



TH 7 Safety Assessment  
Report

Corridor Safety Assessment for  
Trunk Highway 7 (TH 7) in McLeod  
County from TH 22 to East McLeod  
County Line

June 2, 2021

Prepared for:

Minnesota Department of  
Transportation – District 8 and  
McLeod County

Prepared by:

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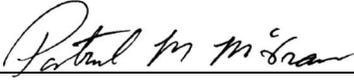


## TH 7 SAFETY ASSESSMENT REPORT

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# TH 7 SAFETY ASSESSMENT REPORT

## Introduction

## 1.0 INTRODUCTION

### 1.1 STUDY BACKGROUND

Trunk Highway 7 (TH 7) is an east-west principal arterial highway that connects communities in the metro-area to the City of Hutchinson and communities beyond, such as the Cities of Cosmos, Prinsburg, and Clara City to the City of Montevideo approximately 100 miles to the west of the metro-area. MnDOT District 8 proposed a safety assessment of a 16.2-mile portion of TH 7 in McLeod County beginning at the junction with TH 22 and ending at the eastern McLeod County line. The purpose of the TH 7 Safety Assessment is to:

- Evaluate existing conditions (traffic volumes, intersection/corridor geometry, crashes, safety, etc.)
- Facilitate discussion between local partners, stakeholders, and the public
- Identify locations along the corridor that may benefit from access modifications or safety improvements
- Provide recommendations to increase safety
- Create a common vision and guidance for managing the corridor now and into the future

Within the TH 7 safety assessment, five key tasks were completed and compiled in the following report. The tasks include an assessment of existing conditions and crash analysis, Intersection Control Evaluations (ICE) for three study intersections, an assessment of access management, public and stakeholder engagement, and corridor management recommendations.

### 1.2 STUDY AREA

The study area consists of a 16.2-mile, primarily rural portion of TH 7 in McLeod County. The western limit of the study area is the junction of TH 7 with TH 22 on the east side of the City of Hutchinson and the eastern limit is the eastern McLeod County line (located at the junction with Zebra Avenue). The corridor was divided into the following segments:

1. Western Segment – a 6.4-mile section between TH 22 in Hutchinson and 0.10-mi east of Main Street/County Road 92 (CR 92) in Silver Lake
2. Silver Lake Segment – a 1.0-mile urban three-lane section encompassing TH 7 within the City of Silver Lake limits between 0.10-mi east of Main Street/CR 92 and 0.15-mi east of Grove Avenue/CR 2



## TH 7 SAFETY ASSESSMENT REPORT

### Introduction

3. Eastern Segment – an 8.8-mile rural two-lane section between 0.15-mi east of Grove Avenue/CR 2 in Silver Lake and the eastern McLeod County line/Zebra Avenue

The corridor contains 36 intersections with county and local roads. Thirty-five of the 36 intersections were included in the TH 7 safety assessment. The intersection of TH 7 with Babcock Avenue/CR 1 was omitted. A single-lane roundabout will be constructed at this intersection. The intersections selected for ICE include TH 7 & CR 15, TH 7 & CR 9, and a cluster of closely spaced intersections in the City of Silver Lake consisting of Main Street/CR 92, Silver Avenue/200<sup>th</sup> Street/CR 16, and Lane Avenue. Although the intersection of TH 7 & TH 22 was included in the initial assessment of the corridor, the intersection will be further evaluated for improvements separately as part of the ICE Lite Report being prepared by McLeod County. No improvements to this intersection will be recommended within this safety assessment.

The existing land use directly adjacent to the study corridor consists primarily of agricultural and commercial uses with a small amount of single family residential (particularly through the City of Silver Lake).<sup>1,2</sup>

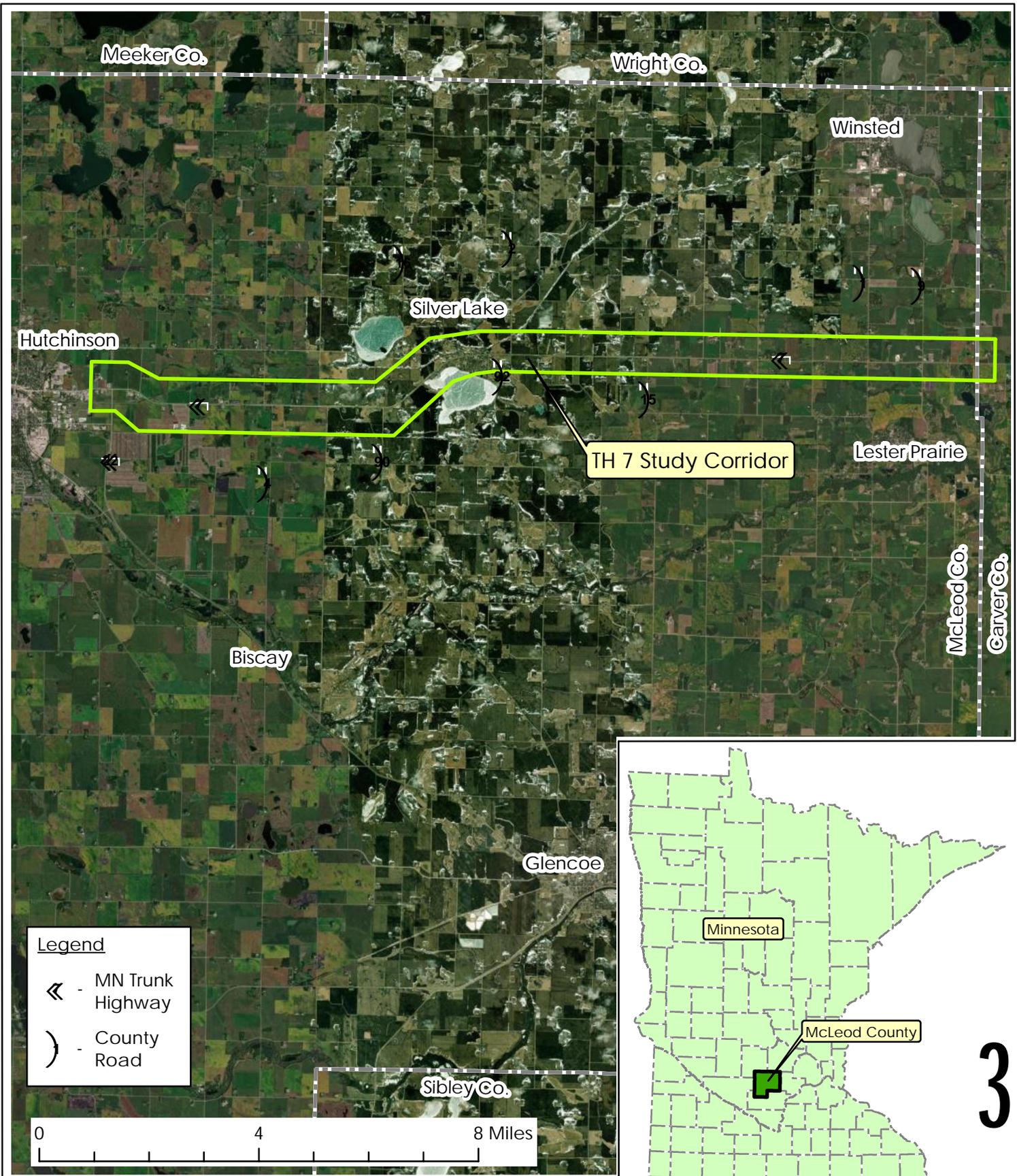
The study corridor and location are shown in Figure 1.

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<sup>1</sup> (*McLeod County Zoning Map*, McLeod County GIS, 2017)

<sup>2</sup> (*Zoning Map*, City of Silver Lake, 2021)





Study Corridor and Location Map

Figure 1

### 1.3 CONTACT INFORMATION

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## TH 7 SAFETY ASSESSMENT REPORT

Existing Conditions

### 2.0 EXISTING CONDITIONS

In September 2020, Stantec submitted a technical memorandum summarizing the Existing Conditions Inventory and Analysis of the TH 7 corridor. This memo is shown in Appendix A.

#### 2.1 EXISTING CORRIDOR AND INTERSECTION GEOMETRICS

The existing corridor and intersection geometrics were determined by reviewing historic plan information supplemented with field measurements and estimating dimensions using aerial photography. See Appendix B for a detailed graphic of existing geometrics, including typical sections. TH 7 is functionally classified as a principal arterial throughout the study corridor.<sup>3</sup> All the corridor intersections operate under minor-leg side-stop control.

##### Western Segment

With one exception, the Western Segment is a two-lane undivided highway with 11-foot through lanes and 11-foot paved shoulders. The use of 11-foot lanes is acceptable where the horizontal curvature meets the design-speed standard and no crash patterns suggest a need for widening the through lanes. A portion of the segment is a four-lane undivided highway. The transition lengths between the two- and four-lane sections meet current MnDOT standards. The segment has shoulder rumble strips, however it lacks centerline rumble strips. The segment is primarily rural with a posted speed limit of 60-mph. Turn lanes at intersections vary between 11 and 14 feet in width and bypass lanes are 11 feet in width. Sixteen turn lanes and four bypass lanes were determined to be shorter than the typical lengths. The intersections of TH 7 with Kale Avenue/CR 90 (east junction) and 190<sup>th</sup> Street do not have bypass lanes and the intersection with the Crow River Winery entrance does not have a right-turn lane or bypass lane. There is no advance warning signage or chevrons in-place for horizontal curves, however the design speed of the curves matches the posted speed. The Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD) indicates that such signage should be considered if there is a decrease in design speed from the mainline to the curve.

##### Silver Lake Segment

The Silver Lake Segment is a three-lane undivided roadway with 10-foot eastbound and 11-foot westbound through lanes, a 15-foot two-way left-turn lane (TWLTL), and 10-foot paved shoulders. The eastbound through lane width does not meet the current MnDOT standard of 11 feet where the horizontal curvature meets the design-speed standard. The segment is primarily urban with a posted speed limit of 45-mph. Two of the intersections have 10 to 11-foot right turn lanes, while the remaining intersections

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<sup>3</sup> (Enterprise MnDOT Mapping Application, Minnesota Department of Transportation, 2021)



## TH 7 SAFETY ASSESSMENT REPORT

### Existing Conditions

have no turn lanes. The right-turn lane at Grove Avenue/CR 2 was determined to be shorter than the current MnDOT typical length (300-ft full width with 180-ft taper). All the intersections are skewed, ranging from 5 to 30 degrees. There is no advance warning signage or chevrons in-place for curves, however the design speed of the curves meets or exceeds the posted speed.

### Eastern Segment

With one exception, the Eastern Segment is a two-lane undivided highway with 12-foot through lanes and 8 to 10-foot paved shoulders. A portion of the segment is a five-lane undivided highway with a 13-foot two-way left-turn lane (TWLTL). The transition lengths between the two- and five-lane sections do not meet current MnDOT standards. The segment has edge-line rumble strips, however it lacks centerline rumble strips. The segment is primarily rural with a posted speed limit of 60-mph. Three intersections have 13-foot left-turn lanes, and 12-foot right turn lanes, while most of the remaining intersections have 12-foot right turn lanes and 12-foot bypass lanes. The intersection of TH 7 with Zero Avenue does not have a right-turn lane or a bypass lane and the intersection with the Shadowbrooke Golf Course entrance does not have a left-turn lane or bypass lane. Five turn lanes and one bypass lane were determined to be shorter than the current MnDOT typical lengths. One sag vertical curve located 1000 feet east of Zero Avenue is sub-standard in length and meets a 55-mph design speed.

## 2.2 TRAFFIC VOLUMES

Historic 2019 and forecast year 2040 average annual daily traffic volumes (AADT) along the study corridor are shown in Table 1. The growth rate used is a 0.75% per year simple growth rate agreed upon by MnDOT and Stantec.

Segment of TH 7	Existing AADT (2019)	Forecast AADT* (2040)
West of TH 22	8,400	9,700
Between TH 22 & Main Street/CR 92	8,300	9,600
Between Main Street/CR 92 & Grove Avenue/CR 2	8,100	9,400
Between Grove Avenue/CR 2 & Babcock Avenue/CR 1	7,200	8,300
Between Babcock Avenue/CR 1 & Zebra Avenue	7,300	8,400
East of Zebra Avenue	8,100	9,400

\*Forecast year AADT calculated from the given AADT using the simple growth rate of 0.75% per year.

<sup>4</sup> (Traffic Forecasting & Analysis Traffic Mapping Application, Minnesota Department of Transportation, 2021)



## TH 7 SAFETY ASSESSMENT REPORT

### Existing Conditions

Existing year 2020 turning movement counts were collected by Spack Solutions for two 12-hour periods from 6:30 AM to 6:30 PM on Tuesday, August 18 and Wednesday, August 19, 2020 at the following intersections:

- TH 7 & Main Street/CR 92
- TH 7 & Silver Avenue/200<sup>th</sup> Street/CR 16
- TH 7 & Lane Avenue
- TH 7 & CR 15
- TH 7 & CR 9

Vehicular and pedestrian/bicycle traffic was included in the turning movement counts. The counts were averaged between the two collection days. The averaged AM and PM peak-hour turning movement counts for the intersections are shown in Appendix C.

Current year daily traffic counts were collected by Spack Solutions from 11:00 AM Monday, August 24 to 10:00 AM Thursday, August 27, 2020 at the following locations:

- TH 7, 800 feet west of Nickel Avenue
- TH 7, 800 feet east of CR 2/CR 92
- TH 7, 1,300 feet east of CR 9

The measurement period covered two full 24-hour periods: Tuesday, August 25 and Wednesday, August 26, 2020. Truck classification counts were included in the daily traffic counts. Speed data was also collected at the selected locations. The counts and speed measurements were averaged between the two full 24-hour periods. The averaged current year daily traffic counts, historic AADT, speed data, and truck classification counts for the selected locations are shown in Table 2.

Due to the COVID-19 pandemic, vehicular travel nationwide has decreased. Traffic count data collected in 2020 is not considered to be representative of typical conditions. To conduct further analysis utilizing the existing 2020 turning movement counts, an adjustment factor has been applied. The adjustment factor was calculated by comparing 2020 daily traffic counts to historic AADT available on MnDOT's Traffic Mapping Application. It was calculated that the TH 7 corridor experienced an average reduction in traffic of 33% due to the COVID-19 pandemic, yielding an adjustment factor of 1.49. It is assumed that the 2020 turning movement counts are proportional to typical volume conditions, therefore the adjustment factor has been applied to all movements. See Appendix C for COVID-19 adjustment factor calculations. Forecast year 2040 peak hour turning movement counts at the five study intersections were developed by applying the 0.75% per year growth rate to the COVID-19 adjusted 2020 turning movement counts.



# TH 7 SAFETY ASSESSMENT REPORT

## Existing Conditions

Daily Count Location	Current Year Traffic Volumes (2020)	Historic AADT (2019)	Average Speed/85 <sup>th</sup> Percentile Speed (mph)	Truck Traffic Percentage
TH 7, 800' W of Nickel Ave	5,040	8,300	69 / 80	33%
TH 7, 800' E of CR 2/CR 92	4,610	7,200	63.5 / 71	28%
TH 7, 1,300' E of CR 9	5,570	7,300	66 / 72	29.5%

## 2.3 CRASH ANALYSIS

A crash analysis was completed along the study corridor to review and identify crash patterns, trends, and factors over the five-year period from 2015 through 2019. The crash analysis utilized the MnDOT crash database and was obtained using the Minnesota Crash Mapping Analysis Tool (MnCMAT2). A detailed review of all crashes along the corridor was performed. Crash analysis conducted at 35 intersections in the study area were analyzed individually to determine intersection specific crash characteristics. A roundabout at TH 7 & Babcock Avenue/CR 1 has been funded and was not analyzed as part of this study. Crash statistics were also compared to the results from the '2016 MnDOT District 8 District Safety Plan'. Table 3 and Table 4 show the number of crashes during the analysis period for each segment and eleven intersections with notable crash history, respectively. See Appendix D for a full list of intersection and segment crash statistics and District Safety Plan results.

Roadway Segment	Number of Crashes (2015 – 2019) <sup>5</sup>					
	Fatal	Personal Injury*			Property Damage	Total Crashes
		Type A	Type B	Type C		
Western Segment	1	2	11	7	37	58
Silver Lake Segment	0	0	1	1	7	9
Eastern Segment	1	4	12	9	35	61

\*Personal Injury Crashes include Type A (Serious Injury), Type B (Minor Injury), and Type C (Possible Injury).

<sup>5</sup> (Minnesota Crash Mapping Analysis Tool (MnCMAT), Minnesota Department of Transportation,



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## Existing Conditions

Table 4 – Intersection Crash Data 2015 – 2019						
Intersection	Number of Crashes (2015 – 2019) <sup>6</sup>					
	Fatal	Personal Injury*			Property Damage	Total Crashes
		Type A	Type B	Type C		
TH 7 & TH 22	0	0	3	2	5	10
TH 7 & Omega Avenue	1	0	2	1	2	6
TH 7 & Memory Circle (incl. winery entrance)	0	0	2	0	0	2
TH 7 & Kale Avenue (west junction)	0	0	0	1	1	2
TH 7 & Kale Avenue/CR 90 (east junction)	0	0	0	0	1	1
TH 7 & Main Street/CR 92	0	0	0	0	0	0
TH 7 & Silver Avenue/200th Street/CR 16	0	0	0	1	1	2
TH 7 & Lane Avenue	0	0	1	0	1	2
TH 7 & CR 2/CR 92	0	0	0	0	3	3
TH 7 & CR 15	0	0	0	0	0	0
TH 7 & CR 9	0	0	2	2	0	4

\*Personal Injury Crashes include Type A (Serious Injury), Type B (Minor Injury), and Type C (Possible Injury).

The five-year crash and severity rates for the intersections and segments were compared to the five-year statewide average rates and the five-year critical rates for similar intersections or segments. Locations with crash/severity rates below the critical rates are statistically considered to be relatively safe and generally not in need of safety improvements due to crash statistics alone. Table 5 and Table 6 show the crash rate comparison for the segments and intersections, respectively.

<sup>6</sup> (Minnesota Crash Mapping Analysis Tool (MnCMAT), Minnesota Department of Transportation,



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## Existing Conditions

**Table 5 – Segment Crash Rates 2015 – 2019**

Segment	Crash Rates (per Million Entering Vehicles)			Severity Rates (per 100 Million Entering Vehicles)		
	Observed Crash Rate	Average Statewide Crash Rate*	Critical Crash Rate**	Observed Severity Rate	Average Statewide Severity Rate*	Critical Severity Rate**
Western Segment	<b>0.60</b>	0.76	0.99	<b>3.10</b>	1.97	4.32
Silver Lake Segment	<b>0.62</b>	1.95	2.93	<b>0.00</b>	2.19	10.66
Eastern Segment	<b>0.53</b>	0.60	0.79	<b>4.33</b>	2.42	4.71

\*Average crash rates based on crash rates from MnDOT 2015 Section Toolkit based on five years of crash data.

\*\*Critical crash rates give an indication of the statistical significance of the segment crash rate. Locations with a crash rate above the critical crash rate, are considered to be in need of safety improvements because they is a high probability (99.5 percent) that conditions at this location are contributing to the higher crash rate.

**Table 6 – Intersection Crash Rates 2015 – 2019**

Intersection	Crash Rates (per Million Entering Vehicles)			Severity Rates (per 100 Million Entering Vehicles)		
	Observed Crash Rate	Average Statewide Crash Rate*	Critical Crash Rate**	Observed Severity Rate	Average Statewide Severity Rate*	Critical Severity Rate**
TH 7 & TH 22	<b>0.55</b>	0.25	0.58	<b>0.00</b>	1.05	6.85
TH 7 & Omega Avenue	<b>0.40</b>	0.25	0.62	<b>6.60</b>	1.05	7.72
TH 7 & Memory Circle (incl. winery entrance)	<b>0.13</b>	0.25	0.62	<b>0.00</b>	1.05	7.72
TH 7 & Kale Avenue (west junction)	<b>0.13</b>	0.25	0.62	<b>0.00</b>	1.05	7.72
TH 7 & Kale Avenue/CR 90 (east junction)	<b>0.07</b>	0.25	0.62	<b>0.00</b>	1.05	7.69
TH 7 & Main Street/CR 92	<b>0.00</b>	0.25	0.62	<b>0.00</b>	1.05	7.66
TH 7 & Silver Avenue/200th Street/CR 16	<b>0.13</b>	0.18	0.49	<b>0.00</b>	0.33	5.28
TH 7 & Lane Avenue	<b>0.14</b>	0.18	0.50	<b>0.00</b>	0.33	5.61
TH 7 & CR 2/CR 92	<b>0.20</b>	0.25	0.62	<b>0.00</b>	1.05	7.77



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### Existing Conditions

TH 7 & Falcon Avenue/CR 15	<b>0.00</b>	0.25	0.63	<b>0.00</b>	1.05	8.09
TH 7 & Kingsley Street/CR 9	<b>0.25</b>	0.25	0.61	<b>0.00</b>	1.05	7.44

\*Average crash rates based on crash rates from MnDOT 2015 Intersection Toolkit based on five years of crash data.

\*\*Critical crash rates give an indication of the statistical significance of the intersection crash rate. Locations with a crash rate above the critical crash rate are considered to be in need of safety improvements because there is a high probability (99.5 percent) that conditions at this location are contributing to the higher crash rate.

The Western Segment had a crash rate lower than the statewide average and critical crash rates. The severity rate was higher than the statewide average severity rate, but lower than the critical severity rate. Sixty percent of crashes in the segment were non-intersection related. The most prevalent crashes were run-off-road, mostly occurring during wintry conditions and at hotspots including the horizontal curves near Omega Avenue and near Kale Avenue/CR 90. Crashes resulting from vehicles veering into the oncoming lane were also prevalent (no particular hotspot), two of which resulted in serious injury. The primary intersections within the segment and their findings are listed below:

- TH 7 & TH 22 – Crash rate exceeds statewide average; severity rate does not exceed statewide average. No significant crash-related concerns.
- TH 7 & Omega Avenue – Crash and severity rates exceed statewide average. There were four rear-end crashes from 2015-2019 with eastbound through vehicles colliding with stopped/slowed left-turning vehicles, one of which resulted in a fatality. Through vehicles may have difficulty seeing stopped vehicles and identifying the bypass lane while navigating the horizontal curve.
- TH 7 & Memory Circle (including Crow River Winery entrance 400 ft to the west) – Neither crash nor severity rates exceed statewide average. The Crow River Winery entrance on TH 7 experienced two rear-end crashes from 2015-2019 with eastbound through vehicles colliding with stopped/slowed left-turning vehicles. Two more crashes related to stopped eastbound left-turning vehicles occurred outside the 2015-2019 analysis period, one in 2013 and one in 2020. The Memory Circle bypass lane does not encompass the winery entrance intersection.
- TH 7 & Kale Avenue (west junction) – Neither crash nor severity rates exceed statewide average. No significant number of crashes. However, two crashes were rear-end and were a result of eastbound TH 7 through vehicles not using the bypass lane to avoid a stopped vehicle turning left onto Kale Avenue. The crashes resulted in one possible injury, and one property damage only crash.
- TH 7 & Kale Avenue/CR 90 (east junction) – Neither crash nor severity rates exceed statewide average. No significant crash-related concerns.



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### Existing Conditions

- TH 7 & Main Street/CR 92 – Neither crash nor severity rates exceed statewide average. The 2016 District Safety Plan crash rates did not exceed statewide average. No significant crash-related concerns were identified in the current data.

The crash analysis revealed the Silver Lake Segment has no significant corridor safety concerns and crash/severity rates are lower than the statewide average and critical rates. The key intersections within the segment and their findings are listed below:

- TH 7 & Silver Avenue/200<sup>th</sup> Street/CR 16 – Neither crash nor severity rates exceed statewide average. Although the TH 7 & Silver Avenue/200<sup>th</sup> Street/CR 16 intersection did not have significant crash volumes during the 2015-2019 analysis period, the intersection geometry presents potential sightline issues. The intersection is skewed 20-30 degrees and is located on a mainline curve.
- TH 7 & Lane Avenue – Neither crash nor severity rates exceed statewide average. No significant crash-related concerns. Potential sightline issues exist due to skew.

The Eastern Segment had a crash rate lower than the statewide average and critical crash rates. The severity rate was higher than the statewide average severity rate, but lower than the critical severity rate. Fifty-one percent of crashes in the segment were non-intersection related. The most prevalent crashes were related to driveway maneuvers, animals, and run-off-road crashes (often due to wintry or rainy conditions). Two crashes resulted from vehicles veering into the oncoming lane, one of which was due to a drunk driver, leading to the one fatality. The key intersections within the segment and their findings are listed below:

- TH 7 & CR 2/CR 92 – Neither crash nor severity rates exceed statewide average. No significant number of crashes. Near misses have been reported informally between through and cross traffic.
- TH 7 & CR 15 – Neither crash nor severity rates exceed statewide average. No significant crash-related concerns were identified in the data. Closure of the CR 15 approach for construction in 2018-2019 may have skewed crash data.
- TH 7 & CR 9 – Crash rate is equal to the statewide average; severity rate does not exceed statewide average. No significant crash-related concerns.

In the analysis period of 2015 to 2019, there were no reported pedestrian or bicycle related crashes along the corridor or at any intersection. It is important to note that it can be difficult to identify crash trends for transportation modes other than vehicles, such as pedestrians and bicycles. The amount of pedestrian/bicycle traffic along TH 7 is relatively low and thus the number of pedestrian/bicycle crashes is



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### Existing Conditions

expected to be very low in comparison to the number of vehicular crashes. Additionally, many pedestrian/bicycle crashes go unreported. Therefore, a lack of pedestrian/bicycle crashes in the five-year period of crash data does not necessarily indicate safe conditions for these users.

## 2.4 EXISTING PEDESTRIAN/BICYCLE FACILITIES

TH 7 is a rural highway corridor with only a short segment passing through a populated area (City of Silver Lake). Pedestrian and bicycle facilities along the study corridor are limited. The corridor has paved shoulders throughout each segment that are 8-11 feet wide. The shoulder is broken up by turn/bypass lanes which take up the entire shoulder width. There are no marked bicycle facilities, no sidewalks, no marked pedestrian crossings, and no pedestrian/bicycle signs throughout the corridor. Street lighting is limited only to intersections within Silver Lake and a few major intersections in the Western and Eastern Segments. The lack of pedestrian/bicycle facilities and abundant lighting combined with high driving speeds and lack of driver expectation puts pedestrians and bicyclists at risk while travelling within the study corridor.

The Luce Line State Trail is a 10-foot paved multi-use trail that runs between the metro-area and communities west of Hutchinson, passing through the Cities of Hutchinson, Silver Lake, and Winsted. The trail crosses beneath TH 7 between Omega and Nickel Avenues and is connected by a nearby private driveway on the south side of TH 7. A portion of the trail runs parallel to the Silver Lake segment of TH 7, between 200 and 700 feet to the north of the corridor. There is a public parking lot/connection to the trail in Silver Lake on the north side of TH 7 across from Oliver Avenue providing direct access to the trail from TH 7. There are businesses and a public park/picnic area less than one-quarter mile south of the trail connection in Silver Lake, which may encourage pedestrian/bicycle crossings at Park and Oliver Avenues.

Future improvements along the study corridors should look for ways to enhance pedestrian, bicycle, and multimodal safety and connectivity within the study area.

## 2.5 EXISTING LIGHTING AND INTELLIGENT TRANSPORTATION SYSTEMS

Street lighting is present along the study corridor only at intersections within Silver Lake and a few major intersections in the Western and Eastern Segments. The following intersections within the study corridor have some form of street lighting:

- TH 7 & TH 22
- TH 7 & Main Street/CR 92
- TH 7 & Silver Avenue/200<sup>th</sup> Street/CR 16



## TH 7 SAFETY ASSESSMENT REPORT

### Existing Conditions

- TH 7 & Lane Avenue
- TH 7 & Oliver Avenue
- TH 7 & Park Avenue
- TH 7 & Summit Avenue
- TH 7 & Lake Avenue
- TH 7 & Grove Avenue/CR 2
- TH 7 & CR 2/CR 92
- TH 7 & CR 9

Intelligent Transportation Systems (ITS) help enable traffic and mobility management while allowing various road users to be better informed of roadway conditions. A Rural Intersection Conflict Warning System (RICWS) was installed in 2015 at the intersection of TH 7 & Babcock Avenue/CR 1 (excluded from study).<sup>7</sup> The RICWS provides warning to Babcock Avenue (cross street) traffic indicating that TH 7 (through street) traffic is approaching the intersection with the use of a lighted “traffic approaching” warning sign/flashing beacon combination. The system also warns TH 7 traffic that Babcock Avenue traffic is occupying the approach with the use of an “entering traffic” warning sign/flashing beacon combination.

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<sup>7</sup> (*Rural Intersection Conflict Warning Systems*, Minnesota Department of Transportation, 2021)



## TH 7 SAFETY ASSESSMENT REPORT

### Intersection Control Evaluations

## 3.0 INTERSECTION CONTROL EVALUATIONS

Intersection Control Evaluations (ICE) were performed for three study intersections within the TH 7 corridor. The intersections include TH 7 & CR 15, TH 7 & CR 9, and a cluster of closely spaced intersections in the City of Silver Lake consisting of Main Street/CR 92, Silver Avenue/200<sup>th</sup> Street/CR 16, and Lane Avenue. The purpose of the ICE was to determine applicable intersection control types that would improve overall operations and/or safety at the study intersections. The following analyses were completed in each ICE:

- Warrant Analysis – to assess whether installation of a traffic control signal (or roundabout by extension) may be warranted.
- Crash Analysis – to estimate the crash reduction potential of each traffic control alternative.
- Capacity Analysis – to assess the performance of each traffic control alternative.

The analysis utilized COVID-19 adjusted 2020 and forecast year 2040 traffic volume conditions. Additional considerations, such as right-of-way, construction cost, multimodal considerations, and transportation system considerations were also examined. A benefit-cost analysis was performed to further evaluate the traffic control alternatives, which included examining user travel benefits, safety benefits, and construction/maintenance costs.

In January 2021, Stantec submitted three ICE reports to MnDOT District 8 titled 'TH 7 and Silver Lake Intersections ICE Report', 'TH 7 and CR 15 ICE Report', and 'TH 7 and CR 9 ICE Report', which are shown in Appendix E. The following sections are summaries of each report. While a full ICE was not performed on the intersection of TH 7 & CR 2/CR 92, alternatives were developed and analyzed in a similar process to determine final safety recommendations.

### 3.1 SILVER LAKE INTERSECTIONS

#### Existing Intersection Characteristics

The existing intersections of TH 7 with Main Street/CR 92 (Main Street), Silver Avenue/200<sup>th</sup> Street/CR 16 (Silver Avenue/200<sup>th</sup> Street), and Lane Avenue currently operate under minor-leg side-stop control.

The Main Street intersection is a three-leg intersection. The eastbound TH 7 approach consists of a through lane and a right-turn lane. The westbound TH 7 approach consists of a through lane and a left-turn lane. The northbound Main Street approach is a shared left and right-turn lane with enough space for right-turning vehicles to pull up alongside vehicles waiting to turn left.



## TH 7 SAFETY ASSESSMENT REPORT

### Intersection Control Evaluations

The Silver Avenue/200<sup>th</sup> Street intersection is a four-leg intersection. The eastbound and westbound TH 7 approaches consist of a through lane, a right-turn lane, and a two-way left-turn lane that functions as the approach's left-turn lane. The southbound 200<sup>th</sup> Street approach is a shared through, left, and right-turn lane. The northbound Silver Avenue approach is a shared through, left, and right-turn lane with enough space for right-turning vehicles to pull up alongside vehicles waiting to turn left. The Silver Avenue and 200<sup>th</sup> Street approaches are skewed 20-30 degrees.

The Lane Avenue intersection is a three-leg intersection. The eastbound and westbound TH 7 approaches consist of a through lane and a two-way left-turn lane. The northbound Lane Avenue approach has no striping but operates as a shared left and right-turn lane with enough space for right-turning vehicles to pull up alongside vehicles waiting to turn left. The Lane Avenue approach is skewed 12 degrees. There are five driveways near the intersection on the north side of TH 7, including one directly across from Lane Avenue.

Main Street, Silver Avenue, and 200<sup>th</sup> Street are classified as minor collectors. Lane Avenue is classified as a local street. The Main Street intersection is located within the 60-mph rural Western Segment and the remaining two intersections are located within the 45-mph urban Silver Lake Segment. Main Street has a posted speed of 30 mph. Silver and Lane Avenues have a speed limit of 30 mph. 200<sup>th</sup> Street has a posted speed limit of 55 mph with 25-mph advised horizontal curves close to the approach. Main Street, Silver Avenue, and Lane Avenue serve as access to local residences and municipal properties, as well as serving as routes to downtown Silver Lake. 200<sup>th</sup> Street serves as access to properties near Swan Lake, local residences, and farmsteads northwest of Silver Lake. The land use surrounding the intersections consists of low density residential and commercial properties.

### Alternatives Analyzed

Traffic control alternatives were analyzed for the intersections of TH 7 with Main Street, Silver Avenue/200<sup>th</sup> Street, and Lane Avenue. The three intersections were analyzed together and alternatives were developed for the intersections as a whole. The following alternatives were considered at the study intersections:

- No-Build Alternative – Existing Geometrics and Traffic Control: Assumes that the existing geometrics of the three intersections are not changed and the intersections continue to be controlled by side-stop control.



## TH 7 SAFETY ASSESSMENT REPORT

### Intersection Control Evaluations

- Alternative No. 1 – Conflict Point Reduction: The number of conflict points at the Silver Avenue/200<sup>th</sup> Street intersection will be reduced by converting the northbound approach to a Right-in Right-out (RIRO) intersection using raised median. The northbound through and left-turn movements, the southbound through movement, and the westbound left-turn movement will be eliminated. These movements will be directed to the Main Street intersection, which will remain full access. An offset right-turn lane will be constructed on the westbound TH 7 approach to improve sight lines for minor street vehicles.



TH 7 & Silver Lake Intersections – Alternative No. 1



## TH 7 SAFETY ASSESSMENT REPORT

### Intersection Control Evaluations

- Alternative No. 2 – Traffic Signal at Silver Avenue/200th Street and RIRO Intersection at Main Street and Lane Avenue: A traffic signal will be installed at the Silver Avenue/200th Street intersection. The number of conflict points at the Main Street and Lane Avenue intersections will be reduced by eliminating most movements using a raised median, leaving only right-turns entering and exiting the minor leg. Eliminated movements to and from the minor legs are directed to the signal at the Silver Avenue/200th Street intersection.



TH 7 & Silver Lake Intersections – Alternative No. 2



## TH 7 SAFETY ASSESSMENT REPORT

### Intersection Control Evaluations

- Alternative No. 3 – Roundabout at Silver Avenue/200th Street and RIRO Intersection at Main Street and Lane Avenue: A single lane roundabout would be installed at the Silver Avenue/200<sup>th</sup> Street intersection. Like Alternative No. 2, the number of conflict points at the Main Street and Lane Avenue intersections will be reduced by eliminating most movements using a raised median, leaving only right-turns entering and exiting the minor leg. Eliminated movements to and from the minor legs are directed to the roundabout at the Silver Avenue/200<sup>th</sup> Street intersection.



**TH 7 & Silver Lake Intersections – Alternative No. 3**

### Intersection Control Evaluation Findings

The following findings were concluded from analysis of the study intersections:

- The warrant analysis concluded neither a traffic signal, an all-way stop, nor a roundabout was warranted at any of the study intersections for both COVID-19 adjusted 2020 and forecast year 2040 traffic conditions.
- The crash analysis concluded while there are no statistically significant safety concerns at any of the study intersections, all the build alternatives had a net positive impact on safety. Alternative No. 2 had the greatest reduction in potential crashes at an approximately 60% reduction, followed by Alternative No. 3 at approximately 55%, Alternative No. 1 at approximately 25%. The proposed safety improvements all have a high potential



## TH 7 SAFETY ASSESSMENT REPORT

### Intersection Control Evaluations

to reduce the number of angle crashes and help negate the effects of the skewed intersection geometry.

- The capacity analysis for the No-build scenario resulted in the intersections operating at LOS A overall and LOS C or better for all approaches for both the 2020 and 2040 traffic volumes. There are no significant delay or queueing issues. The build alternatives all operate at LOS A overall for all intersections. Alternative No. 3 performs the best with all approaches operating at LOS A, followed by Alternative No. 2 with approaches operating at LOS B or better, then Alternative No. 1 with approaches operating at LOS C or better.
- The benefit-cost analysis concluded that Alternative No. 1 was the only build alternative to achieve a benefit-cost ratio greater than the threshold of 1.00, at 1.55. Alternatives No. 2 and No. 3 had negative benefit-cost ratios of -1.15 and -2.82, respectively, indicating an overall financial disbenefit to road users.

## 3.2 TRUNK HIGHWAY 7 & COUNTY ROAD 15

### Existing Intersection Characteristics

The existing intersection of TH 7 with CR 15 operates under minor-leg side-stop control.

The study intersection is a four-leg intersection. The eastbound and westbound TH 7 approaches consist of two through lanes with left and right turn lanes. The northbound CR 15 approach is a shared through and left-turn lane and a right-turn lane. The southbound CR 15 approach has no striping but operates as a single lane approach for all movements. There is one driveway/farm entrance within 250 feet of the intersection on the northbound approach of CR 15.

The southern leg of CR 15 is classified as a minor collector and the northern leg of CR 15 is classified as a local road. The intersection is located within the 60-mph Eastern Segment of TH 7. CR 15 has a speed limit of 55 mph. The northern leg of CR 15 is a gravel-surfaced road. CR 15 to the north serves farmsteads. CR 15 to the south serves as access to farmsteads and local businesses and provides a connection from TH 7 to the City of Glencoe. Land use surrounding the intersection consists of agricultural and low-density commercial properties.

### Alternatives Analyzed

Traffic control alternatives were analyzed for the study intersection. The following alternatives were considered:

- No-Build Alternative – Existing Geometrics and Traffic Control: Assumes that the existing geometrics of the study intersection are not changed and the intersection continues to be controlled by side-stop control.



## TH 7 SAFETY ASSESSMENT REPORT

### Intersection Control Evaluations

- Alternative No. 1 – Eliminate TH 7 Right Turn Lanes: The number of TH 7 lanes for CR 15 left-turning and through vehicles to cross will be reduced by eliminating the right-turn lanes on the eastbound and westbound approaches. The outermost through lanes will be converted to shared through-right turn lanes. This increases the opportunities for crossing vehicles to complete their movements by shortening the distance required to travel, thus decreasing the gap required to complete their movement.



**TH 7 & CR 15 Intersection – Alternative No. 1**



## TH 7 SAFETY ASSESSMENT REPORT

### Intersection Control Evaluations

- Alternative No. 2 – Eliminate Westbound Right, Offset Eastbound Right: The number of TH 7 lanes for CR 15 left-turning and through vehicles to cross will be reduced by eliminating the westbound right-turn lane and offsetting the eastbound right turn lane. The outermost westbound through lane will be converted to shared through-right turn lane. The eastbound right-turn lane will be maintained but offset to better serve TH 7 traffic turning onto southbound CR 15. The offset right-turn lane will be separated by a median. This increases the opportunities for crossing vehicles to complete their movements by shortening the distance required to travel, thus decreasing the gap required to complete their movement. The offset right-turn lane also improves sight lines for minor street vehicles.



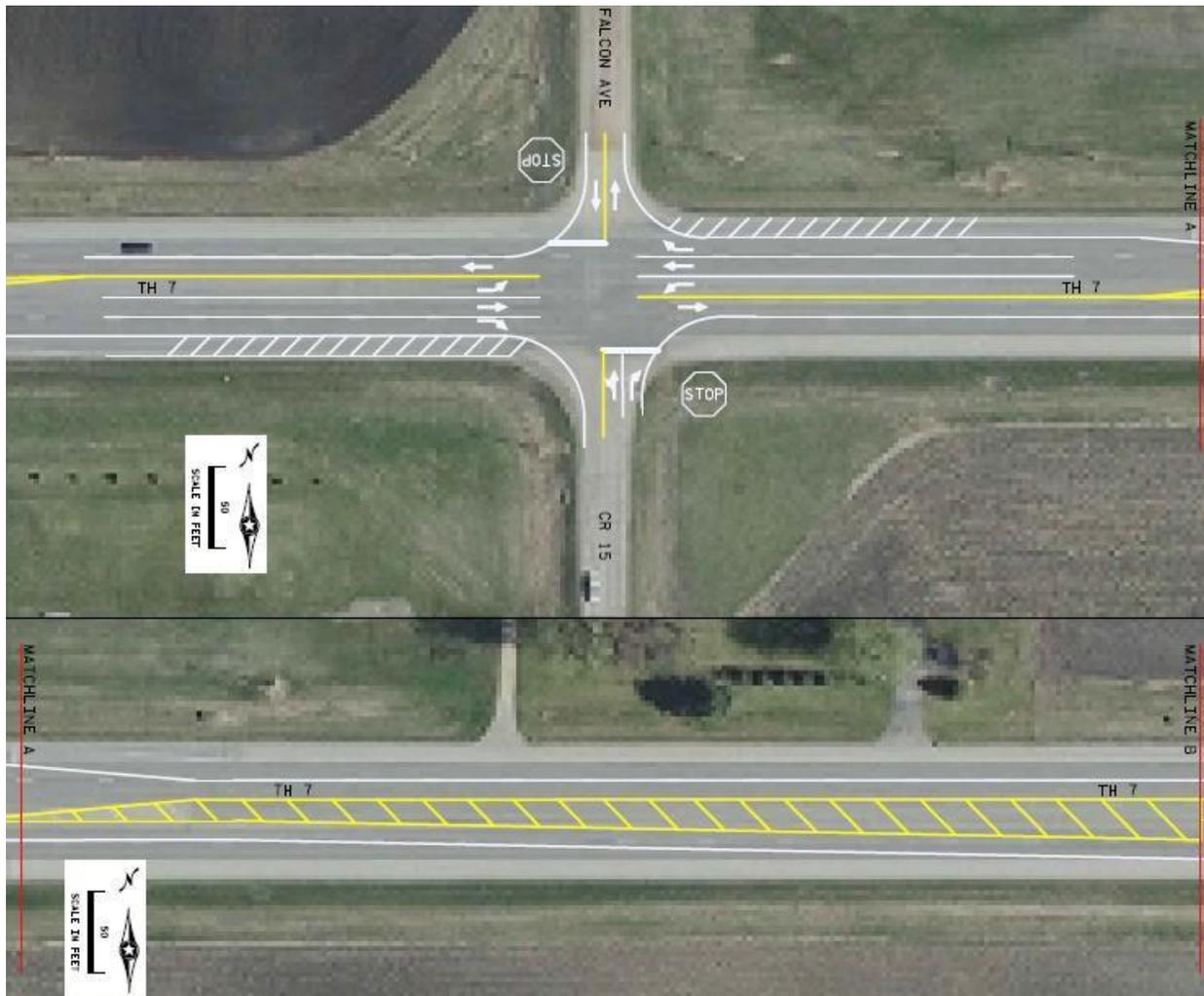
TH 7 & CR 15 Intersection – Alternative No. 2



## TH 7 SAFETY ASSESSMENT REPORT

### Intersection Control Evaluations

- Alternative No. 3 – Shift Passing Lane Section East: The number of TH 7 lanes for CR 15 left-turning and through vehicles to cross will be reduced by shifting the five-lane passing lane section of TH 7 to the east. The new passing lane section would begin 500 feet east of CR 15 and requires approximately one mile of pavement widening. This reduces the number of through lanes from two to one in each direction, shortening the distance required to travel. Additionally, this build alternative updates the transition taper lengths of the passing lane section to meet current MnDOT design standards.

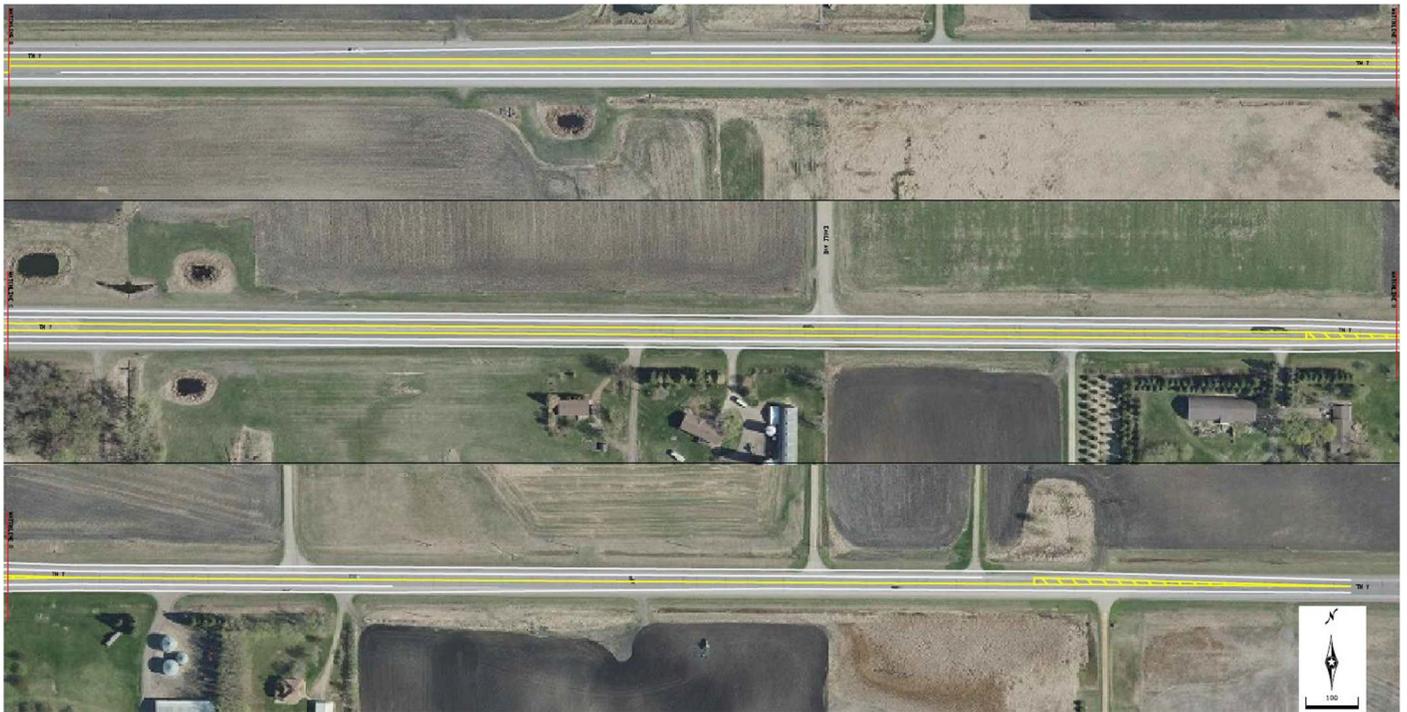


TH 7 & CR 15 Intersection – Alternative No. 3, Intersection and East Approach



## TH 7 SAFETY ASSESSMENT REPORT

### Intersection Control Evaluations



#### TH 7 & CR 15 Intersection – Alternative No. 3, Passing Lane Section to the East

#### Intersection Control Evaluation Findings

The following findings were observed from the analysis of the study intersection:

- The warrant analysis concluded that neither a traffic signal, an all-way stop, nor a roundabout was warranted at the study intersection for both COVID-19 adjusted 2020 and forecast year 2040 traffic conditions.
- The crash analysis concluded that while there are no statistically significant safety concerns at the study intersection, Alternative No. 2 had the greatest reduction in potential crashes at an approximately 25% reduction. The reduction in crashes due to the crossing distance reduction under all build alternatives was unable to be determined and was excluded from crash reduction calculations. This safety improvement was still given consideration in the final alternative recommendations. The proposed safety improvements have a high potential to reduce the number of angle crashes, which are one of the most dangerous types of intersection crash.
- The capacity analysis for the No-build scenario resulted in the intersections operating at LOS A overall and LOS B or better for all approaches for both the 2020 and 2040 traffic volumes. There are no significant delay or queueing issues. All the build alternatives are anticipated to operate similarly.



## TH 7 SAFETY ASSESSMENT REPORT

### Intersection Control Evaluations

- The benefit-cost analysis concluded that Alternative No. 2 was the only build alternative to achieve a benefit-cost ratio greater than the threshold of 1.00, at 1.47. Alternatives No. 1 and No. 3 had both had negative benefit-cost ratios of -0.10 indicating an overall disbenefit to road users.

### 3.3 TRUNK HIGHWAY 7 & COUNTY ROAD 9

#### Existing Intersection Characteristics

The existing intersection of TH 7 with CR 9 operates under minor-leg side-stop control.

The study intersection is a four-leg intersection. The eastbound and westbound TH 7 approaches consist of a through lane with left and right turn lanes. The southbound CR 9 approach is a single lane approach for all movements. The northbound CR 9 approach is a shared through and left-turn lane and a right-turn lane. There are two driveways/farm entrances within a 250-foot radius of the intersection and a total of five entrances within 500 feet of the intersection.

CR 9 is classified as a major collector. The intersection is located within the 60-mph Eastern Segment of TH 7. CR 9 has a speed limit of 55 mph. CR 9 to the north serves farmsteads and local businesses as well as an alternate route to the City of Winsted 3.5 miles north of the study intersection. CR 9 to the south serves as one of the primary routes to the City of Lester Prairie in conjunction with Babcock Avenue/CR 1, serves as access to farmsteads, and ultimately connects with US Route 212 in the City of Plato. Land use surrounding the intersection consists of agricultural and low-density commercial properties.

#### Alternatives Analyzed

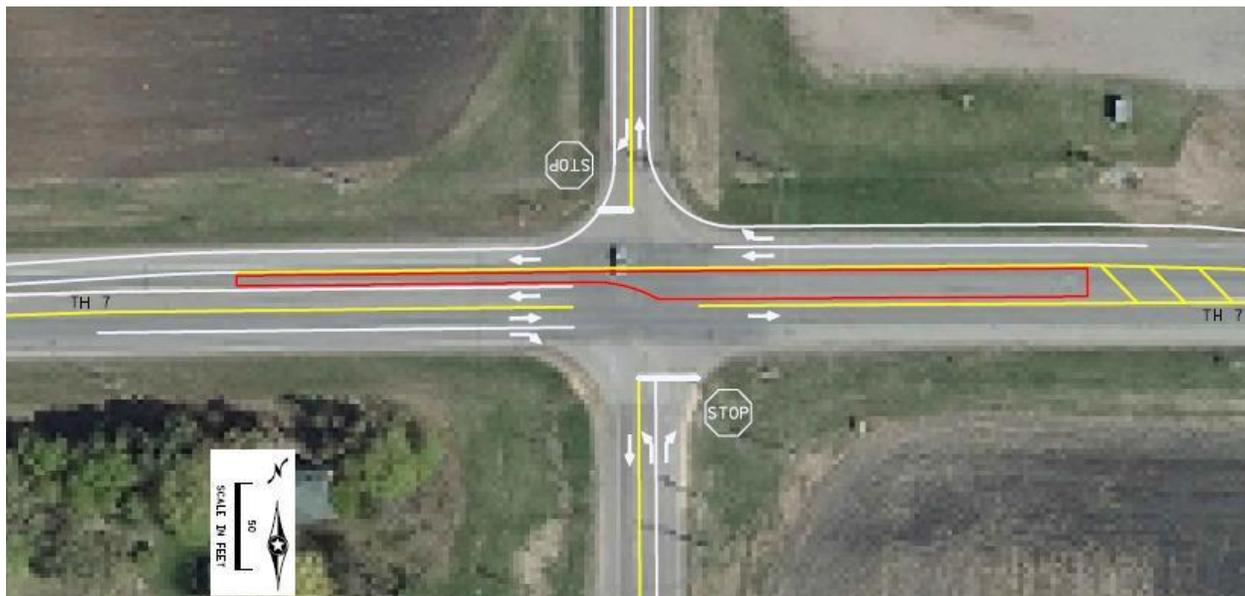
Traffic control alternatives were analyzed at the study intersection. The following alternatives were considered:

- No-Build Alternative – Existing Geometrics and Traffic Control: Assumes that the existing geometrics of the study intersection are not changed and the intersection continues to be controlled by side-stop control.
- Alternative No. 1a – Modified 'Green-T' intersection + RIRO, Option 1: The number of conflict points at the study intersection will be reduced by converting the intersection to a modified 'Green-T' intersection for the northbound approach and a RIRO intersection for the southbound approach. This eliminates several movements using a raised median, including the westbound left-turn, the eastbound left-turn, the northbound through, and the southbound through and left-turn. Eliminated movements are rerouted to the Babcock Avenue/CR 1 proposed roundabout one mile to the west.



# TH 7 SAFETY ASSESSMENT REPORT

## Intersection Control Evaluations



**TH 7 & CR 9 Intersection – Alternative No. 1a**

- Alternative No. 1b – Modified 'Green-T' intersection + RIRO, Option 2: The lane configuration and traffic control of this build alternative is identical to Alternative No. 1a, however an additional median island separates the northbound to westbound left-turning traffic instead of a paint stripe.



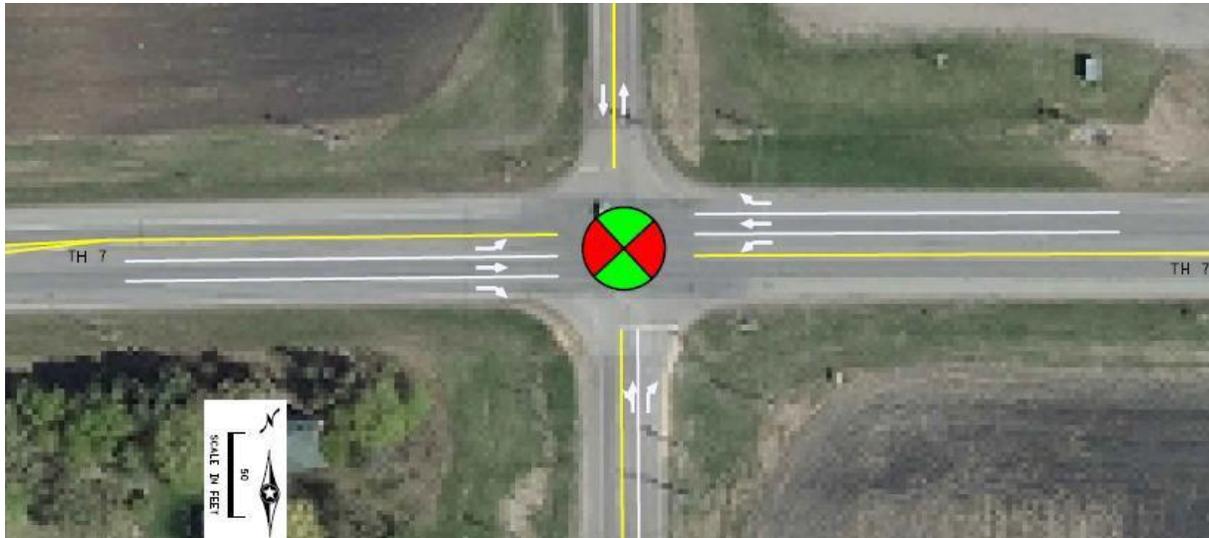
**TH 7 & CR 9 Intersection – Alternative No. 1b**



## TH 7 SAFETY ASSESSMENT REPORT

### Intersection Control Evaluations

- Alternative No. 2 – Traffic Signal Control: A traffic signal would be installed at the study intersection. Lane configuration and geometry remains unchanged.



**TH 7 & CR 9 Intersection – Alternative No. 2**

- Alternative No. 3 – Roundabout Control: A single lane roundabout would be installed at the study intersection. All the approaches will be constructed as a single lane with the through, left, and right-turning movements sharing the same lane.



**TH 7 & CR 9 Intersection – Alternative No. 3**



## TH 7 SAFETY ASSESSMENT REPORT

### Intersection Control Evaluations

#### Intersection Control Evaluation Findings

The following findings were observed from the analysis of the study intersection:

- The warrant analysis concluded that neither a traffic signal, an all-way stop, nor a roundabout was warranted at the study intersection for both COVID-19 adjusted 2020 and forecast year 2040 traffic conditions.
- The crash analysis concluded that there are no statistically significant safety concerns at the study intersection. All the build alternatives had a net positive impact on safety. Alternative No. 3 had the greatest reduction in potential crashes at an approximately 88% reduction, followed by Alternative No. 2 at an approximately 38% reduction, then Alternative No. 1a/1b at an approximately 19% reduction. The benefit created from crash reduction under Alternatives 1a/1b was outweighed by the disbenefit created due to increased travel times.
- The capacity analysis for the No-build scenario resulted in the intersections operating at LOS A overall and LOS D or better for all approaches for both the 2020 and 2040 traffic volumes. There are no significant delay or queueing issues. Alternative No. 1a/1b operates at LOS A overall and operates at LOS A for all approaches. Capacity analysis for Alternative No. 2 and Alternative No. 3 was omitted in accordance with MnDOT ICE guidance that dictates if the warrant analysis concludes that a traffic signal, all-way stop, or roundabout is not warranted, then a capacity analysis of those alternatives should not be conducted to avoid over-analysis.
- The benefit-cost analysis concluded that none of the build alternatives achieved a benefit-cost ratio greater than 1.00. Alternatives No. 1a, No. 1b, No. 2, and No. 3 had negative benefit-cost ratios of -17.80, -13.24, -3.82, and -2.71 respectively, indicating an overall economic disbenefit to road users.

### 3.4 TRUNK HIGHWAY 7 & COUNTY ROAD 2/92

#### Existing Intersection Characteristics

The existing intersection of TH 7 with CR 2/CR 92 operates under minor-leg side-stop control.

The study intersection is a four-leg intersection. The eastbound and westbound TH 7 approaches consist of a through lane with left and right turn lanes. The northbound CR 92 approach is a single lane approach for all movements. The southbound CR 2 approach is a shared through and left-turn lane and a right-turn lane. There is one driveway entrance within 250 feet of the intersection on the southbound approach of CR 2. The intersection of Century Lane, a local residential street, and CR 92 is approximately 375 feet south of the study intersection.



## TH 7 SAFETY ASSESSMENT REPORT

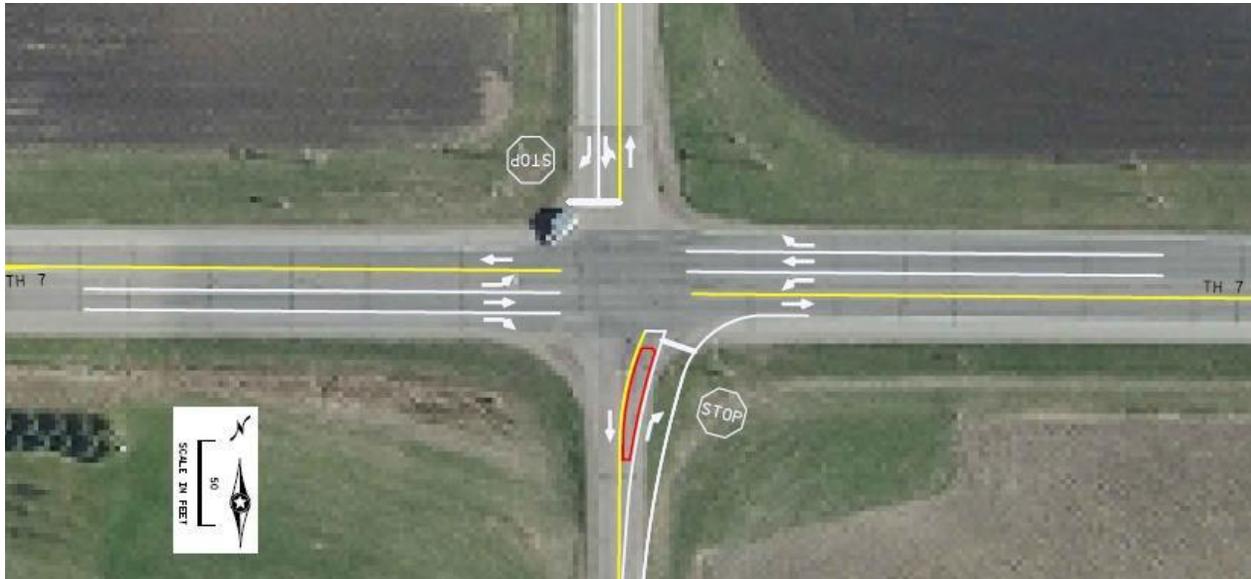
### Intersection Control Evaluations

CR 2 and CR 92 are classified as major collectors. The intersection is located within the 60-mph Eastern Segment of TH 7. CR 2 and CR 92 have a speed limit of 55 mph. Just south of the study intersection, CR 92 enters a winding curve section with an advisory speed of 30 mph. CR 2 to the north mainly serves farmsteads north of Silver Lake and provides a connection from TH 7 to the City of Cokato. CR 92 to the south serves residences within Silver Lake and connects with Main Street in downtown Silver Lake. Land use surrounding the intersection consists of agricultural and low-density residential properties.

### Alternatives Analyzed

Traffic control alternatives were analyzed for the study intersection. The analysis of this intersection mainly consists of a crash analysis as well as additional considerations such as right-of-way, construction cost, multimodal considerations, and transportation system considerations. The following alternatives were considered:

- No-Build Alternative – Existing Geometrics and Traffic Control: Assumes that the existing geometrics of the study intersection are not changed and the intersection continues to be controlled by side-stop control.
- Alternative No. 1 – Northbound Right-Out: The number of conflict points at the study intersection would be reduced by converting the northbound approach to right-out only using a raised median. The northbound left and through movements would be eliminated and rerouted through Silver Lake to the Grove Avenue/CR 2 intersection 0.4 miles to the west.



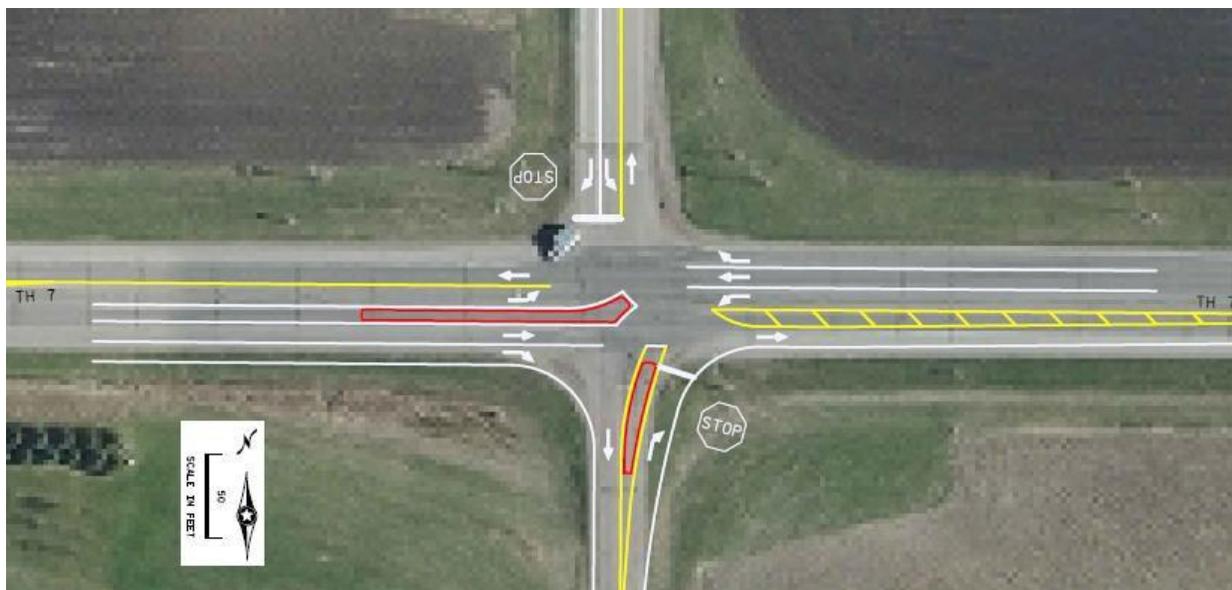
**TH 7 & CR 2/CR 92 Intersection – Alternative No. 1**



## TH 7 SAFETY ASSESSMENT REPORT

### Intersection Control Evaluations

- Alternative No. 2 – Northbound Right-Out + Median: The number of conflict points at the study intersection would be reduced further by using a right-out only northbound approach and left/right-out only southbound approach using raised medians. The northbound left, northbound through, and southbound through movements will be eliminated and rerouted through to the Grove Avenue/CR 2 intersection.



**TH 7 & CR 2/CR 92 Intersection – Alternative No. 2**

- Alternative No. 3a – ‘Green-T’ intersection + RIRO, Option 1: The number of conflict points at the study intersection would be reduced further by converting the intersection to a ‘Green-T’ intersection for the southbound approach and a RIRO intersection for the northbound approach. This eliminates several movements using a raised median, including the westbound left-turn, the southbound through, and the northbound through and left-turn. Eliminated movements are rerouted to the Grove Avenue/CR 2 intersection.



# TH 7 SAFETY ASSESSMENT REPORT

## Intersection Control Evaluations



**TH 7 & CR 2/CR 92 Intersection – Alternative No. 3a**

- Alternative No. 3b – ‘Green-T’ intersection + RIRO, Option 2: The lane configuration and traffic control of this build alternative is identical to Alternative No. 3a, however an additional median island separates the eastbound to northbound and southbound to eastbound left-turning traffic instead of a paint stripe.



**TH 7 & CR 2/CR 92 Intersection – Alternative No. 3b**



## TH 7 SAFETY ASSESSMENT REPORT

### Intersection Control Evaluations

### Crash Analysis

The study intersection experienced three crashes between 2015 and 2019. Two of the crashes were angle crashes that resulted from a TH 7 through vehicle colliding with a southbound left-turning or through vehicle. The third crash was a sideswipe crash resulting from a turning vehicle losing traction during wintry conditions and colliding with a stopped vehicle. All three crashes resulted in property damage only. The historic crash data does not suggest significant issues related to a failure to stop, a failure to yield, or vehicles selecting insufficient gaps to turn onto TH 7, however near misses between through and cross traffic have been reported informally.

A crash analysis was conducted to determine the anticipated impact that each of build alternative would have on the number of crashes at the study intersection. Crash modification factors (CMF) were obtained from the Federal Highway Administration (FHWA) nationwide Crash Modification Factor Clearinghouse. A CMF is a multiplicative factor used to calculate the anticipated number of crashes after a countermeasure is implemented. Table 7 contains the CMFs considered for each build alternative. Detailed information on each CMF used is included in Appendix F.

Table 7 – Crash Modification Factors and Anticipated Crash Reduction Ranges	
Alternative	Crash Modification Factor <sup>8</sup>
Alternative No. 1 (Northbound Right-Out)	No applicable CMF found
Alternative No. 2 (Northbound Right-Out + Median)	No applicable CMF found
Alternative No. 3a/3b (‘Green-T’ Intersection + RIRO)	Convert T Intersection into Green T - <b>0.92</b> (CMF ID: 8657) <i>(8% reduction in Angle, Rear-end, and Sideswipe Crashes)</i> Install RIRO Intersection - <b>0.55</b> (CMF ID: 9821) <i>(45% reduction in All Crashes)</i>

Installing a ‘Green-T’ intersection under Alternative No. 3a/3b has the potential to reduce the total number of angle, rear-end, and sideswipe crashes from the southbound approach of the study intersection by eight percent. Installing a RIRO intersection has the potential to reduce the total number of crashes exiting/entering the northbound approach by forty-five percent.

No applicable CMF was found for the improvements proposed in Alternative No. 1. The northbound right-out only would prohibit northbound crossing movements at this intersection, however since the crash data did not indicate any crashes occurring involving northbound vehicles, the safety benefit would be minimal.

No applicable CMF was found for the improvements proposed in Alternative No. 2. Since the southbound through crossing movement was eliminated with a median barrier like in Alternative No. 3a/3b, it was

<sup>8</sup> (Crash Modification Factors (CMF) Clearinghouse, Federal Highway Administration, 2021)



## TH 7 SAFETY ASSESSMENT REPORT

### Intersection Control Evaluations

assumed that Alternative No. 2 would experience similar crash reductions to the installation of a RIRO intersection on the northbound approach. This has the potential to reduce the total number of crashes exiting/entering the northbound approach by forty-five percent. Although the median barrier eliminates the southbound through movement, it conversely lengthens the distance that southbound left-turns must cross, which is anticipated to negatively impact the safety of that movement.

In total, Alternatives No. 2 and No. 3a/3b are estimated to reduce the number of potential crashes at the study intersection by approximately 33%. Over 20 years, if crash activity at the intersection is assumed typical, four property damage only (PDO) crashes would be prevented by the alternatives. Converting this to a monetary benefit using MnDOT crash costs by severity<sup>9</sup> where a PDO crash is equivalent to \$13,000, the safety benefit of the alternatives is approximately \$52,000. Alternative No. 1 is not anticipated to significantly reduce the number of potential crashes.

### Additional Considerations

It is anticipated that there is currently adequate right-of-way to accommodate each build alternative. Temporary easement may be required in the ditch wherever approach widening is needed.

Preliminary (conceptual level) cost estimates (in 2020 dollars) were developed for each build alternative for the purpose of this analysis. It will be necessary to revisit the cost estimates for other purposes, such as funding applications and final design. The construction estimate for Alternative No. 1 is approximately \$187,100, Alternative No. 2 is approximately \$380,000, Alternative No. 3a is approximately \$609,300, and Alternative No. 3b is approximately \$1,042,400. All the build alternatives consist of varying amounts of approach widening, median construction, permanent signing, and pavement markings and include a lighting system and temporary traffic control. Alternatives No. 3a and 3b also include a storm sewer system in their estimates. Detailed preliminary construction cost estimates are shown in Appendix F. The build alternatives will have similar operation and maintenance costs.

Currently no bike facilities exist at the study intersection. Bike volumes are not significant enough to consider dedicated bike lanes. Wide paved shoulders will be maintained for each of the build alternatives. Currently no pedestrian facilities exist at the study intersection. Pedestrian volumes are not significant enough to consider pedestrian facilities such as sidewalks or crosswalks.

The nearest major intersections to the study intersection are TH 7 & Grove Avenue/CR 2 located 0.4 miles west, and TH 7 & CR 15 located 2.5 miles east. Minimal operational interaction between nearby major intersections and the study intersection is anticipated.

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<sup>9</sup> (*Benefit-Cost Analysis for Transportation Projects*, Minnesota Department of Transportation, 2021)



## 4.0 ACCESS MANAGEMENT

### 4.1 MNDOT ACCESS MANAGEMENT CATEGORIES

According to MnDOT's Access Management Categories<sup>10</sup>, TH 7 within the project limits is considered a Category 3 Regional Corridor with a Sub-Category of A, Rural, except for within the City of Silver Lake. TH 7 within Silver Lake has a Sub-Category of B, Urban/Urbanizing. Specifically, the Access Management Category limits are as follows<sup>11</sup>:

- TH 22 to Silver Avenue/200<sup>th</sup> Street/CR 16 – 3A
- Silver Avenue/200<sup>th</sup> Street/CR 16 to Grove Avenue/CR 2 – 3B
- Grove Avenue/CR 2 to eastern McLeod County line – 3A

Both primary and sub-categories are intended to reflect the future or long-term function of the roadway, not necessarily the existing condition. Below is text from the 2008 MnDOT Access Management Manual describing Category 3 and Sub-Categories A and B assignments.

#### Category 3 – Regional Corridor

This access category is intended for Regional Corridors, which connect smaller regional trade centers to the rest of the state. Although their primary function is to provide mobility among communities, Regional Corridors may also provide direct property access in areas where a supporting local road network or hierarchical grid pattern has not been established. Regional Corridors are expected to operate at an average corridor peak-hour travel speed of 50 mph; however, posted speeds may vary as the highway passes through a community. For this reason, access management practices along these highways may vary greatly. Regional Corridors may be functionally classified as either Principal or Minor Arterials.

#### Sub-Category A – Rural

This subcategory is intended for trunk highway segments that extend through agricultural, open, or forested areas with limited development. It is also assigned to areas planned for long-term, low-density development, characterized by scattered, large-lot residential development and limited commercial or industrial use.

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<sup>10</sup> (*MnDOT Access Management Manual*, Chapter 2, Minnesota Department of Transportation, 2008)

<sup>11</sup> (*MnDOT District Category Assignments, District 8*, Minnesota Department of Transportation, 2004)



## TH 7 SAFETY ASSESSMENT REPORT

### Access Management

Highway segments outside municipalities are generally designated as Rural (Subcategory A) unless the area is undergoing or planned for urban-scale development. Highways in this subcategory are generally expected to operate at speeds of 50 mph or more; however, in areas lacking a complete supporting local road network, these highways will also be required to provide direct access to adjacent property.

Special attention should be given to transition areas on the fringe of growing municipalities where local zoning may permit urban-type development without corresponding requirements for streets and utilities. Since the private access allowance in Rural (Subcategory A) areas is more permissive than in Urbanizing (Subcategory B) areas, it is important to appropriately categorize these transition areas to maintain long-term safety and mobility goals for the corridor.

In some geographically large municipalities, full urbanization may not be anticipated within the next 20 (or more) years. Highway segments extending through areas of municipalities planned to remain rural in character are designated Rural (Subcategory A).

Figure 2 illustrates a municipal area with both a Rural (Subcategory A) segment that extends into an area which is not planned for development and an Urbanizing (Subcategory B) segment that extends into a transition area outside the city's boundary.

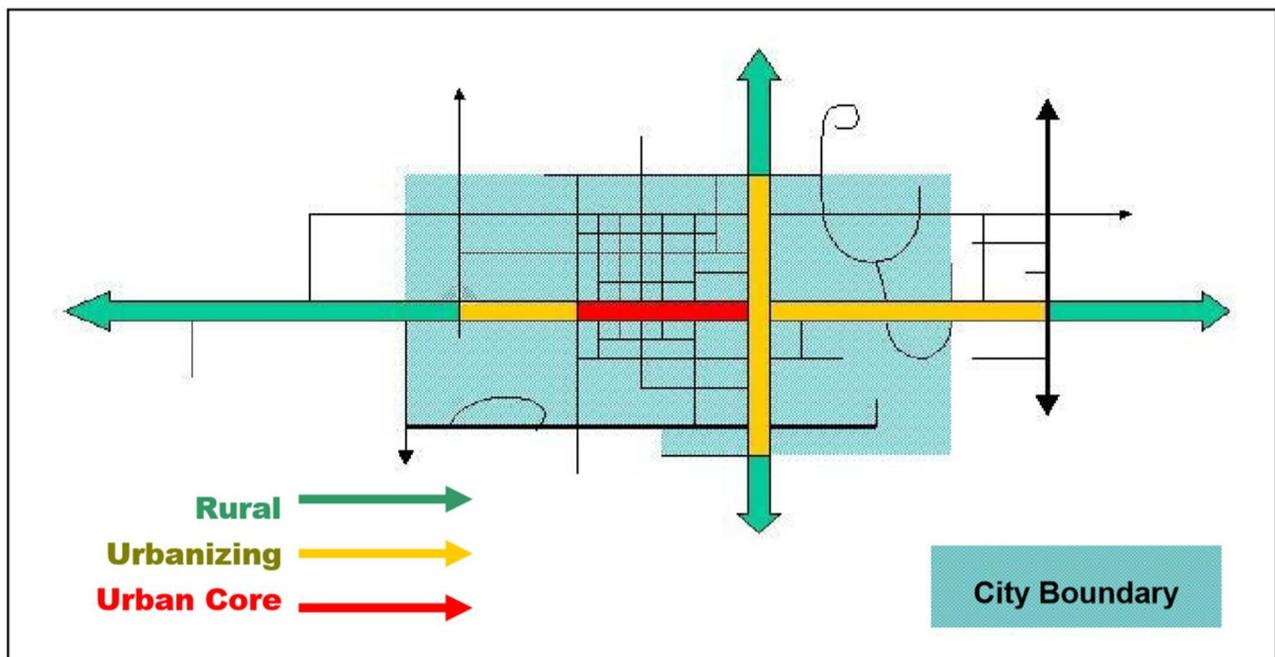


Figure 2: Category Assignments in a City



## TH 7 SAFETY ASSESSMENT REPORT

### Access Management

#### **Sub-Category B – Urban/Urbanizing**

This subcategory is intended for areas outside the urban core that are either urbanized or planned for urbanization over the next 20 years with a full range of urban services, especially a local supporting street network. These are generally highway segments within municipal boundaries or in transition areas outside municipal boundaries. Because they must serve the needs of both through-trip and local trip drivers, highways in this subcategory are generally expected to operate at a somewhat reduced speed compared to that of the corridor overall.

Urban/Urbanizing areas are of the greatest concern because of their potential impact on the highway system; however, they also provide the best opportunity for the development of a fully-connected street network. When assigning this designation, MnDOT will consider the adopted plans, development regulations, and the street extension plans and policies of the community. In transition areas where urban growth is occurring outside the municipal boundaries, MnDOT will expect the local land use authority – township or county – to manage development and to ensure that direct access to private property is available through the local road network. This subcategory is not intended for short highway segments serving individual, isolated developments.

## 4.2 MNDOT RECOMMENDED ACCESS SPACING

Chapter 3 of the MnDOT Access Management Manual<sup>12</sup> provides guidelines for the spacing of public street connections and the allowance of driveways to the state highway system for each access management category. These guidelines are based on the following principles and technical considerations:

- Network Connectivity
- Urban Arterials – Balancing Safety and Mobility through Coordinated Signal Progression
- Rural Areas – Maintaining the Historical Road Network
- Rural Areas – Providing Adequate Intersection Geometrics

Table 8, Table 9, and Table 10 list the recommended access and driveway spacing guidelines for Category 3A and 3B assignments.

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<sup>12</sup> (*MnDOT Access Management Manual*, Chapter 3, Minnesota Department of Transportation, 2008)



TH 7 SAFETY ASSESSMENT REPORT

Access Management

Table 8 - Recommended Access Spacing for Category 3 – Regional Corridors					
Category	Area or Facility Type	Typical Functional Class	Public Street Spacing		Signal Spacing
			Primary Full-Movement Intersection	Secondary Intersection	
3AF	Non-Interstate Freeway	Principal and Minor Arterials	Interchange Access Only		Interim
3A	Rural		1 mile	½ mile	N/A
3B	Urban/Urbanizing		½ mile	¼ mile	½ mile
3C	Urban Core		300-600 feet, dependent upon block length		¼ mile

Table 9 - Recommended Driveway Allowance (Spacing) for Category 3A and 3B		
Category	Area or Facility Type	Driveway Allowance
1A 2A 3A 4A 5A	Rural (Not planned for full access control)	<ul style="list-style-type: none"> <li>□ If a property retains access rights but no reasonably convenient and suitable alternative access is available, a driveway is permitted.</li> <li>□ The driveway should be located and designed to minimize the impact on the safety and operations of the highway.</li> <li>□ All driveways (Types 1, 2, and 3) should be spaced in accordance with Table 10.</li> </ul>
1B 2B 3B 4B 5B	Urban/Urbanizing	<ul style="list-style-type: none"> <li>• If a property retains access rights but no reasonably convenient and suitable alternative access is available, a driveway is permitted.</li> <li>• It is MnDOT's preference to permit public street connections rather than driveways in Urban/Urbanizing areas. Where possible, MnDOT should work with local agencies to encourage the development of a supporting road system to serve the property.</li> <li>• High-volume (Type 3) driveways should be spaced in accordance with Table 10.</li> <li>• Driveways should be permitted as interim where a future supporting street system is anticipated.</li> </ul>



**Table 10 - Spacing between Adjacent Driveways**

Posted Speed Limit (mph)	Rural (Types 1 & 2) Spacing between Adjacent Driveways (feet) <sup>(2)(4)</sup>	Rural & Urban/Urbanizing (Type 3) Spacing between Adjacent Driveways (feet) <sup>(1)(2)(3)</sup>
40	--	305
45	50	360
50	75	425
55	100	495
60	100	570
65	--	645

- (1) The Spacing between Adjacent High-Volume Driveways is based on the Stopping Sight Distance described in the AASHTO Green Book 2001 and the Mn/DOT Road Design Manual, Table 2-5.09A, but uses the posted speed of the highway instead of the design speed.
- (2) The values shown in this table may be superceded to avoid the functional area (see Section 3.4.4) of adjacent intersections and driveways, or to accommodate turn lanes for the proposed access.
- (3) The spacing between adjacent driveways is based on a level roadway without any horizontal curvature. In areas with vertical and horizontal curves, additional distance may be needed.
- (4) Spacing based on the Texas Transportation Institute "Safety of Driveways in Close Proximity to Each Other." The spacing was modeled for speeds between 45 mph and 60 mph. No data is available for posted speeds below 45 mph or above 60 mph.

### 4.3 MCLEOD COUNTY ACCESS ORDINANCES

Section 10 of the McLeod County Zoning Ordinance<sup>13</sup> lists Access Requirements for the Highway Business District. These access requirements are:

- The location of any commercial driveway from a public road shall require approval by the County Planning Commission and the Board of Commissioners with advice from the County Engineer.
- No driveway shall be located closer than 125 feet to the intersection of two public roads. This distance shall be measured from the centerline of the driveway to the edge of the right-of-way of the parallel road.
- There shall be a maximum of two access points per parcel. Access points should be located as far apart as feasible.

<sup>13</sup> (McLeod County Zoning Ordinance, McLeod County, 2021)



## TH 7 SAFETY ASSESSMENT REPORT

### Access Management

#### 4.4 EXISTING ACCESS ANALYSIS AND REVIEW

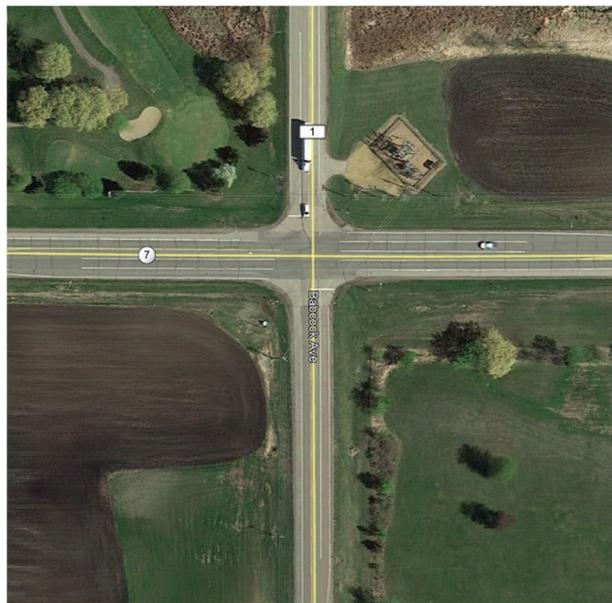
Using Google Earth, the existing number of private, public, and field entrances were counted. If a public roadway or trail access intersected TH 7 from both the north and south at a 90-degree angle it was counted as one access. If a public roadway or trail ended as a T-intersection this was also counted as one access. See Figure 3 for an example of each scenario.

Table 11 shows the number of access points per access type and MnDOT Access Management Category. The limits and posted speed for each Access Management Category along TH 7 within the project limits are as follows:

- TH 22 to Silver Avenue/200<sup>th</sup> Street/CR 16 – 3A (6.29 miles) – 60 mph
- Silver Avenue/200<sup>th</sup> Street/CR 16 to Grove Avenue/CR 2 – 3B (0.94 miles) – 45 mph
- Grove Avenue/CR 2 to eastern McLeod County line – 3A (8.91 miles) – 60 mph



The TH 7 and west junction of Major Avenue/CR 4 was counted as one public access.



The TH 7 and Babcock Avenue/CR 1 intersection was counted as one public access.

**Figure 3: Examples of Public Access**



## TH 7 SAFETY ASSESSMENT REPORT

### Access Management

Access Type	MnDOT access Management Category		Total
	Rural Regional Corridor (3A)	Urban/Urbanizing Regional Corridor (3B)	
<b>Public Roadway Access</b>	26	9	35
<b>Driveway Access</b>	90	19	109
<b>Field Drive Access</b>	31	0	31
<b>Trail Access</b>	1	0	1

The number of access points per mile is shown in Table 12. Field drives are of low concern along TH 7 due to the limited vehicular traffic that utilizes them. The public roadway density recommendations calculated from Table 8 are 2.0 accesses per mile for Category 3A and 4.0 accesses per mile for Category 3B. The driveway density recommendations for Category 3 roads calculated from Table 10 are 9.3 accesses per mile for 60 mph and 14.7 accesses per mile for 45 mph. The access density of public roads and driveways in the Category 3B portion of the study corridor exceeds MnDOT recommendations.

While the access density in the Category 3A portion does not exceed MnDOT recommendations, there are localized areas with public road or driveway spacing that does not meet the recommended spacing. For example, Major Avenue/CR 4, Lace Avenue, and Kale Avenue/CR 90 intersect TH 7 at separate east and west junctions creating two public road access points less than one-quarter mile of each other. Main Street/CR 92 also intersects TH 7 twice within the City of Silver Lake. Further analysis would be required to pinpoint access locations that do not meet MnDOT spacing recommendations. Given the scope of this safety assessment, the following general access recommendations are provided.

- Relocate accesses to side streets
- Remove unneeded accesses
- Encouraged shared driveways for adjacent properties
- Add turn lanes to public roadway accesses

Access Type	MnDOT access Management Category	
	Rural Regional Corridor (3A) Density	Urban/Urbanizing Regional Corridor (3B) Density
<b>Public Roadway Access</b>	1.7	9.6
<b>Driveway Access</b>	5.9	20.2
<b>Field Drive Access</b>	2.0	0
<b>Trail Access</b>	0.1	0



## 5.0 PUBLIC ENGAGEMENT

Effective public engagement is essential to MnDOT and their project partners. It keeps the public informed, allows the project team to listen and acknowledge concerns or aspirations, and invites public feedback on transportation decisions and outcomes. The primary method of public and stakeholder engagement for this project was through Project Management Team (PMT) and Virtual Open House meetings. The project specific Public Engagement Plan (PEP) located in Appendix G, left room for additional tools to be implemented such as targeted stakeholder or focus group meetings, but none were determined to be needed.

### 5.1 COVID-19 PANDEMIC'S IMPACT

As of March 2020 COVID-19 changed the way we interact in large groups. This has made in-person public engagement more difficult and pushed all public engagement initiatives for this project online or via mail. MnDOT did not anticipate a return to in-person gatherings prior to the completion of the study so we moved forward with meaningful and thoughtful virtual engagement. All public engagement activities were completed in a good faith effort to overcome barriers and make it as accessible as possible to everyone.

### 5.2 PROJECT MANAGEMENT TEAM

The PMT consisted of six representatives from the State and one from McLeod County. This group helped guide the project by making decisions, staying up to date on project information, and providing local knowledge. All meetings were held via an online virtual platform such as Skype, Teams, or Zoom. A list of the PMT meetings and PMT members are outlined below.

#### **PMT Meetings**

- PMT #1 – Kick-off Meeting: Review and confirm Project Management Plan, discuss internal versus external expectations for public engagement, discuss stakeholders and their level of interest and influence on decisions, and identify known access, mobility, safety, environmental and stakeholder issues. Completed on June 18, 2020.
- PMT #2 – Confirm up to five Intersections for further data collection and evaluation, review Stakeholders Map, confirm PEP. Completed on June 30, 2020.
- PMT #3 – Review Existing Conditions Memo, review stakeholder/public input received to-date, discuss upcoming Open House #1, identify intersections for ICE reporting. Completed on August 25, 2020.



## TH 7 SAFETY ASSESSMENT REPORT

### Public Engagement

- PMT #4 – Discuss input received from Open House #2, discuss final edits to Safety Report. Completed on May 21, 2021.

### PMT Members

- John Hager (MnDOT District 8 Project Manager) – Prior to March 2021
- Mofeed Issa (MnDOT District 8 Project Manager) – March 2021 to present
- Mandi Lighthizer-Schmidt (MnDOT District 8 Engagement Coordinator)
- Lindsey Bruer (MnDOT District 8 Planning Director)
- Ryan Barney (MnDOT District 8 Engineer)
- Tim McCoy (MnDOT District 8 Maintenance Supervisor)
- Jamie Ortloff (MnDOT District 8 Supervisor)
- John Brunkhorst (McLeod County Engineer)

## 5.3 VIRTUAL OPEN HOUSE

Open houses provide an opportunity for the public to learn about the project, interact with the project team, and provide their input. This project had one virtual open house and will have one virtual public comment period. A summary of each open house is below. A full summary of responses from Open House #1 are included in Appendix H. A summary of comments and responses from Open House #2 are included in Appendix H.

- Open House #1 – A GIS based online Storymap was created and housed on MnDOT's website. The Storymap showed existing conditions and asked for public participation through an online survey, interactive map, and open comment solicitation. Figure 4 shows the results of this engagement as an infographic and a full summary of survey responses can be found in Appendix H. The virtual open house was available for comment from September 24 to October 14, 2020 and was advertised in the McCloud County Chronicle on September 23, 2020 and the Hutchinson Leader on September 30, 2020.
- Open House #2 – A two-page summary of the draft safety assessment report was prepared and posted on MnDOT's website. The summary shows general intersection, general corridor, access specific, and multimodal recommendations from the study. A link to the full draft report was also provided on the website along with space for the public to comment. The public comment period was open from April 27, 2021 to May 11, 2021. An advertisement to visit the project website was advertised in the McCloud County Chronicle and the Hutchinson Leader on April 28, 2021. Targeted Facebook ads were also utilized to spread the word.





Figure 4: Open House #1 Infographic





# Highway 7 Safety Study Recommendations

Study and recommendations are available at [www.mndot.org/d8/projects/hwy7safetystudy](http://www.mndot.org/d8/projects/hwy7safetystudy)  
Comment period is April 27 – May 11, 2021

## Study Recommendations



### Intersection Recommendations

- Hwy 7 & Silver Avenue/200<sup>th</sup> Street
  - Install a right-in right-out to reduce crash points.
  - Install an offset westbound right-turn lane to improve visibility and sight lines.
- Hwy 7 & County Road 15
  - Convert the westbound right turn lane to a shared through-right lane and offset the eastbound right turn lane to shorten the number of lanes vehicles have to cross.
- Hwy 7 & Omega Avenue
  - Eliminate the eastbound bypass lane and install an eastbound left-turn to provide slowed or stopped turning vehicles a refuge.
- Hwy 7 & Memory Circle/Crow Wing Winery
  - Eliminate the eastbound bypass lane and install two eastbound left-turn lanes, one for the Crow River Winery Entrance and one for Memory Circle to provide slowed or stopped turning vehicles a refuge.



Hwy 7 & Silver Avenue/200<sup>th</sup> Street Intersection



Hwy 7 & County Road 15 Intersection

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Figure 5: Open House #2 Informational Sheet (Page 1 of 2)





# Highway 7 Safety Study Recommendations

## Study Recommendations Continued



### Corridor Recommendations

- Install centerline rumble strips
- Place advanced warning signs at roadway curves
- Where necessary, widen roadway lanes to 12 feet
- Where warranted, lengthen existing turn lanes and bypass lanes
- Replace bypass lanes with exclusive left turn lanes
- Consider left turn lanes at busy accesses



### Corridor Access Recommendations

- Relocate accesses to side streets
- Remove unneeded accesses
- Encourage shared driveways for adjacent properties



### Multimodal Recommendations

- Create painted and signed pedestrian crossings on Hwy 7 in Silver Lake
- Add sidewalk on the north side of Hwy 7 between the Dollar General and Lane Ave in Silver Lake
- Provide bicycle facilities on adjacent local roads which connect to Hwy 7 crossings and the Luce Line Trail

**Thank you**  
MnDOT and McLeod County would like to thank you for your feedback on this study

Over **700**  
People visited our virtual open house, and 40 people completed the survey.

What's next?

- Compile comments
- Finalize Report

Project Contact Information:  
Pat McGraw, Stantec Project Manager | [Pat.McGraw@stantec.com](mailto:Pat.McGraw@stantec.com) | (612) 712-2088  
Mofeed Issa, MnDOT Project Manager | [Mofeed.Issa@state.mn.us](mailto:Mofeed.Issa@state.mn.us) | (320) 214-6398



Figure 6: Open House #2 Informational Sheet (Page 2 of 2)



## 6.0 CORRIDOR MANAGEMENT RECOMMENDATIONS

The primary goal for managing the TH 7 corridor in McLeod County into the future is to improve safety for road users. This goal was developed in line with Minnesota's 'Toward Zero Deaths' (TZD) traffic safety program created to reduce traffic crashes, injuries, and deaths on all of Minnesota's roadways. The TZD team identified four focus areas known as 'The 4 E's':<sup>14</sup>

- Education – Giving drivers the knowledge they need to avoid hazardous driving practices and choose responsible behavior.
- Emergency Medical & Trauma Services – Providing fast, efficient emergency medical and trauma services to reduce fatalities and serious injuries whenever a crash does occur.
- Enforcement – Ensuring compliance with traffic laws to change driver behavior and reduce unsafe driving practices.
- Engineering – Changing the roadway (with cable median barriers, signage, the roadside, and more) to make travel safer

As future roadway projects are developed for the TH 7 corridor, safety improvements should be considered depending on the location and type of project. These improvements focus on the Engineering and Education areas of TZD. Improvements can be broken into four recommendation categories: Corridor, Intersection Control, Access Management, and Enhanced Multimodal recommendations.

## 6.1 CORRIDOR RECOMMENDATIONS

Improvements to enhance safety along the corridor were examined in this safety assessment. These recommendations were developed using the crash analysis and existing geometrics inventory. The non-geometric recommendations below are safety improvements that can be implemented outside of regularly scheduled resurfacing or reconstruction projects and do not require significant modification to roadway geometry. The geometric recommendations below are improvements that consist primarily of modifying the geometry of the corridor and should be implemented with larger resurfacing or reconstruction projects.

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<sup>14</sup> (Minnesota TZD Mission, Goals, & Values, Minnesota Towards Zero Deaths, 2021)



## TH 7 SAFETY ASSESSMENT REPORT

### Corridor Management Recommendations

#### Non-Geometric Recommendations

Edge-line and shoulder rumble strips are present in the Eastern and Western segments, respectively, however there are no centerline rumble strips present. Installing centerline rumble strips to the two segments where lane width permits is recommended to reduce oncoming crashes, which can be some of the most severe crashes. During the 2015-2019 crash analysis period, the two segments experienced a total of eight oncoming crashes, three of which resulted in fatality or serious injury. According to a CMF for the installation of centerline rumble strips, the improvement has a potential to reduce oncoming crashes by 49%.<sup>15</sup> Centerline rumble strips are required for rural highway reconstruction/resurfacing projects with a posted speed of 55-mph or greater but may also be placed as a proactive safety measure.<sup>16</sup> Detailed information on the CMF used is included in Appendix J.

There are three major horizontal curves in the Western segment of the corridor. The radii of the curves meet the current MnDOT standards for a 60-mph design speed. Although the MN MUTCD does not require advanced warning or advisory signage, the horizontal curves occur after several miles of roadway tangent and 85<sup>th</sup> percentile speeds may exceed 60-mph prior to the curves. During the 2015-2019 crash analysis period, the Western Segment experienced seven run-off-road crashes at horizontal curves, four east of Kale Avenue, and three near Omega Avenue. Placing advanced warning signs ahead of the curves and chevrons through the curves may increase alertness of drivers navigating the curve and reduce run-off-road crashes at curve locations.

#### Geometric Recommendations

The following recommendations are geometric modifications that will bring the corridor up to current MnDOT design standards:

- In the Western Segment, the through lanes should be restriped to a width of 12 feet. This will reduce the width of the shoulder to 10 feet, which meets design standards. The pavement at right-turn and bypass lanes should be widened to accommodate 12-foot lanes. Investigation needs to occur as to why they are striped at the existing widths before making changes.
- In the Silver Lake Segment, the through lanes should be restriped to a width of 12 feet. To accommodate this, the TWLTL should be reduced to a width of 13 feet and half of a foot should be reduced from each shoulder, which will still meet design standards. The pavement at right-turn lanes should be widened to accommodate 12-foot lanes.
- Throughout the corridor, existing right-turn, left-turn, and bypass lanes should be lengthened to the design standard of 300 feet for turn lanes and 250 feet for bypass lanes, plus the length needed to achieve a 1:15 taper.

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<sup>15</sup> (*Crash Modification Factors (CMF) Clearinghouse*, Federal Highway Administration, 2021)

<sup>16</sup> (*Technical Memorandum No. 17-08-T-02*, Minnesota Department of Transportation, 2017)



## TH 7 SAFETY ASSESSMENT REPORT

### Corridor Management Recommendations

- In the Eastern and Western segments, exclusive left-turn lanes should be installed to replace bypass lanes at all public roads. This provides slowing/stopped turning vehicles with refuge from through traffic and mitigates the need for through vehicles to change course to avoid turning vehicles. Left-turn lanes should also be considered at high-volume commercial attractions such as the Crow River Winery and Shadowbrooke Golf Course.

The 2016 District Safety Plan recommended the installation of a 4-foot centerline buffer in the two-lane portions of the Eastern and Western segments. This will require widening the two-lane portions of roadway by 2 feet on each side or reducing the width of the shoulders to 8 feet, which still meets design standards. The separation of the two opposing through lanes reduces the total number of oncoming crashes by approximately 50% and reduces fatal and serious injury crashes by 100%. It is recommended that centerline rumble strips are installed first, then if oncoming crashes remain prevalent, the installation of a centerline buffer should be considered.<sup>17</sup>

## 6.2 INTERSECTION CONTROL RECOMMENDATIONS

Improvements to several intersections within the TH 7 corridor were developed. The following recommendations are made outside of overall corridor recommendations and may be considered separately from corridor improvements. As noted previously, the intersection of TH 7 & Babcock Avenue/CR 1 was omitted from the safety assessment due to a planned roundabout and the intersection of TH 7 & TH 22 will be evaluated for improvements in a separate study.

Three intersections/locations were selected for detailed analysis following the ICE process. TH 7 & CR 15, TH 7 & CR 9, and the Silver Lake intersections which included Main Street/CR 92, Silver Avenue/200<sup>th</sup> Street/CR 16, and Lane Avenue were analyzed and the preferred traffic control alternatives were determined. The ICE for each location is discussed further in Section 3.0. The remaining intersections were analyzed using the crash analysis results from in Section 2.3.

### TH 7 & Silver Lake Intersections

The ICE for the Silver Lake Intersections concluded that Alternative No. 1 was the preferred build alternative and is the recommended treatment to improve safety. Alternative No. 1 consists of converting the northbound approach of the Silver Avenue/200<sup>th</sup> Street intersection to a RIRO intersection using raised median and installing an offset right-turn lane on the westbound TH 7 approach. The Main Street/CR 92 and Lane Avenue intersections will remain unchanged. This improvement reduces the number of conflict points at the Silver Avenue intersection and lessens the effect of the reduced visibility created by the skew. The improvement reduces crashes at the group of intersections by approximately 25% and minor street approaches operate at LOS C or better under 2040 traffic conditions. Angle crashes are the most likely type of crash to be reduced by this improvement. The benefit-cost analysis also indicated that the improvement is economically justified.

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<sup>17</sup> (Minnesota State Highway 23 Road Safety Audit: Technical Report, p. 40, Bolton & Menk, Inc., 2017)



## **TH 7 SAFETY ASSESSMENT REPORT**

### Corridor Management Recommendations

#### **TH 7 & CR 15**

The ICE for the TH 7 & CR 15 intersection concluded that Alternative No. 2 was the preferred build alternative and is the recommended treatment to improve safety. Alternative No. 2 consists of eliminating the westbound right-turn lane and offsetting the eastbound right turn lane with a raised median. This improvement shortens the distance required to complete a crossing movement from either of the minor approaches, thus decreasing the gap required, while also improving sight lines for northbound vehicles. The improvement reduces crashes at the intersection by at least 25%, with angle crashes being the most likely type of crash reduced. The improvement is anticipated to operate similar to the No-Build alternative, with minor street movements operating at LOS B or better under 2040 traffic conditions. The benefit-cost analysis also indicated that the improvement is economically justified.

#### **TH 7 & CR 9**

The ICE for the TH 7 & CR 9 intersection concluded that no change to the intersection control or geometry is recommended. The warrant analysis indicated that neither a traffic signal, an all-way stop, nor a roundabout was warranted at the intersection. The capacity analysis indicated that the No-build alternative operates at LOS D or better for the minor approaches under 2040 traffic conditions. While all the build alternatives provided some reduction in crashes, the benefit created from the crash reduction was outweighed by the disbenefit created due to increased travel times; none of the build alternatives were deemed economically justified.

#### **TH 7 & CR 2/CR 92**

No change to the intersection control or geometry is recommended for the TH 7 & CR 2/CR 92 intersection. While Alternatives No. 2 and No. 3a/3b provided some reduction in crashes, the benefit created from the crash reduction was outweighed by the estimated cost of the improvements; none of the build alternatives were deemed economically justified.

#### **TH 7 & Omega Avenue**

Eliminating the eastbound bypass lane and installing an eastbound left-turn lane is the recommended treatment to improve safety at the TH 7 & Omega Avenue intersection. Crash and severity rates exceed the statewide average, with most of the crashes caused by eastbound through vehicles colliding with eastbound left-turning vehicles. The left-turn lane provides slowing/stopped turning vehicles with refuge from through traffic and mitigates the need for through vehicles to change course to avoid turning vehicles.

#### **TH 7 & Memory Circle/Crow River Winery Entrance**

Eliminating the eastbound bypass lane and installing two eastbound left-turn lanes, one each for the Crow River Winery Entrance and Memory Circle, is the recommended treatment to improve safety at the two



## TH 7 SAFETY ASSESSMENT REPORT

### Corridor Management Recommendations

intersections. The spacing between the two intersections is approximately 340 feet. The left-turn lane for Memory Circle would be striped-in between the two intersections. While the crash and severity rates do not exceed the statewide average, government and public safety personnel have noted growing concerns regarding conflicts between eastbound through and eastbound left-turning vehicles. The left-turn lanes provide slowing/stopped turning vehicles with refuge from through traffic and mitigates the need for through vehicles to slow, stop, or change course to avoid turning vehicles. It is also recommended that a separate right-turn lane for the winery entrance is added to ensure that winery traffic does not use the right-turn lane at Memory Circle and continue through the intersection.

Another recommendation that was considered is to consolidate access to the winery by eliminating the driveway entrance on TH 7. Winery traffic would use the driveway entrance located on Memory Circle to access TH 7. Eliminating the eastbound bypass lane and installing a left-turn lane for Memory Circle is recommended. Further analysis and discussions with key stakeholders will be necessary if this recommendation is chosen.

### TH 7 & Kale Avenue/CR 90 (east and west junction)

The crash and severity rates for the eastern and western TH 7 & Kale Avenue intersections do not exceed the statewide average. Since there are no statistically significant safety concerns at the intersections, the installation of left-turn lanes is not immediately recommended. However, this determination does not preclude future installation of left-turn lanes as discussed in Section 6.1. Since the eastern Kale Avenue/CR 90 intersection has no existing westbound left-turn lane or bypass lane, installing a bypass lane is recommended to improve safety at the intersection.

## 6.3 ACCESS MANAGEMENT RECOMMENDATIONS

A general assessment of access management within the TH 7 corridor was performed in Section 4.0. The assessment determined there is a high number of driveway accesses within the corridor. One way to improve safety with respect to accesses is to establish a goal for access consolidation wherever possible. Reducing the number of accesses will in turn reduce the number of conflict points on the corridor in between intersections. During the 2015-2019 crash analysis period, ten crashes occurred on the corridor between vehicles entering or exiting a driveway and mainline vehicles, excluding crashes from the Crow River Winery. One of the crashes resulted in a serious injury. It is expected that reducing access points will reduce the number of driveway crashes.

Access consolidation can be accomplished by the following three methods:

- Relocate accesses to side streets – Properties adjacent to side streets should consider relocating their access point off the mainline. The side streets within the project limits usually have a lower functional classification, speed, and traffic volume.



## TH 7 SAFETY ASSESSMENT REPORT

### Corridor Management Recommendations

- Remove unneeded accesses – Properties that have multiple access points should be evaluated to determine if any of them can be removed while maintaining functionality and internal circulation of the property.
- Encouraged shared driveways for adjacent properties – Properties that have separate access points in close proximity to each other should be encouraged to connect to a single access point.

## 6.4 ENHANCED MULTIMODAL RECOMMENDATIONS

As part of the TH 7 safety assessment, multimodal transportation within the corridor was explored for potential improvements. The corridor has limited pedestrian and bicycle facilities through each segment. The corridor has wide paved shoulders but has no marked bicycle/pedestrian facilities or sidewalks.

In November 2020, MnDOT prepared a 'Pedestrian and Bicycle Scoping Recommendation Report' examining pedestrian and bike transportation from Hutchinson to Silver Lake. This report is shown in Appendix K. The study focused on facilities within the urban areas of TH 7, including the Silver Lake Segment. The study identified issues and needs at various locations, which primarily consists of pedestrian and bike crossings of the mainline to get to area businesses and the Luce Line State Trail from downtown Silver Lake. The study provided the following recommendations for the TH 7 corridor in Silver Lake:

- Provide pedestrian crossings with signs, ramps, and markings at four intersections (listed in order of priority). Access to the Luce Line trail should be provided by at least one of the proposed crossings.
  - Lane Avenue – Crossing proposed in combination with a paved sidewalk or shared-use path connection to the Luce Line trail. This intersection was indicated by the City of Silver Lake to be a frequent crossing location. Access management on the north side of TH 7 at this location should be considered in coordination with the city and local businesses to close a driveway access and accommodate a pedestrian median refuge in the TWLTL.
  - Grand Avenue/Park Avenue
  - Lake Avenue – This intersection is in the MnDOT District 8 Bicycle Plan as a local priority investment route.
  - Silver Avenue/200<sup>th</sup> Street/CR 16
- Provide sidewalk on the north side of TH 7 between Dollar General (located at the intersection of TH 7 & Silver Avenue/200<sup>th</sup> Street) and one of the pedestrian crossings, preferably Lane Avenue.



## TH 7 SAFETY ASSESSMENT REPORT

### Corridor Management Recommendations

- In coordination with the city, provide bicycle facilities on adjacent local roads such as Railroad Street between Grand Avenue and Lake Avenue, and Frank Street between Lane Avenue and Grove Avenue/CR 2. Connect these facilities to TH 7 crossings and the Luce Line trail.

In addition to the MnDOT pedestrian crossing recommendations at Lane Avenue, the crossing would benefit from the addition of a Rectangular Rapid Flashing Beacon (RRFB). The flashing indicators in addition to the pedestrian crossing signs provides greater warning and visibility, making pedestrian crossings safer.

Pedestrian and bike volume in the Eastern and Western segments are significantly lower than the volume in Silver Lake. No additional pedestrian/bike facilities are recommended in these rural segments. No other multimodal considerations, such as transit, are present within the corridor.

### 6.5 ADDITIONAL CONSIDERATIONS FROM PUBLIC ENGAGEMENT

During the virtual open houses, comments from the public and area stakeholders were gathered which describe their anecdotal concerns and considerations for the study corridor. Refer to the PEP, the Open House #1 survey results, and the Open House #2 comments and responses in Appendix G, Appendix H, and Appendix I for the additional public considerations.



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### References

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