffic signal. The CSAH 11/149th Street SE intersection is side-street stop controlled. Existing geometrics, traffic controls, and peak hour traffic volumes in the study area are shown in Figure 2.

Intersection Capacity Analysis

An existing intersection capacity analysis was completed using VISSIM software to establish a baseline condition to which future traffic operations could be compared. Capacity analysis results identify a Level of Service (LOS) which indicates how well an intersection is operating. Intersections are graded from LOS A through LOS F. The LOS results are based on average delay per vehicle, which correspond to the delay threshold values shown in Table 1. LOS A indicates the best traffic operation, while LOS F indicates an intersection where demand exceeds capacity. Overall intersection LOS A though LOS D is generally considered acceptable based on MnDOT guidelines.

Table 1. Level of Service Criteria for Signalized and Unsignalized Intersections

LOS Designation	Signalized Intersection Average Delay/Vehicle (seconds)	Unsignalized Intersection Average Delay/Vehicle (seconds)
A	≤ 10	≤ 10
B	> 10 - 20	> 10 - 15
C	> 20 - 35	> 15 - 25
D	> 35 - 55	> 25 - 35
E	> 55 - 80	> 35 - 50
F	> 80	> 50



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Existing Conditions

Becker Township Business Park and Solar Development Traffic Analysis

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Figure 2

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For side-street stop/yield-controlled intersections, special emphasis is given to providing an estimate for the level of service of the side-street approach. Traffic operations at an unsignalized intersection with side-street stop/yield control can be described in two ways. First, consideration is given to the overall intersection level of service. This considers the total number of vehicles entering the intersection and the capability of the intersection to support these volumes. Second, it is important to consider the delay on the minor approach. Since the mainline does not have to stop, the majority of delay is attributed to the side-street approaches. It is typical of intersections with higher mainline traffic volumes to experience high-levels of delay (i.e. poor levels of service) on the side-street approaches, but an acceptable overall intersection level of service during peak hour conditions.

Results of the existing capacity analysis, shown in Table 2, indicate that during the p.m. peak hour, the intersection of CSAH 11/149th Street SE operates at a poor level of service with average delays for the eastbound approach exceeding 3 minutes. This issue is mainly caused by the poor operations of the Highway 10/CSAH 11 intersection when a train event occurs where northbound traffic queues can spill back over 2,000 feet based on the modeling results and site observations. When this queue develops, it spills past 149th Street SE, impacting operations at this location.

Based on information from BNSF and our traffic counts, approximately 2 train events occur during each peak hour. In addition to a train event, the northbound approach of CSAH 11 at Highway 10 only has one approach lane without a left-turn lane and only a short channelization for the right turn movement which also contributes to the operations and queuing issues that develop today.

Table 2. Existing Intersection Capacity Analysis

Intersection	A.M. Peak Hour		P.M. Peak Hour	
	LOS	Delay	LOS	Delay
Highway 10/CSAH 11	C	34 sec.	D	53 sec.
CSAH 11/149th Street SE (1)	A / C	16 sec.	F / F	**202 sec.**

(1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst side-street approach LOS. The delay shown represents the worst side-street approach delay.

Existing Conditions with No Train Events

An additional scenario was evaluated that assumed no train events during each peak hour. This scenario was analyzed to understand the impacts that the train events had on the traffic operations at the two study intersections. The intersection results from this scenario shown in Table 3 indicate that train events have a significant impact on the traffic operations at the two study intersections during the p.m. peak hour. Without a train event, the average delay on the eastbound approach at the CSAH 11/149th Street SE intersection is reduced by over two minutes, resulting in an average delay of slightly more than one minute per vehicle. However, there are still significant queueing issues on the northbound approach at the Highway 10/CSAH 11 intersection due to the lack of capacity on the northbound approach. The northbound queue at the Highway 10/CSAH 11 intersection spills back over 1,300 feet beyond the intersection of 149th Street SE. This queue impacts traffic operations at the CSAH 11/149th Street SE intersection even without train events. The queueing issues that remain on the northbound approach at the Highway 10/CSAH 11 intersection even without trains indicate that the lack of capacity on the northbound approach is a primary source of the operational issues.

Table 3. Existing Intersection Capacity Analysis with No Train Events

Intersection	A.M. Peak Hour		P.M. Peak Hour	
	LOS	Delay	LOS	Delay
Highway 10/CSAH 11	C	30 sec.	D	48 sec.
CSAH 11/149th Street SE (1)	A / C	17 sec.	C / F	65 sec.

(1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst side-street approach LOS. The delay shown represents the worst side-street approach delay.

Proposed Development

The east portion of the proposed development (i.e., East Block) is generally located south of Highway 10 and between Sherburne Avenue and CSAH 11. This portion of the proposed development will occur on approximately 1,700-acre site and is scheduled to be constructed between April 2023 and October 2024. The main access point to the site will be off Sherburne Avenue near 137th Street. This location will also be the primary access point for the site during construction.

Peak Construction Conditions

Construction Traffic

Based on information provided by Xcel Energy, construction for the West Block and East Block of the solar project sites will take approximately 30 months to complete. During the peak months, approximately 400 construction workers per day will be on site between both sites. Construction traffic generated from both construction sites will drive through the Highway 10/CSAH 11 intersection on Highway 10. Due to the proximity of the study intersections and the existing northbound queues observed on CSAH 11 at the Highway 10 intersection, adding traffic to the Highway 10/CSAH 11 intersection has the potential to impact the traffic operations at both study intersections.

The primary staging area for the East Block will be located along Sherburne Avenue near 137th Street. The closest access from the staging area to Highway 10 is via Sherburne Avenue to Liberty Lane or via Sherburne Avenue to 137th Street. Therefore, it would be anticipated that most of the East Block construction traffic accessing Highway 10 will enter and exit the staging area using either Liberty Lane or 137th Street. Alternatively, some traffic may exit to the south via Sherburne Avenue and then turn south on CSAH 11. There is potential for some construction traffic to enter and exit the staging area via Sherburne Avenue to CSAH 11 to Highway 10. However, this is unlikely since this route has a further travel distance from the staging area to Highway 10 compared to the Liberty Lane and

137th Street routes, and given that there are known back-ups on northbound CSAH 11 at the Highway 10 intersection.

To understand the impact that this construction traffic will have on the study intersections, a construction peak scenario was evaluated. Peak construction conditions of 400 construction workers per day are expected from March 2023 to October 2023. The construction workers are expected to arrive on site during the a.m. peak hour and will depart during the p.m. peak hour. While some traffic may enter the site via CSAH 11 to Sherburne Avenue, the model conservatively routed all traffic via Highway 10 to understand the maximum potential impacts to the study intersections. The workers were modelled to arrive at the site from Highway 10 to Liberty Lane or 137th Street with approximately 50 percent coming from the east and 50 percent coming from the west. Construction traffic is not expected to pass through the CSAH 11/149th Street SE intersection. Construction peak traffic conditions are shown in Figure 3.

Traffic Operations

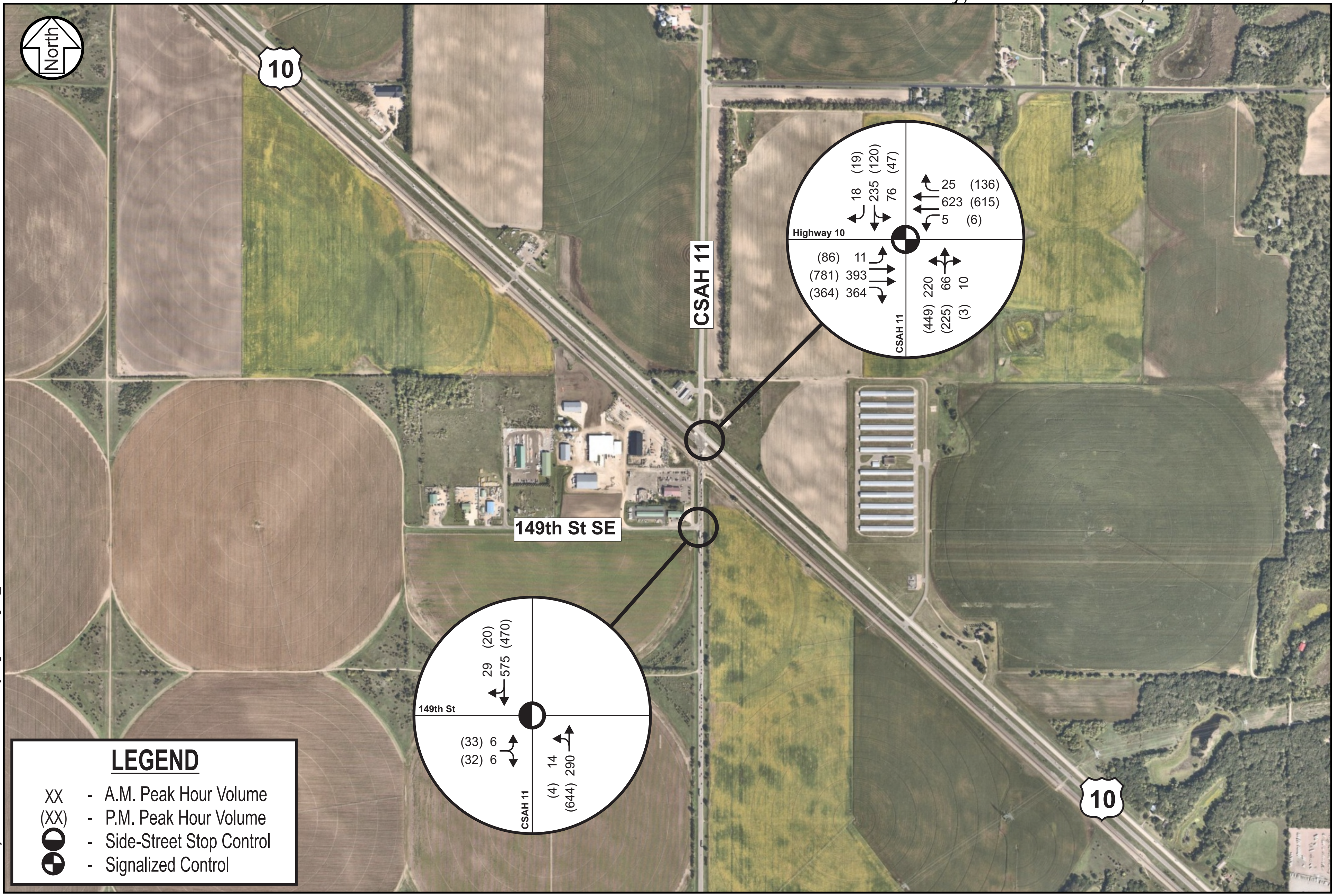
Results of the peak construction conditions intersection analysis are shown in Table 4. The results in Table 4 indicate that the traffic generated from the construction workers will not have a significant impact on the operations of the study intersections under peak construction conditions. The results from the peak construction conditions analysis reflect the results from the existing conditions analysis closely, only showing a slight increase in delay between the study intersections.

It should be noted that when conducting analysis using traffic modeling software, there is some variation and randomness that occurs during simulation. This model variation is prone to happen for movements with lower traffic volumes. The operations on the side-street approach at the CSAH 11/149th Street SE intersection is slightly better during peak construction conditions than it is under existing conditions. Since the traffic on this approach is relatively low, the discrepancy in delay can be attributed to model variation.

Table 4. Construction Peak Intersection Capacity Analysis

Intersection	A.M. Peak Hour		P.M. Peak Hour	
	LOS	Delay	LOS	Delay
Highway 10/CSAH 11	C	35 sec.	D	54 sec.
CSAH 11/149th Street SE (1)	A / C	20 sec.	**F / F**	**195 sec.**

(1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst side-street approach LOS. The delay shown represents the worst side-street approach delay.



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Peak Construction Conditions

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Figure 3

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Year 2040 Baseline Conditions

Year 2040 Traffic Volumes

Year 2040 traffic volumes are consistent with those developed in the *Highway 10/CSAH 11 Intersection Study*. These forecasts were developed using Met Council's Travel Demand Model and reflect planned development for the neighboring communities of Becker, Big Lake and Monticello at the time the study was conducted.

Traffic Operations

A future analysis was conducted to determine how the two study intersections would operate under future conditions if no improvements were made to the intersections and if the proposed development was not constructed. The year 2040 baseline scenario assumed the existing lane geometry at both study intersections and assumed a consistent train schedule as the existing conditions. The traffic conditions for the year 2040 baseline scenario are shown in Figure 4. The results for the year 2040 baseline scenario are shown in Table 5.

Based on these results, the operations at the study intersections worsen significantly during the afternoon peak hour. During the p.m. peak hour, the northbound queue approaching the Highway 10/CSAH 11 intersection exceeds one mile. This queue is caused by a combination of train events at the railroad crossing and the lack of capacity on the northbound approach at the Highway 10/CSAH 11 intersection. This excessive northbound queue impacts the drivers exiting the Business Park at CSAH 11/149th Street SE, causing the eastbound delay to exceed 10 minutes at that intersection. It is important to note that the traffic modeling software is not a dynamic model that would capture motorists who are not willing to accept significant delays. In reality, motorists would likely use other routes resulting in less delay and shorter queues.

Table 5. Year 2040 Baseline Intersection Capacity Analysis

Intersection	A.M. Peak Hour		P.M. Peak Hour	
	LOS	Delay	LOS	Delay
Highway 10/CSAH 11	D	42 sec.	E	62 sec.
CSAH 11/149th Street SE (1)	A / C	24 sec.	F / F	> 500 sec.

(1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst side-street approach LOS. The delay shown represents the worst side-street approach delay.