

St. Louis County Railroad Crossing Safety Plan

Final Report

St. Louis County, Minnesota
June 13, 2024

Railroad Crossing Safety Plan

St. Louis County, Minnesota

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1 Introduction

St. Louis County owns and maintains approximately 3,000 centerline miles of county roads on which there are 122 active at-grade railroad crossings. The majority of crossings under county jurisdiction are used for transporting general freight and taconite ore via rail. Daily train counts at these crossings range from zero to 48 per day while the average daily traffic (ADT) count at these crossings ranges from 5 to nearly 10,000 vehicles per day. For the 10-year period from 2013 through 2022, there were 17 reported crashes on county roads that involved a train in St. Louis County. Three of these crashes resulted in a fatality and five resulted in an injury. The remaining crashes resulted in property damage only. While crashes at railroad crossings involving a train are rare, they have a higher likelihood of resulting in injury or death as compared to other crash types.

A common refrain in the rail safety community is that the safest crossing is no crossing at all. Therefore, the purpose of this study is to use a combination of data-driven analysis and engagement with highway-rail grade crossing stakeholders to identify and prioritize suitable candidates for crossing closure and grade separation. The end goal of the study is a list of recommended crossing candidates for closure or grade separation with preliminary layouts and cost estimates to be used for further discussions with local municipalities on the feasibility of implementation.

Figure 1-1. Center Line Road, CR 694 (#251928Y)

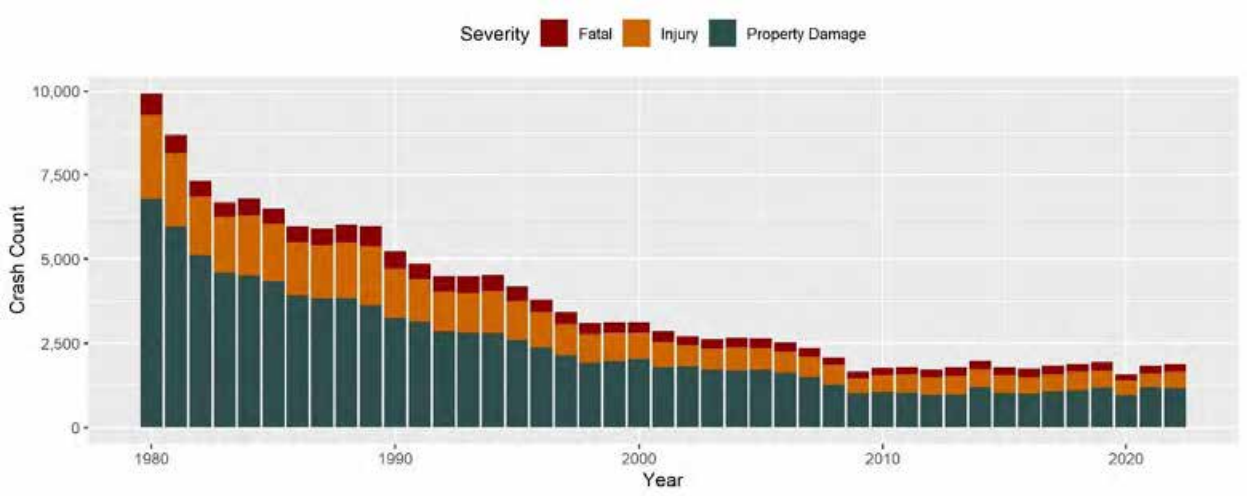
This crossing was the site of the most recent grade crossing crash in January 2023. A vehicle pulled in front of an oncoming train resulting in the death of the driver. The crossing is controlled by a STOP sign and has unrestricted sight distance when stopped at the STOP sign. This type of crossing has the greatest percentage of crashes at crossings on county roads in St. Louis County involving a train.



1.1 Crash History and Crossing Closures

A review of crash[1] data from the Federal Railroad Administration (FRA) shows a sharp decline in accidents and incidents at grade crossings over the past few decades (Figure 1-2). The number of annual highway-rail crashes fell by approximately 80 percent between 1980 and 2022. In part, this was due to a series of railroad mergers and consolidations beginning in the 1980s which led to the discontinuation or abandonment of many unprofitable rail lines. This trend, in combination with the steady closure of grade crossings, led to an overall decrease in the number of grade crossings nationally over this time period.

Figure 1-2. U.S. Crossing Crashes by Severity (1980-2022)



Source: FRA Accident Data as Reported by Railroads.

Figure 1-3 shows the total number of crashes at U.S. crossings compared to the number of grade crossing currently open at the end of each calendar year. Nationwide, the number of grade crossings has been reduced from over 200,000 in 1980 to approximately 135,000 in 2022. However, the year-to-year reduction in grade crossings began to plateau in 2010. In the last 10 years, there has been little to no reduction in grade crossings in the U.S. At the same time, the reduction in annual grade crossing crashes also began to plateau, highlighting an apparent correlation between grade crossing elimination and crash reduction. This is a pattern that is also seen at the state level (Figure 1-4) and at the county level (Figure 1-5).

By the year 2000, many of the “low hanging fruit” crossing closure projects had already been implemented. While the installation of gates and lights at crossings has continued, it has not had an apparent impact on reducing the total number of crashes. St. Louis County recognizes the effectiveness of crossing closures and grade separation and seeks to identify good closure and grade separation candidates through this study.

[1] FRA uses the terminology “accident/incident” to describe collisions between rail and highway users. This report uses the term “crash” for consistency with modern traffic safety practice.

Figure 1-3. U.S. Crossing Crashes and Grade Crossings (1980-2022)

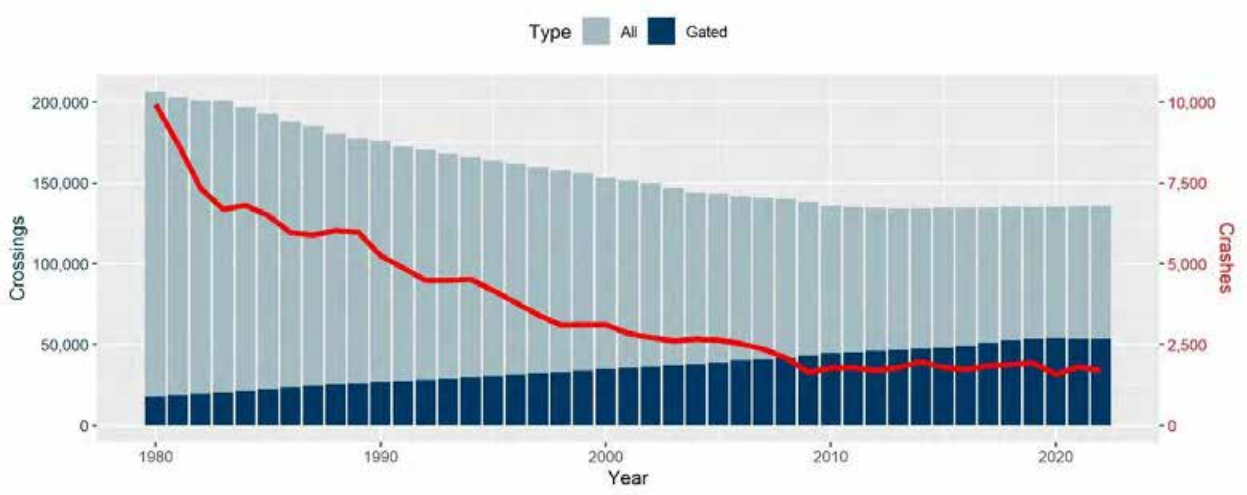


Figure 1-4. Minnesota Crossing Crashes and Grade Crossings (1980-2022)

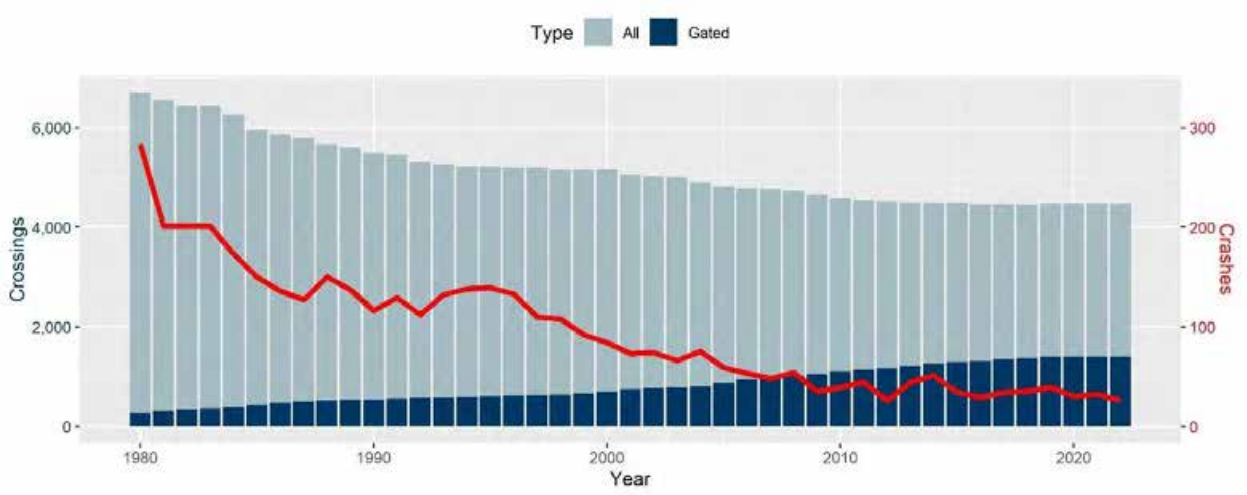
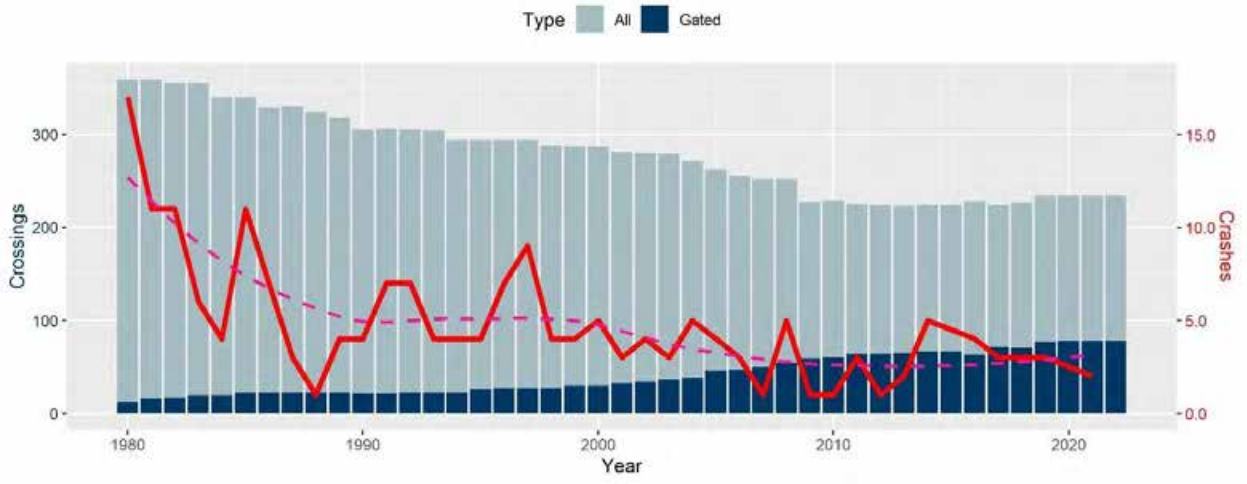


Figure 1-5. St. Louis County Crossing Crashes and Grade Crossings (1980-2022)*

* All Roads



1.2 Alignment with State and National Rail Safety Efforts

This study and its approach are in alignment with multiple recent grade crossing safety initiatives including the recent Minnesota Department of Transportation (MnDOT) Rail Crossing Safety Action Plan (SAP) and new federal grant programs through the Federal Railroad Administration (FRA).

MnDOT SAP

The MnDOT SAP was completed in 2022 in accordance with new requirements in the federal Infrastructure Investment and Jobs Act (IIJA). At a minimum, the IIJA required that each state identify crossings that have experienced one or more crashes in the previous five years. Additionally, each state was required to discuss specific strategies—including highway-rail grade crossing closures and grade separations—to improve the safety at crossing in the state over a four-year period.

Key analysis findings from this plan included the following:

- Crossing closures are effective but have become more difficult to implement.
- Truck-trailer crashes at crossings equipped with only crossbuck and stop or yield signs are disproportionately high in Minnesota.
- Pedestrian crashes at crossings equipped with gates and/or flashing lights are disproportionately high in Minnesota.
- More than half of all crashes at crossings equipped with only crossbucks and stop or yield signs were the result of the highway motorist not stopping or yielding to the train.

Additionally, the SAP included two goals specifically related to the focus of this study:

- **Goal 1:** Continue development and investment in reducing rail/highway conflicts, including crossing upgrades, **grade separations, and crossing closure.**
- **Goal 6:** Encourage **local roadway authority initiatives** for rail safety.

These findings and goals reinforce the goals of this safety study, specifically with its focus on reducing the potential for collisions through the implementation of crossing closures and grade separations through local initiatives and studies.

Federal Grant Programs and Transportation Funding

In recent years, the FRA and USDOT in general have acknowledged the importance of focusing on grade crossing elimination by implementing multiple grant programs and federal transportation funding changes that incentivize crossing closures. The following summarizes some of these recent programs and changes as well as long-time programs that have maintained a focus on grade crossing safety:

- **FRA Rail Crossing Elimination Grant Program (RCE):** This program was first released in November 2021. The program seeks to provide funding for grade crossing improvement projects that improve safety and improve mobility. Eligible projects include grade separations, closure, track relocation, and warning device upgrades.

- **FRA Consolidated Rail Infrastructure and Safety Improvements Program (CRISI):** The CRISI grant program was first established under the 2015 Fixing America's Surface Transportation (FAST) Act. Funding through this program is made available for a variety of rail-related projects, including grade crossing improvements, and other safety-related projects.
- **Federal Section 130 Program Changes:** One of the biggest changes for highway-rail grade crossing safety in recent years was the changes to the Federal Railway-Highway Crossings Program (Section 130) under the Bipartisan Infrastructure Law (BIL) transportation bill. This program provides funds to state DOTs for the elimination of hazards at public grade crossings. Changes to the Section 130 program under BIL include a change in the local funding match requirement from 10 percent local match to 0 percent local match and an increase in the allowable crossing closure incentive funding from $7,500 per crossing to $100,000. Note that the incentive funds still require a matching contribution from the railroad to qualify.
- **Reconnecting Communities and Neighborhoods (RCN) Program:** This is a relatively new program first initiated in 2022. The focus of the program is to provide technical assistance and funding for communities planning and construction projects aiming to connect neighborhoods back together by removing, retrofitting, or mitigating transportation barriers such as highway and railroad tracks. Example projects awarded in FY 22 included capital funding for pedestrian bridges and planning funding for community impact studies.

1.3 Project Process and Phases

This study has been conducted following a three-phase approach as outlined below:

- **Phase I – Initial Prioritization:** This first phase included a preliminary review of the crossing characteristics that could potentially be used as scoring and prioritization criteria for identifying closures and grade separations. After reviewing these characteristics and gathering feedback from a group of rail safety stakeholders[2], our team developed scoring weights and calculated a preliminary ranking of closures and grade separations.
- **Phase II – Desktop Review:** This phase began with an overall assessment of the preliminary rankings to ensure alignment with initial expectations. No single prioritization formula can account for localized, context sensitive issues and characteristics. Therefore, the top 30 crossings under each category were evaluated through additional desktop review to confirm their feasibility for closure or grade separation. A final list of proposed crossing closures and grade separations was reviewed via a workshop with rail safety stakeholders[2] to assist in finalizing the study recommendations.
- **Phase III – Final Review and Coordination:** This final phase included coordination and outreach with local municipalities[3] to further discuss the findings from the study and achieve consensus on proposed recommendations for improvements.

[2] Included representation from the two private operating railroads in St. Louis County (CN and BNSF), MnDOT Rail Office, MnDOT Traffic Safety Office, MnDOT District 1, and St. Louis County.

[3] Included townships where there was a recommended crossing closure or grade separation.

2 St. Louis County Highway-Rail Crossings

This section summarizes available information on public highway-rail grade crossings in St. Louis County based on a combination of data from the FRA and MnDOT grade crossing inventories and the FRA accident/incident database.

In total, St. Louis County contains 218 public grade crossings on all roads. This is second only to Hennepin county for the highest number of public grade crossings in a single county. Additionally, for the period between 2016 and 2020, St. Louis County tied Hennepin County for the highest number of crossing crashes with 10 over this five year period (Table 2-1).

Table 2-1. Top 10 Counties by Public Grade Crossing Count

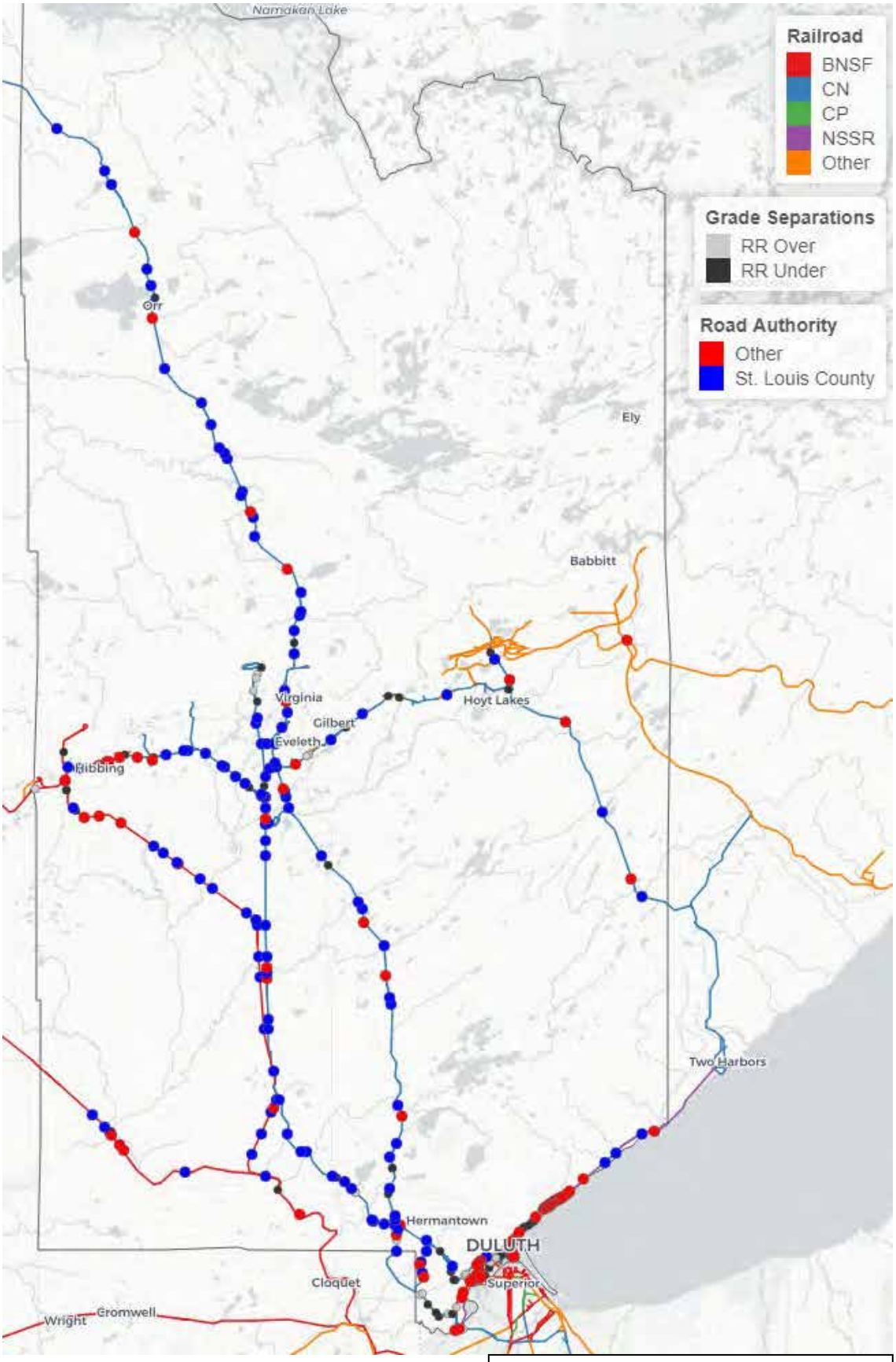
Rank	Top 10 Counties	Crossings	Crashes (2016-2020)
1	Hennepin	238	10
2	St. Louis	218	10
3	Clay	118	7
4	Polk	167	6
5	Sherburne	37	6
6	Ramsey	134	5
7	Otter Tail	111	5
8	Faribault	99	5
9	Winona	74	5
10	Steele	70	5

Of these 2019 public grade crossings, 122 of them are on roads under county jurisdiction (Table 2-2). The remaining crossings are on roads under MnDOT or local municipal jurisdiction. The locations of these crossings are shown in Figure 2-1. This figure also shows the locations of the 83 grade separated crossings in the county and identifies the railroad corridors by ownership. The primary freight railroads operating in St Louis County are Burlington Northern Santa Fe Railway (BNSF), Canadian National Railway (CN), and Canadian Pacific Kansas City Limited (CP/CPKC). The North Shore Scenic Railroad (NSSR) also operates seasonal heritage train service between Duluth and Two Harbors. Other rail operators in the area are predominantly shortline rail services connecting mining locations with port facilities in Two Harbors and Silver Bay.

Table 2-2. St. Louis Crossing by Warning Device and Jurisdiction

Warning Device	Municipal	County	State	Total
Gates and Lights	7	65	4	76
Flashing Lights Only	11	1	0	12
Passive (Stop or Yield)	73	56	1	130
Total	**91**	**122**	**5**	**218**

Figure 2-1. St. Louis County Highway-Rail Crossings



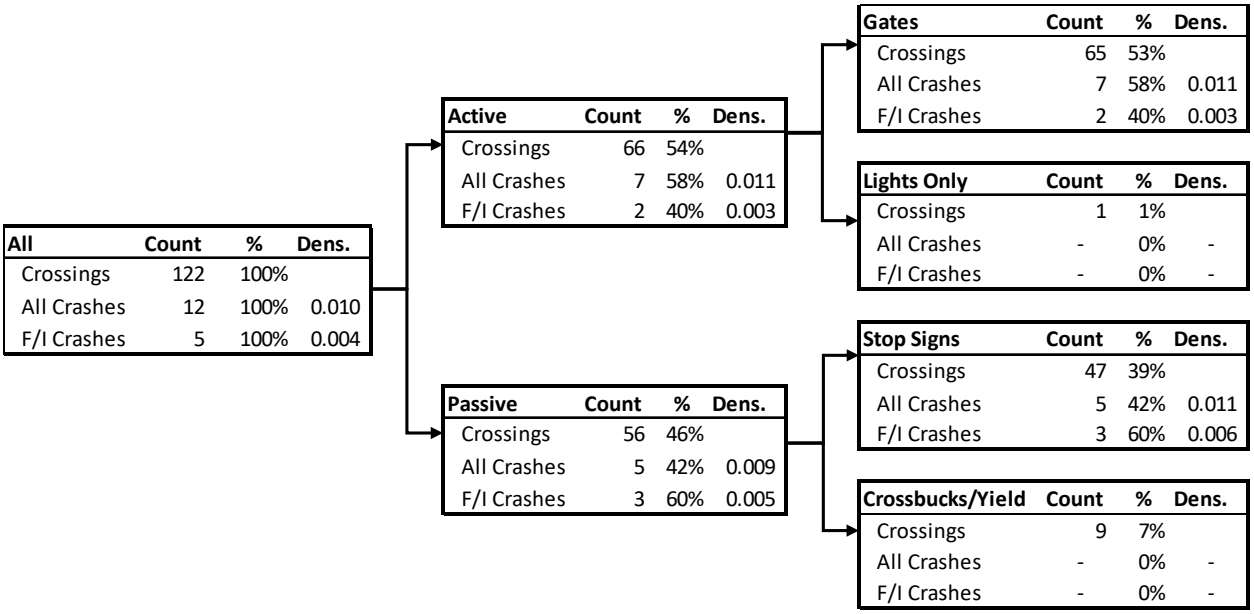
NSSR = North Shore Scenic Railroad

2.1 Crash Density

The following figures highlight the distribution of crossings and crashes by warning device type. These include active crossings equipped with automatic vehicle gates and lights ("Gates"), active crossings equipped with only flashing warning lights ("Lights Only"), and passive crossings equipped with either stop signs or a combination of crossbucks and/or yield signs. The purpose of these figures is to highlight the fact that the installation of gates and flashing lights does not guarantee that these crossings will have fewer crashes than crossing without gates and lights.

Figure 2-2 shows this distribution for crossings under St. Louis County jurisdiction. The split between active and passive crossings is close to evenly split. However, the density of crashes (i.e., crashes per crossing per year) show a slightly higher density of 0.011 at active crossings relative to the same measure at passive crossings at 0.009. While 53 percent of St. Louis County crossings under county jurisdiction are equipped with gates and flashing lights, these crossings also account for 58 percent of all highway-rail grade crossing crashes. Notably, the crash density of fatal and injury crashes at active crossings (0.003) is slightly lower than the density for passive crossings (0.005), indicating that active warning devices may have a measurable impact on the most severe crash types. Crossings with stop signs have the greatest overrepresentation of crashes. These crossing make up 39 percent of all County-owned crossings, yet 60 percent of fatal and severe injury crashes occur at these locations.

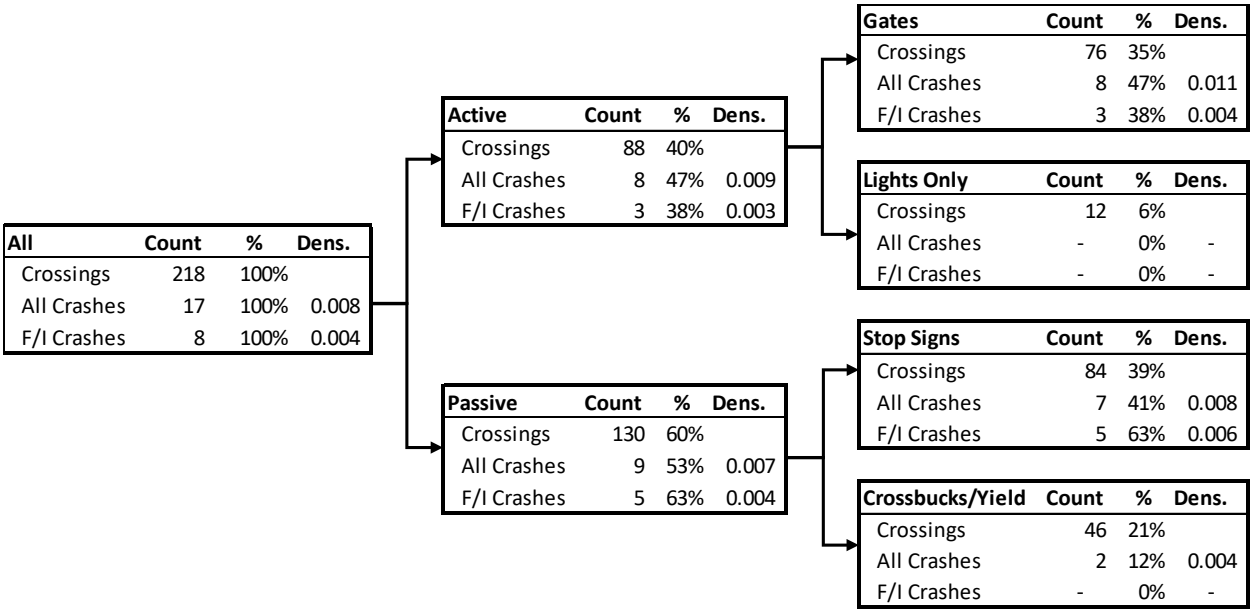
Figure 2-2. Crash/Crossing Overview (2013-2022): County-Owned Crossings



F/I: Fatal and Injury Crashes
Dens.: Crash Density (Crashes per Crossing per Year)

Figure 2-3 highlights this same information for all crossings in St. Louis County, including those not under county jurisdiction. Within this universe of crossings, there are more crossings with passive protection than with active protection (60 percent versus 40 percent). However, the crash density shows similar results to the previous figure with a density of 0.009 crashes per crossing per year at active crossings and 0.004 at passive crossings.

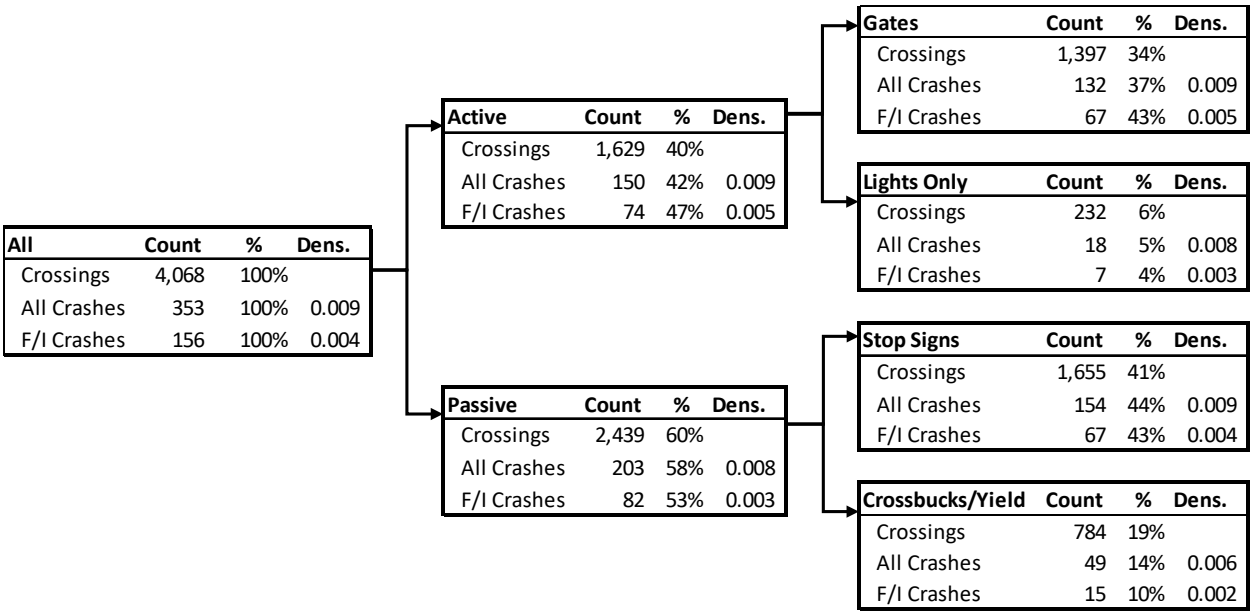
Figure 2-3. Crash/Crossing Overview (2013-2022): All St. Louis County Crossings



F/I: Fatal and Injury Crashes
Dens.: Crash Density (Crashes per Crossing per Year)

Finally, Figure 2-4 shows similar information for all public crossings in Minnesota. The overall statewide distribution is very similar to the distribution for St. Louis County with 40 percent of crossings being equipped with gates and flashing lights and the remaining 60 percent being equipped with passive protection. Likewise, the crash density between active and passive crossings is 0.009 and 0.008 respectively, showing that the density of crashes in both groupings of crossings is relatively constant. However, unlike the crossings in St. Louis County, the crossings in Minnesota as a whole show a higher crash density for fatal and injury crashes at active crossings (0.005) compared to passive crossings (0.003).

Figure 2-4. Crash/Crossing Overview (2013-2022): All Minnesota Crossings



F/I: Fatal and Injury Crashes
Dens.: Crash Density (Crashes per Crossing per Year)

2.2 Review of Key Crossing Characteristics

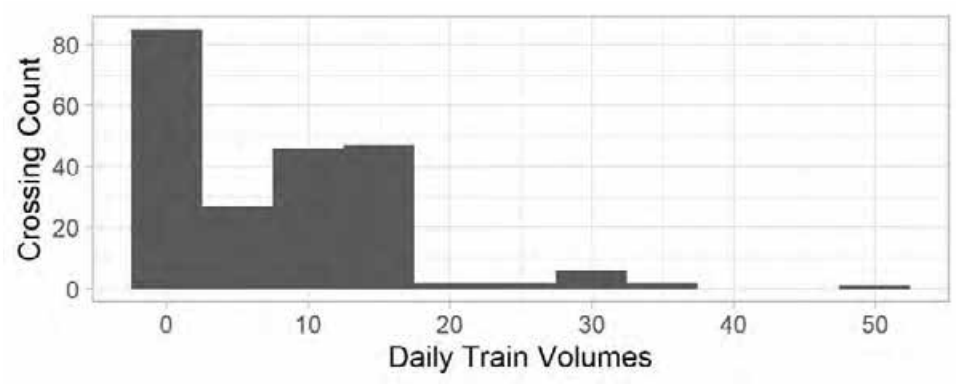
The following section provides an overview of the various crossing characteristics that were considered during this evaluation to prioritize crossing for closure and grade separation. Each characteristic was presented to a stakeholder group consisting of subject matter experts from a variety of agencies. The discussion in the following sections includes a summary of the stakeholder group's recommendations for whether each characteristic should, or should not, be included in prioritization of grade crossing closures and grade separations. Additional detail regarding the stakeholder group and the prioritization process as a whole is discussed in more detail in the next sections.

Note that the discussion of crossing characteristics in this section includes both crossings under county jurisdiction as well as crossings under municipal or state jurisdiction. This approach was used to display a complete picture of rail crossings in the county and to provide similar information to project partners. However, only crossings on the county road system were considered for proposed improvement recommendations.

Daily Train Volumes

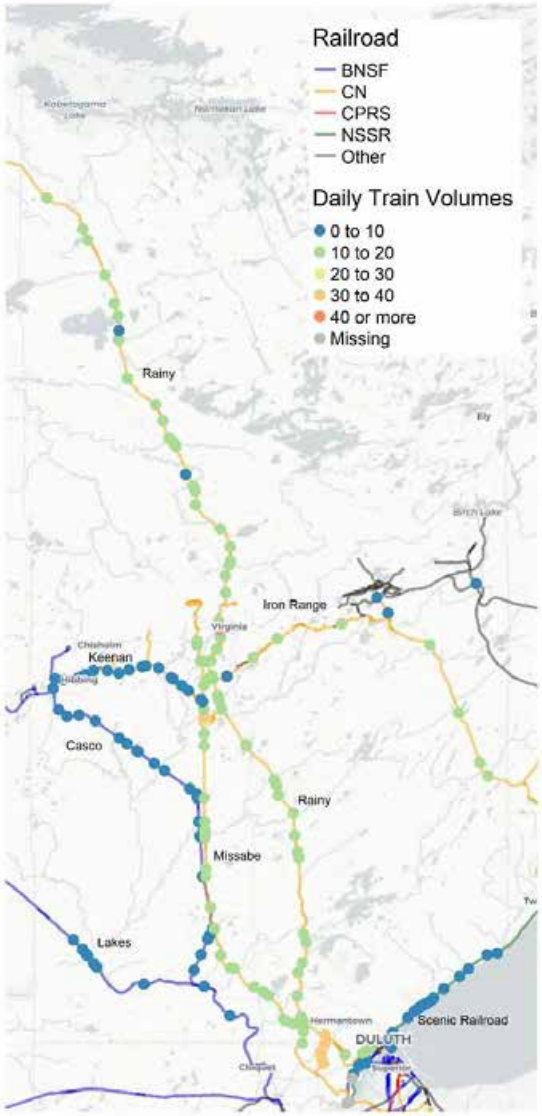
Train volumes represent the combined total of day through trains, night through trains, and switching trains from the FRA and MnDOT inventories. In St. Louis County, the highest train volumes occur on a small portion of the CN network just west of Duluth, with volumes at 30-40 trains per day. High train volumes are also seen on the CN Rainy and Missabe subdivisions, with volumes up to 20 trains per day. Train volumes on the CN Iron Range subdivision are also between 11 and 20 trains per day while train volumes on the BNSF Casco, and Lakes, and Keenan subdivisions and on the North Shore Scenic Railroad are up to 10 trains per day.

Figure 2-5. Daily Train Volumes Histogram



Higher train volumes are associated with a higher potential for collisions at rail crossings since each additional train represents another opportunity for collision with a highway user. At the stakeholder workshop, the group discussed the potential for inclusion of this characteristic in the prioritization process, but ultimately recommended that it not be included as a stand-alone metric for either closure or grade separation prioritization. The exposure index measure, which represents the product of the train volumes and the highway volumes at a crossing, was seen as a more appropriate indicator.

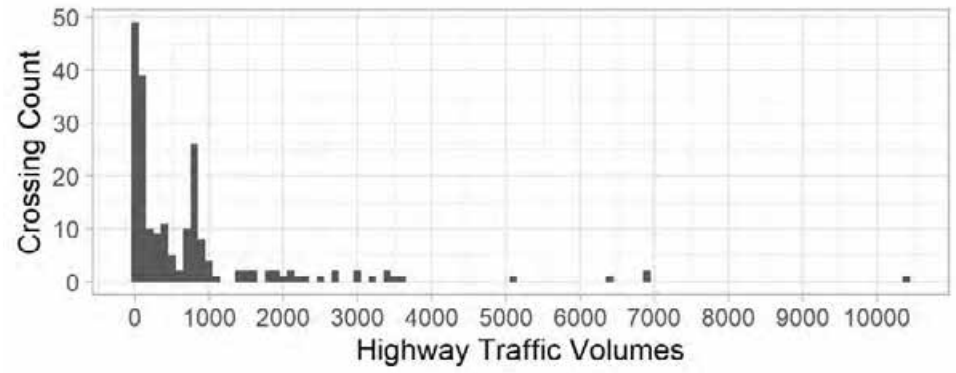
Figure 2-6. Daily Train Volumes



Highway Traffic Volumes

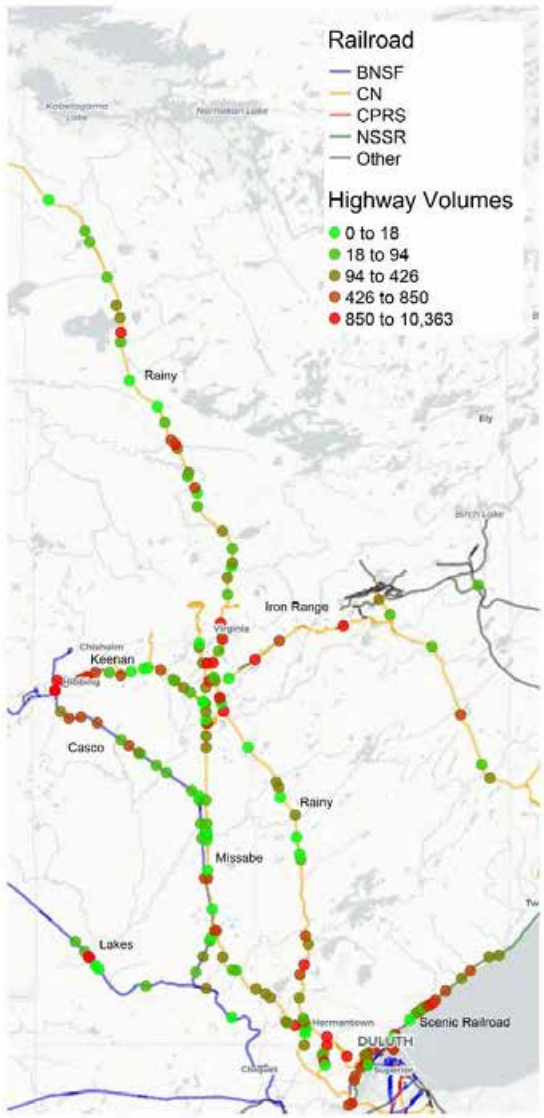
Highway volumes represent the annual average daily traffic (AADT) of highway vehicles crossing over each rail crossing. The primary data source for these volumes was the MnDOT Grade Crossing Inventory. The highest traffic volumes are at Congdon Blvd (MN61), located to the east of Duluth with 10,363 vehicles per day. The next highest volumes were at Midway Road (CSAH 13) with 6,900 vehicles per day. The majority of crossings in the county show relatively low daily traffic volumes. In total, 24 crossings showed highway traffic volumes of less than 10 vehicles per day and nearly half of all crossings showed highway traffic volumes less than 200 vehicles per day. The higher traffic volume locations are generally concentrated in the urban areas including Duluth, Hibbing, and Virginia.

Figure 2-7. Highway Traffic Volumes Histogram



Similar to train volumes, higher highway traffic volumes are associated with a higher potential for collisions at rail crossings since each additional highway vehicle represents another opportunity for collision with a train. Stakeholders at the stakeholder workshop recommended that this characteristic be included as a factor in both closures and grade separations: Low traffic volumes should be used to prioritize closures, since fewer motorists will be impacted by the closures. High traffic volumes should be used to prioritize grade separations to minimize the impacts to motorists.

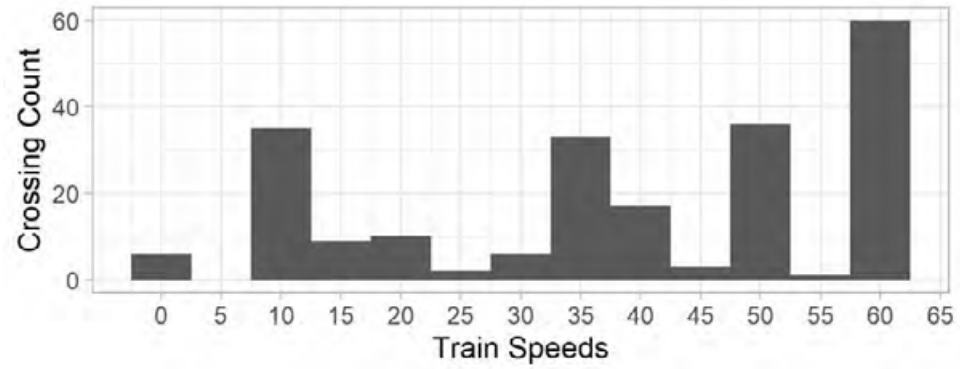
Figure 2-8. Highway Traffic Volumes



Train Speeds

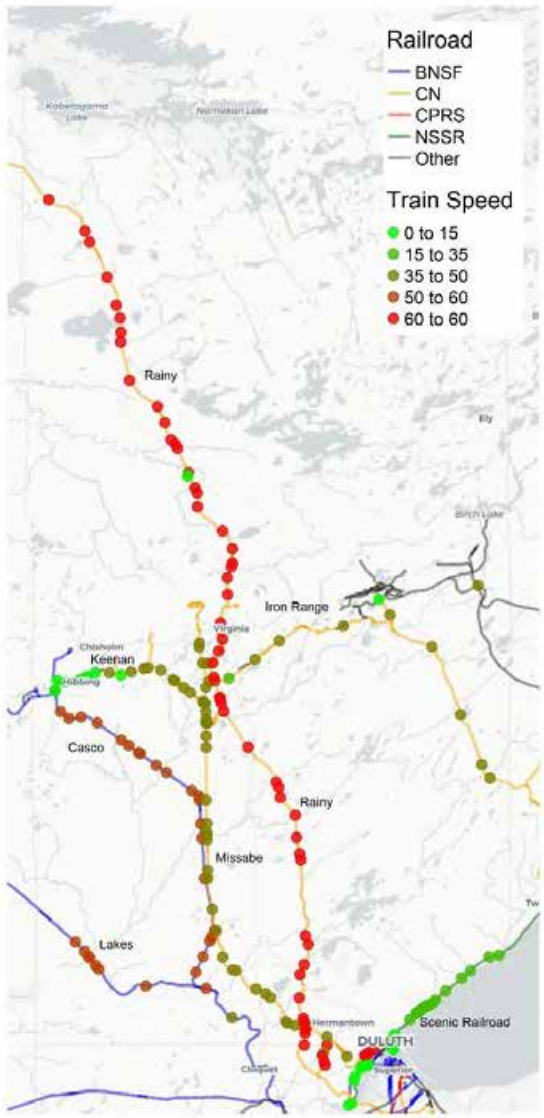
Train speeds used for this analysis represent the maximum timetable speed that trains are allowed to operate at over each crossing. The primary data source for this characteristic was the MnDOT Grade Crossing Inventory. Note that in practice, trains may operate at lower speeds for operational, safety, or other reasons. However, the maximum potential speed was used for this evaluation. Train speeds are largely clustered by subdivision: the CN Rainy subdivision has the highest train speeds at 60 mph. The BNSF Casco and Lakes subdivisions are the next highest at 50 mph. The slowest speeds are seen on the North Shore Scenic Railroad with some portions of the line at a maximum of 15 mph and other portions at a maximum of 35 mph.

Figure 2-9. Train Speeds Histogram



Collisions with higher speed trains are much more likely to result in severe injuries or fatalities due to the higher kinetic energy involved and the reduced reaction times. Given this, the stakeholder group recommended that high train speeds be included as a factor for both closures and grade separations.

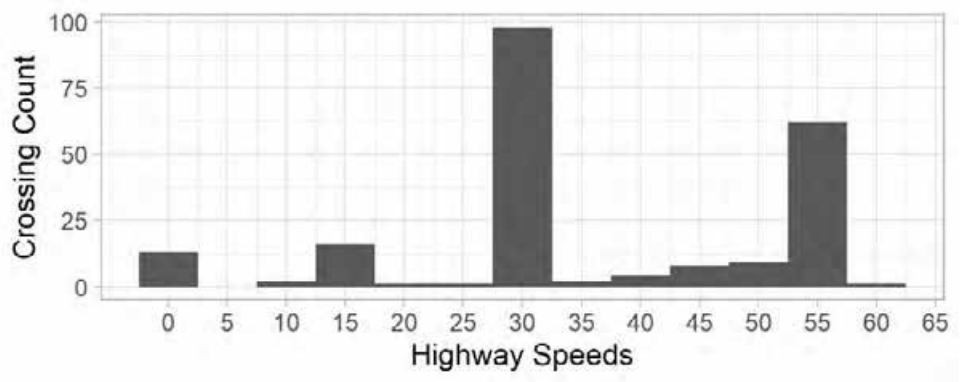
Figure 2-10. Train Speeds



Highway Speeds

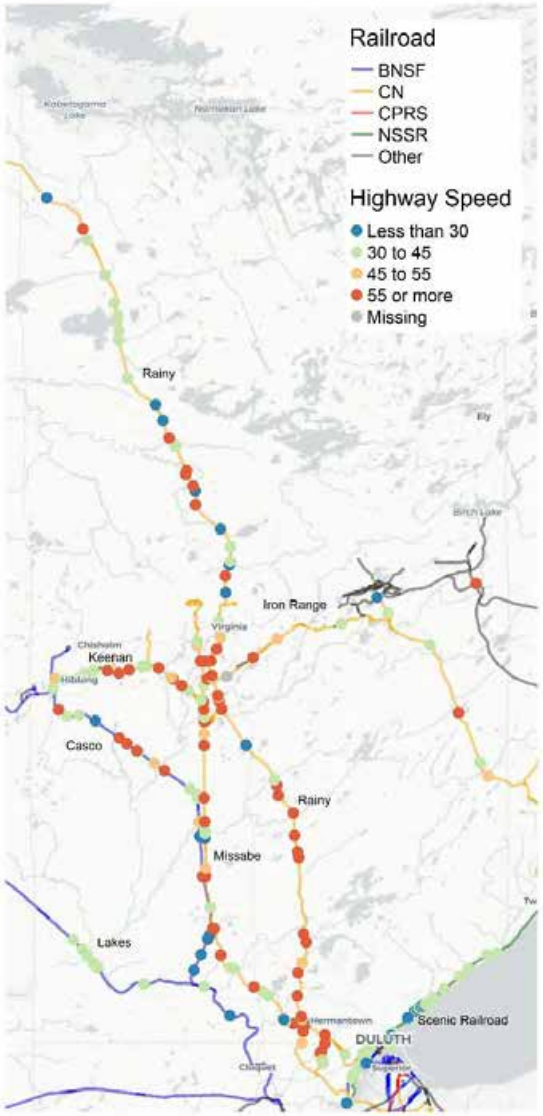
Highway Speeds used for this analysis represent the established speed limit for the highway approaches to each crossing. The primary data source for this characteristic was the MnDOT Grade Crossing Inventory. Note that when a speed limit sign is not visible on any of the approaches, MnDOT defaults to the statutory speed limits of 30 mph on streets in urban areas and 55 mph for non-expressway highways in rural areas. Nearly half of all the grade crossing highway speed limits recorded for St. Louis County crossings are 30 mph and nearly one third are at 55 mph. The higher speed limit crossings are generally located in more rural areas of the county.

Figure 2-11. Highway Speeds Histogram



Similar to the discussion for train speeds, collisions involving higher speed highway vehicles are also more likely to result in severe injuries or fatalities. The stakeholder group also recommended that high highway speeds be included as a factor for both closures and grade separations.

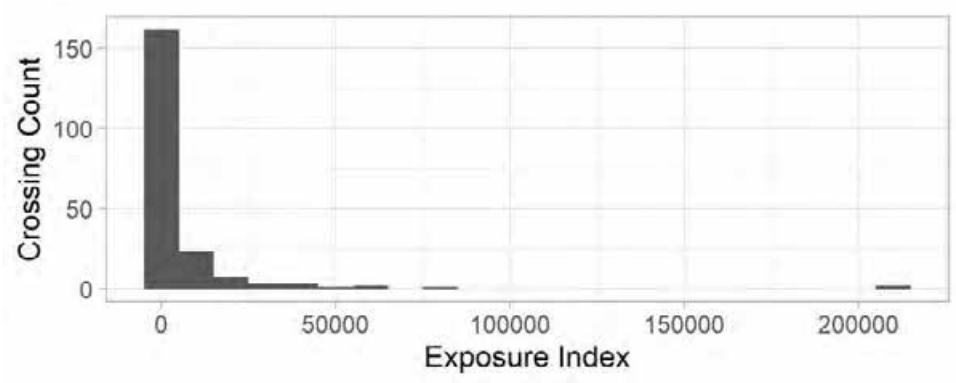
Figure 2-12. Highway Speeds



Exposure Index

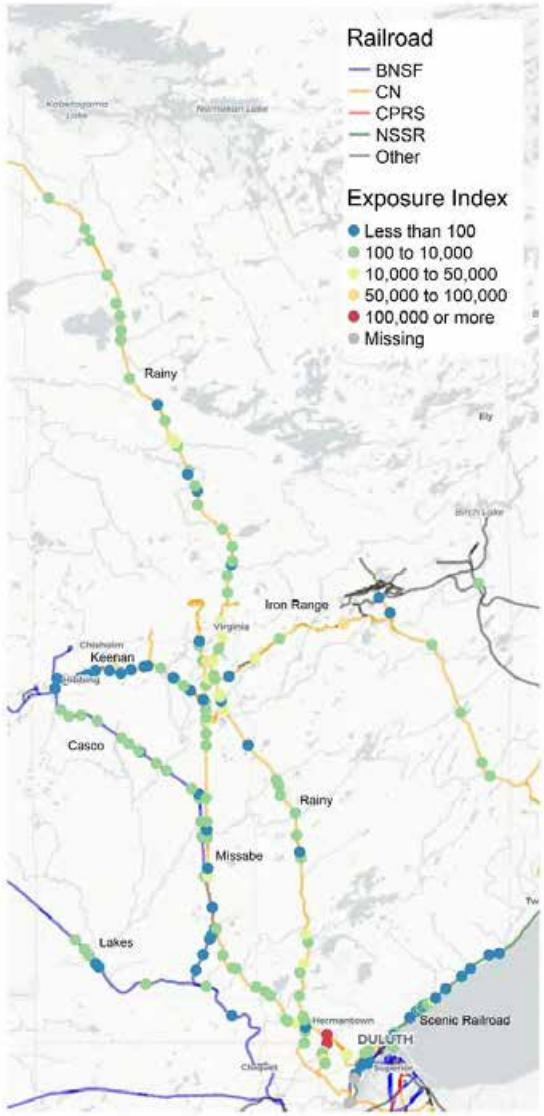
Exposure index is calculated as the product of daily train volumes and daily highway volumes. The intent of this measure is to quantify the total number of potential conflicts between rail and highway users at a specific crossing. Exposure index is used as the foundation for multiple grade crossing safety risk calculations, including those used by MnDOT and FRA. Exposure index values in St. Louis County are highly skewed with a high concentration of values under 10,000. The mean exposure index value is 6,500 and the median value is 834. The highest exposure index values are seen at the two separate crossings of Midway Rd (CSAH13) west of Duluth with values over 200,000.

Figure 2-13. Highway Speeds Histogram



The stakeholder group recommended that exposure index be included as a factor for grade separation prioritization but recommended that it not be included for closure prioritization. The group recommended that determination of closures be based more on highway traffic than on rail traffic.

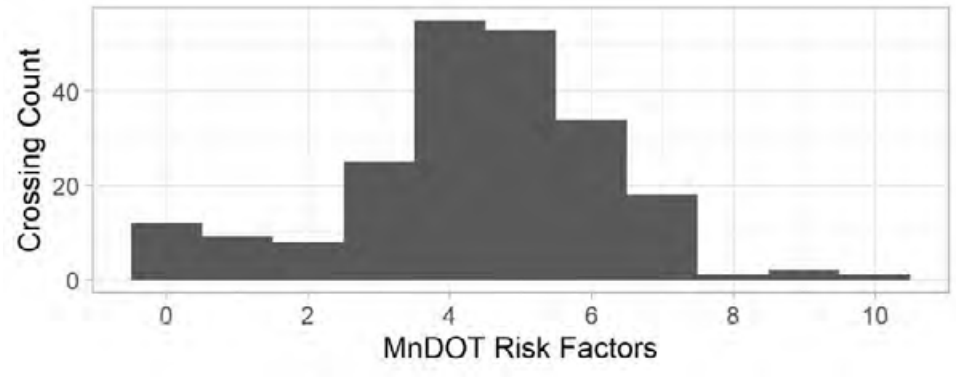
Figure 2-14. Exposure Index



MnDOT Risk Factors

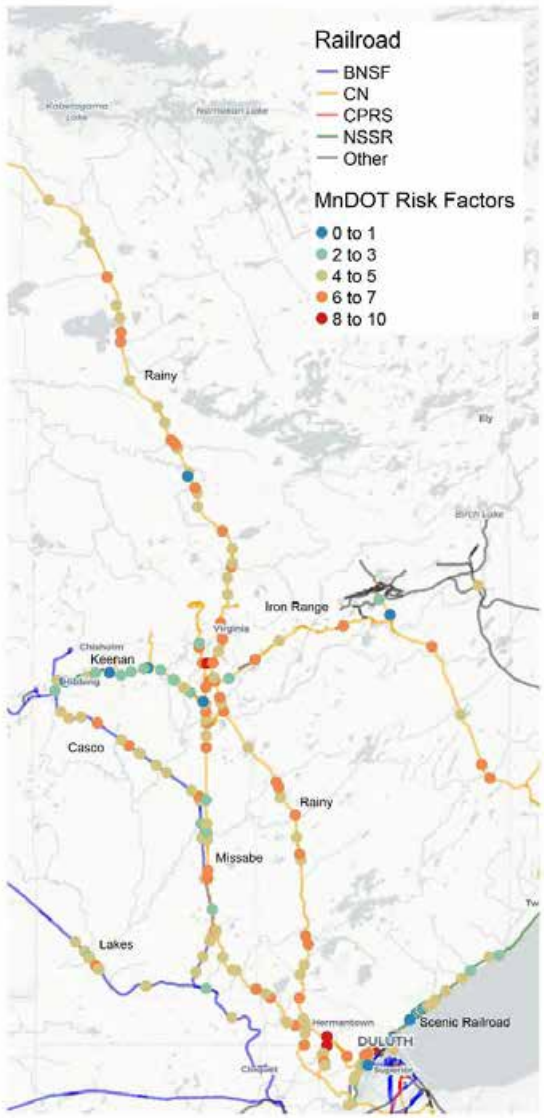
In 2016, MnDOT revised its crossing prioritization process to focus on a set number of defined risk factors rather than the use of hazard index formulas. Using a risk factor approach, crossings are scored based on the tally of risk factors which meet a set threshold (up to 10 total). Crossings can then be grouped into tiers based on the number of risk factors exceeded and can be further reviewed by rail crossing subject matter experts for further prioritization. The factors used in the MnDOT approach include daily highway and train volumes, exposure index, highway and rail speed limits, number of tracks, crossing angle, distance to nearby intersections and crossings, and sight distances. Nearly all crossings in St. Louis County have between three and seven risk factors. Only four crossings have eight or more risk factors, including CSAH 7 southwest of Virginia, two crossings at Midway Road (CSAH 13) west of Duluth, and N 40th Avenue W in Duluth.

Figure 2-15. MnDOT Risk Factors Histogram



The recommendation of the stakeholder group was that the MnDOT risk factors should not be included as a standalone factor for closure or grade separation prioritization for this project. Many of the individual MnDOT risk factors are already being taken into consideration and would risk double counting if they were to be included in this capacity as well.

Figure 2-16. MnDOT Risk Factors



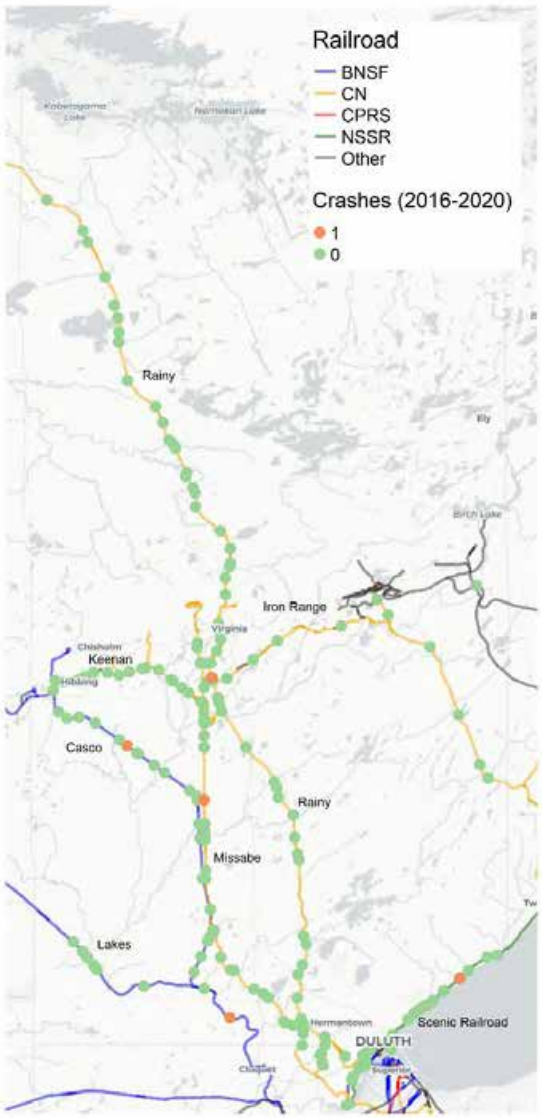
5-Year Crash History

Previous crashes have long been used as a benchmark measure of grade crossing safety and as a means of prioritizing the implementation of closures, grade separations, and other safety improvements. They are currently one of the most impactful inputs to the FRA's hazard index model. In St. Louis County, between 2016 and 2020, only five crashes occurred, one at each of the following locations:

- N Burnett Rd west of Duluth
- CSAH 5 on the BNSF Casco Subdivision
- Sax Rd on the Missabe Subdivision
- McQuade Rd on the North Shore Scenic Railroad
- Remshaw Rd south of Virginia

However, in recent years, many practitioners have attempted to focus less on crash history as a predominant measure since doing so can lead to a reactive approach of "chasing crashes". This was one of the key reasons MnDOT adopted their revised risk factor approach discussed previously. The stakeholder group agreed that crash history should not overshadow other factors considered in the prioritization of closure and grade separations, but also acknowledged that crash history should play some role, particularly if crossing experience more than one crash over a given timeframe. Also, while a 5-year crash history has typically been the standard for most hazard index models and other grade crossing safety reviews, the stakeholder group also recommended the use of a 10-year timeframe in order to potentially capture more crash data in the county. The stakeholder group ultimately recommended that a 10-year crash history be included as a factor in the prioritization of both closures and grade separations.

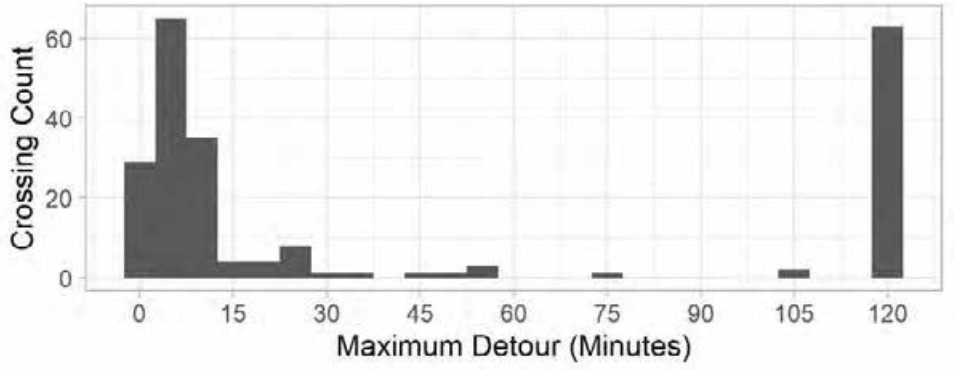
Figure 2-17. 5-Year Crash History



Maximum Detour Time Volumes

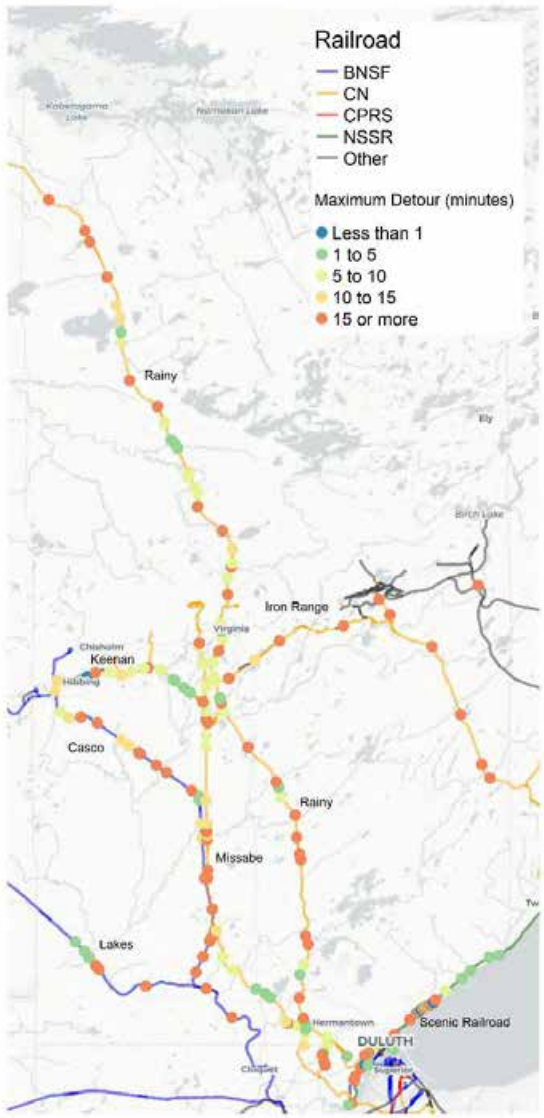
The maximum detour time represents the estimated travel time for a passenger vehicle to travel from one side of each crossing to the other side, assuming that the crossing has been closed. This analysis was completed using the HERE routing API to automatically generate travel paths and times at each crossing. In some cases, such as dead end roads, an alternate detour path may not have been available. In these cases, the detour time was set to a maximum of 120 minutes. In practice, any detour longer than 15 minutes was considered by the project team to be impractical. In addition to impacts on travel times for local residents and businesses, a key consideration with crossing closure is the potential impact to emergency services vehicles. This aspect is discussed further in the next section.

Figure 2-18. Maximum Detour Histogram



The stakeholder group recommended that high maximum detours be included as a factor for grade separation prioritization and that low maximum detours be included as a factor for crossing closure.

Figure 2-19. Maximum Detour Time

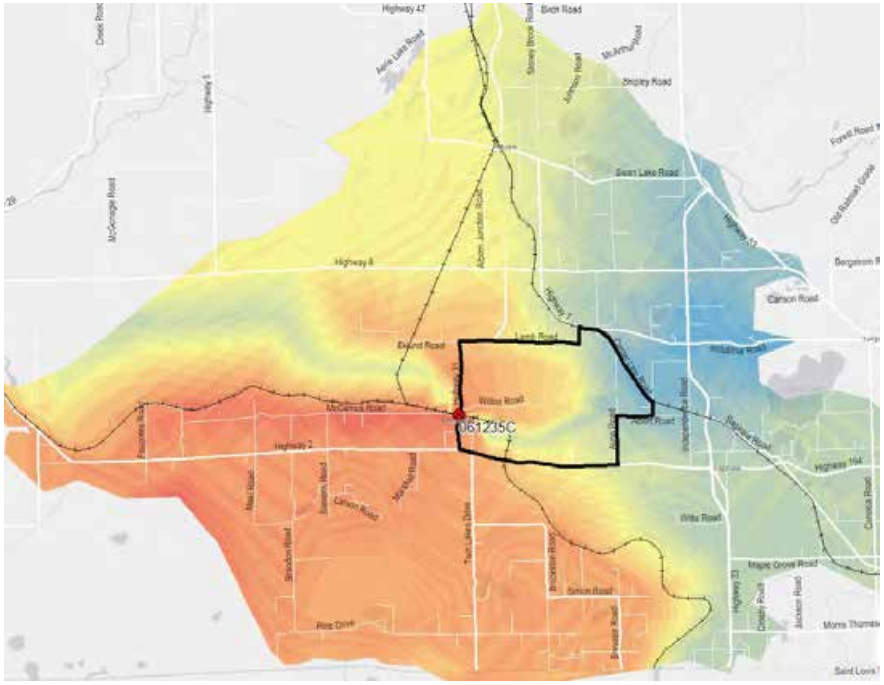


Impact to Emergency Response Times

As noted earlier, the potential impact of grade crossing closures on the response time for emergency services (e.g., fire, police, ambulance) is one of the key considerations when considering whether a crossing can be closed or not. When emergency services are needed, every minute of delay has the potential for increasing the severity of the outcome. An approach considered by the project team was an expansion on the maximum detour time analysis showed previously. The figure to the right shows the result of comparing travel time shed before and after a potential crossing closure. The red areas indicate locations where the closure would result in substantial delay while the areas in blue represent locations that would have little to know impact due to the closure.

The project team considered the potential for comparing this travel time information to U.S. Census data for the calculation of a weighted travel time impact score. However, during discussion with the stakeholder group, it was recommended that this approach not be considered for inclusion in the prioritization of closure and grade separations. Overall, the approach was considered to be overly complicated, and the issue could be better represented through simple measures such as the maximum detour time and further coordination with emergency services providers. The consideration of the impact on emergency response time is best suited for a project development process.

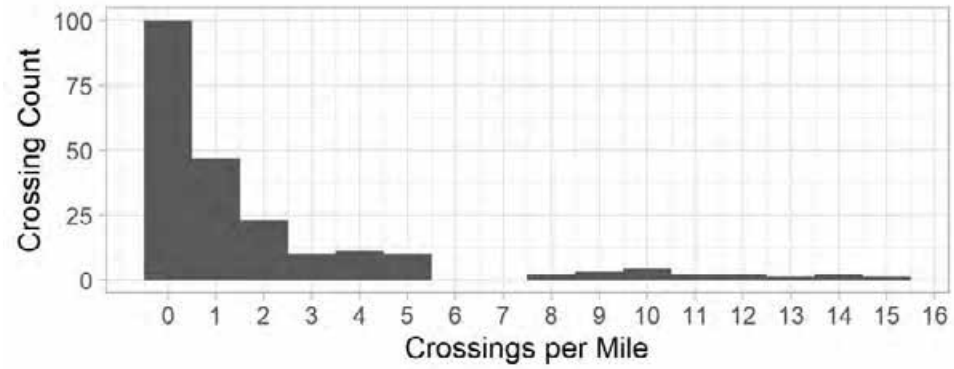
Figure 2-20. Isochronal Travel Time Shed



Crossing Density

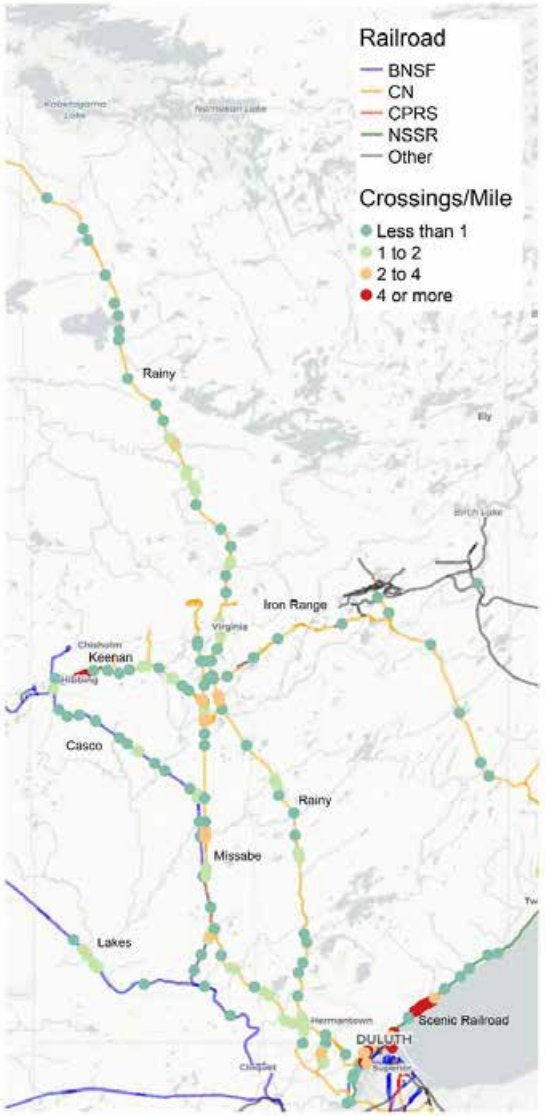
Crossing density refers to the spacing frequency of crossings along a single rail line when considering crossing closures. Rail corridors with low crossing density would likely result in significant impacts on travel time and access. However, rail corridors with high crossing density likely have better opportunities to improve safety by removing redundant and unnecessary crossings with limited impacts. Finding a middle ground between these extremes is important for maintaining a balance between mobility and safety. Crossing density for this study was evaluated by calculating the number of crossings within one mile of each crossing on the same rail corridor. In St. Louis County, the areas with the highest crossing density are located in the Duluth area, specifically along the North Shore Scenic Railroad. Many crossings in more rural areas of the county have a density of less than one, indicating that there are no other crossings within one mile in either direction for these locations.

Figure 2-21. Blocked Crossing Reports



The stakeholder group recommended that high crossing density be considered as a factor in the prioritization of crossing closures, but not for grade separations. In combination with the maximum detour factor, crossing density can highlight potentially redundant crossings that could be closed with minimal impact.

Figure 2-22. Crossing Density



Potential for Blocked Crossings

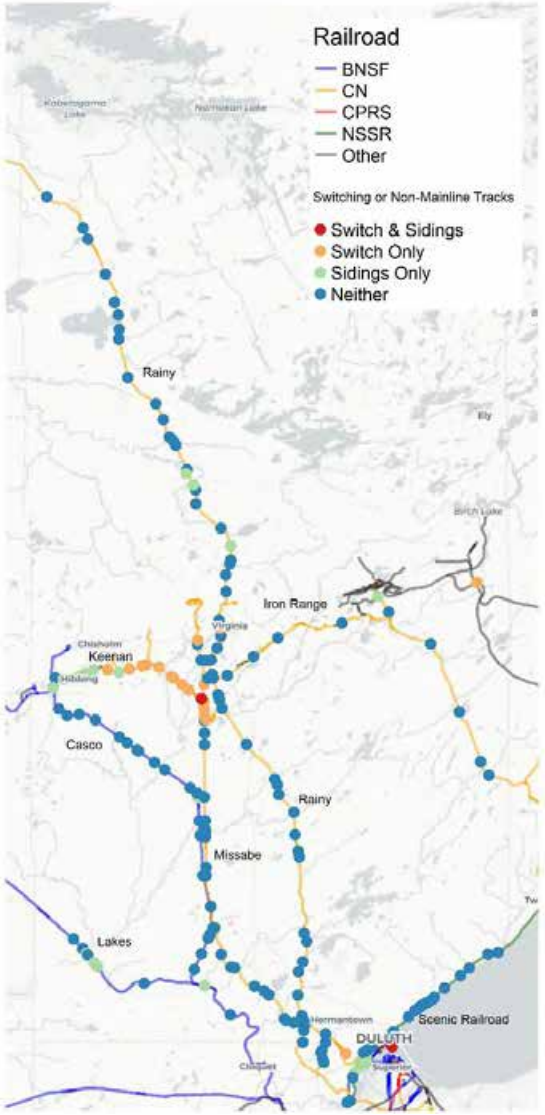
At a national level, grade crossings blocked by trains for extended periods of time is a growing issue for many communities. This is being caused by a variety of factors including railroads using longer trains and changes to operating procedures and rail service. In 2019 the FRA began recording instances of blocked crossing through the use of an online blocked crossing reporting tool. The tool relies on crowd-sourced data provided by either law enforcement or members of the public. As such, the thoroughness of the data depends on how frequently members of the public notice and record blocked crossing instances. The Figure below shows the locations of grade crossings in the continental U.S. that have one or more blocked crossing records. As of this writing, nine blocked crossing records in St. Louis County have been recorded in the system. Given the small amount of data on this issue, a proxy measure was proposed. Since switching train activity and the presence of non-mainline siding tracks are both associated with the potential for blocked crossings, these measures were considered in this evaluation.

Figure 2-23. Blocked Crossing Reports



The stakeholder group recommended that the potential for blocked crossings be considered as a factor in the prioritization of both closures and grade separations. However, the group also recommended that the proxy measure be expanded to include factors such as the distance to the nearest rail yard and the number of daily trains at each crossing.

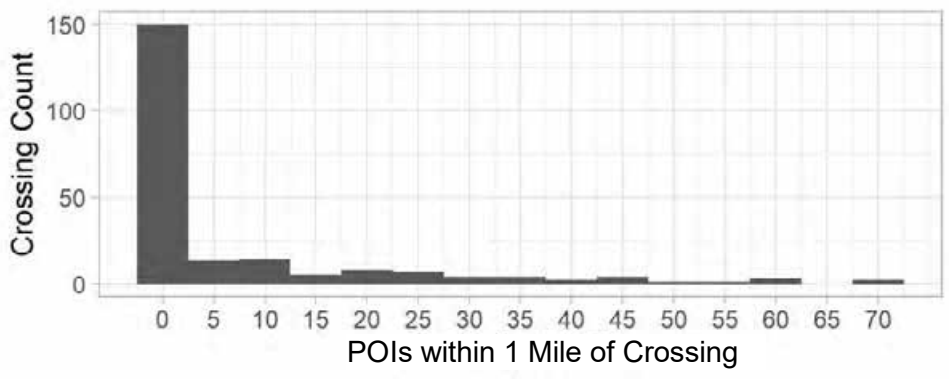
Figure 2-24. Switching Movements and/or Non-Mainline (Siding) Tracks



Proximity to Places of Interest

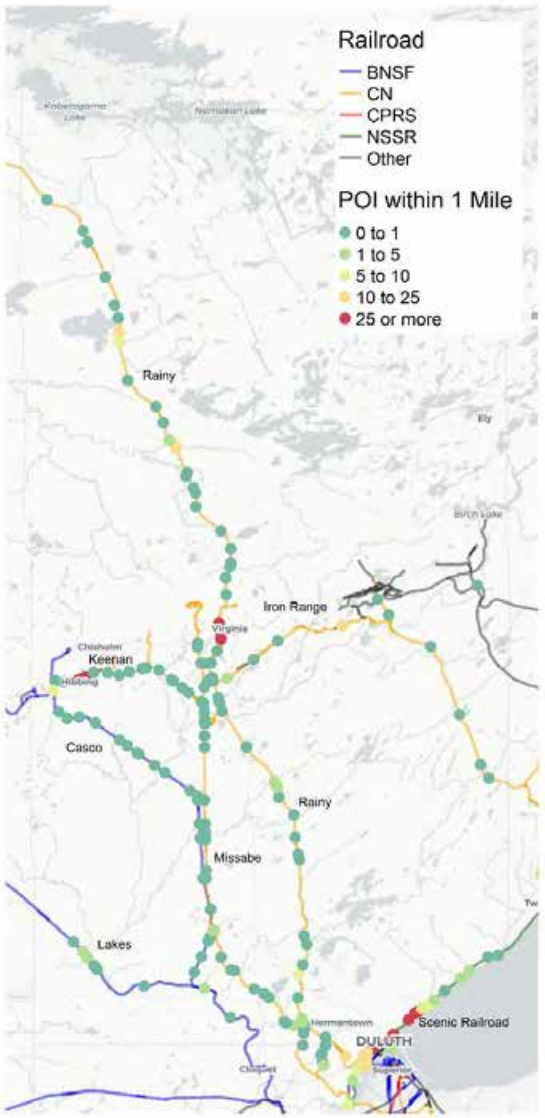
The number of and proximity to major activity centers near grade crossings may be an important consideration when determining whether crossing closures or separations are feasible. The closure of a crossing with multiple nearby places of interest (POIs) could cause issues for patrons accessing those locations and, in some cases, could lead to potential trespassing concerns if pedestrians choose to cross the tracks where they used to. Place of interest data was collected from OpenStreetMap. OpenStreetMap is crowdsourced data maintained by volunteers similar to how sites like Wikipedia are maintained. The POI data for St. Louis County included features such as parks, playgrounds, sports fields, schools, and restaurants. Crossings with the highest number of POIs within one mile are located in the urban areas of Duluth, Virginia, and Hibbing. More than half of all crossings in the county have zero POIs within one mile.

Figure 2-25. Places of Interest Within One Mile



The stakeholder group recommended that proximity to places of interest not be included as a factor for grade crossing closures. However, the group did recommend that it be included as a factor for grade separations, with a specific emphasis on places of interest as a proxy measure of commercial development.

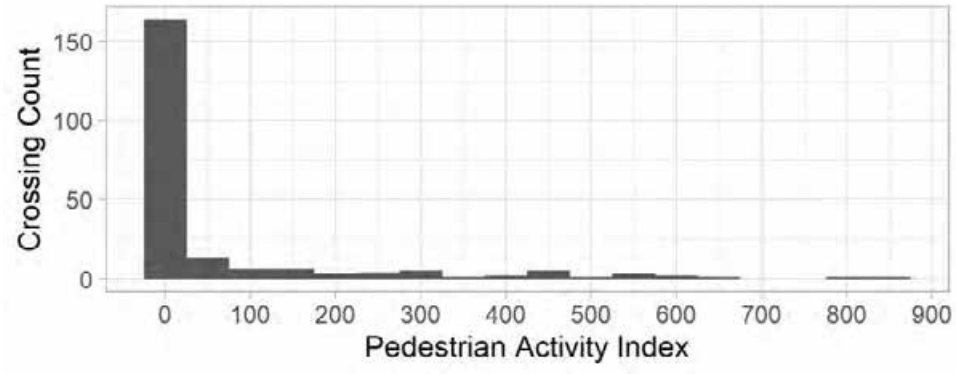
Figure 2-26. Proximity to POIs



Pedestrian Activity

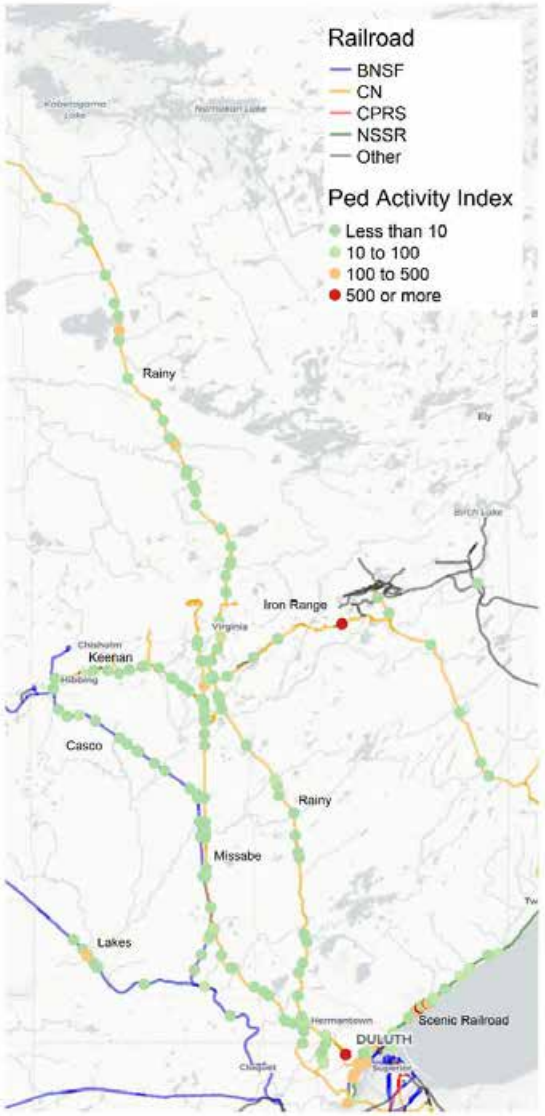
Daily pedestrian volume is not a characteristic that is typically recorded by either MnDOT or local road authorities at highway-rail grade crossings. As a way of approximating pedestrian activity for this study, the study team used data from the StreetLight Insight platform. StreetLight is an online data platform that provides estimates of modal travel information based on location-based services data and other sources. The resulting value, the Pedestrian Activity Index, is not intended to represent the daily number of pedestrians using each crossing but is instead a relative value that can be compared between crossing locations to determine the overall magnitude of pedestrian activity. The crossing with the highest pedestrian activity index is N 47th Ave E in Duluth with a value of 858. However, the vast majority of crossings in St. Louis County have index values of 50 or less.

Figure 2-27. Pedestrian Activity Index



The stakeholder group recommended that the pedestrian activity index not be included as a factor in the prioritization of grade crossing closures or grade separations. This direction was partly out of concern about the reliability of the underlying data, but the group also felt that consideration of pedestrian volumes and movements would be better suited for later phases of the study.

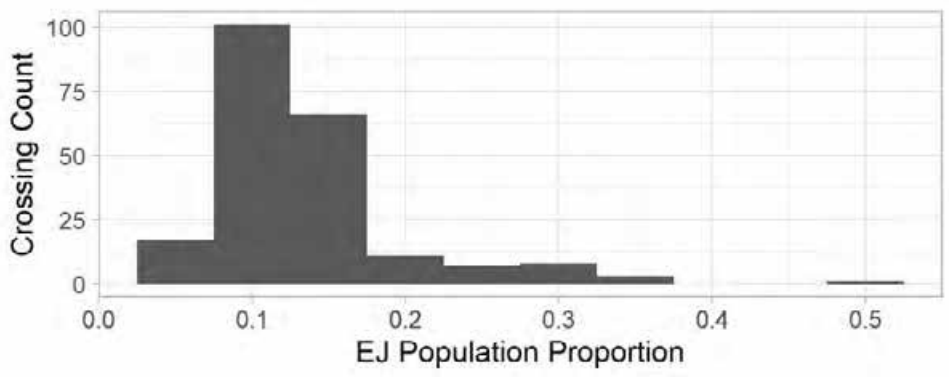
Figure 2-28. Pedestrian Activity Index



Environmental Justice (EJ) Populations

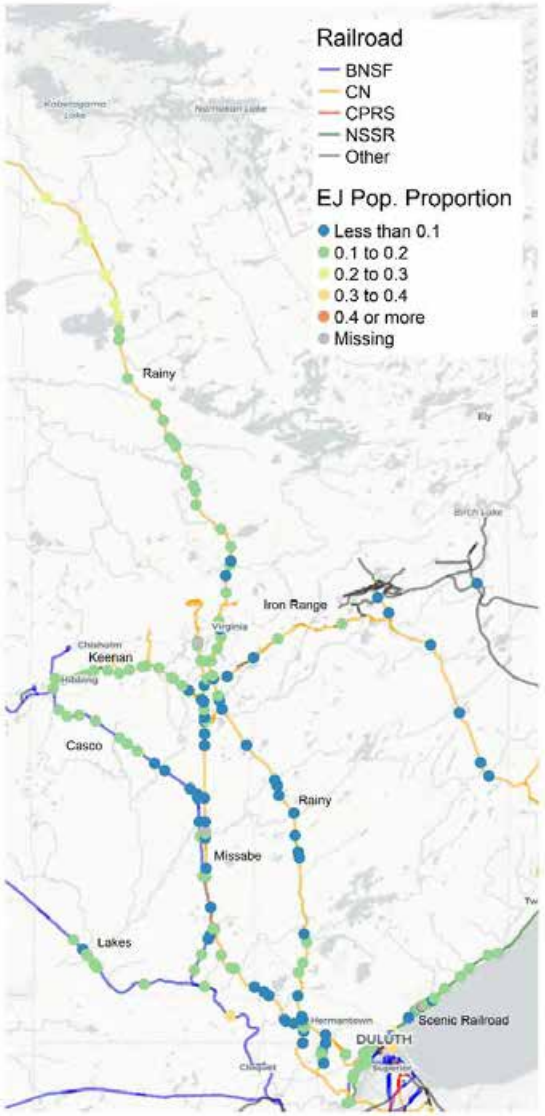
The need for consideration of the potential for disparate impacts and disproportionate burdens on minority or low-income populations has been highlighted at the federal and state levels in recent years. The recent Minnesota Rail Grade Crossing Action Plan included an equity analysis which found that Minnesota's non-white, Hispanic or Latino, and low-income populations are both more likely to travel over highway-rail grade crossings and are more likely to be involved in highway-rail grade crossing crashes. In St. Louis County approximately half of all crossings have an EJ population proportion less than 10 percent. Approximately 10 percent of crossings have an EJ population proportion above 20 percent. The highest estimated proportion is located at the pedestrian crossing near S 52nd Ave East in Duluth at 51.5 percent.

Figure 2-29. EJ Population Proportions



The stakeholder group recommended that this characteristic not be considered for prioritization of either closures or grade separations. Other factors were considered more important for the initial screening of potential crossings. However, the group noted that this characteristic should be considered during the next phase of the project when the prioritization scheme and final recommendations are being generated.

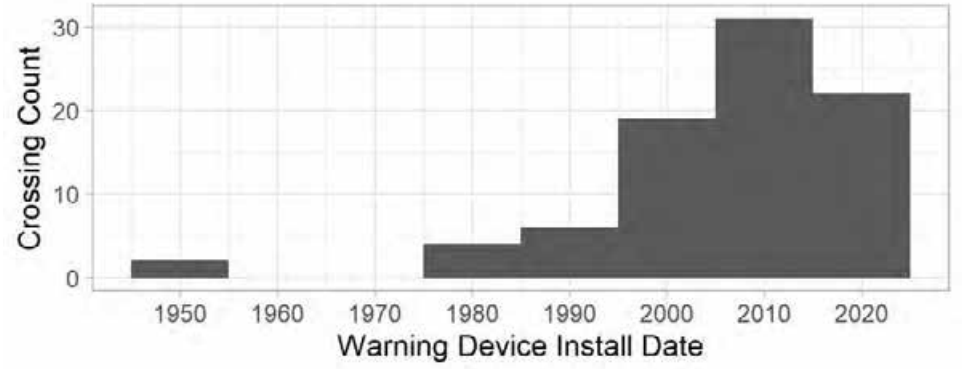
Figure 2-30. EJ Population Proportions



Age of Current Warning Device

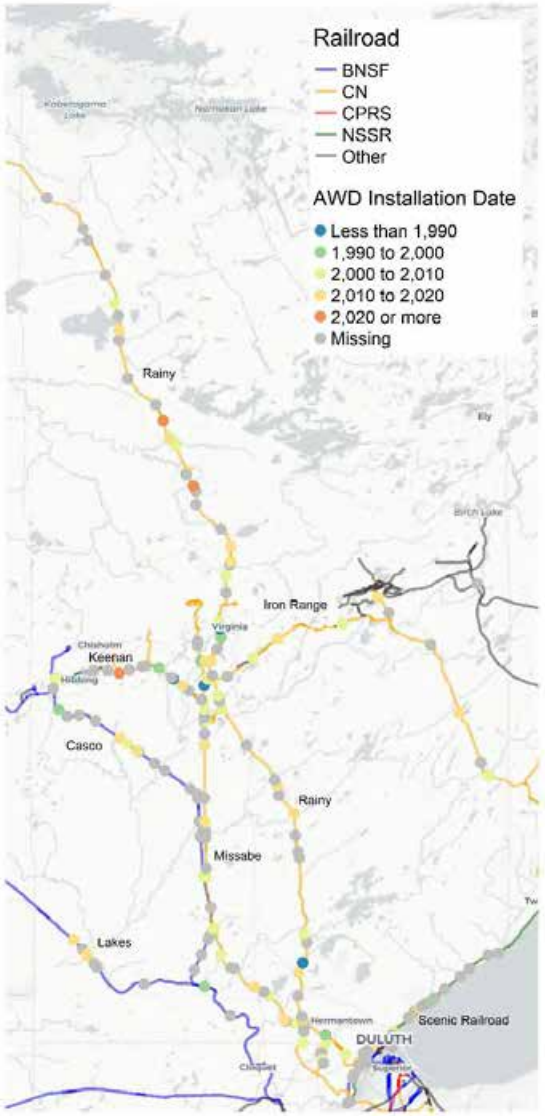
The age of active warning devices at crossings was evaluated to determine the potential to include this characteristic in the prioritization processes. The majority of crossings with active warning devices in St. Louis County have warning devices that were installed in the year 2000 or more recently. The oldest warning devices according to the data are at N 40th Ave E and S 60th Ave E in Virginia. However, based on visual inspection, these crossings have likely been updated since their original installation date.

Figure 2-31. Blocked Crossing Reports



The group recommended that the age of current warning devices should be considered as a factor for crossing closure but should not be considered as a factor for grade separation. The group noted that newly installed active warning devices at a crossing should not be seen as a deterrent to either closure or installation since many newer devices can often be reinstalled at other crossing locations.

Figure 2-32. Warning Device Age



Other Characteristics

Other factors and characteristics that were recommended for potential inclusion by the stakeholder group included the presence of hazardous materials, forecast train volumes, crossing geometry (horizontal and vertical grade), crossing surface condition, roadway classification as a designated freight route, presence of sidewalk or trail, commercial development adjacent to the crossing.

Recommended Crossing Characteristics

The factors recommended by the stakeholder group for use in the prioritization of closures and grade separations in St. Louis County are summarized in Table 2-3 below. Where a factor is recommended, additional information is included to indicate the magnitude that the group recommended for the prioritization. For example, the stakeholder group recommended that low highway traffic volumes be used to prioritize closures, but that high highway traffic volumes be used to prioritize grade separations. Additionally, some factors were recommended to not be included for prioritizations, but the group recommended that they be considered in later phases of the project.

Table 2-3. Summary of Stakeholder-Recommendations

Crossing Characteristic	Recommended for Closure Prioritization	Recommended for Grade Separation Prioritization
Daily Train Volumes	No	No
Highway Traffic Volumes	Yes (low)	Yes (high)
Train Speeds	Yes (high)	Yes (high)
Highway Speeds	Yes (high)	Yes (high)
Exposure Index	No	Yes (high)
MnDOT Risk Factors	No	No
Crash History	Yes (high)	Yes (high)
Max Detour Time	Yes (low)	Yes (high)
Impact to Emergency Response Times	No (next phase)	No (next phase)
Crossing Density	Yes (high)	No
Potential for blocked Crossings	Yes (revised measure)	Yes (revised measure)
Proximity to Places of Interest	No	Yes (high)
Pedestrian Activity	No (next phase)	No (next phase)
Environmental Justice Populations	No (next phase)	No (next phase)
Age of Current Warning Devices	Yes (older)	No

3 Stakeholder Workshop A

A series of stakeholder workshops were coordinated and facilitated to present the initial study findings, gather feedback on proposed prioritization measures, and act as an overall sounding board for study analyses and recommendations.

This first meeting of the project stakeholders was held on March 4, 2022. The purpose of the meeting was to share information related to highway rail grade crossing safety issues and to review potential crossing criteria and characteristics that St. Louis County might use as it prioritizes investment in safety improvements at highway-rail grade crossings in the county, specifically crossing closure and grade separation. Meeting participants for the are summarized in Table 3-1.

Table 3-1. Workshop A Participant List

Agency/Organization	Participant
St. Louis County	Victor Lund, Traffic Engineer/Project Manager
Minnesota Department of Transportation (MnDOT)	Julie Whitcher , State Rail Safety Engineer Paul DeLaRosa, State Rail Office Project Manager Krysten Foster, District 1 State Aid Engineer Derek Leuer, State Traffic Safety Engineer Maren Webb, MnDOT District 1 Planner Girma Feyissa, State Aid Traffic Safety Engineer
Canadian National Railway (CN)	Jackie Sapp
BNSF Railway	Alex Fiorini
North Shore Scenic Railroad	Sarah Ciochetto
Michigan Tech University	Pasi Lautala, Professor, Civil and Environmental Engineering
Consultant Team, HDR	Chris Ryan Kurt Bearinger
Consultant Team, SRF	Justin Scott

The workshop opened with a welcome and introductions by all participants. This was followed by a brief summary of the project background and overview of the study goals. The primary goals of the study are to identify crossings suitable for closure or grade separation using a robust and objective data analysis while incorporating stakeholder feedback into the process.

MnDOT Presentation on SAP and IIJA Changes

MnDOT provided an update on the recently published Minnesota Rail Crossing Safety Action Plan (SAP). The SAP was developed to meet federal requirements applicable to all states. The goals of the SAPs were to identify crossings that have experienced one or more crashes within the previous three to five years, or which are otherwise at risk for crashes as defined in the SAP. Additionally, the SAP discusses specific strategies, including closures or grade separations, that could be used to improve safety at those crossings. Some of MnDOT's key SAP analysis takeaways included:

- Crossing closures are an effective tool for crossing safety, but they have become more difficult to implement due to many of the “low-hanging fruit” opportunities having already been implemented.
- Truck-trailer crashes at crossing with passive protection (signage and striping only) have been recorded at disproportionately high levels with approximately one in every three crashes in Minnesota in the previous five years being of this type.
- Pedestrian crashes at crossings with active warning devices have been recorded at disproportionately high levels in the previous five years.
- The five goals developed for the SAP included:
    - **Goal 1:** Continue development and investment in reducing rail/highway conflicts, including crossing upgrades, grade separations, and crossing closure.
    - **Goal 2:** Replace obsolete/antiquated warning devices at highway-rail grade crossings.
    - **Goal 3:** Identify pedestrian/bicycle safety issues at highway-rail grade crossings.
    - **Goal 4:** Incorporate an equity lens into grade crossing safety programs and practices.
    - **Goal 5:** Evaluate methods for supplementing MnDOT Risk Scoring Approach.
    - **Goal 6:** Encourage local roadway authority initiatives for rail safety.

MnDOT also provided an update on changes resulting from the new Infrastructure Investment and Jobs Act (IIJA), the new transportation infrastructure funding bill. Many changes in the IIJA relate to the Railway-Highway Crossings (Section 130) program. This program provides funding to state agencies for use in the implementation of safety improvements at highway-rail crossings. Changes that impact the use of this funding on grade crossing safety in Minnesota and other states includes the following:

- Under the previous funding bill, Section 130 projects required a 10% non-federal funding match. This has been reduced to 0 percent.
- The program allows states to provide crossing closure incentive payments. Under the previous funding bill, the maximum amount allowed from state agencies such as MnDOT was $7,500 per crossing with a matching amount from the railroads. This amount has been raised to $100,000 per crossing with a matching funding amount from the railroads. However, MnDOT noted that Section 130 funding in Minnesota has never been used for closure incentive payments due to the burdensome process requirements relative to the amount of funding available.

Railroad Presentations

Both CN and BNSF provided an overview of a railroad perspective of their rail crossing infrastructure and safety concerns and issues in the St. Louis County area.

- BNSF summarized the BNSF CASCO, Lakes, and Hib-Tac subdivisions that run through St. Louis County and summarized BNSF operations in the area. BNSF has 366 at-grade crossings (including private crossings) and seven sidings in the county and voiced a willingness to closely review existing rail sidings and switching areas to dig more deeply into these apparent safety issues in this study effort. BNSF also highlighted a few hotspots and several crossings in Hibbing that have experienced crashes in the last 5 years.
- CN similarly summarized CN rail operations in St. Louis County. CN operates seven subdivisions and two core routes through the county (Rainy and Missabe subdivisions) and two core docks in Duluth and Two Harbors along with several rail yards in Proctor, Virginia, Duluth, and International Falls. CN noted that the rail service from Winnipeg to Chicago along the Rainy and Missabe subdivisions is likely to continue to grow. Current daily train counts in this corridor are likely 20-30 per day, more than what is currently shown on the grade crossing inventory records. CN highlighted the opportunity that this study provides to find ways that railroads and public agencies can come together to make safety improvements needed in the county.

Review of Crossing Characteristics

The consultant team led the group through a review of various crossing characteristics and factors such as highway volumes and speeds, train volumes and speeds, and crash history. For each item, the group reviewed the overall distribution of the characteristic within St. Louis County and discussed the relevance and suitability of each characteristic for the prioritization of closures and grade separations in the county. The key discussion topics and final results of this review are summarized in the previous section.

Michigan Tech University Presentation

At this point in the meeting, Pasi Lautala from Michigan Tech University gave a presentation describing recent work his group has been doing using drone-collected aerial imagery for highway-rail grade crossings. A primary driver of this work has been to see how it could improve and inform the crossing risk models used by MnDOT and other agencies. Specifically, one of the areas that they are seeking to improve through this method is the evaluation of sight distances. For MnDOT, sight distances at crossings are currently evaluated using field staff taking measurements with range finders. This method is prone to error, particularly in areas with few natural or manmade landmarks that can be used as targets for the rangefinder. Examples of the photogrammetry and data that can be collected through this method are shown in Figure 3-1 and Figure 3-2 below.

Figure 3-1. Drone Hill Shade Example

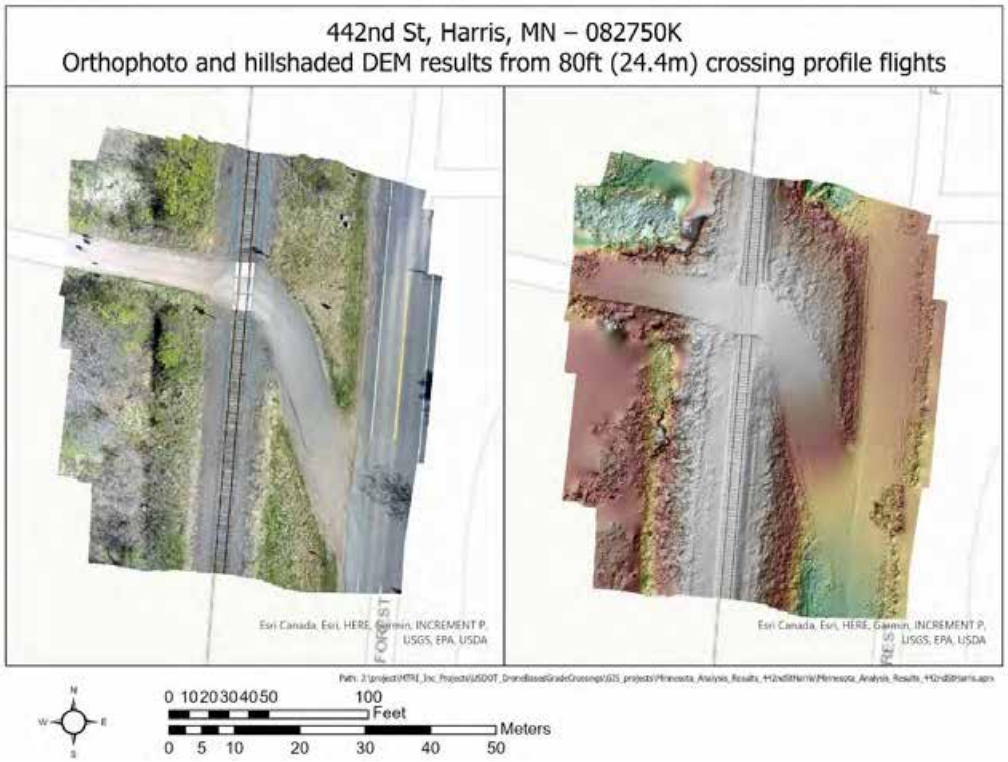


Figure 3-2. Drone Sight Distance Example



Prioritization Factor Weighting

The final portion of the workshop included an interactive voting exercise to compare and contrast the various crossing characteristics identified as having potential for the prioritization of crossing closures and grade separations. Due to time constraints, this portion of the workshop was finalized through an online survey provided to the meeting participants. The approach and results of this method are summarized in the next section.

4 Crossing Improvement Prioritization

The previous sections discussed the identification of various grade crossing characteristics that were recommended for use in the prioritization of crossing closure and grade separation. However, some characteristics are generally considered to be more or less important than others in the list. In order to develop an appropriate weighting for each of the crossing characteristics, our project team led the stakeholder group through a pair-wise ranking comparison. Each characteristic was compared with every other characteristic and stakeholder group members were instructed to respond with which was more, less, or equally important. A portion of the survey is shown in Figure 4-1 below. This approach allows for a more objective assessment of the relative importance of each characteristic. By isolating the characteristic pairs this way, the respondents are forced to make more objective comparisons and decisions.

Figure 4-1. Pair-wise Comparison Survey Example



Closures

Which factor is more important when identifying closures?

	Most Important	Important	Slightly Important	Neutral	Slightly Important	Important	Most Important	
Low Highway Volumes	○	○	○	○	○	○	○	High Train Speeds
Low Highway Volumes	○	○	○	○	○	○	○	High Highway Speeds
Low Highway Volumes	○	○	○	○	○	○	○	10-Year Crashes
Low Highway Volumes	○	○	○	○	○	○	○	Low Max Detour

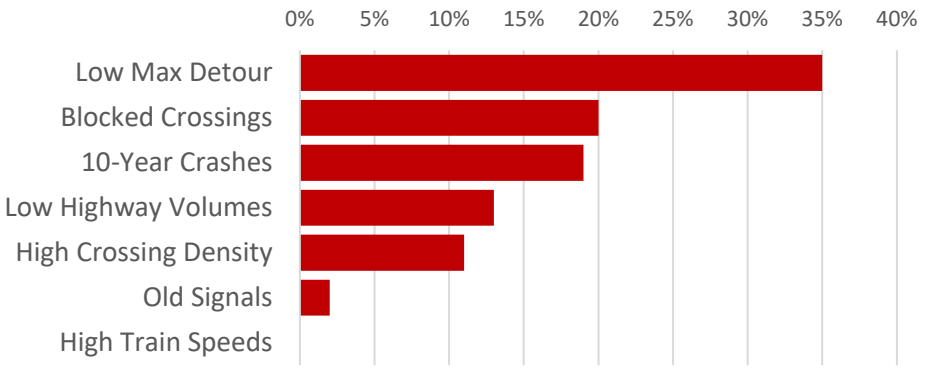
Seven responses were to the survey were received, including one response each from CN and BNSF, two responses from MnDOT staff, one response from St. Louis County staff, and two anonymous responses.

The responses to the survey were aggregated and summarized to develop weighting scores. In each comparison, the characteristic which was determined to be the more important one was assigned a score of 1 if it was classified as “slightly important”, a score of 2 if it was classified as “important”, and a score of 3 if it was classified as “most important”. In the case of a “neutral” response, a score of 0 was assigned. The combined total of these scores were grouped by each characteristic and compared to the total number of scoring points to determine the percentage of the score that should be assigned to each characteristic.

4.1 Crossing Closure Prioritization

The results of the weighting exercise for crossing closures are summarized in Figure 4-2. The characteristic of low maximum detour was consistently rated more highly than any other characteristic and received a proposed scoring weight of 35 percent. Blocked crossings and 10-year crash history received the second and third highest scores with 20 percent and 19 percent, respectively. The characteristic of high highway speeds does not show on the chart since it was not selected as the preferred characteristic in any of the responses. Likewise, high train speeds were only ever scored as neutral in comparison to other characteristics. While the characteristic of old signals received some responses ranking it higher than other characteristics, its final scoring weight was calculated as 2 percent. Due to their low rankings, the characteristics of old signals, high train speeds, and high highway speeds were excluded from the final prioritization calculation.

Figure 4-2. Crossing Closure Weighting Scores



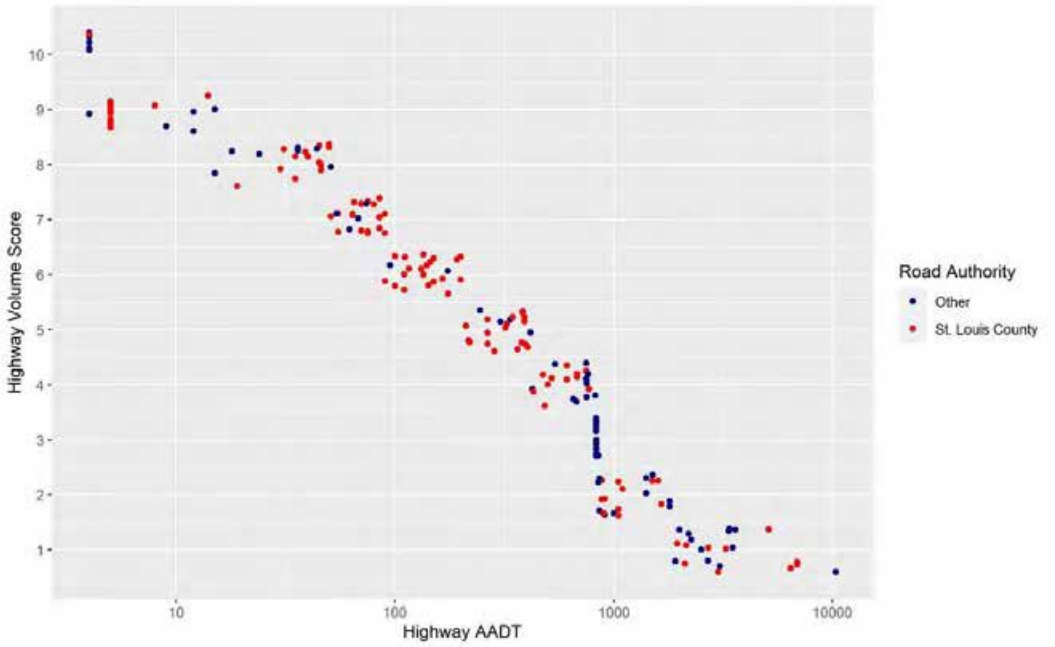
Decile Scoring Normalization

For each characteristic, the crossings were grouped into decile rankings and given a score of 1 to 10. For example, Figure 4-3 shows an example of this decile score for the highway volumes characteristic. In this case, low highway volumes are used to prioritize closures, so the 10 percent of crossings with the lowest volumes are assigned a score of 10, the next 10 percent of crossings are assigned a score of 9. Likewise, the 10 percent of crossings with the highest traffic volumes are assigned a score of 1. Note that the figure is plotted using a jitter plot type which artificially scatters the points to avoid overlap and make it easier to see the overall group of data. The chart is also plotted with a log-scale x-axis to better visualize the distribution of data.

This approach was taken for each characteristic in turn with the following modifications made to better represent the intent of the measure:

- Low Max Detour: Maximum detours in excess of 15 minutes were automatically assigned a value of 1.
- 10-year Crash History: Given the low number of crossings with crash history, the scores for this characteristic were assigned values of 1 if no crashes occurred, a value of 5 if one crash occurred, and a value of 10 if multiple crashes occurred within the time period.

Figure 4-3. Decile Scoring Example – Low Highway Volumes



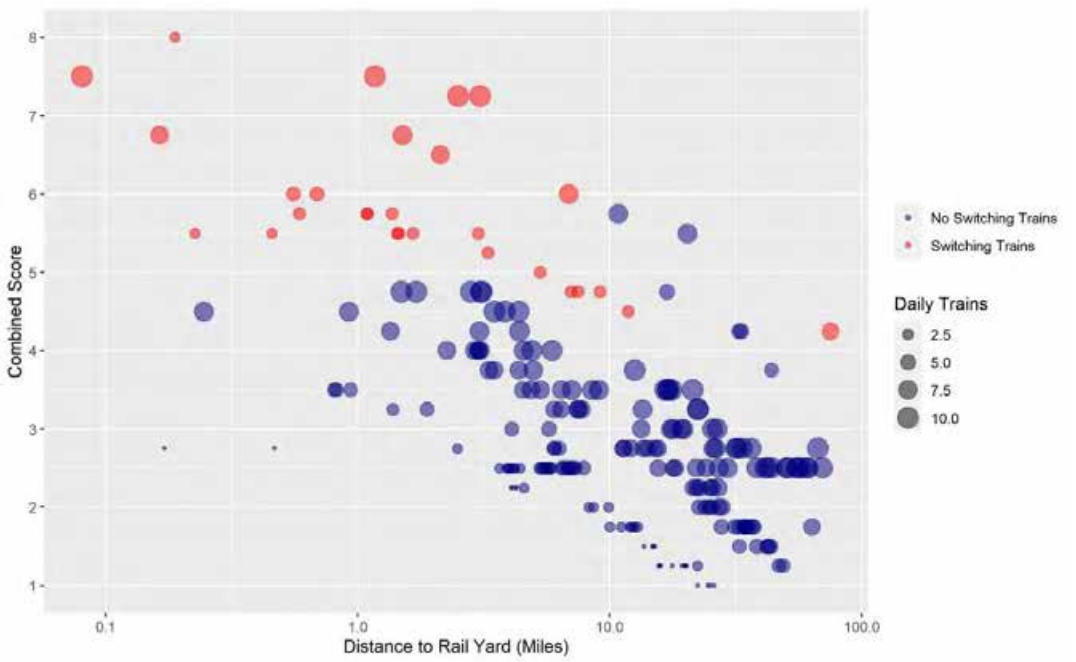
Additional Prioritization Measure Modifications

The stakeholder group recommended that the proxy measure for blocked crossings incorporate additional measures such as the number of daily trains. This measure was recalculated to be based on equal parts of the following four data measures:

- Distance to nearest rail yard (decile ranking)
- Number of daily trains (decile ranking)
- Presence of switching trains (10 if true; 0 if false)
- Presence of non-mainline siding or industry tracks (10 if true; 0 if false)

The results of this new proxy measure are shown in Figure 4-4. Note that due to this measure being developed as an estimate of the potential for blocked crossing issues and not a representation of actual blocked crossing data, the project team manually lowered the weight of this measures from 20 percent to 12 percent.

Figure 4-4. Decile Scoring – Blocked Crossing Proxy Measure

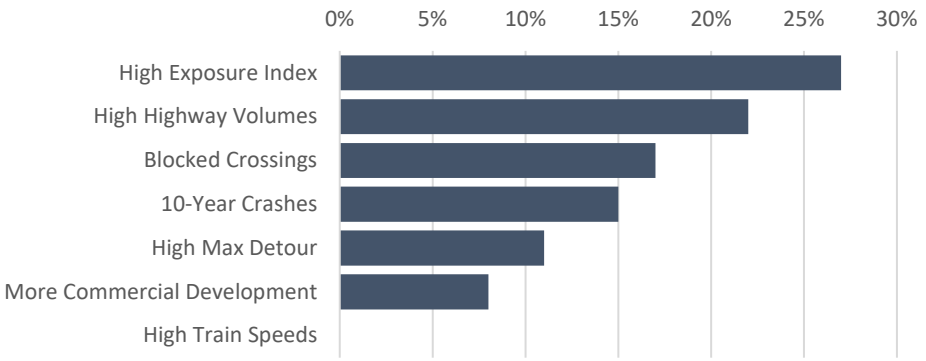


Another characteristic added to this prioritization exercise was the maximum estimated total vehicle-hours of delay due to closure. This was calculated by multiplying the maximum detour duration by the estimated average daily traffic values at each crossing. This value was used to assess the overall magnitude of the potential impacts of closure on detoured traffic.

4.2 Grade Separation Prioritization

The results of the weighting exercise for grade separations are summarized in Figure 4-5. The characteristic of high exposure index was consistently rated more highly than any other characteristics and received a proposed scoring weight of 27 percent. A close second was the characteristic of high highway volumes as 22 percent. The third highest characteristic was blocked crossings at 17 percent.

Figure 4-5. Grade Separation Weighting Scores



5 Desktop Review of Top Ranked Results

After applying the results of the prioritization methodology discussed in the previous sections, the project team undertook a manual desktop review of the top ranked results to further evaluate the potential of each closure and grade separation. While the prioritization process can provide an objective, data-driven result, the data available cannot always paint a complete picture. Other factors such as geometric constraints, access limitations, and the proximity of private parcels may limit or hinder the ability to implement the proposed recommendation.

Figure 5-1 summarizes the top ranked crossings for closure as well as the key takeaways from the desktop review. Eight of the crossings in the top 30 list were approved as good candidates for closure. Eleven crossings were identified as having potential for closure, but which would need additional review and evaluation before finalizing a recommendation. The remaining eleven crossings in the top 30 were identified as not being good candidates for closure for a variety of reasons including severe impacts to local access or estimated traffic detours that would severely impact the local road network. Note that this list also includes an additional five crossings that were identified by the project team and stakeholder group as being potentially good candidates for closure, but which were not identified by the initial screening process.

Figure 5-2 summarizes similar information for proposed grade separations. Fourteen of the top 30 crossings were identified as good candidates for grade separation. Eight were identified as potential candidates requiring further evaluation or considerations. The remaining eight crossings were identified as not being good candidates for grade separation due to unfavorable site conditions or other reasons. This list also included six additional crossings identified by the project team and stakeholder group as being potentially good candidates for grade separation, but which were not identified by the initial screening process.

Figure 5-1. Desktop Review Notes for Top Ranked Closure Candidates

Crossing ID	Highway	Street	Hours of Del	CloseScore	Rank	Comments
260087J	CR846	Hermantown Rd	0.21	6.5866	1	Good candidate
260122V	CR382	Woodland Rd	2.04	6.492	2	Good candidate
252016S	CR592	Allavus Rd	2.66	6.4612	3	Pick between Alavus and Fraser; Can't close both; Recommend this one
252015K	CSAH137	Spirit Lake Rd	14.09	6.262	4	Pick between Alavus and Fraser; Can't close both
260125R	CR755	Ramshaw Rd	7.90	6.2478	5	May need to confirm whether there are any local industries that use this route as a truck bypass
252027E	CR592	McSweeney Rd	0.47	6.2046	6	Good candidate
252013W	CSAH62	Admiral Rd	2.78	5.9378	7	Good candidate
251952A	CR311	Fermoy Rd	7.41	5.8482	8	Pick between Fermoy and Norway Ridge; Can't close both; Recommend this one
252008A	CR310	Keenan Rd	13.82	5.6932	9	Pick between Keenan (9) and Keenan (21); Can't close both; Farily substantial delay from either
260169R	CR948	Johnson RD	3.77	5.6542	10	Possible Candidate
251852V	CR894	Stark Rd	20.16	5.6382	11	Good candidate
061248D	CR207	Kolu Rd	0.27	5.5938	12	Good candidate
097754G	CSAH30	7th Ave	15.65	5.5646	13	Would greatly impact local access
260112P	CSAH59	Melrude Rd	4.25	5.5608	14	Traffic would be diverted to be very low FC roadway
251917L	CR873	Seville Rd	5.76	5.5572	15	Possible Candidate; Need to confirm how much impact closure of Seville and Vibert at the same time would have
251920U	CR875	Vibert Rd	5.51	5.5572	16	Good candidate
252028L	CR451	Shaw Rd	0.47	5.5446	17	Good candidate
260089X	CSAH6	Maple Grove RD	21.57	5.5366	18	Possible Candidate; Would likely need to upgrade Jeffrey Road and intersection with US 2
251908M	CR223	Munger Shaw RD	16.46	5.527	19	Alternate crossing is local road with only stop signs.
252191H	CSAH33	Mc Quade Rd	26.96	5.5032	20	Substantial impact to boat launch access
251965B	CR310	Keenan Rd	13.82	5.46	21	Pick between Keenan (9) and Keenan (21); Can't close both; Farily substantial delay from either
252014D	CR452	Iron Junction Rd	12.18	5.437	22	If Admiral Rd (7) is closed, this crossing will need to remain open
061247W	CSAH28	Sax Rd	2.48	5.3242	23	Kolu Rd (12) makes better sense for closure and if so, Sax will need to remain open
097753A	CR260	Saint Vincent Rd	4.57	5.2196	24	Possible Candidate
251948K	CSAH28	Sax Rd	10.57	5.15	25	Similar reasoning to Sax Rd
260162T	CR430	Burghardt Rd	0.68	5.08	26	Possible Candidate; Need to further evaluate EMS response impacts
097751L	UT9101	Savanna RD	3.35	5.0546	27	Can't close both Savanna and Saint Vincent; Saint Vincent makes more sense as closure
260124J	CR776	Old Mesabe Rd	19.84	4.8678	28	Possible Candidate; Need to further evaluate EMS response impacts
251951T	CR312	Norway Ridge Rd	9.59	4.814	29	Pick between Fermoy and Norway Ridge; Can't close both; Recommend Fermoy
251974A	CR316	Maxwell Rd	24.93	4.8128	30	Substantial impact to hours of delay
061244B	CSAH29	Hwy 29				Additional Crossing Identified by Project Team/Stakeholder Group
251923P	CR874	Independence Rd				Additional Crossing Identified by Project Team/Stakeholder Group
251930A	CR867	Burnett Rd				Additional Crossing Identified by Project Team/Stakeholder Group
260092F	CR694	Seville Rd				Additional Crossing Identified by Project Team/Stakeholder Group
						Additional Crossing Identified by Project Team/Stakeholder Group
		Recommended for Project Sheet				
		Recommended for Further Discussion				
		Not Recommended				

Figure 5-2. Desktop Review Notes for Top Ranked Grade Separation Candidates

Crossing ID	Highway	Street	GradeSepScore	Rank	Comments
251900H	CSAH11	2nd St	7.4817	1	Lots of homes/buildings close to the ROW. Intersections with 5th and Pionk Drive might need to close
252305T	CSAH100	S Main St W	7.3012	2	Spacing looks more manageable here. Be aware of snowmobile route.
260149E	CSAH102	Mineral Ave	7.1668	3	US 53 may be too close to make this work
251887W	CSAH91	N 40th Ave W	7.1629	4	Lots of home in close proximity. Check if frontage road setup is even feasible
251953G	CSAH7	CSAH 7	7.0922	5	Good Candidate
251854J	CSAH45	N Cloquet Rd	7.0234	6	Good Candidate
260128L	CR657	Southern Dr	6.8668	7	Good Candidate
251850G	CSAH13	Midway Rd	6.5312	8	Bisected intersection. Could be difficult geometrically
252375H	CSAH7	CSAH 7	6.529	9	Good Candidate
251909U	CSAH98	Canosia Rd	6.5095	10	Good Candidate. Need to close or reroute Old Hwy 2
252070K	CSAH7	CSAH 7	6.4734	11	Bisected intersection. Could be difficult geometrically
251905S	CSAH13	Midway Rd	6.4212	12	Good Candidate, but some potential encroachments on the south side
260171S	CSAH24	Vermilion Dr	6.3822	13	Not sure there is enough room here
260126X	CSAH101	Fayal Rd	6.1429	14	Good Candidate
252001C	CSAH97	Sparta Rd	6.0217	15	Good Candidate. Potential frontage road on SE quad for access.
252003R	CSAH20	Heritage Tr	5.9829	16	Possible, but Hwy ADT pretty low
251934C	CSAH47	Swan Lake Rd	5.9688	17	Not recommended
251937X	CSAH133	CSAH 133	5.7444	18	Possible, but Hwy ADT pretty low
251963M	CSAH16	Town Line RD	5.72	19	Possible, but Hwy ADT pretty low
260120G	CSAH16	Town Line RD	5.7012	20	Possible candidate, but only if we need it to get to 10
260175U	CSAH115	Ashawa Rd	5.6944	21	Possible candidate, but only if we need it to get to 10
260182E	CSAH23	Orr Buyck RD	5.6883	22	Not recommended, bad geometry
252261V	CSAH16	Town Line RD	5.5783	23	Possible candidate, but only if we need it to get to 10
251967P	CR452	Iron Junction Rd	5.5039	24	Not recommended, bad geometry
260100V	CSAH15	Munger Shaw Rd	5.47	25	Possible candidate, but only if we need it to get to 10
260098W	CR885	Industrial Rd	5.45	26	Possible candidate, but only if we need it to get to 10
260189C	CSAH15	CSAH 15	5.4183	27	Possible candidate, but only if we need it to get to 10
251965B	CR310	Keenan Rd	5.4	28	Not recommended, bad geometry
260113W	CSAH59	Melrude Rd	5.3822	29	Not recommended
260089X	CSAH6	Maple Grove RD	5.3756	30	Not recommended
061253A	CSAH27	Zim Rd			Additional Crossing Identified by Project Team/Stakeholder Group
061254G	CSAH5	Hwy 5			Additional Crossing Identified by Project Team/Stakeholder Group
260106L	CSAH52	Comstock Lake Rd			Additional Crossing Identified by Project Team/Stakeholder Group
252256Y	CSAH44	Pequaywan Lake Rd			Additional Crossing Identified by Project Team/Stakeholder Group
252017Y	CSAH25	Hwy 25			Additional Crossing Identified by Project Team/Stakeholder Group
252015K	CSAH137	Spirit Lake Rd			Additional Crossing Identified by Project Team/Stakeholder Group
		Recommended for Project Sheet			
		Recommended for Further Discussion			
		Not Recommended			

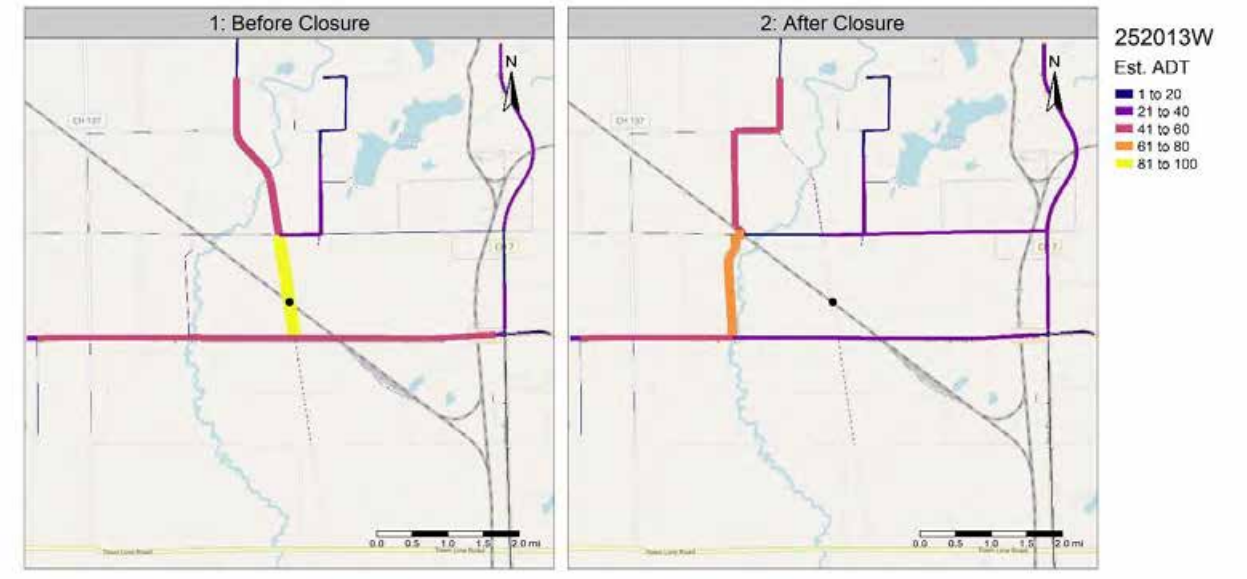
5.1 Visualization of Closure Rerouting

An additional task undertaken as part of the desktop review was an assessment of the estimated detour routes that traffic would use in the case of a crossing closure. This task was completed using a combination of multiple data sources and tools:

- **Replica Data:** Replica is a data platform that provided a variety of estimated transportation system information. Replica is essentially a travel demand model on a national scale. The platform was used for this project to estimate the start and end locations of all vehicular trips using each crossing.
- **HERE Routing API:** The HERE Routing API generates the most feasible and efficient routes based on user-defined start and end points. The API was first used on the trip start and end points identified by the HERE data under existing conditions. The API was then used to generate similar route after assuming the closure of the target grade crossing.

This before and after analysis helped the project team to better understand the potential impacts of crossing closures. An example of the analysis results is shown in Figure 5-3 for Admiral Road (CSAH 62). The example shows that if this crossing were to be closed, the greatest impacts would be in diverting traffic to Macon Road to the west. However, other roads such as Iron Junction Road would also experience increases in traffic. Similar before and after routing diagrams were developed for the top 30 candidates for closure and are included in Appendix C.

Figure 5-3. Vehicle Rerouting Example – Admiral Road (CSAH 62)



6 Stakeholder Workshop B

The second stakeholder workshop was held on September 22, 2022. Agencies and organizations in attendance at this meeting included St. Louis County, BNSF, CN, and MnDOT. The purpose of this meeting was to review the analysis, findings, and proposed

safety improvements resulting from the efforts of the project team in applying the stakeholder-guided prioritization criteria to the St. Louis County grade crossings and after undertaking the desktop review of the recommendations.

After providing a recap of the previous workshop and the efforts taken since that workshop to develop the proposed recommendations, the consultant team provided a crossing-by-crossing overview of the proposed closures, grade separations, and other safety-related improvements recommended for this study. The stakeholder group provided recommendations for consideration on some individual crossings and on the approach as a whole. Some of the key takeaways from the meeting included:

- A recommendation to group the improvements into categories:
    - Standalone crossing improvements that have independent utility unrelated to adjacent or nearby crossing improvements
    - Bundled or contingent crossings that make sense to implement as a group, but which may not be as useful if implemented only in parts.
- The group recommended the development of corridor-specific summaries of the proposed crossing improvements to better evaluate the overall impact of what is being proposed.

7 Final Recommendations

The final recommendations for closures and grade separations are summarized in Table 7-1 on the following pages. The recommendations are grouped according to the following categories:

- **Independent Closures:** These are proposed closures that have independent utility outside of any other proposed recommendations.
- **Independent Grade Separations:** These are proposed closures that have independent utility outside of any other proposed recommendations.
- **Combination Closures:** These are groups of two or more crossings that make sense to close together as a unit but may not be effective as individual closures.
- **Grade Separations with Closures:** These are combinations of closures and grade separations that may not make sense to implement independently but which would be an effective combination if implemented together.
- **Other Crossing Improvements**: A variety of other proposed safety improvements were identified at some crossings by the project team or stakeholder group. These include recommendations such as the consideration of long-term closure, roadway approach realignment, and additional signage and pavement markings.

More detailed descriptions and high level cost estimates for the proposed improvement recommendations included in Appendix A. Corridor-based summaries of the proposed improvements are included in Appendix B.

Table 7-1. Final Recommendation Summary

Recommendation Category	Highway Name	Highway Number	Crossing ID	Action	Closure/ Grade Separation Scoring Rank	Township/City
Independent Closure	Hermantown Rd	CR 846	260087J	Closure	1	Solway Township
Independent Closure	Woodland Rd	CR 382	260122V	Closure	2	Clinton Township
Independent Closure	Admiral Rd	CSAH 62	252013W	Closure	7	Clinton Township
Independent Closure	Kolu Rd	CR 207	061248D	Closure	12	McDavitt Township
Independent Closure	Saint Vincent Rd	CR 260	097753A	Closure	24	Floodwood Township
Independent Closure	Burghardt Rd	CR 430	260162T	Closure	26	Angora Township
Independent Closure	Seville Rd	CR 694	260092F	Closure	215	Grand Lake Township/Solway Township
Independent Grade Separation	Main St	CSAH 100	252305T	Grade Separation	2	City of Aurora
Independent Grade Separation	Canosia Rd	CSAH 98	251909U	Grade Separation	10	Solway Township
Independent Grade Separation	Hwy 7	CSAH 7	252070K	Grade Separation	11	Clinton Township/City of Mountain Iron
Independent Grade Separation	Hwy 101	CSAH 101	260126X	Grade Separation	14	Clinton Township/City of Eveleth/City of Leonidas/ City of Mountain Iron
Independent Grade Separation	Hwy 97	CSAH 97	252001C	Grade Separation	15	City of Gilbert

Recommendation Category	Highway Name	Highway Number	Crossing ID	Action	Closure/ Grade Separation Scoring Rank	Township/City
Combination Closure 1 (Recommendation to close one and provide access to the other or close both and provide access via a new crossing in between)	Burnett Rd	CR 867	251930A	Closure	73	Industrial Township
	Center Line Rd	CR 694	251928Y	Closure	78	Industrial Township
Combination Closure 2 (Recommendation to close all three, using Hwy 33 and US 2 for cross-track access)	Independence Rd	CR 874	251923P	Closure	71	Industrial Township
	Vibert Rd	CR 875	251920U	Closure	16	Industrial Township
	Seville Rd	CR 873	251917L	Closure	15	Industrial Township/Brevator Township
Combination Closure-Separation 1	Allavus Rd	CR 592	252016S	Closure	8	Cherry Township
	Spirit Lake Rd	CSAH 137	252015K	Grade Separation	110	Cherry Township/Clinton Township
Combination Closure-Separation 2	Ramshaw Rd	CR 755	260125R	Closure	13	Clinton Township
	Hwy 7	CSAH 7	252375H	Grade Separation	12	Clinton Township
Combination Closure-Separation 3	Shaw Rd	CR 451	252028L	Closure	41	Cherry Township
	McSweeney Rd	CR 592	252027E	Closure	15	Cherry Township

	Hwy 25	CSAH 25	252017Y	Grade Separation	79	Cherry Township
Combination Closure-Separation 4	Fermoy Rd	CR 311	251952A	Closure	26	McDavitt Township
	Hwy 7	CSAH 7	251953G	Grade Separation	8	McDavitt Township
Combination Closure-Separation 5	Midway Rd	CSAH 13	251905S	Grade Separation	18	City of Hermantown
	Midway Rd	CSAH 13	251850G	Grade Separation	15	Midway Township/City of Hermantown
	Stark Rd	CR 894	251852V	Closure	37	Midway Township
	North Cloquet Rd	CSAH 45	251854J	Grade Separation	6	Midway Township
Combination Closure-Separation 6	Southern Dr	CR 657	260128L	Grade Separation	9	City of Virginia
	Unity Dr		260146J	Signing and Pavement Markings	n/a	City of Mountain Iron
	Old Hwy 169	CSAH 102	260149E	Closure	30	City of Mountain Iron
Other Crossings 1	Hwy 23	CSAH 23	260182E	Long-term potential to relocate crossing and realign CSAH 23	n/a	City of Orr
Other Crossings 2	7th Ave	CSAH 30	097754G	Long-term improvements in support of Hwy 73 closure	n/a	City of Floodwood
	Hwy 73	MNTH 73	097755N	Long-term closure potential	n/a	City of Floodwood
Other Crossings 3	2nd St	CSAH 11	251900H	Signing and Pavement Markings	n/a	City of Proctor

8 Township Coordination and Next Steps

The project team presented the draft recommendations to a group of local township officials that represented townships for which there was a recommendation to close or grade separate a crossing. Township representatives were asked to write down comments on the layouts of the proposed closures and grade separations. St. Louis County stated that all comments would be included with the final project sheets. This meeting was held on October 24, 2023. The presentation included an overview of the study, the goals and purpose behind focusing on crossing elimination, and a summary of the evaluation metrics and approaches used to prioritize and select specific county crossings for closure or grade separation. A copy of this presentation is included as Appendix D to this plan.

The township officials provided useful feedback on the project as a whole as well as at individual crossing locations. Some attendees expressed concern about the potential impacts to emergency services vehicles. Other useful feedback included comments regarding the use of some crossings as major ATV and snowmobile crossings. Information on this type of use is not readily available for review in a systematic approach but is essential for understanding the potential impact to surrounding communities.

Additional coordination with the local townships as well as coordination with other stakeholders including MnDOT, BNSF, and CN will be required prior to implementation of any of the proposed recommendations.

Additionally, St. Louis County should consider funding the implementation of these improvements through the use of federal grant funding. The FRA's Rail Crossing Elimination (RCE) Program is specifically designed to help facilitate projects including grade crossing closures and grade separations such as the ones recommended in this plan. As stated in the FY 2022 Notice of Funding Opportunity:

> *"FRA has a strong interest in promoting grade separations, closing crossings through track relocation, and corridor-wide grade crossing improvements that maximize the safety and efficiency of the U.S. rail network. Highway-rail grade crossing accidents, together with accidents caused by trespassing along the railroad right-of-way, account for 94% of all rail-related deaths and injuries. The safest crossing is no crossing, and grade separating or otherwise eliminating crossing is the most direct way to prevent intrusions into the railroad right-of-way."*

The Notice of Funding Opportunity for the next round of this program is expected to be released sometime in summer 2024.

Appendix A:
Conceptual Layouts and Cost Estimates

Independent Crossing Closure Projects



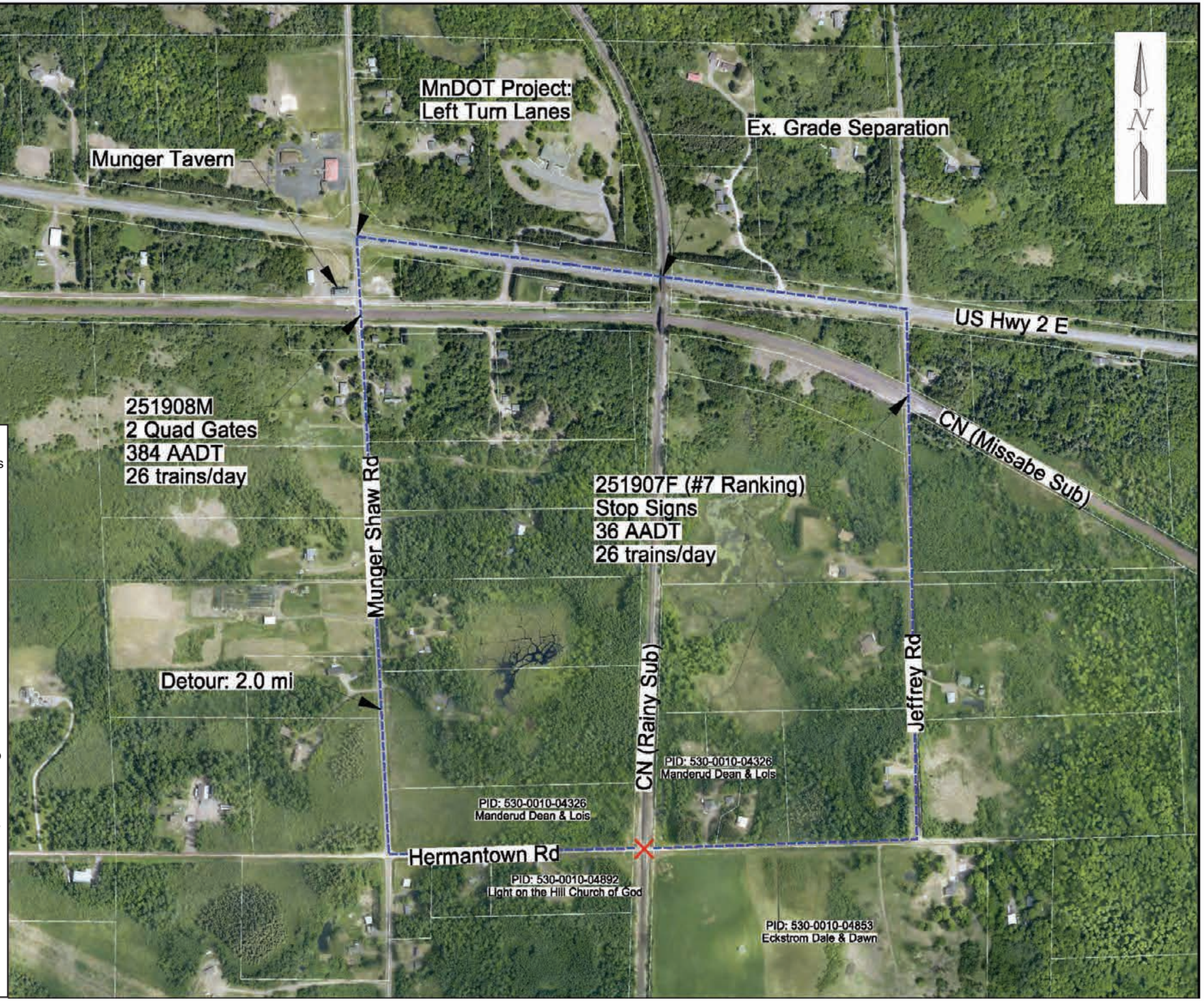
Street	Hermantown Rd (CR846)
Crossing ID	260087J
Highway AADT	5
Highway Speed	55
Train Volumes	11
Train Speed	60
Warning Device	StopSign
Max Detour (min)	2.57
Hours of Delay	0.21
10-Year Crashes	0
Max Detour Score	9
Blocked Crossing Score	2.75
Crash Score	0
Highway AADT Score	9
Crossing Density Score	7
Hours of Delay Score	10

The Hermantown Road (CR 846) at-grade railroad crossing (ID #260087J) located in Solway Township is a candidate for closure. Hermantown Road is a two-lane roadway with shoulders and ditches and a posted speed limit of 55 mph at the crossing. This single-track CN rail crossing is equipped with stop sign passive warning devices and heavy vegetation is present on the northwest, northeast, and southwest quadrants that could limit visibility of oncoming trains. There are 11 total trains per day traveling at 60 mph through this crossing. Dean and Lois Manderud own property on both northern quadrants of the crossing at Hermantown Road with their homestead located on the northeast quadrant and would be potentially affected by a closure. There is also a church located adjacent to the crossing on the southeast quadrant. The Hermantown Road crossing is a highly ranked closure candidate considering the minimal detour as well as low highway AADT's and hours of delay if the crossing were to be closed.

The Jeffrey Road crossing located northeast of the Hermantown Road crossing is also a strong candidate for closure and there have been discussions of a paired approach to improve safety at both crossings. The Jeffrey Road crossing is a skewed crossing of a two-lane roadway with stop sign passive warning devices, 26 total trains per day, and 36 cars per day.

Both crossings are in close proximity to US highway 2, which has a grade separated crossing of the Rainy Subdivision line. A future MnDOT project is programmed for left turn lanes at Munger Shaw Road and US 2, near the popular Munger Tavern.

Township Workshop Comments: If the Jeffrey Road Crossing were closed, then the Hermantown Road crossing could be considered for grade improvements to improve visibility. Consider the Eckstrom farm equipment and snow plows using the Hermantown Road Crossing and the lack of alternative routes.



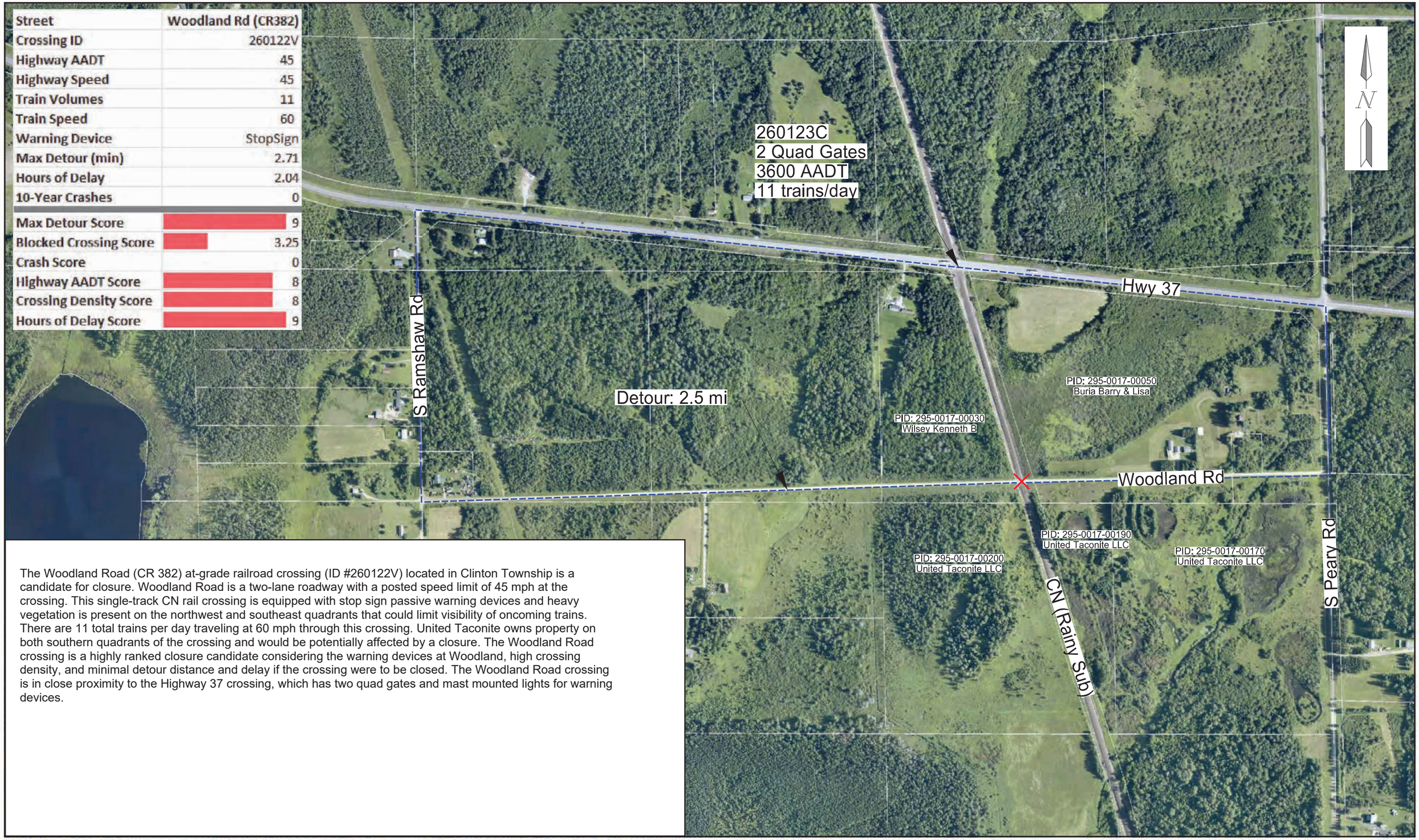
SRF
14857
01/23/2023

Hermantown Rd: Crossing ID# 260087J

Potential Closure Option

Duluth, MN

Street	Woodland Rd (CR382)
Crossing ID	260122V
Highway AADT	45
Highway Speed	45
Train Volumes	11
Train Speed	60
Warning Device	StopSign
Max Detour (min)	2.71
Hours of Delay	2.04
10-Year Crashes	0
Max Detour Score	9
Blocked Crossing Score	3.25
Crash Score	0
Highway AADT Score	8
Crossing Density Score	8
Hours of Delay Score	9



The Woodland Road (CR 382) at-grade railroad crossing (ID #260122V) located in Clinton Township is a candidate for closure. Woodland Road is a two-lane roadway with a posted speed limit of 45 mph at the crossing. This single-track CN rail crossing is equipped with stop sign passive warning devices and heavy vegetation is present on the northwest and southeast quadrants that could limit visibility of oncoming trains. There are 11 total trains per day traveling at 60 mph through this crossing. United Taconite owns property on both southern quadrants of the crossing and would be potentially affected by a closure. The Woodland Road crossing is a highly ranked closure candidate considering the warning devices at Woodland, high crossing density, and minimal detour distance and delay if the crossing were to be closed. The Woodland Road crossing is in close proximity to the Highway 37 crossing, which has two quad gates and mast mounted lights for warning devices.

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Woodland Rd: Crossing ID# 260122V

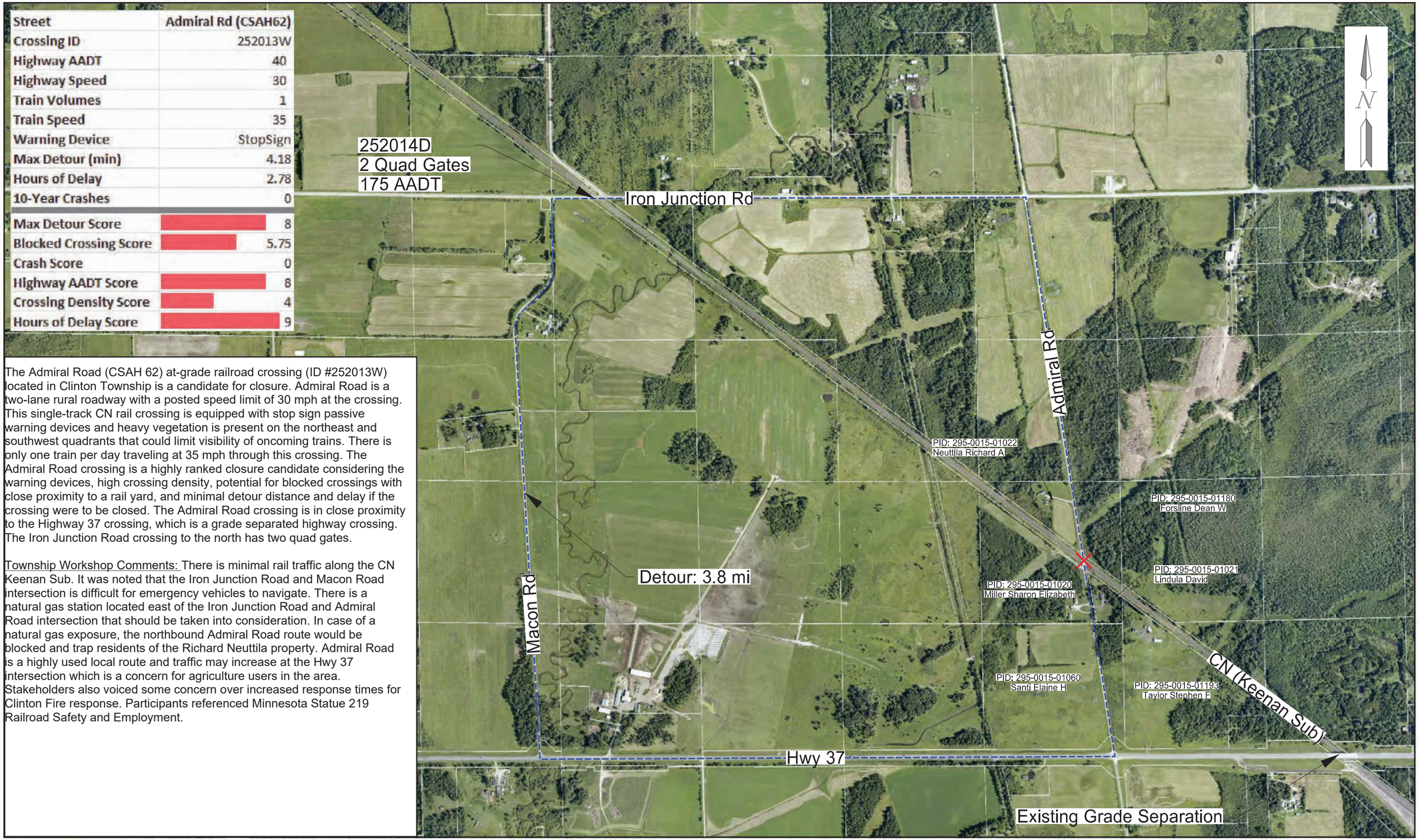
Potential Closure Option

Iron Junction, MN

Street	Admiral Rd (CSAH62)
Crossing ID	252013W
Highway AADT	40
Highway Speed	30
Train Volumes	1
Train Speed	35
Warning Device	StopSign
Max Detour (min)	4.18
Hours of Delay	2.78
10-Year Crashes	0
Max Detour Score	8
Blocked Crossing Score	5.75
Crash Score	0
Highway AADT Score	8
Crossing Density Score	4
Hours of Delay Score	9

The Admiral Road (CSAH 62) at-grade railroad crossing (ID #252013W) located in Clinton Township is a candidate for closure. Admiral Road is a two-lane rural roadway with a posted speed limit of 30 mph at the crossing. This single-track CN rail crossing is equipped with stop sign passive warning devices and heavy vegetation is present on the northeast and southwest quadrants that could limit visibility of oncoming trains. There is only one train per day traveling at 35 mph through this crossing. The Admiral Road crossing is a highly ranked closure candidate considering the warning devices, high crossing density, potential for blocked crossings with close proximity to a rail yard, and minimal detour distance and delay if the crossing were to be closed. The Admiral Road crossing is in close proximity to the Highway 37 crossing, which is a grade separated highway crossing. The Iron Junction Road crossing to the north has two quad gates.

Township Workshop Comments: There is minimal rail traffic along the CN Keenan Sub. It was noted that the Iron Junction Road and Macon Road intersection is difficult for emergency vehicles to navigate. There is a natural gas station located east of the Iron Junction Road and Admiral Road intersection that should be taken into consideration. In case of a natural gas exposure, the northbound Admiral Road route would be blocked and trap residents of the Richard Neuttila property. Admiral Road is a highly used local route and traffic may increase at the Hwy 37 intersection which is a concern for agriculture users in the area. Stakeholders also voiced some concern over increased response times for Clinton Fire response. Participants referenced Minnesota Statue 219 Railroad Safety and Employment.



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Admiral Rd: Crossing ID# 252013W

Potential Closure Option

Iron Junction, MN

Street	Kolu Rd (CR207)
Crossing ID	061248D
Highway AADT	5
Highway Speed	30
Train Volumes	4
Train Speed	50
Warning Device	Crossbuck
Max Detour (min)	3.23
Hours of Delay	0.27
10-Year Crashes	0
Max Detour Score	8
Blocked Crossing Score	1.5
Crash Score	0
Highway AADT Score	9
Crossing Density Score	6
Hours of Delay Score	10

The Kolu Road (CR 207) at-grade railroad crossing (ID #061248D) located in McDavitt Township is a candidate for closure. Kolu Road is a two-lane rural roadway with a posted speed limit of 30 mph at the crossing. This single-track BNSF rail crossing is equipped with yield sign and crossbuck passive warning devices and heavy vegetation is present at this skewed crossing that could limit visibility of oncoming trains. There are four trains per day traveling at 50 mph through this crossing. The Admiral Road crossing is a highly ranked closure candidate considering the skew, passive warning devices, minimal adjacent property impacts, and minimal delay if the crossing were to be closed. Admiral Road is in close proximity to the Kolu Road crossing. The Sax Road crossing to the south has yield signs for warning devices at the crossing.



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Kolu Rd: Crossing ID# 061248D

Potential Closure Option

Sax, MN

Street	Saint Vincent Rd (CR260)
Crossing ID	097753A
Highway AADT	75
Highway Speed	30
Train Volumes	4
Train Speed	50
Warning Device	StopSign
Max Detour (min)	3.66
Hours of Delay	4.57
10-Year Crashes	0
Max Detour Score	8
Blocked Crossing Score	1.75
Crash Score	0
Highway AADT Score	7
Crossing Density Score	5
Hours of Delay Score	9

The Saint Vincent Road (CR 260) at-grade railroad crossing (ID #097753A) located in Floodwood Township is a candidate for closure. Saint Vincent Road is a two-lane crossing with a posted speed limit of 30 mph at the crossing. This single-track BNSF rail crossing is equipped with stop sign passive warning devices. There are four trains per day traveling at 50 mph through this crossing. Dillon Baumann owns property on both sides of the crossing and would be potentially affected by a closure. The Saint Vincent Road crossing is a highly ranked closure candidate considering the minimal delay and detour if the crossing were to be closed. There are some additional considerations like the impacts to traffic on US 2 and the changes to private property access on the east side of the railroad tracks.



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Saint Vincent Rd: Crossing ID# 097753A

Potential Closure Option

Hibbing, MN

Street	Burghardt Rd (CR430)
Crossing ID	260162T
Highway AADT	5
Highway Speed	15
Train Volumes	15
Train Speed	60
Warning Device	StopSign
Max Detour (min)	8.16
Hours of Delay	0.68
10-Year Crashes	0
Max Detour Score	6
Blocked Crossing Score	3
Crash Score	0
Highway AADT Score	9
Crossing Density Score	5
Hours of Delay Score	10

The Burghardt Road (CR 430) at-grade railroad crossing (ID #260162T) located in Angora Township is a candidate for closure. Burghardt Road is a gravel roadway with a posted speed limit of 15 mph at the crossing. This single-track CN rail crossing is equipped with stop sign passive warning devices and heavy vegetation is present that could limit visibility of oncoming trains. There are 15 total trains per day traveling at 60 mph through this crossing. Lisa Ostrin Vaara owns property on both northern quadrants of the crossing and would be potentially affected by a closure. The Burghardt Road crossing is a candidate, and there are additional considerations of longer detour and property ownership if the crossing were to be closed. The Burghardt Road crossing is in close proximity to US Highway 1, which is the closest nearby crossing with two quad gates for warning devices. Additionally, there are several programmed projects on US 1 including J-turn project and considerations for grade separation.

Township Workshop Comments: The Angora Township and surrounding businesses do not support the proposed closure at Burghardt Road and suggested that Heino Road would be a better candidate for closure. The Heino Road crossing score lower in the analysis due to a higher maximum detour score, which accounts for one third of the final score. It was noted that Burghardt Road has seen an increase in ATV users and this could have a potential for more accidents with illegal crossings and could justify adding crossing gate arms. Participants suggested that train counts along the Rainy Sub may be higher than what is listed in the crossing inventory. Participants also noted that trains occasionally block the Hwy 1 crossing and that emergency vehicles are incredibly impacted when that happens.



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Burghardt Rd: Crossing ID# 260162T

Potential Closure Option

Angora, MN

Street	Seville Rd (CR694)
Crossing ID	260092F
Highway AADT	217
Highway Speed	55
Train Volumes	11
Train Speed	60
Warning Device	StopSign
Max Detour (min)	120.00
Hours of Delay	434.00
10-Year Crashes	0
Max Detour Score	1
Blocked Crossing Score	2.5
Crash Score	0
Highway AADT Score	5
Crossing Density Score	1
Hours of Delay Score	1

The Seville Road (CR 694) at-grade railroad crossing (ID #260092F) located in Grant Lake Township/Solway Township is a candidate for closure. Seville Road is a two-lane roadway with shoulders and ditches and a posted speed limit of 55 mph at the crossing. This single-track CN rail crossing is equipped with stop sign passive warning devices and heavy vegetation is present that could limit visibility of oncoming trains. There are 11 total trains per day traveling at 60 mph through this crossing. John Prouty owns property on both northern quadrants of the crossing and would be potentially affected by a closure. There is a gravel mine located adjacent to the crossing on the southwest quadrant. There are lights and gates being installed at this crossing and a left turn project programmed at the intersection of highway 194 and Canosia Road in 2023.

Township Workshop Comments: From Solway's perspective this would be a viable option with improvements to Bergquist Road in addition to intersection improvements at Hwy #2.



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Seville Rd: Crossing ID# 260092F

Potential Closure Option

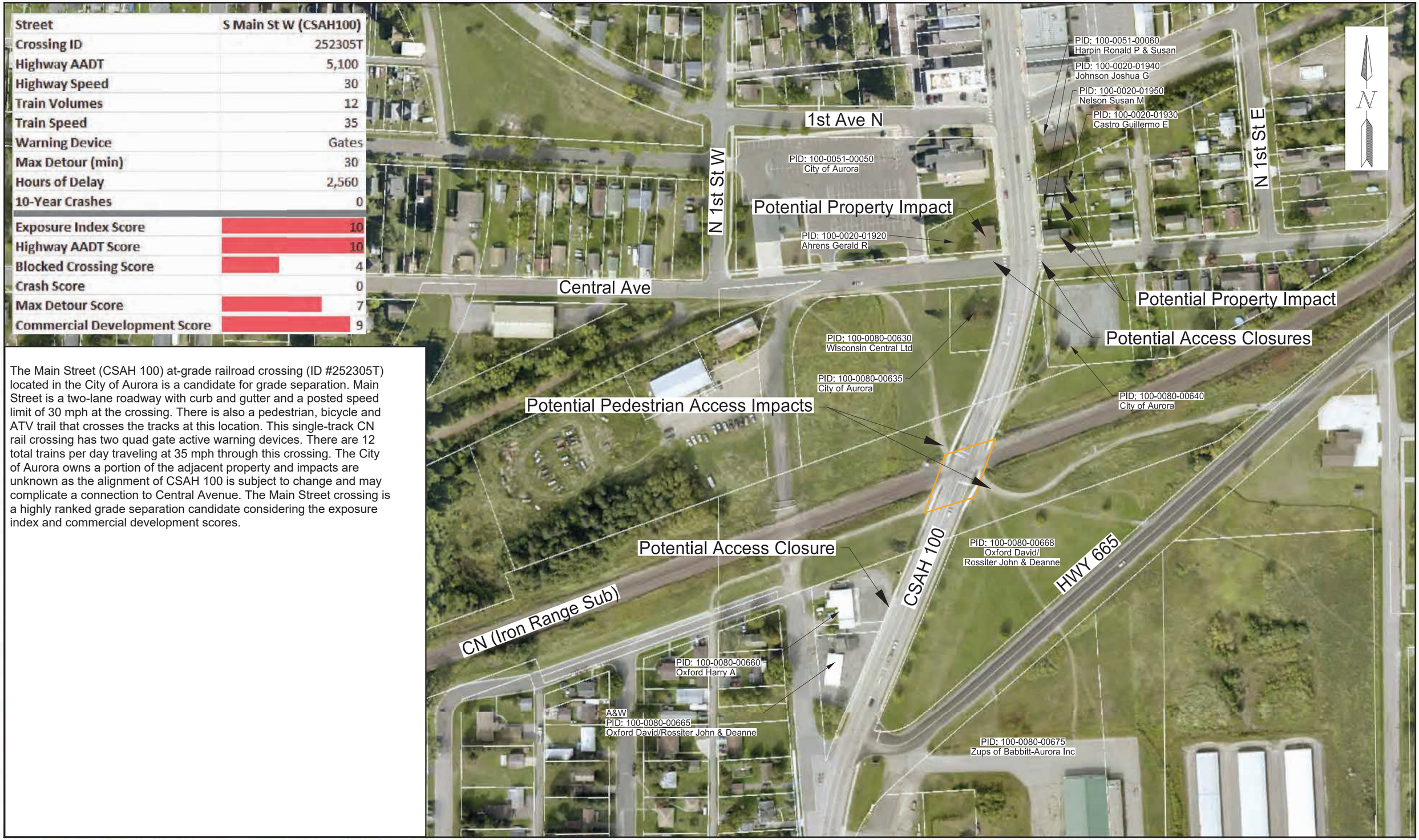
Saginaw, MN

Independent Grade Separation Projects



Street	S Main St W (CSAH100)
Crossing ID	252305T
Highway AADT	5,100
Highway Speed	30
Train Volumes	12
Train Speed	35
Warning Device	Gates
Max Detour (min)	30
Hours of Delay	2,560
10-Year Crashes	0
Exposure Index Score	10
Highway AADT Score	10
Blocked Crossing Score	4
Crash Score	0
Max Detour Score	7
Commercial Development Score	9

The Main Street (CSAH 100) at-grade railroad crossing (ID #252305T) located in the City of Aurora is a candidate for grade separation. Main Street is a two-lane roadway with curb and gutter and a posted speed limit of 30 mph at the crossing. There is also a pedestrian, bicycle and ATV trail that crosses the tracks at this location. This single-track CN rail crossing has two quad gate active warning devices. There are 12 total trains per day traveling at 35 mph through this crossing. The City of Aurora owns a portion of the adjacent property and impacts are unknown as the alignment of CSAH 100 is subject to change and may complicate a connection to Central Avenue. The Main Street crossing is a highly ranked grade separation candidate considering the exposure index and commercial development scores.



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S Main St W: Crossing ID# 252305T

Potential Grade Separation Option
Aurora, MN

Street	Canosia Rd (CSAH98)
Crossing ID	251909U
Highway AADT	1,650
Highway Speed	55
Train Volumes	16
Train Speed	42
Warning Device	Gates
Max Detour (min)	5
Hours of Delay	150
10-Year Crashes	0
Exposure Index Score	10
Highway AADT Score	9
Blocked Crossing Score	4
Crash Score	0
Max Detour Score	4
Commercial Development Score	6

The Canosia Road (CSAH 98) at-grade railroad crossing (ID #251909U) located in Soloway Township is a candidate for grade separation. Canosia Road is a two-lane roadway with a posted speed limit of 55 mph at the crossing. This single-track CN rail crossing has two quad gate active warning devices. There are 16 total trains per day traveling at 42 mph through this crossing. There are potential access closures and impacts on the northwest, northeast, and southwest quadrants of the crossing. The County recently completed a project at the intersection of Old Highway 2 and Canosia Road and are considering the most effective alternatives to connect Canosia Road to Old Highway 2 if a grade separation project were constructed. The Canosia Road crossing is a highly ranked grade separation candidate considering the exposure index, highway AADT, and commercial development scores.



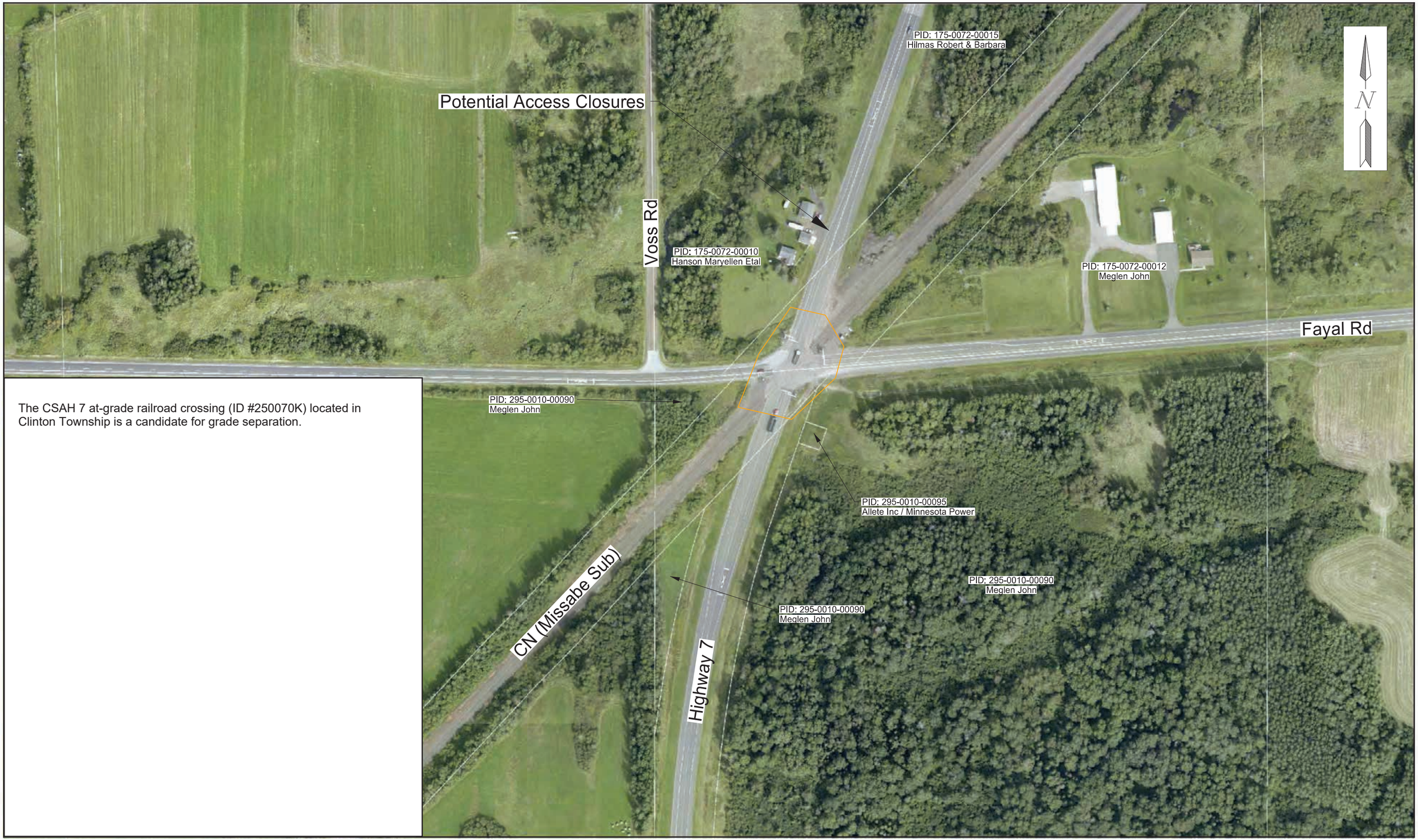
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Canosia Rd: Crossing ID# 251909U

Potential Grade Separation Option

Cloquet, MN

The CSAH 7 at-grade railroad crossing (ID #250070K) located in Clinton Township is a candidate for grade separation.



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CSAH 7: Crossing ID# 252070K

Potential Grade Separation Option
Eveleth, MN

Street	Fayal Rd (CSAH101)
Crossing ID	260126X
Highway AADT	1,600
Highway Speed	55
Train Volumes	11
Train Speed	60
Warning Device	Gates
Max Detour (min)	7
Hours of Delay	181
10-Year Crashes	0
Exposure Index Score	10
Highway AADT Score	9
Blocked Crossing Score	4
Crash Score	0
Max Detour Score	5
Commercial Development Score	0

The Fayal Road (CSAH 101) at-grade railroad crossing (ID #260126X) located in the City of Eveleth is a candidate for grade separation. Fayal Road is a two-lane roadway with shoulders and ditches, a stopping lane at the crossing, and a posted speed limit of 55 mph. This single-track CN rail crossing has two quad gates and mast mounted lights. There are 11 total trains per day traveling at 60 mph through this crossing. The Fayal Road crossing is a strong grade separation candidate considering the exposure index and highway AADT scores.



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Fayal Rd: Crossing ID# 260126X

Potential Grade Separation Option

Eveleth, MN

Street	Sparta Rd (CSAH97)
Crossing ID	252001C
Highway AADT	1,500
Highway Speed	55
Train Volumes	12
Train Speed	35
Warning Device	Gates
Max Detour (min)	11
Hours of Delay	271
10-Year Crashes	0
Exposure Index Score	10
Highway AADT Score	9
Blocked Crossing Score	3
Crash Score	0
Max Detour Score	6
Commercial Development Score	0

The Sparta Road (CSAH 97) at-grade railroad crossing (ID #252001C) located in the City of Gilbert is a candidate for grade separation. Sparta Road is a two-lane roadway with a posted speed limit of 55 mph at the crossing. This single-track CN rail crossing has two quad gate active warning devices. There are 12 total trains per day traveling at 35 mph through this crossing. There are potential access closures and impacts on the northwest, southwest, and southeast quadrants of the crossing. The Sparta Road crossing is a strong grade separation candidate considering the exposure index, highway AADT, and blocked crossing scores.



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Sparta Rd: Crossing ID# 252001C

Potential Grade Separation Option

Eveleth, MN

Street	Burnett Rd (CR867)
Crossing ID	251930A
Highway AADT	65
Highway Speed	40
Train Volumes	16
Train Speed	35
Warning Device	StopSign
Max Detour (min)	8.85
Hours of Delay	9.58
10-Year Crashes	0
Max Detour Score	6
Blocked Crossing Score	2.5
Crash Score	0
Highway AADT Score	7
Crossing Density Score	6
Hours of Delay Score	8

The Burnett Road (CR 867) at-grade railroad crossing (ID #251930A) and the Centerline Road (CR 694) at-grade railroad crossing (ID #251928Y) located in Industrial Township are strong candidates for combined crossing closures. Burnett Road is a two-lane roadway with a posted speed limit of 40 mph at the crossing. The Burnett Road crossing is equipped with stop sign passive warning devices and heavy vegetation is present that could limit visibility of oncoming trains. The crossing is situated close to Highway 7, creating stopping storage concerns and the topography of the crossing sometimes leads to trucks being hung up on the tracks. The state of Minnesota owns property adjacent to the tracks at this crossing. Centerline Road is a two-lane roadway with a posted speed limit of 20 mph at the crossing. The Centerline Road crossing is equipped with stop sign passive warning devices and heavy vegetation is present that could limit visibility of oncoming trains. There are 16 total trains per day traveling at 30 mph through both single-track CN rail crossings. There are additional considerations of property ownership if the crossings were to be closed. The Centerline Road crossing is also in close proximity to US Highway 7, creating stopping distance and storage issues at the crossing. The combined Burnett Road and Centerline Road crossing closures are a highly ranked candidate considering the crossing density score, hours of delay and detour scores.

Township Workshop Comments: Stakeholders voiced the need to consider maintaining property access to the Lance Leckman property on the south side of the Missabe Sub, East of Burnett Road.



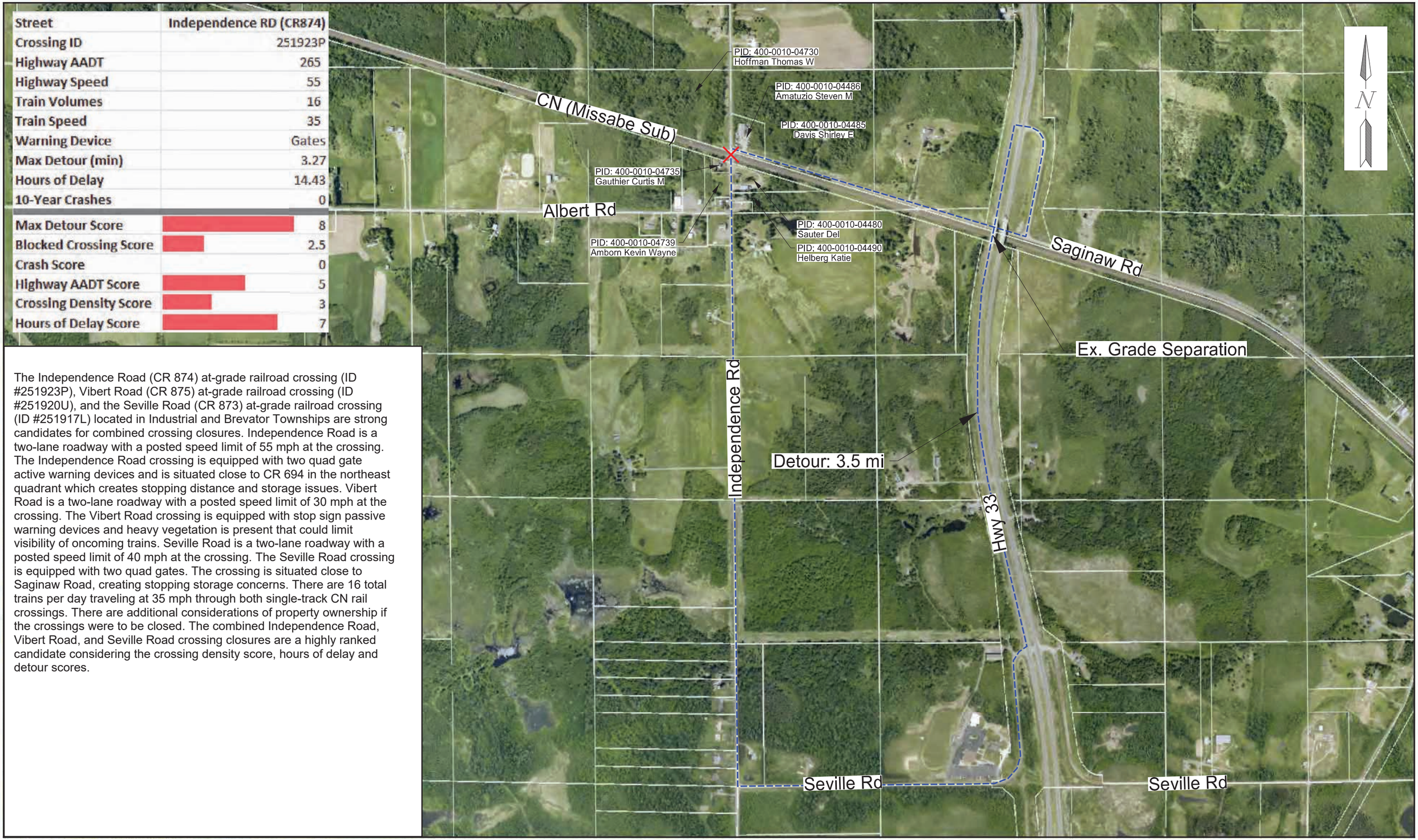
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Burnett Rd: Crossing ID# 251930A & Center Line Rd: Crossing ID# 251928Y

Potential Closure Option
Culver, MN

Street	Independence RD (CR874)
Crossing ID	251923P
Highway AADT	265
Highway Speed	55
Train Volumes	16
Train Speed	35
Warning Device	Gates
Max Detour (min)	3.27
Hours of Delay	14.43
10-Year Crashes	0
Max Detour Score	8
Blocked Crossing Score	2.5
Crash Score	0
Highway AADT Score	5
Crossing Density Score	3
Hours of Delay Score	7

The Independence Road (CR 874) at-grade railroad crossing (ID #251923P), Vibert Road (CR 875) at-grade railroad crossing (ID #251920U), and the Seville Road (CR 873) at-grade railroad crossing (ID #251917L) located in Industrial and Brevator Townships are strong candidates for combined crossing closures. Independence Road is a two-lane roadway with a posted speed limit of 55 mph at the crossing. The Independence Road crossing is equipped with two quad gate active warning devices and is situated close to CR 694 in the northeast quadrant which creates stopping distance and storage issues. Vibert Road is a two-lane roadway with a posted speed limit of 30 mph at the crossing. The Vibert Road crossing is equipped with stop sign passive warning devices and heavy vegetation is present that could limit visibility of oncoming trains. Seville Road is a two-lane roadway with a posted speed limit of 40 mph at the crossing. The Seville Road crossing is equipped with two quad gates. The crossing is situated close to Saginaw Road, creating stopping storage concerns. There are 16 total trains per day traveling at 35 mph through both single-track CN rail crossings. There are additional considerations of property ownership if the crossings were to be closed. The combined Independence Road, Vibert Road, and Seville Road crossing closures are a highly ranked candidate considering the crossing density score, hours of delay and detour scores.



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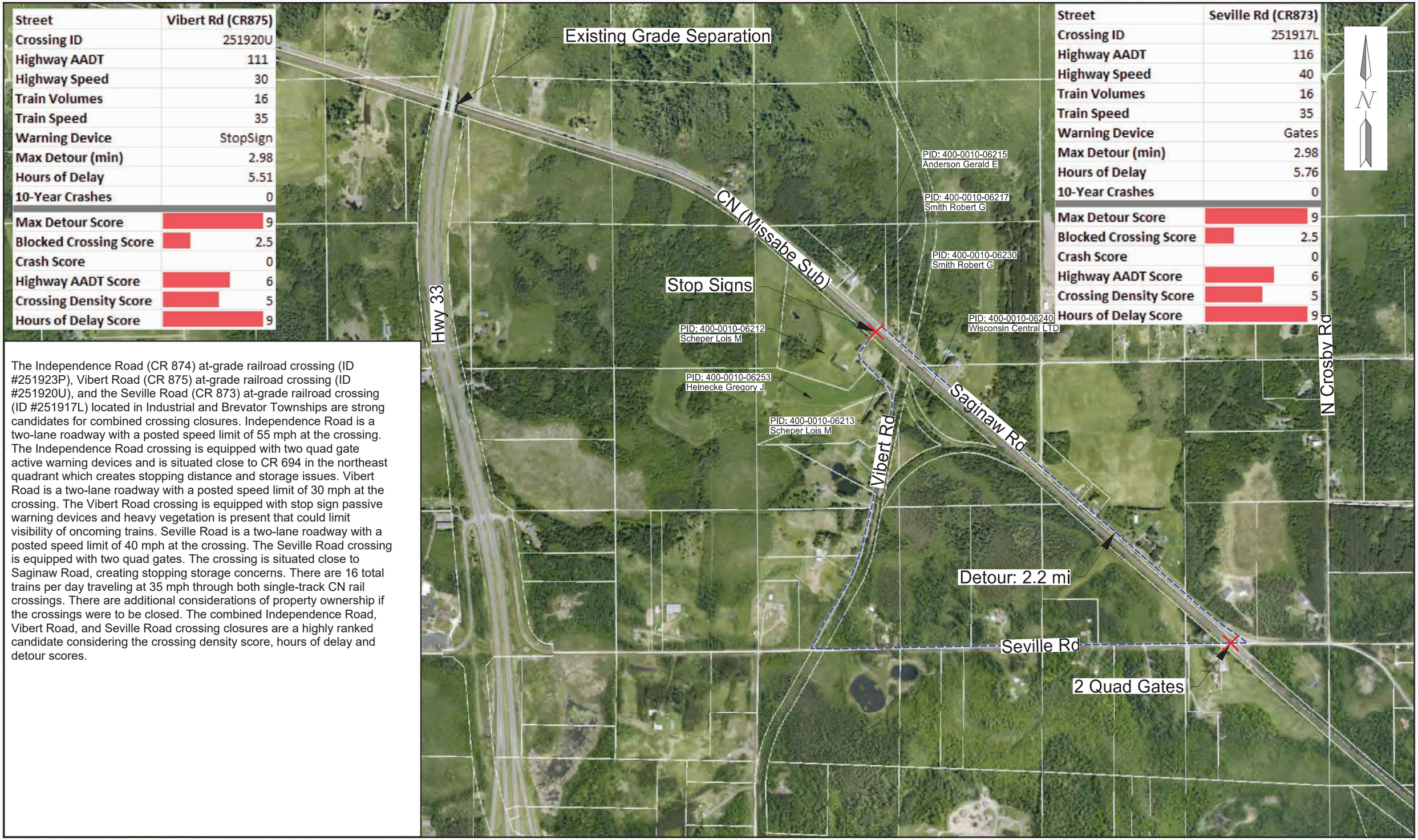
Independence Rd: Crossing ID# 251923P

Potential Closure Option

Saginaw, MN

Street	Vibert Rd (CR875)
Crossing ID	251920U
Highway AADT	111
Highway Speed	30
Train Volumes	16
Train Speed	35
Warning Device	StopSign
Max Detour (min)	2.98
Hours of Delay	5.51
10-Year Crashes	0
Max Detour Score	9
Blocked Crossing Score	2.5
Crash Score	0
Highway AADT Score	6
Crossing Density Score	5
Hours of Delay Score	9

Street	Seville Rd (CR873)
Crossing ID	251917L
Highway AADT	116
Highway Speed	40
Train Volumes	16
Train Speed	35
Warning Device	Gates
Max Detour (min)	2.98
Hours of Delay	5.76
10-Year Crashes	0
Max Detour Score	9
Blocked Crossing Score	2.5
Crash Score	0
Highway AADT Score	6
Crossing Density Score	5
Hours of Delay Score	9



The Independence Road (CR 874) at-grade railroad crossing (ID #251923P), Vibert Road (CR 875) at-grade railroad crossing (ID #251920U), and the Seville Road (CR 873) at-grade railroad crossing (ID #251917L) located in Industrial and Brevator Townships are strong candidates for combined crossing closures. Independence Road is a two-lane roadway with a posted speed limit of 55 mph at the crossing. The Independence Road crossing is equipped with two quad gate active warning devices and is situated close to CR 694 in the northeast quadrant which creates stopping distance and storage issues. Vibert Road is a two-lane roadway with a posted speed limit of 30 mph at the crossing. The Vibert Road crossing is equipped with stop sign passive warning devices and heavy vegetation is present that could limit visibility of oncoming trains. Seville Road is a two-lane roadway with a posted speed limit of 40 mph at the crossing. The Seville Road crossing is equipped with two quad gates. The crossing is situated close to Saginaw Road, creating stopping storage concerns. There are 16 total trains per day traveling at 35 mph through both single-track CN rail crossings. There are additional considerations of property ownership if the crossings were to be closed. The combined Independence Road, Vibert Road, and Seville Road crossing closures are a highly ranked candidate considering the crossing density score, hours of delay and detour scores.

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Vibert Rd: Crossing ID# 251920U & Seville Rd: Crossing ID# 251917L

Potential Closure Option
Saginaw, MN

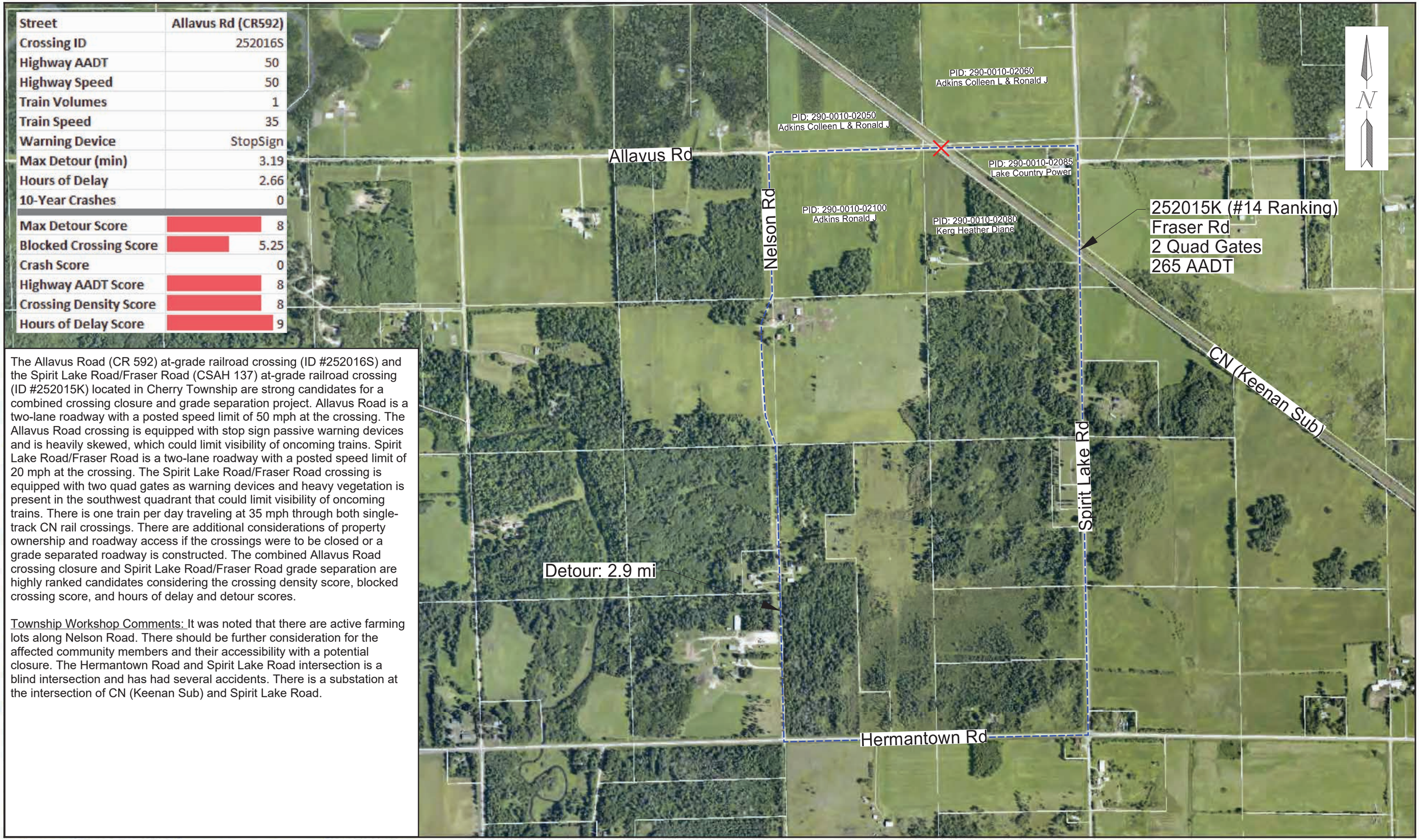
Combination Closure & Grade Separation Projects



Street	Allavus Rd (CR592)
Crossing ID	252016S
Highway AADT	50
Highway Speed	50
Train Volumes	1
Train Speed	35
Warning Device	StopSign
Max Detour (min)	3.19
Hours of Delay	2.66
10-Year Crashes	0
Max Detour Score	8
Blocked Crossing Score	5.25
Crash Score	0
Highway AADT Score	8
Crossing Density Score	8
Hours of Delay Score	9

The Allavus Road (CR 592) at-grade railroad crossing (ID #252016S) and the Spirit Lake Road/Fraser Road (CSAH 137) at-grade railroad crossing (ID #252015K) located in Cherry Township are strong candidates for a combined crossing closure and grade separation project. Allavus Road is a two-lane roadway with a posted speed limit of 50 mph at the crossing. The Allavus Road crossing is equipped with stop sign passive warning devices and is heavily skewed, which could limit visibility of oncoming trains. Spirit Lake Road/Fraser Road is a two-lane roadway with a posted speed limit of 20 mph at the crossing. The Spirit Lake Road/Fraser Road crossing is equipped with two quad gates as warning devices and heavy vegetation is present in the southwest quadrant that could limit visibility of oncoming trains. There is one train per day traveling at 35 mph through both single-track CN rail crossings. There are additional considerations of property ownership and roadway access if the crossings were to be closed or a grade separated roadway is constructed. The combined Allavus Road crossing closure and Spirit Lake Road/Fraser Road grade separation are highly ranked candidates considering the crossing density score, blocked crossing score, and hours of delay and detour scores.

Township Workshop Comments: It was noted that there are active farming lots along Nelson Road. There should be further consideration for the affected community members and their accessibility with a potential closure. The Hermantown Road and Spirit Lake Road intersection is a blind intersection and has had several accidents. There is a substation at the intersection of CN (Keenan Sub) and Spirit Lake Road.



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Allavus Rd: Crossing ID# 252016S

Potential Closure Option

Mountain Iron, MN

Street	Ramshaw RD (CR755)
Crossing ID	260125R
Highway AADT	70
Highway Speed	55
Train Volumes	11
Train Speed	60
Warning Device	StopSign
Max Detour (min)	6.78
Hours of Delay	7.90
10-Year Crashes	1
Max Detour Score	6
Blocked Crossing Score	3.5
Crash Score	5
Highway AADT Score	7
Crossing Density Score	7
Hours of Delay Score	9

The Ramshaw Road (CR 755) at-grade railroad crossing (ID #260125R) and the CSAH 7 at-grade railroad crossing (ID #252375H) located in Clinton Township are strong candidates for a combined crossing closure and grade separation project. Ramshaw Road is a two-lane roadway with a posted speed limit of 50 mph at the crossing. The Ramshaw Road crossing is equipped with stop sign passive warning devices and is skewed, which could limit visibility of oncoming trains. CSAH 7 is a four-lane roadway with a posted speed limit of 55 mph at the crossing. The CSAH 7 crossing is equipped with two quad gates as warning devices. There are 12 trains per day traveling at 35 mph through both single-track CN rail crossings. The combined Ramshaw Road crossing closure and CSAH 7 grade separation are highly ranked candidates considering the exposure index score, highway AADT score, and blocked crossing score.

Township Workshop Comments: Participants suggested that this location is a great candidate for a potential closure. They noted that there may be consideration for adding two railroad crossings for access heading north and then east. It was noted that the increased time for emergency response as a five mile detour is not acceptable.



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Ramshaw Rd: Crossing ID# 260125R

Potential Closure Option

Eveleth, MN

Street	CSAH 7 (CSAH7)
Crossing ID	252375H
Highway AADT	2,110
Highway Speed	55
Train Volumes	12
Train Speed	35
Warning Device	Gates
Max Detour (min)	11
Hours of Delay	397
10-Year Crashes	0
Exposure Index Score	10
Highway AADT Score	10
Blocked Crossing Score	4.25
Crash Score	0
Max Detour Score	6
Commercial Development Score	0

The Ramshaw Road (CR 755) at-grade railroad crossing (ID #260125R) and the CSAH 7 at-grade railroad crossing (ID #252375H) located in Clinton Township are strong candidates for a combined crossing closure and grade separation project. Ramshaw Road is a two-lane roadway with a posted speed limit of 50 mph at the crossing. The Ramshaw Road crossing is equipped with stop sign passive warning devices and is skewed, which could limit visibility of oncoming trains. CSAH 7 is a four-lane roadway with a posted speed limit of 55 mph at the crossing. The CSAH 7 crossing is equipped with two quad gates as warning devices. There are 12 trains per day traveling at 35 mph through both single-track CN rail crossings. The combined Ramshaw Road crossing closure and CSAH 7 grade separation are highly ranked candidates considering the exposure index score, highway AADT score, and blocked crossing score.

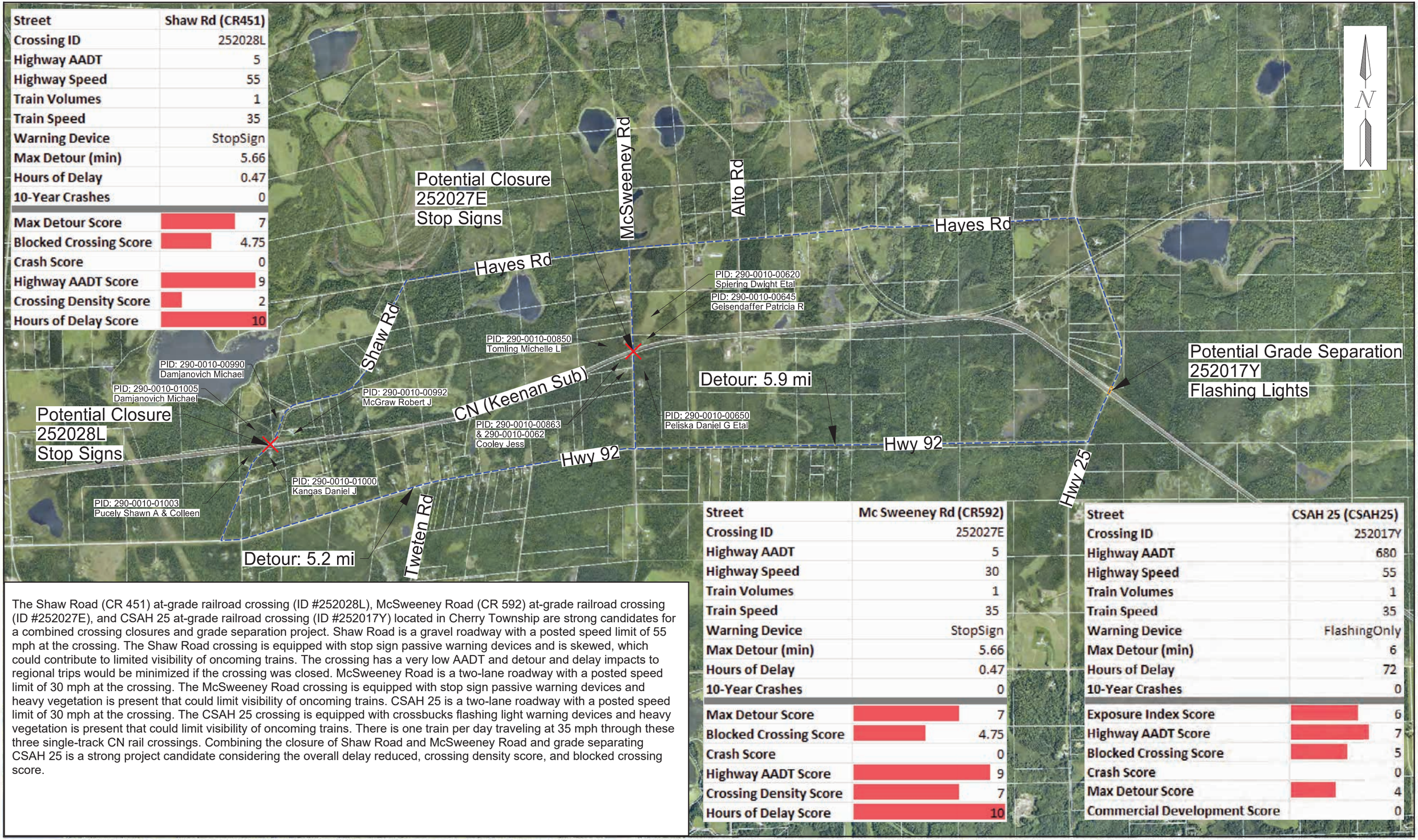


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CSAH 7: Crossing ID# 252375H

Potential Grade Separation Option
Aurora, MN

Street	Shaw Rd (CR451)
Crossing ID	252028L
Highway AADT	5
Highway Speed	55
Train Volumes	1
Train Speed	35
Warning Device	StopSign
Max Detour (min)	5.66
Hours of Delay	0.47
10-Year Crashes	0
Max Detour Score	7
Blocked Crossing Score	4.75
Crash Score	0
Highway AADT Score	9
Crossing Density Score	2
Hours of Delay Score	10



Street	Mc Sweeney Rd (CR592)
Crossing ID	252027E
Highway AADT	5
Highway Speed	30
Train Volumes	1
Train Speed	35
Warning Device	StopSign
Max Detour (min)	5.66
Hours of Delay	0.47
10-Year Crashes	0
Max Detour Score	7
Blocked Crossing Score	4.75
Crash Score	0
Highway AADT Score	9
Crossing Density Score	7
Hours of Delay Score	10

Street	CSAH 25 (CSAH25)
Crossing ID	252017Y
Highway AADT	680
Highway Speed	55
Train Volumes	1
Train Speed	35
Warning Device	FlashingOnly
Max Detour (min)	6
Hours of Delay	72
10-Year Crashes	0
Exposure Index Score	6
Highway AADT Score	7
Blocked Crossing Score	5
Crash Score	0
Max Detour Score	4
Commercial Development Score	0

The Shaw Road (CR 451) at-grade railroad crossing (ID #252028L), McSweeney Road (CR 592) at-grade railroad crossing (ID #252027E), and CSAH 25 at-grade railroad crossing (ID #252017Y) located in Cherry Township are strong candidates for a combined crossing closures and grade separation project. Shaw Road is a gravel roadway with a posted speed limit of 55 mph at the crossing. The Shaw Road crossing is equipped with stop sign passive warning devices and is skewed, which could contribute to limited visibility of oncoming trains. The crossing has a very low AADT and detour and delay impacts to regional trips would be minimized if the crossing was closed. McSweeney Road is a two-lane roadway with a posted speed limit of 30 mph at the crossing. The McSweeney Road crossing is equipped with stop sign passive warning devices and heavy vegetation is present that could limit visibility of oncoming trains. CSAH 25 is a two-lane roadway with a posted speed limit of 30 mph at the crossing. The CSAH 25 crossing is equipped with crossbucks flashing light warning devices and heavy vegetation is present that could limit visibility of oncoming trains. There is one train per day traveling at 35 mph through these three single-track CN rail crossings. Combining the closure of Shaw Road and McSweeney Road and grade separating CSAH 25 is a strong project candidate considering the overall delay reduced, crossing density score, and blocked crossing score.

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Shaw Rd: Crossing ID# 252028L, McSweeney Rd: Crossing ID# 252027E, CSAH 25: Crossing ID# 252017Y

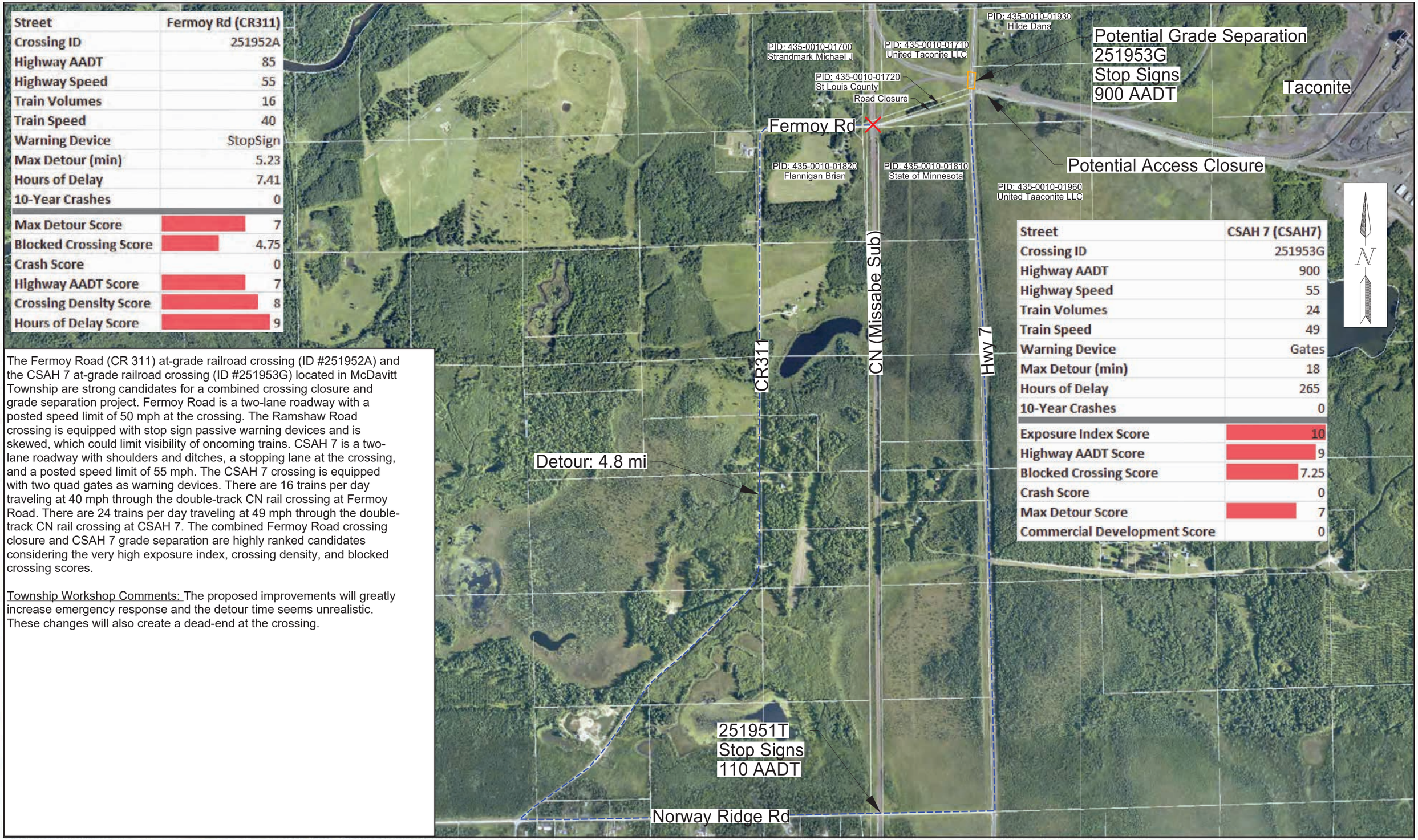
Potential Combination Closure & Grade Separation Option

Hibbing, MN

Street	Fermoy Rd (CR311)
Crossing ID	251952A
Highway AADT	85
Highway Speed	55
Train Volumes	16
Train Speed	40
Warning Device	StopSign
Max Detour (min)	5.23
Hours of Delay	7.41
10-Year Crashes	0
Max Detour Score	7
Blocked Crossing Score	4.75
Crash Score	0
Highway AADT Score	7
Crossing Density Score	8
Hours of Delay Score	9

The Fermoy Road (CR 311) at-grade railroad crossing (ID #251952A) and the CSAH 7 at-grade railroad crossing (ID #251953G) located in McDavitt Township are strong candidates for a combined crossing closure and grade separation project. Fermoy Road is a two-lane roadway with a posted speed limit of 50 mph at the crossing. The Ramshaw Road crossing is equipped with stop sign passive warning devices and is skewed, which could limit visibility of oncoming trains. CSAH 7 is a two-lane roadway with shoulders and ditches, a stopping lane at the crossing, and a posted speed limit of 55 mph. The CSAH 7 crossing is equipped with two quad gates as warning devices. There are 16 trains per day traveling at 40 mph through the double-track CN rail crossing at Fermoy Road. There are 24 trains per day traveling at 49 mph through the double-track CN rail crossing at CSAH 7. The combined Fermoy Road crossing closure and CSAH 7 grade separation are highly ranked candidates considering the very high exposure index, crossing density, and blocked crossing scores.

Township Workshop Comments: The proposed improvements will greatly increase emergency response and the detour time seems unrealistic. These changes will also create a dead-end at the crossing.



Street	CSAH 7 (CSAH7)
Crossing ID	251953G
Highway AADT	900
Highway Speed	55
Train Volumes	24
Train Speed	49
Warning Device	Gates
Max Detour (min)	18
Hours of Delay	265
10-Year Crashes	0
Exposure Index Score	10
Highway AADT Score	9
Blocked Crossing Score	7.25
Crash Score	0
Max Detour Score	7
Commercial Development Score	0

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Fermoy Rd: Crossing ID# 251952A & CSAH 7: Crossing ID# 251953G

Potential Combination Closure & Grade Separation Option

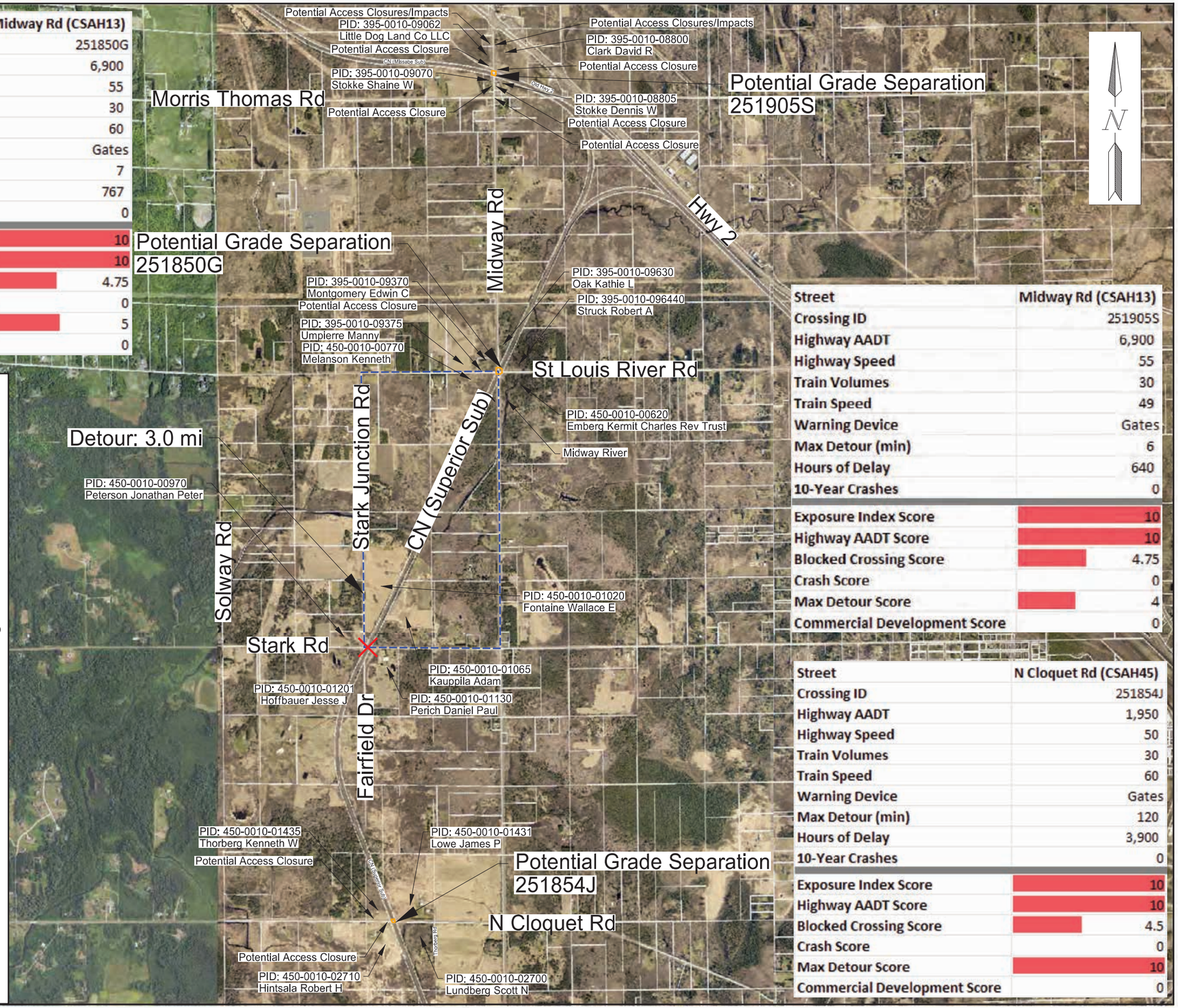
Forbes, MN

Street	Stark Rd (CR894)
Crossing ID	251852V
Highway AADT	363
Highway Speed	55
Train Volumes	30
Train Speed	25
Warning Device	Gates
Max Detour (min)	3.33
Hours of Delay	20.16
10-Year Crashes	0
Max Detour Score	8
Blocked Crossing Score	4.75
Crash Score	0
Highway AADT Score	5
Crossing Density Score	8
Hours of Delay Score	6

Street	Midway Rd (CSAH13)
Crossing ID	251850G
Highway AADT	6,900
Highway Speed	55
Train Volumes	30
Train Speed	60
Warning Device	Gates
Max Detour (min)	7
Hours of Delay	767
10-Year Crashes	0
Exposure Index Score	10
Highway AADT Score	10
Blocked Crossing Score	4.75
Crash Score	0
Max Detour Score	5
Commercial Development Score	0

The Midway Road (CSAH 13) at-grade railroad crossing (ID #251905S), Midway Road (CSAH 13) at-grade railroad crossing (ID #251850G), Stark Road (CR 894) at-grade railroad crossing (ID #251852V), and North Cloquet Road (CSAH 45) at-grade railroad crossing (ID #251854J) located in the City of Hermantown and Midway Township are strong candidates for a project including a crossing closure and several grade separated crossing projects. The northernmost crossing on Midway Road is a two-lane roadway with high AADT's and a posted speed limit of 55 mph at the crossing. Train volumes at this crossing are at 30 trains per day, traveling about 49 mph on two separate tracks. The northern crossing on Midway Road is equipped with two quad gates and a convenience store is present in the southeast quadrant that could limit visibility of oncoming trains. The southern crossing on Midway Road is also a two-lane roadway with high AADT's and a posted speed limit of 55 mph at the crossing. The skew of the roadway as it crosses the tracks creates very unsafe vehicle operating conditions. Train volumes at this crossing are at 30 trains per day, traveling up to 60 mph on one set of tracks that is obstructed by dense vegetation. The southern crossing on Midway Road is equipped with two quad gates and is a heavily traveled truck route. Stark Road is a two-lane roadway with a posted speed limit of 55 mph at the crossing. The Stark Road crossing is equipped with two quad gate warning devices. North Cloquet Road is a two-lane roadway with a posted speed limit of 50 mph at the crossing and is equipped with two quad gates. Combining the closure of Stark Road with grade separation projects at two crossings on Midway Road and also North Cloquet Road is a very good project candidate considering the exposure index score, overall delay reduced, moderate crossing density score and max detour score, and blocked crossing score.

Township Workshop Comments: There should be further investigation on the connections from Fairview Road to Stark Road. In addition, Solway is not an effective detour route as it does not go through to N. Cloquet Road.



Street	Midway Rd (CSAH13)
Crossing ID	251905S
Highway AADT	6,900
Highway Speed	55
Train Volumes	30
Train Speed	49
Warning Device	Gates
Max Detour (min)	6
Hours of Delay	640
10-Year Crashes	0
Exposure Index Score	10
Highway AADT Score	10
Blocked Crossing Score	4.75
Crash Score	0
Max Detour Score	4
Commercial Development Score	0

Street	N Cloquet Rd (CSAH45)
Crossing ID	251854J
Highway AADT	1,950
Highway Speed	50
Train Volumes	30
Train Speed	60
Warning Device	Gates
Max Detour (min)	120
Hours of Delay	3,900
10-Year Crashes	0
Exposure Index Score	10
Highway AADT Score	10
Blocked Crossing Score	4.5
Crash Score	0
Max Detour Score	10
Commercial Development Score	0

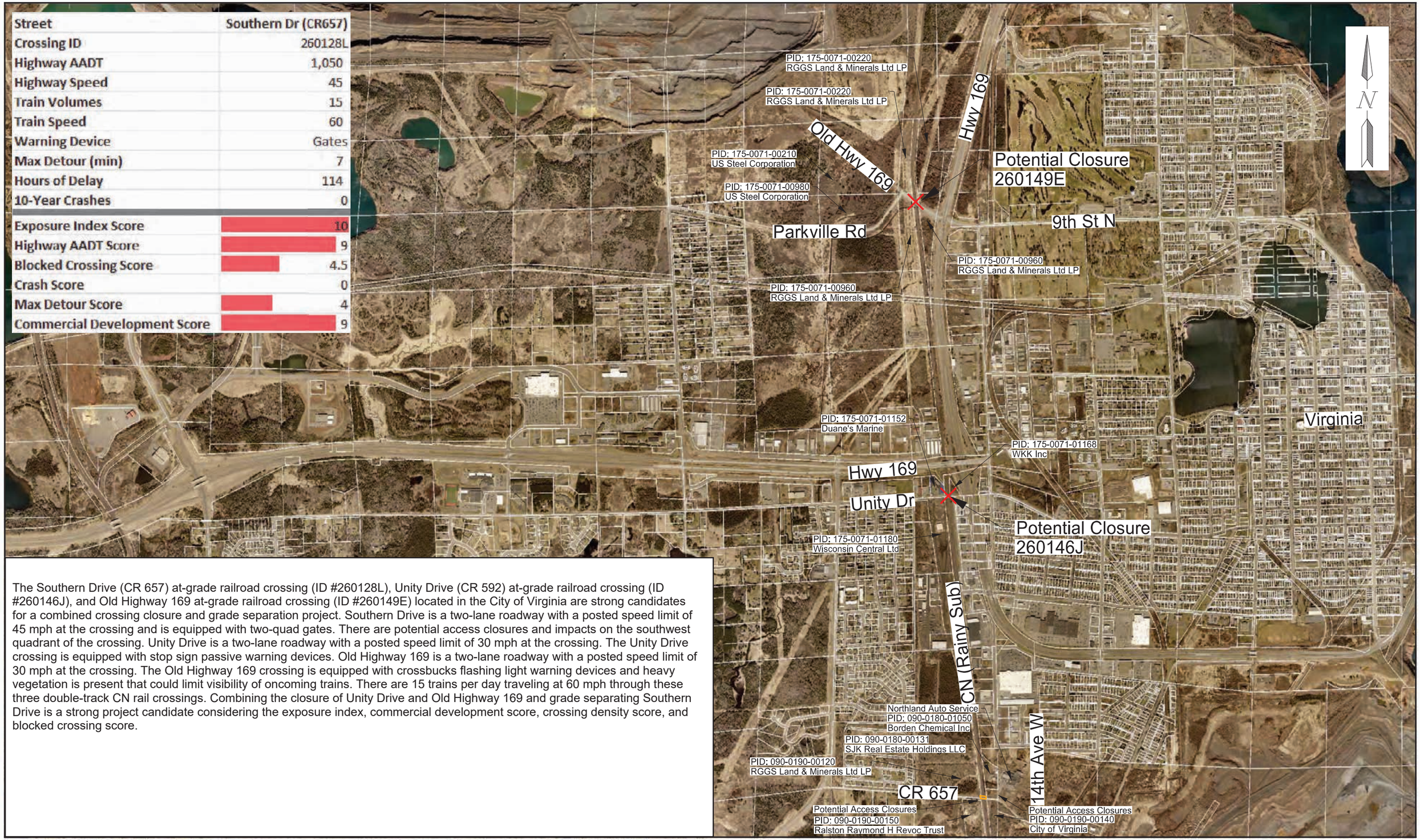
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01/23/2023

Stark Rd: Crossing ID# 251852V, N Cloquet Rd: Crossing ID# 251854J, Midway Rd: Crossing ID# 251850G, Midway Rd: Crossing ID# 251905S

Potential Combined Closure & Grade Separation Option
Proctor, MN

Street	Southern Dr (CR657)
Crossing ID	260128L
Highway AADT	1,050
Highway Speed	45
Train Volumes	15
Train Speed	60
Warning Device	Gates
Max Detour (min)	7
Hours of Delay	114
10-Year Crashes	0

Exposure Index Score	10
Highway AADT Score	9
Blocked Crossing Score	4.5
Crash Score	0
Max Detour Score	4
Commercial Development Score	9



The Southern Drive (CR 657) at-grade railroad crossing (ID #260128L), Unity Drive (CR 592) at-grade railroad crossing (ID #260146J), and Old Highway 169 at-grade railroad crossing (ID #260149E) located in the City of Virginia are strong candidates for a combined crossing closure and grade separation project. Southern Drive is a two-lane roadway with a posted speed limit of 45 mph at the crossing and is equipped with two-quad gates. There are potential access closures and impacts on the southwest quadrant of the crossing. Unity Drive is a two-lane roadway with a posted speed limit of 30 mph at the crossing. The Unity Drive crossing is equipped with stop sign passive warning devices. Old Highway 169 is a two-lane roadway with a posted speed limit of 30 mph at the crossing. The Old Highway 169 crossing is equipped with crossbucks flashing light warning devices and heavy vegetation is present that could limit visibility of oncoming trains. There are 15 trains per day traveling at 60 mph through these three double-track CN rail crossings. Combining the closure of Unity Drive and Old Highway 169 and grade separating Southern Drive is a strong project candidate considering the exposure index, commercial development score, crossing density score, and blocked crossing score.

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01/23/2023

Southern Dr: Crossing ID# 260128L, Unity Dr: Crossing ID# 260146J, Old Highway 169: Crossing ID# 260149E

Potential Combination Closure & Grade Separation Option

Virginia, MN

Appendix B:
Corridor Improvement Summaries

BNSF Casco Sub

The BNSF Casco Subdivision consists of 23 highway-rail grade crossings. Of these, 16 are under the jurisdiction of St. Louis County. The remaining crossings are under the jurisdiction of local cities and townships (7). This corridor also has 4 existing grade separated crossings.

This study recommends closure of the crossing at Kolu Road. No other recommendations are made for the other corridor crossings.

The number of railroad crossing crashes experienced on this corridor from 2013 to 2022 was 4. Over the next 10 years, the estimated number of railroad crossing crashes on this corridor is 1.36. The implementation of the Railroad Crossing Safety Plan recommendations would reduce the estimated number of railroad crossing crashes to 1.35 for a 10-year period. This is a reduction of 0.01 crashes per 10 year period, a 1 percent reduction.

Proposed Improvements	Crossing Count	10-Year Crashes (2013-2022) Tot.	Fat.	Inj.	Estimated 10-Year Crashes* Before	After
Closure	1	0	0	0	0.01	-
None	22	4	0	1	1.35	1.35
TOTAL	**23**	**4**	**0**	**1**	**1.36**	**1.35**

** Estimated Crashes based on FRA APS Model*

Crossing Category	Before	After
Signs Only	14	13
Flashing Lights Only	2	2
Gates and Lights	7	7
Subtotal	**23**	**22**
Grade Separated	4	4
Closure	-	1

BNSF Lakes Sub

The BNSF Lakes Subdivision consists of 9 highway-rail grade crossings. Of these, 5 are under the jurisdiction of St. Louis County. The remaining crossings are under the jurisdiction of MnDOT (1), and local cities and townships (3). This corridor also has 1 existing grade separated crossing.

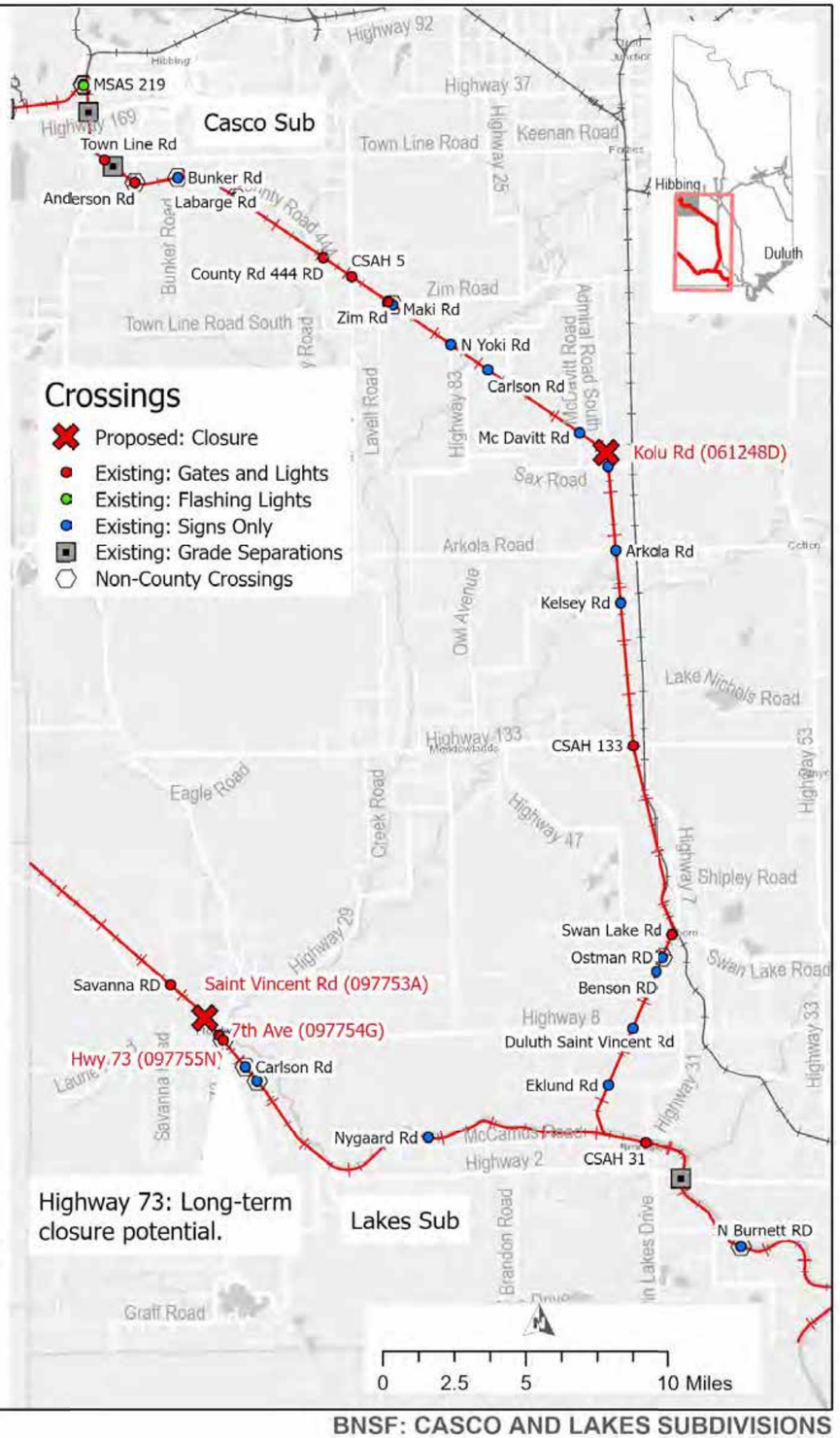
This study recommends closure of the crossing at Saint Vincent Road and the consideration of long-term closure potential at the crossing at Highway 73 in Floodwood.

The number of railroad crossing crashes expereinced on this corridor from 2013 to 2022 was 1. Over the next 10 years, the estimated number of railroad crossing crashes on this corridor is 1.16. The implementation of the Railroad Crossing Safety Plan recommendations would reduce the estimated number of railroad crossing crashes to 1.14 for a 10-year period. This is a reduction of 0.02 crashes per 10 year period, a 2 percent reduction.

Proposed Improvements	Crossing Count	10-Year Crashes (2013-2022) Tot.	Fat.	Inj.	Estimated 10-Year Crashes* Before	After
Closure	1	0	0	0	0.02	-
Miscellaneous	2	0	0	0	0.05	0.05
None	6	1	0	0	1.09	1.09
TOTAL	**9**	**1**	**0**	**0**	**1.16**	**1.14**

** Estimated Crashes based on FRA APS Model*

Crossing Category	Before	After
Signs Only	5	4
Gates and Lights	4	4
Subtotal	**9**	**8**
Grade Separated	1	1
Closure	-	1



CN Iron Range/Hib-Tac/Keenan Subs

The CN Iron Range, Hib-Tac, and Keenan Subdivisions consist of 33 highway-rail grade crossings. Of these, 20 are under the jurisdiction of St. Louis County. The remaining crossings are under the jurisdiction of the National Park Service (2) and local cities and townships (11). These corridors also have 10 existing grade separated crossings.

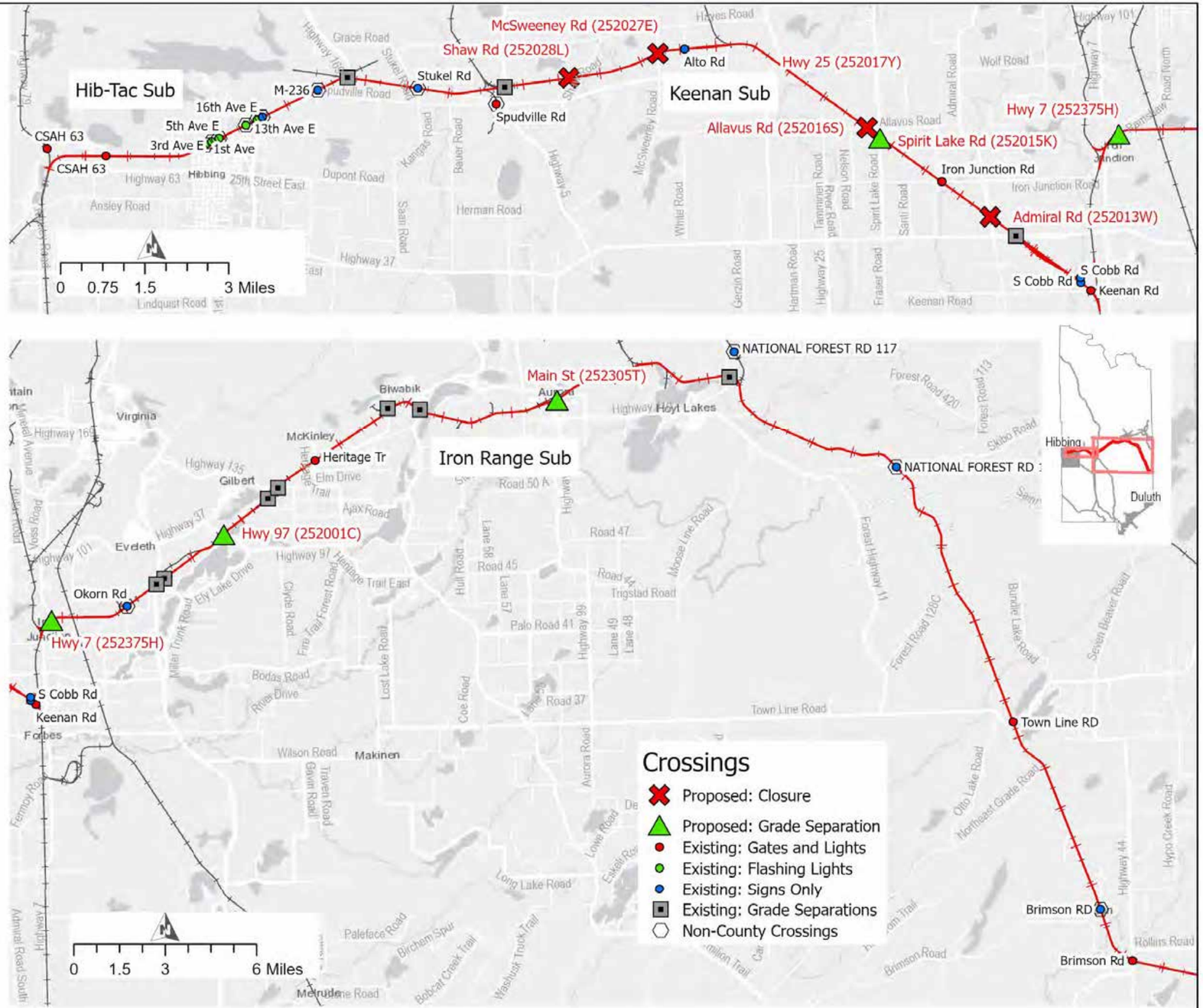
This study recommends the closure of 4 crossings and grade separation of 5 crossings.

The number of railroad crossing crashes experienced on these corridors from 2013 to 2022 was 2. Over the next 10 years, the estimated number of railroad crossing crashes on these corridors is 0.34. The implementation of the Railroad Crossing Safety Plan recommendations would reduce the estimated number of railroad crossing crashes to 0.17 for a 10-year period. This is a reduction of 0.17 crashes per 10 year period, a 51 percent reduction.

Proposed Improvements	Crossing Count	10-Year Crashes (2013-2022) Tot.	Fat.	Inj.	Estimated 10-Year Crashes* Before	After
Closure	4	0	0	0	0.03	-
Grade Separation	5	1	0	0	0.15	-
None	24	1	0	0	0.17	0.17
TOTAL	**33**	**2**	**0**	**0**	**0.34**	**0.17**

** Estimated Crashes based on FRA APS Model*

Crossing Category	Before	After
Signs Only	14	10
Flashing Lights Only	6	5
Gates and Lights	13	9
Subtotal	**33**	**24**
Grade Separated	10	15
Closure	-	4



CN Missabe/Superior Subs

The CN Missabe and Superior Subdivisions consist of 42 highway-rail grade crossings. Of these, 32 are under the jurisdiction of St. Louis County. The remaining crossings are under the jurisdiction of local cities and townships (10). These corridors also have 23 existing grade separated crossings.

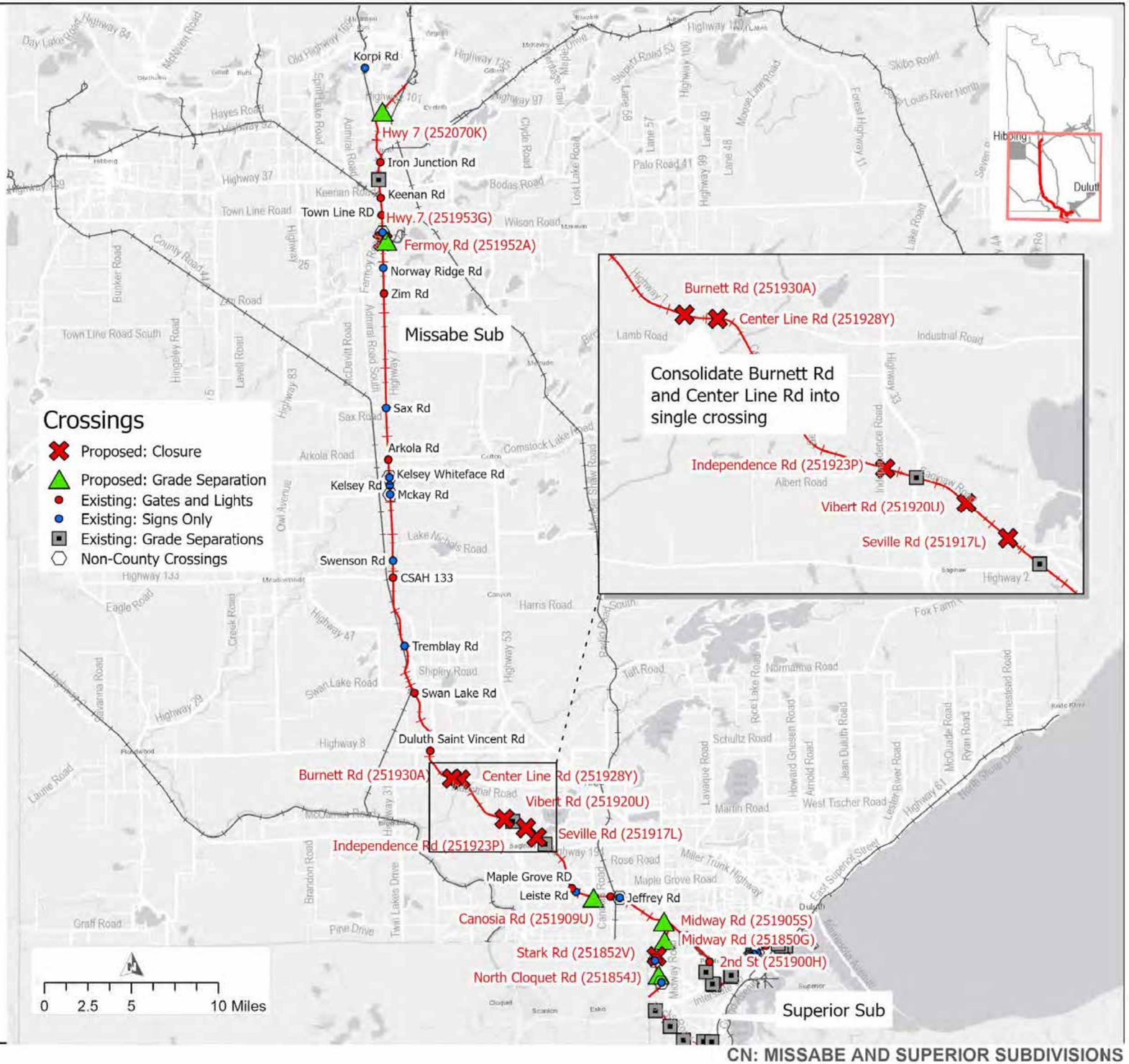
This study recommends the closure of 5 crossings, the closure/consolidation of 2 adjacent crossings into a single new crossing, grade separation of 6 crossings, and other improvements at 1 crossing.

The number of railroad crossing crashes experienced on these corridors from 2013 to 2022 was 6. Over the next 10 years, the estimated number of railroad crossing crashes on these corridors is 2.23. The implementation of the Railroad Crossing Safety Plan recommendations would reduce the estimated number of railroad crossing crashes to 1.38 for a 10-year period. This is a reduction of 0.84 crashes per 10 year period, a

Proposed Improvements	Crossing Count	10-Year Crashes (2013-2022) Tot.	Fat.	Inj.	Estimated 10-Year Crashes* Before	After
Closure	7	1	0	0	0.16	-
Grade Separation	6	3	0	1	0.32	-
Miscellaneous	1	0	0	0	0.03	0.03
None	28	2	1	0	1.72	1.35
TOTAL	**42**	**6**	**1**	**1**	**2.23**	**1.38**

** Estimated Crashes based on FRA APS Model*

Crossing Category	Before	After
Signs Only	21	17
Gates and Lights	21	12
Subtotal	**42**	**29**
Grade Separated	23	29
Closure	-	7
New Crossing (consolidation)	-	1



SAINT LOUIS COUNTY HDR SRF

CN: MISSABE AND SUPERIOR SUBDIVISIONS

PROPOSED IMPROVEMENTS

CN Rainy Sub

The CN Rainy Subdivision consists of 53 highway-rail grade crossings. Of these, 43 are under the jurisdiction of St. Louis County. The remaining crossings are under the jurisdiction of MnDOT (2), the National Park Service (1), and local cities and townships (7). This corridor also has 8 existing grade separated crossings.

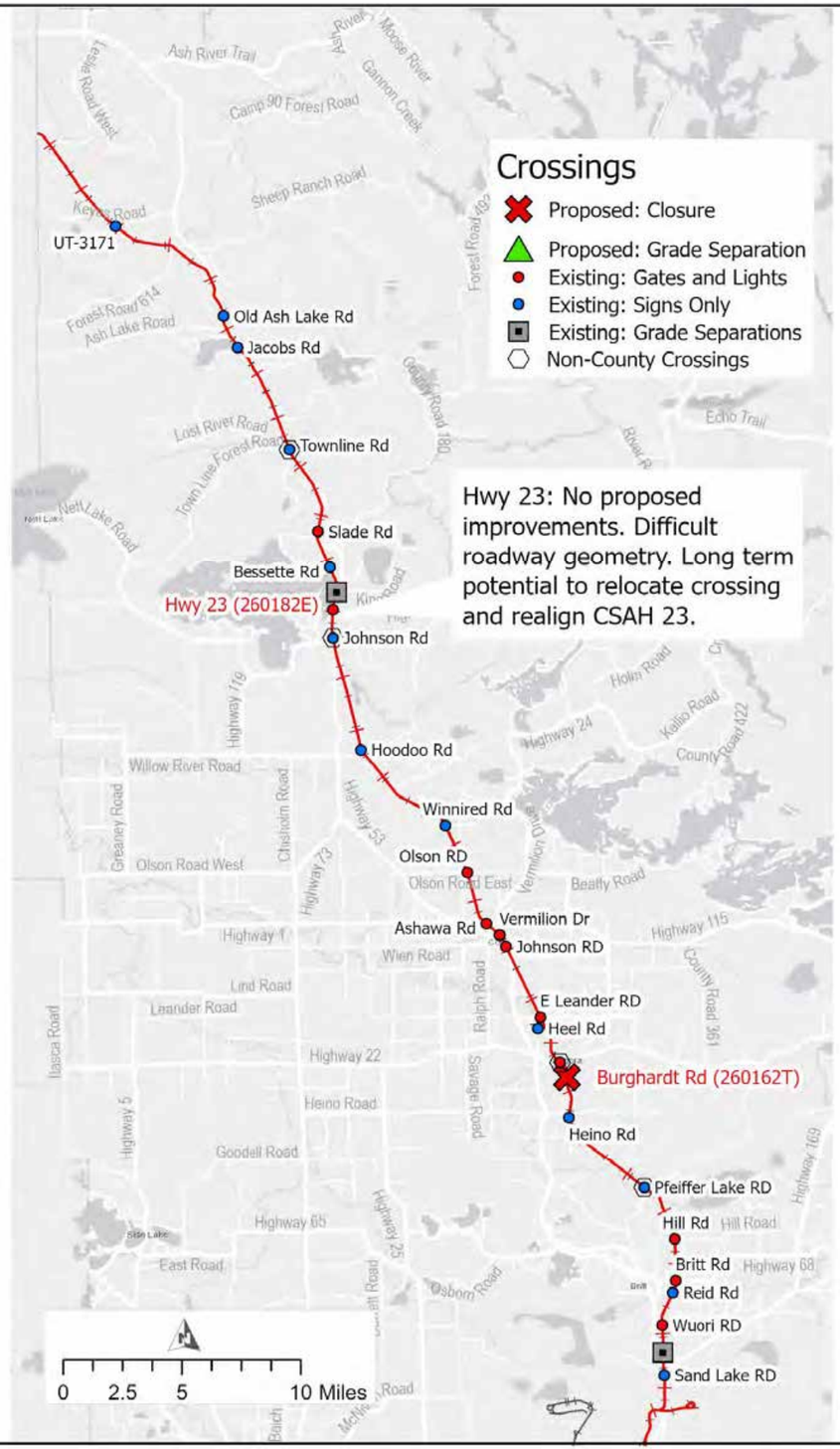
This study recommends closure of 6 crossings, grade separation of 2 crossings, and other improvements at 2 crossings.

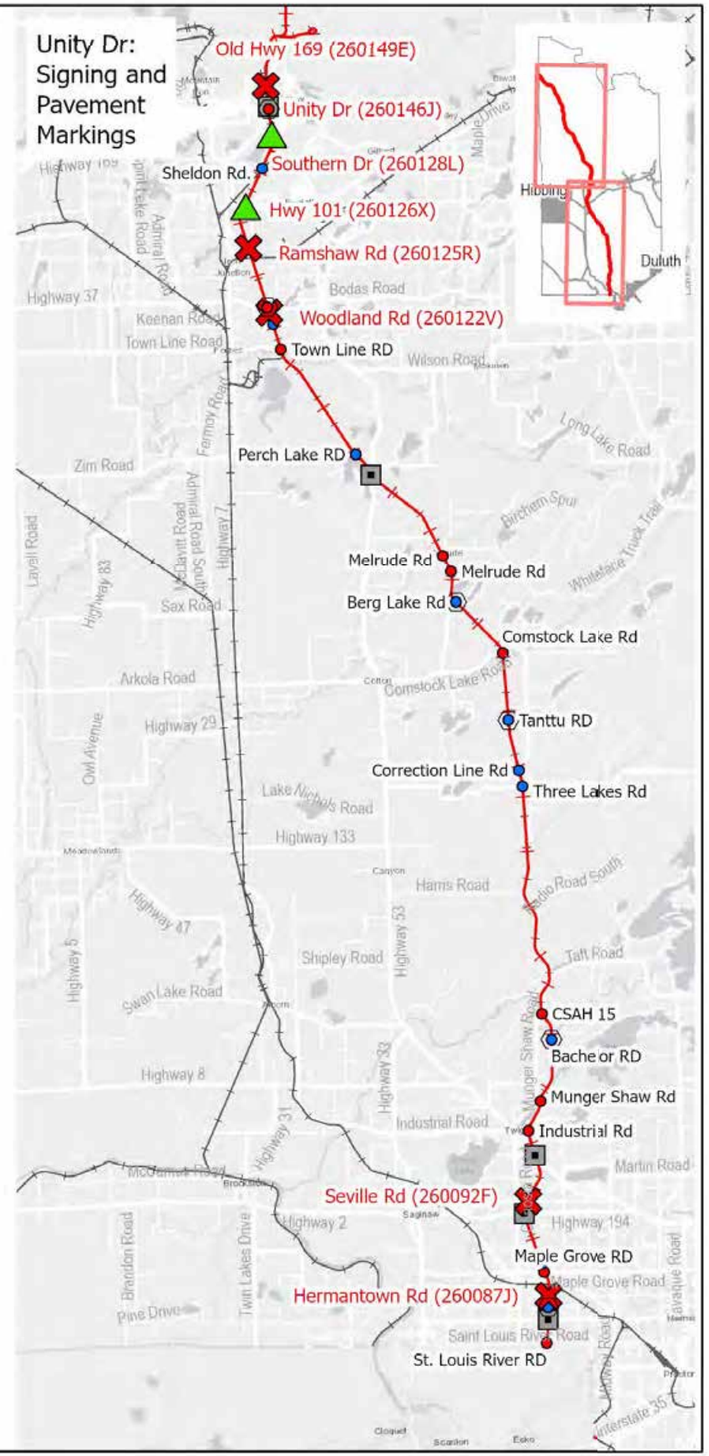
The number of railroad crossing crashes experienced on this corridor from 2013 to 2022 was 2. Over the next 10 years, the estimated number of railroad crossing crashes on this corridor is 2.53. The implementation of the Railroad Crossing Safety Plan recommendations would reduce the estimated number of railroad crossing crashes to 1.25 for a 10-year period. This is a reduction of 1.28 crashes per 10 year period, a 51 percent reduction.

Proposed Improvements	Crossing Count	10-Year Crashes (2013-2022) Tot.	Fat.	Inj.	Estimated 10-Year Crashes* Before	After
Closure	6	1	0	0	1.22	-
Grade Separation	2	0	0	0	0.06	-
Miscellaneous	2	0	0	0	0.03	0.03
None	43	1	0	0	1.22	1.22
TOTAL	**53**	**2**	**0**	**0**	**2.53**	**1.25**

** Estimated Crashes based on FRA APS Model*

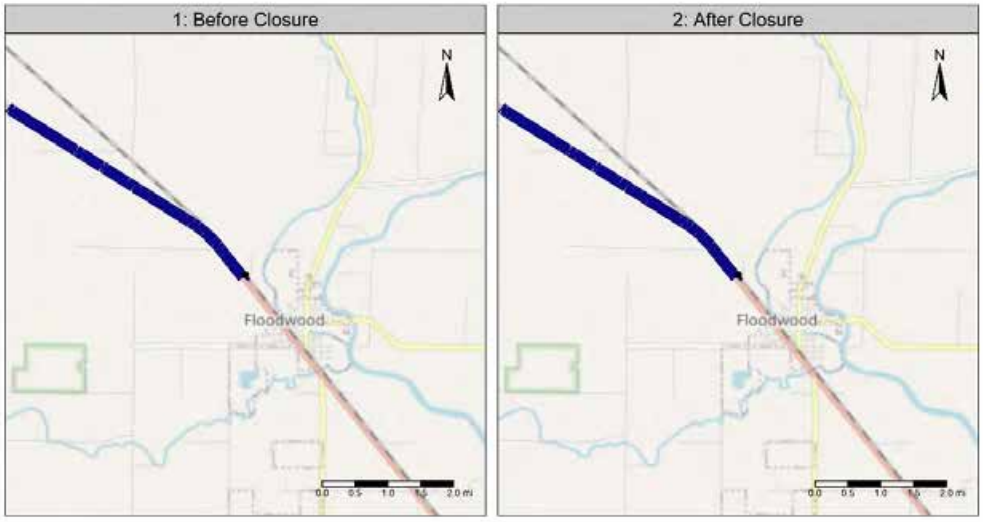
Crossing Category	Before	After
Signs Only	28	23
Flashing Lights Only	-	-
Gates and Lights	25	22
Subtotal	**53**	**45**
Grade Separated	8	10
Closure	-	6



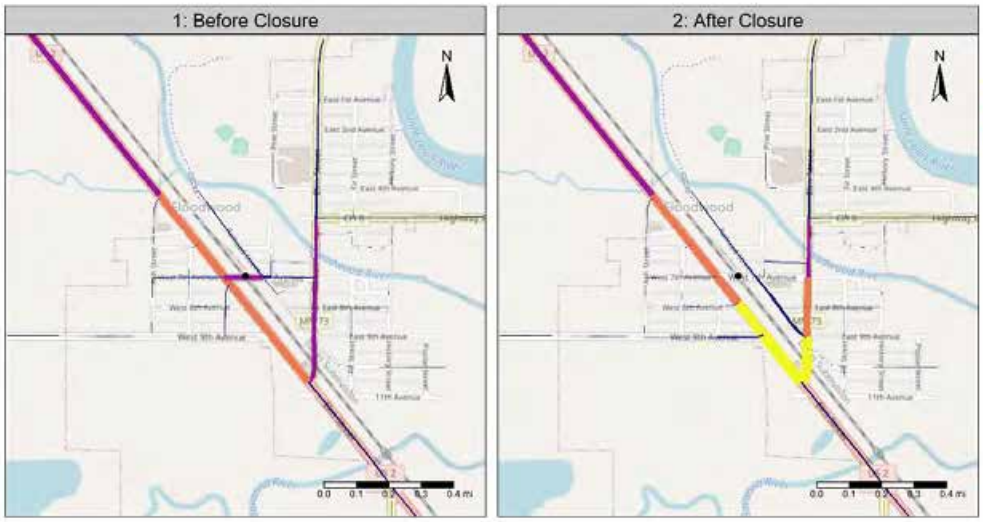


Appendix C:

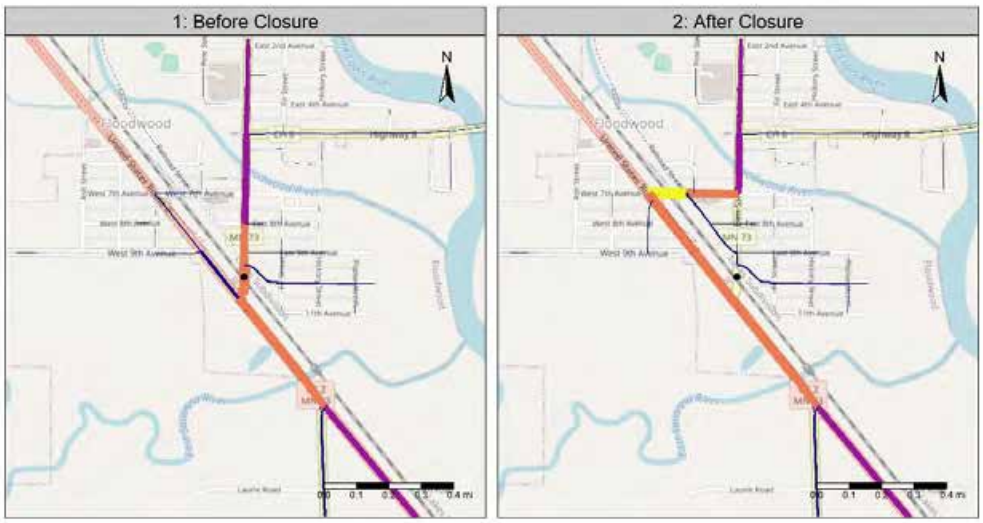
Travel Patterns Before and After Closure



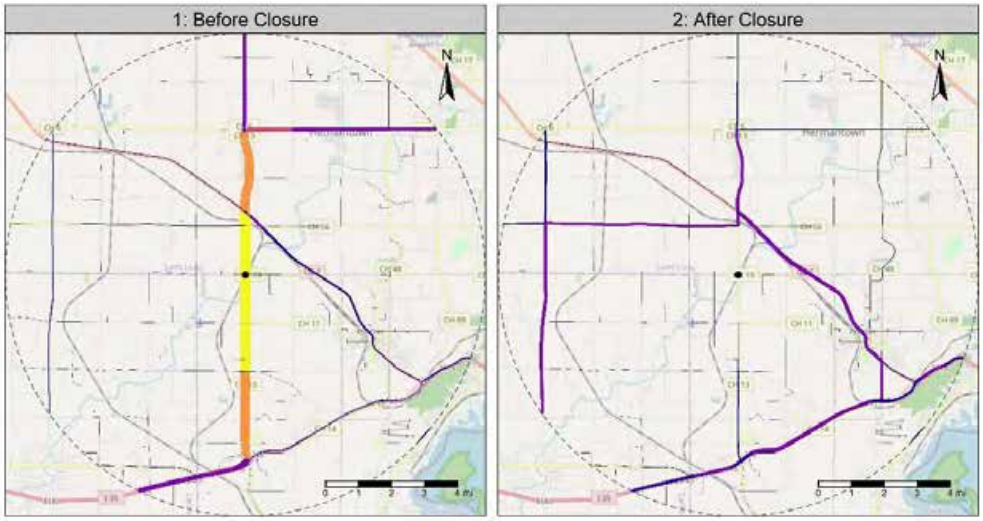
097753A
Est. ADT
3



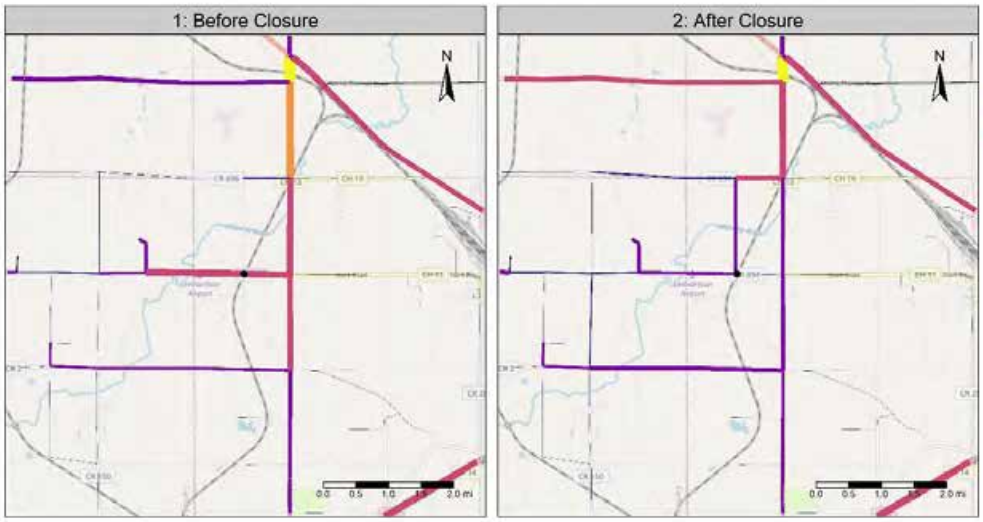
097754G
Est. ADT
1 to 100
101 to 200
201 to 300
301 to 400



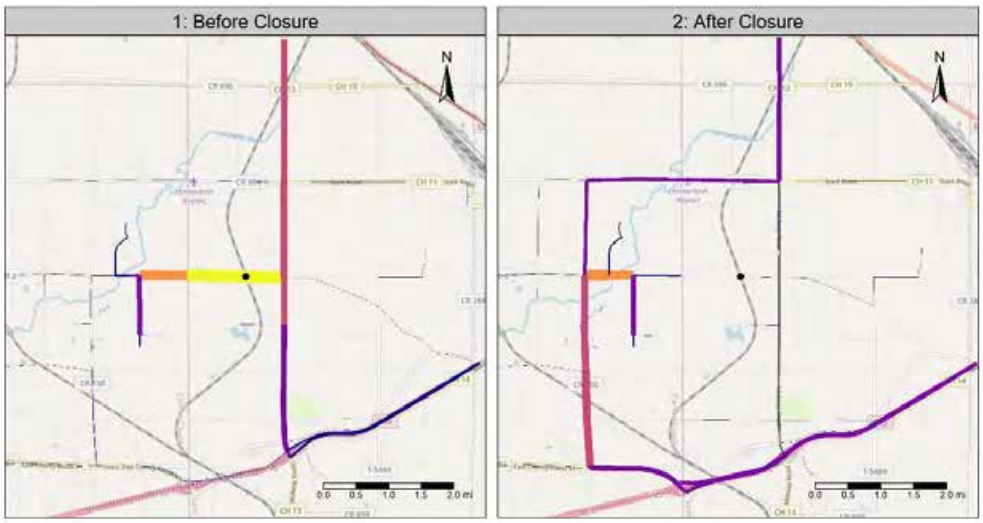
097755N
Est. ADT
1 to 500
501 to 1,000
1,001 to 1,500
1,501 to 2,000



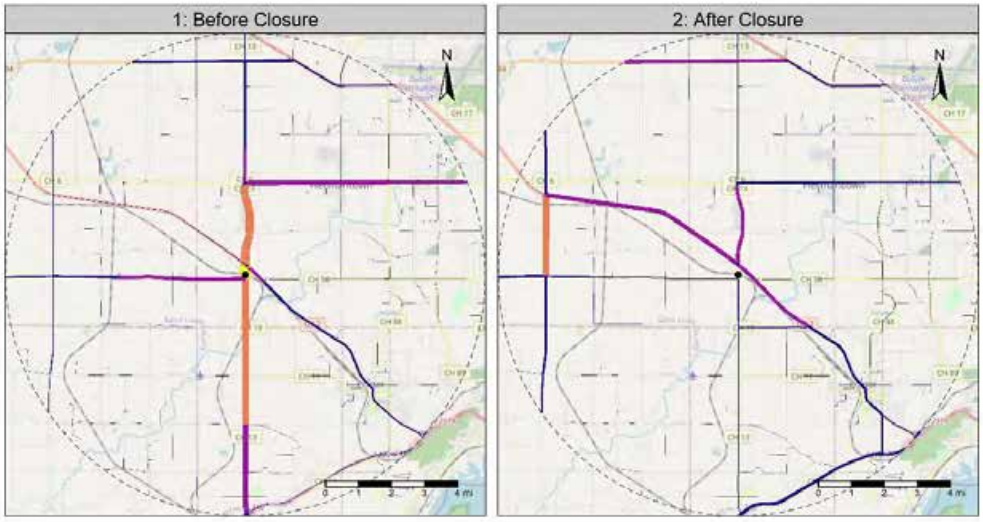
251850G
Est. ADT
1 to 500
501 to 1,000
1,001 to 1,500
1,501 to 2,000
2,001 to 2,500



251852V
Est. ADT
1 to 50
51 to 100
101 to 150
151 to 200
201 to 250



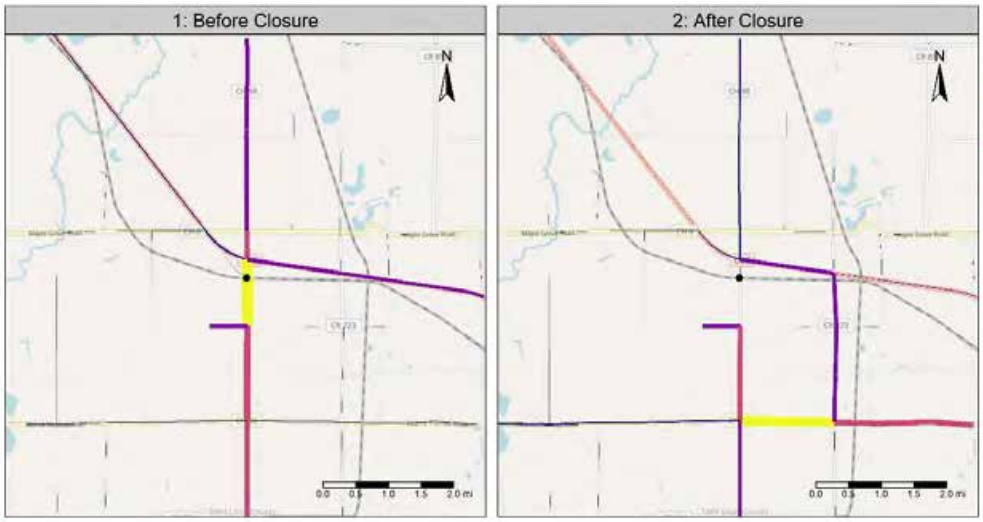
251854J
Est. ADT
1 to 50
51 to 100
101 to 150
151 to 200
201 to 250



251905S

Est. ADT

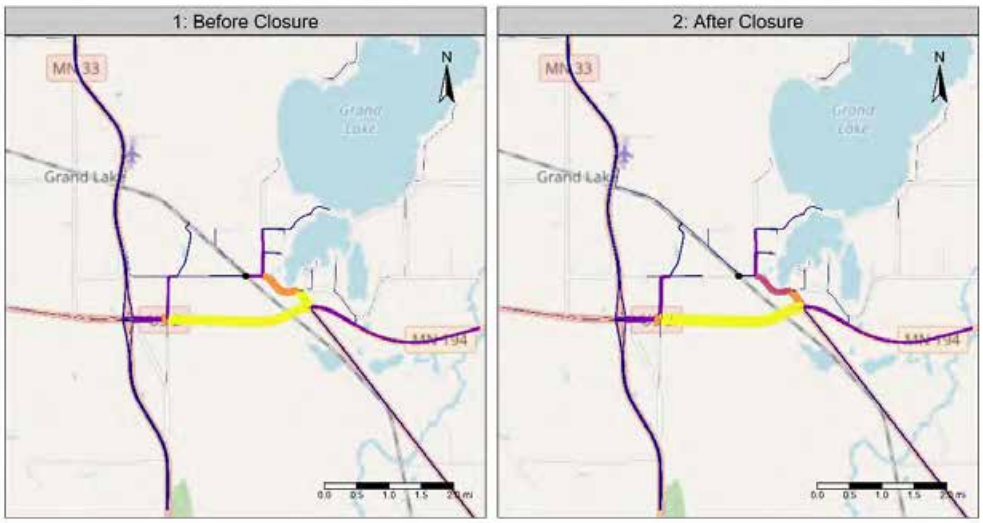
- 1 to 1,000
- 1,001 to 2,000
- 2,001 to 3,000
- 3,001 to 4,000



251909U

Est. ADT

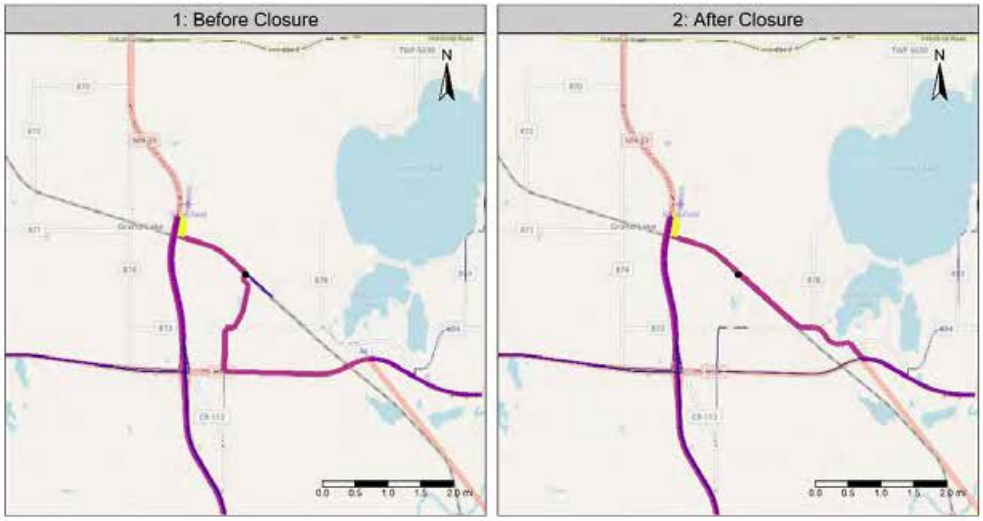
- 1 to 50
- 51 to 100
- 101 to 150
- 151 to 200
- 201 to 250

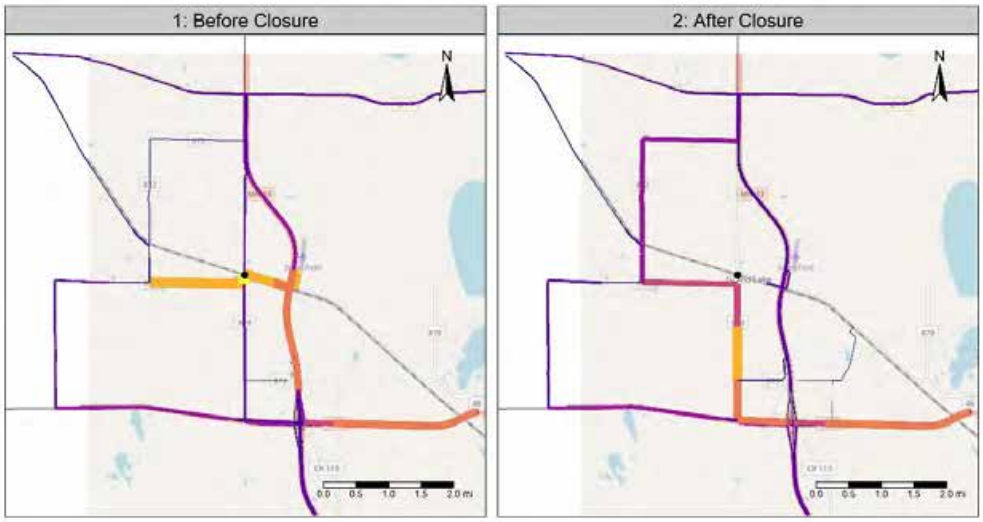


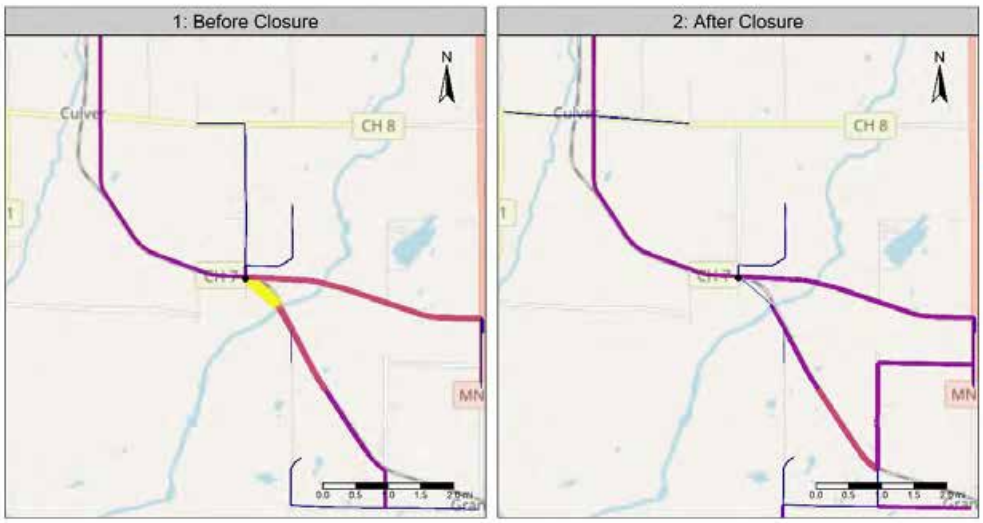
251917L

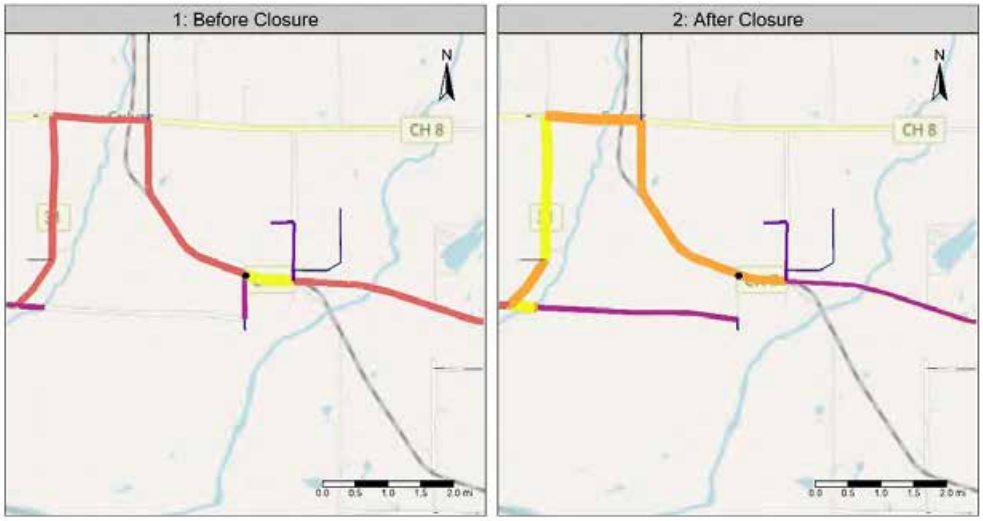
Est. ADT

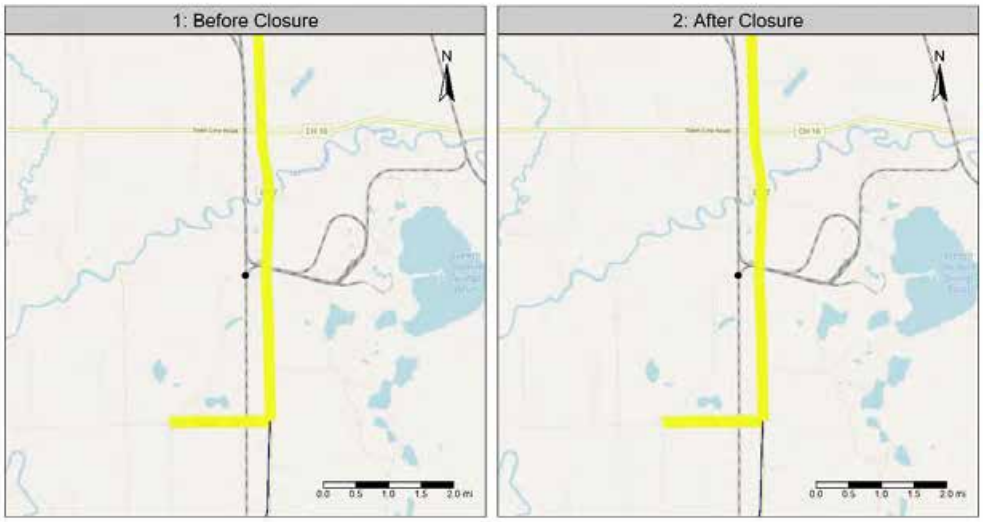
- 1 to 20
- 21 to 40
- 41 to 60
- 61 to 80
- 81 to 100

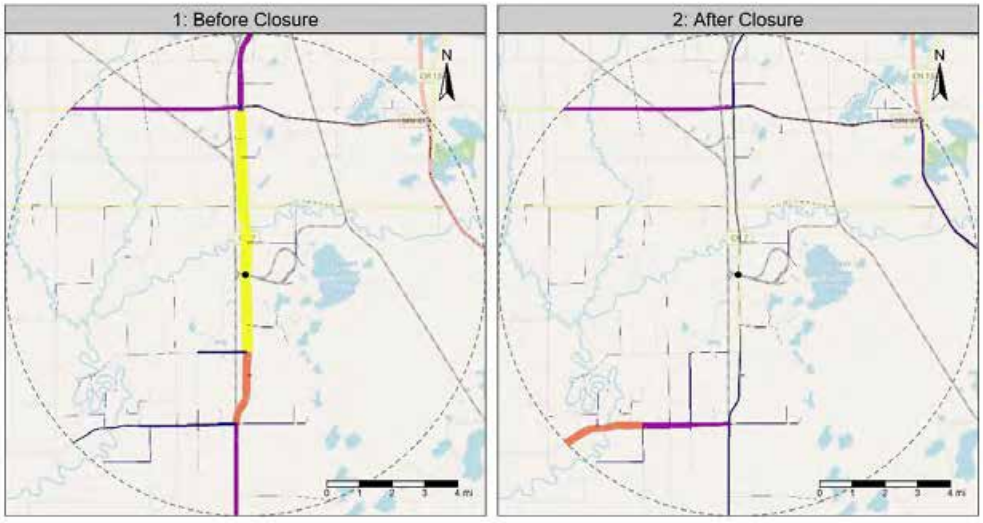

1: Before Closure
2: After Closure
N
0.0 0.5 1.0 1.5 2.0 mi
251920U
Est. ADT
1 to 5
6 to 10
11 to 15
16 to 20
21 to 25
26 to 30
31 to 35
36 to 40

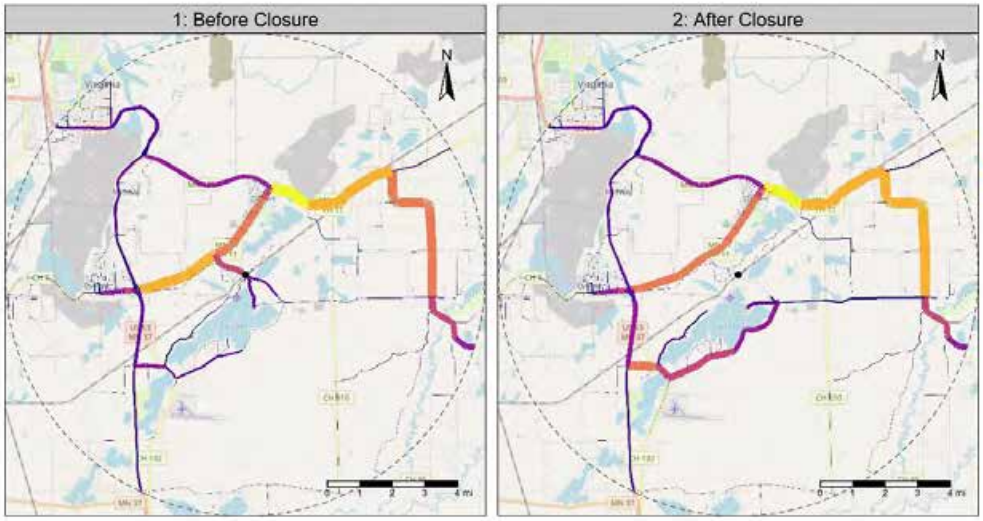

1: Before Closure
2: After Closure
N
0.0 0.5 1.0 1.5 2.0 mi
251923P
Est. ADT
1 to 5
6 to 10
11 to 15
16 to 20
21 to 25
26 to 30
31 to 35


1: Before Closure
2: After Closure
N
Culver
CH 8
MN
0.0 0.5 1.0 1.5 2.0 mi
251928Y
Est. ADT
1 to 2
3 to 4
5 to 6
7 to 8
9 to 10
11 to 12
13 to 14

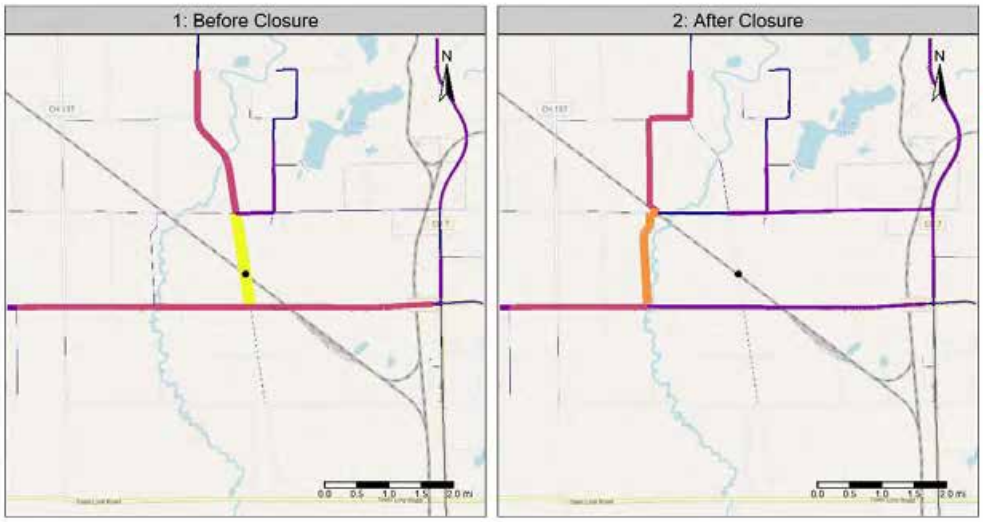

1: Before Closure
2: After Closure
CH 8
N
0.0 0.5 1.0 1.5 2.0 mi
251930A
Est. ADT
1 to 10
11 to 20
21 to 30
31 to 40
41 to 50
51 to 60


1: Before Closure
2: After Closure
N
0.0 0.5 1.0 1.5 2.0 mi
251952A
Est. ADT
1 to 5
6 to 10
11 to 15
16 to 20
21 to 25

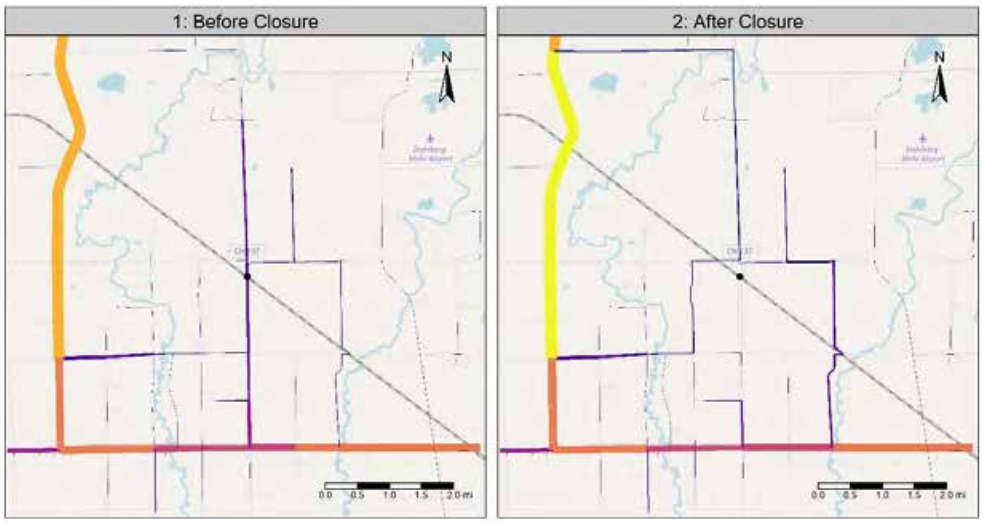

1: Before Closure
2: After Closure
N
0 1 2 3 4 mi
251953G
Est. ADT
1 to 200
201 to 400
401 to 600
601 to 800



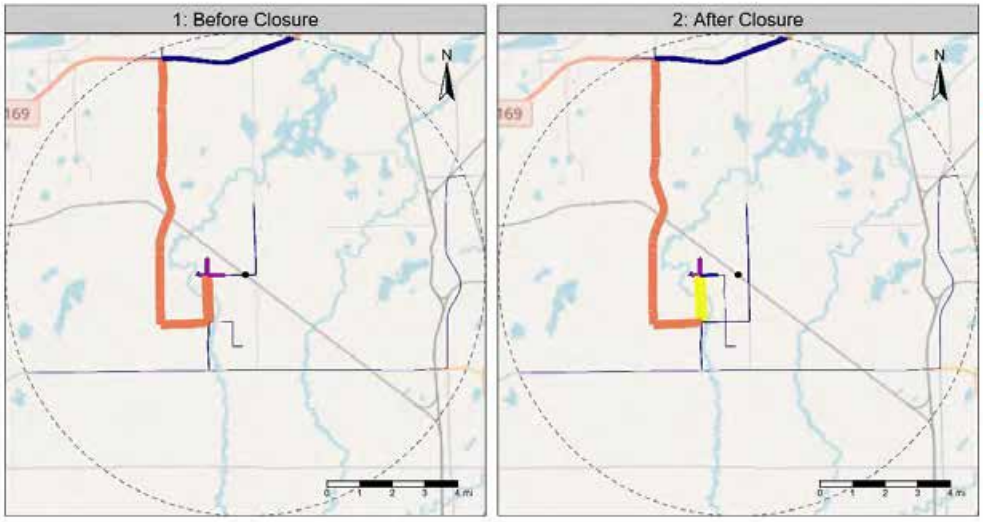
252001C
Est. ADT
1 to 100
101 to 200
201 to 300
301 to 400
401 to 500
501 to 600
601 to 700



252013W
Est. ADT
1 to 20
21 to 40
41 to 60
61 to 80
81 to 100



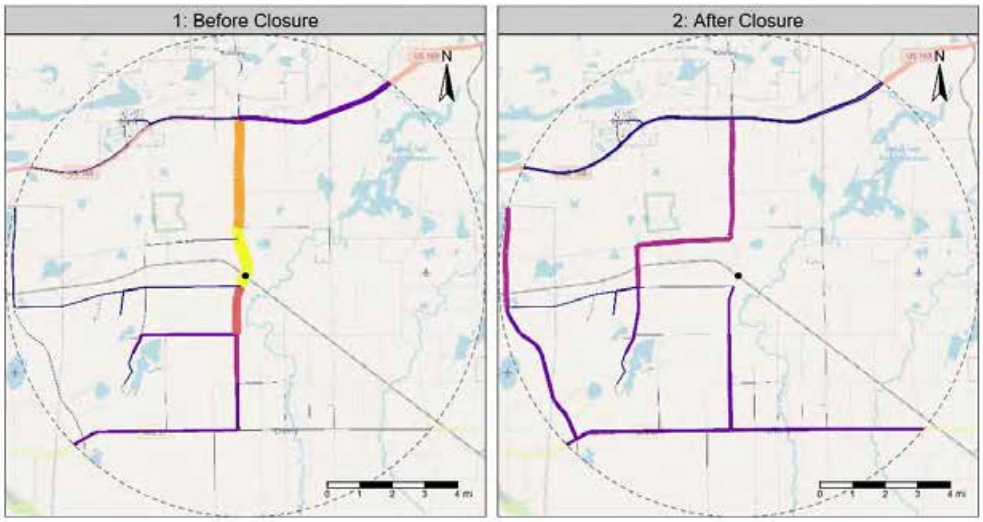
252015K
Est. ADT
1 to 50
51 to 100
101 to 150
151 to 200
201 to 250
251 to 300
301 to 350



252016S

Est. ADT

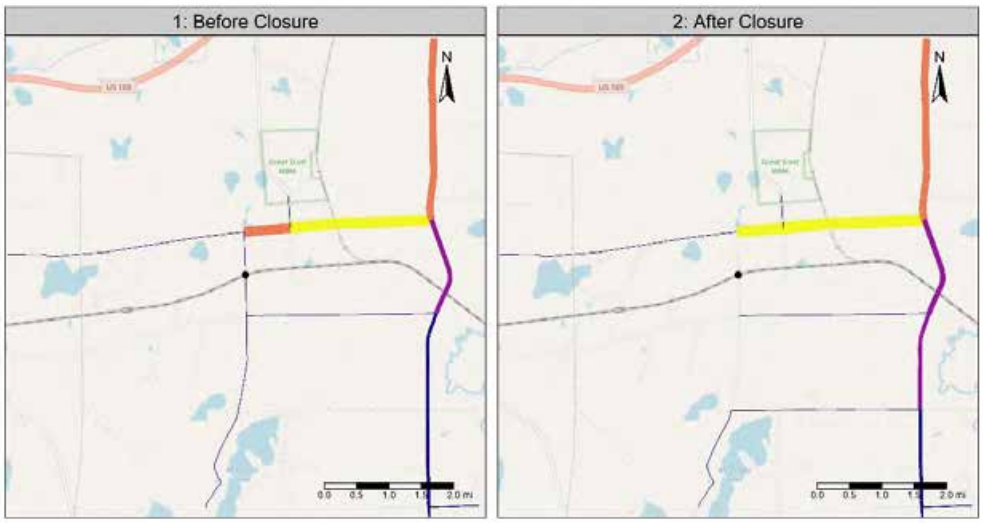
- 1 to 5
- 6 to 10
- 11 to 15
- 16 to 20



252017Y

Est. ADT

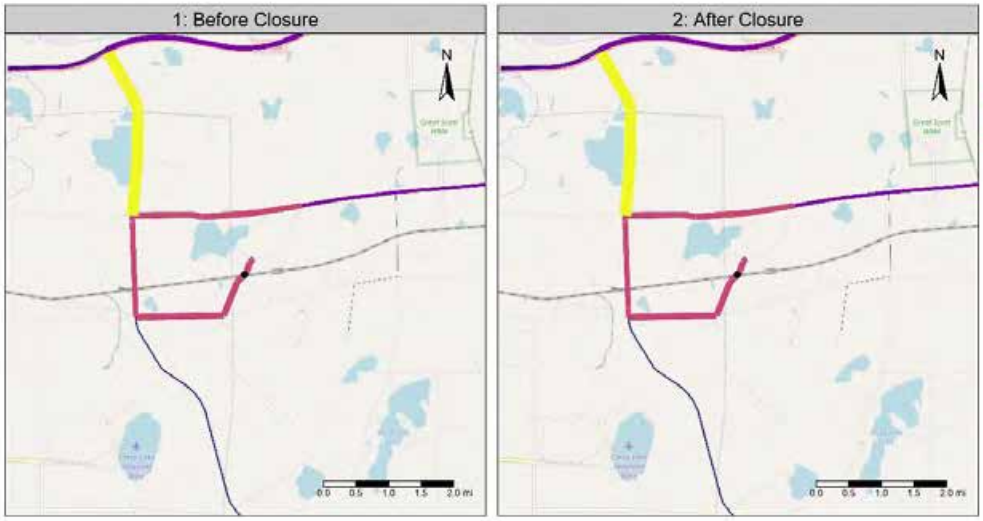
- 1 to 50
- 51 to 100
- 101 to 150
- 151 to 200
- 201 to 250
- 251 to 300

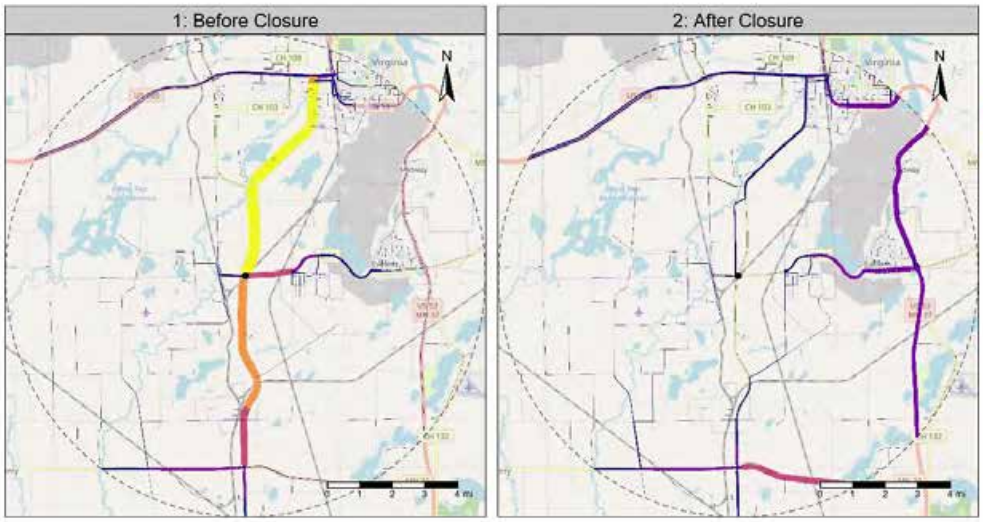


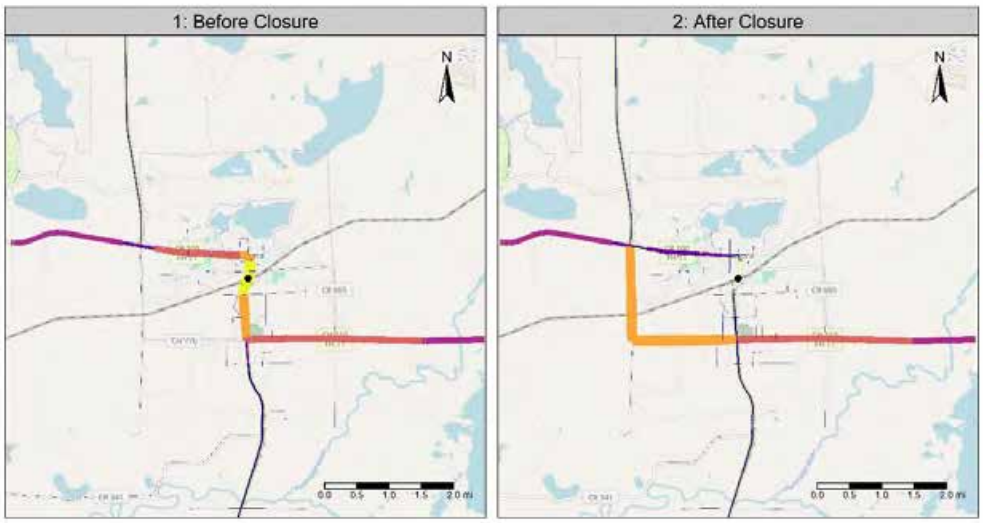
252027E

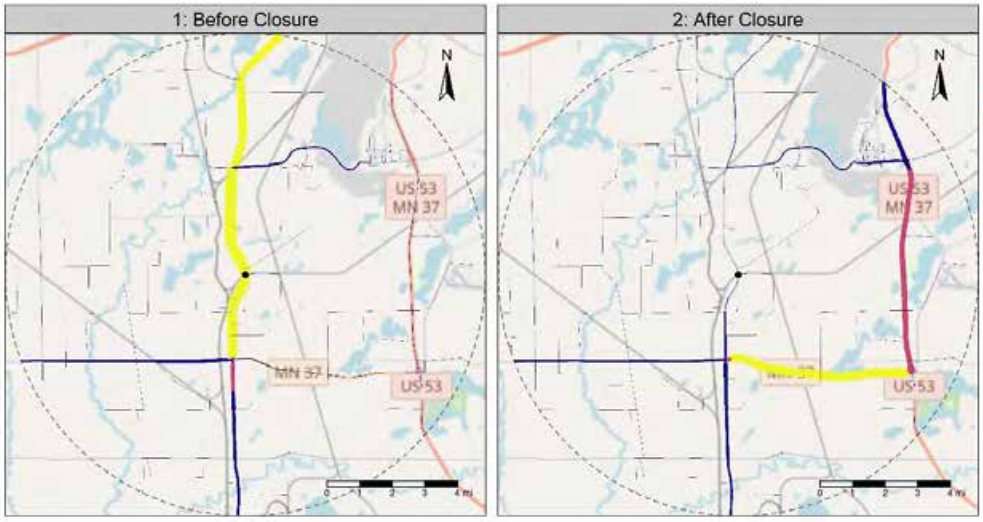
Est. ADT

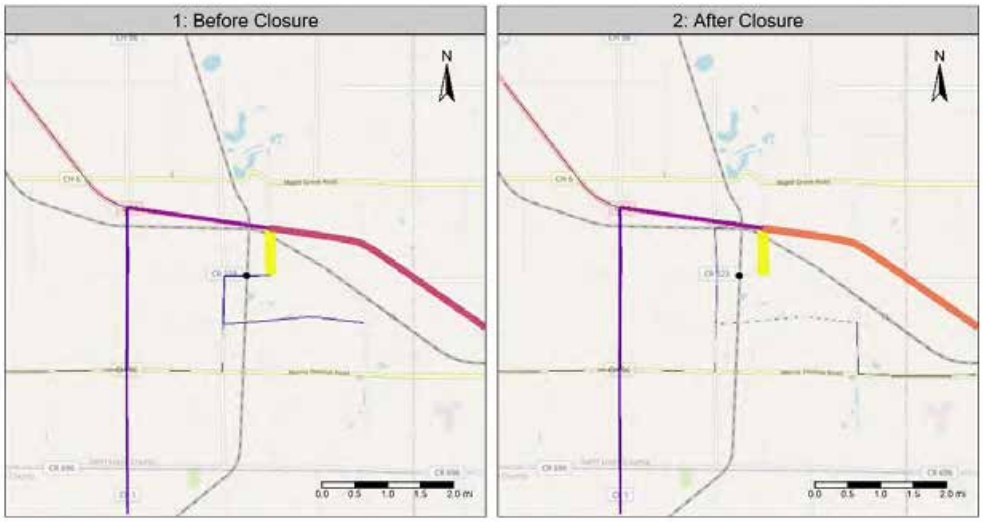
- 1 to 5
- 6 to 10
- 11 to 15
- 16 to 20

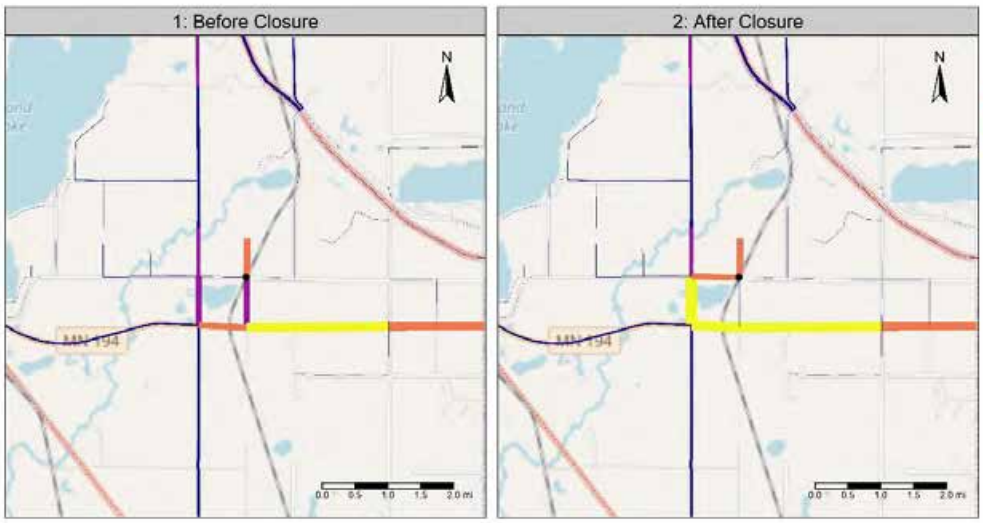

1: Before Closure
2: After Closure
N
0.0 0.5 1.0 1.5 2.0 mi
252028L
Est. ADT
1 to 10
11 to 20
21 to 30
31 to 40
41 to 50

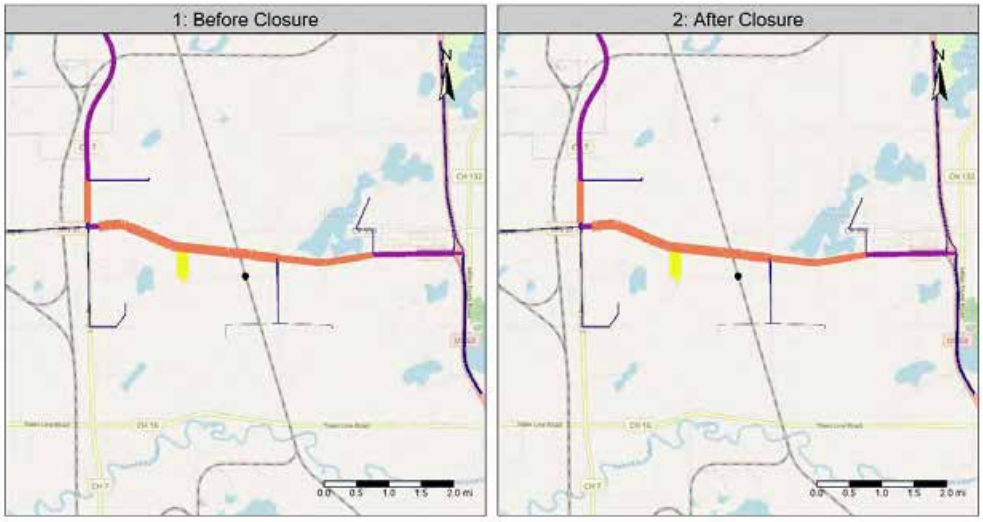

1: Before Closure
2: After Closure
N
Virginia
0 1 2 3 4 mi
252070K
Est. ADT
1 to 500
501 to 1,000
1,001 to 1,500
1,501 to 2,000
2,001 to 2,500

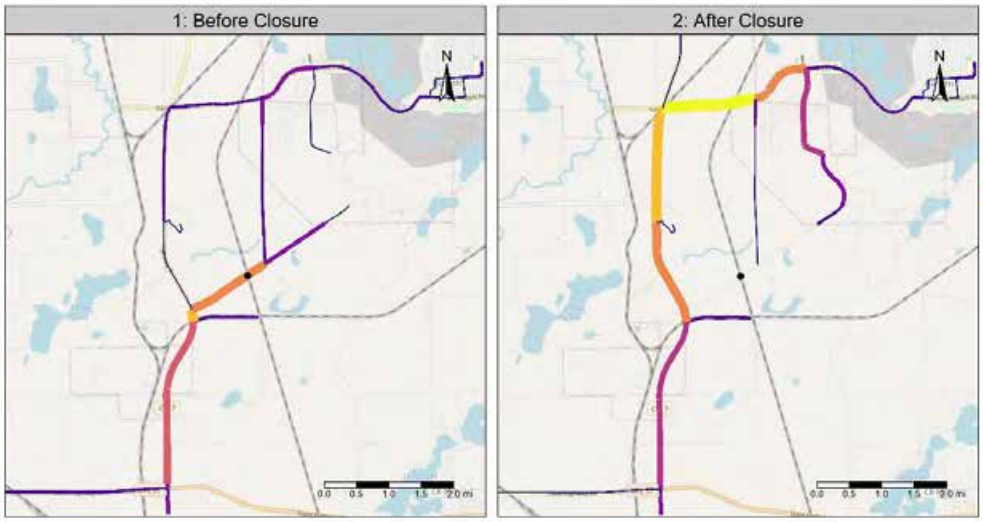

1: Before Closure
2: After Closure
N
0.0 0.5 1.0 1.5 2.0 mi
252305T
Est. ADT
1 to 1,000
1,001 to 2,000
2,001 to 3,000
3,001 to 4,000
4,001 to 5,000
5,001 to 8,000

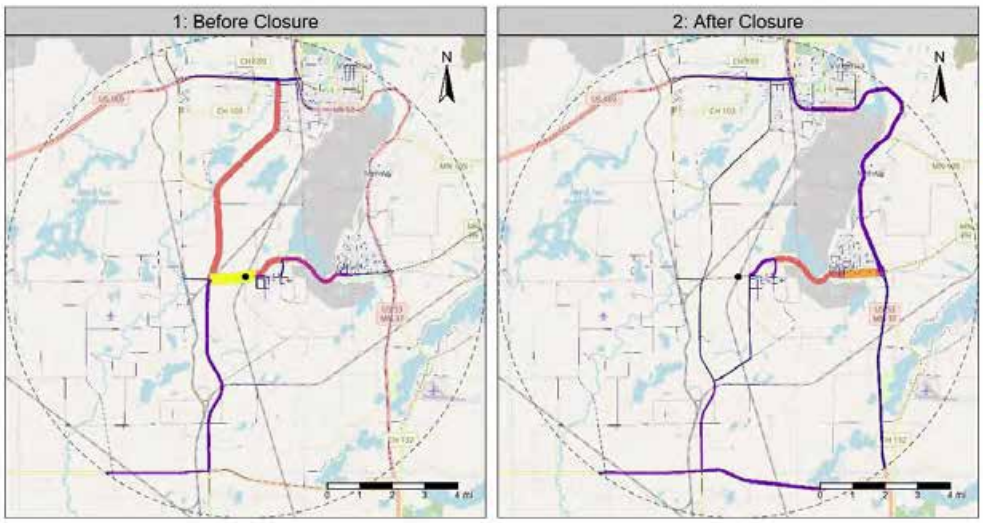

1: Before Closure
2: After Closure
N
US 53
MN 37
252375H
Est. ADT
1 to 500
501 to 1,000
1,001 to 1,500

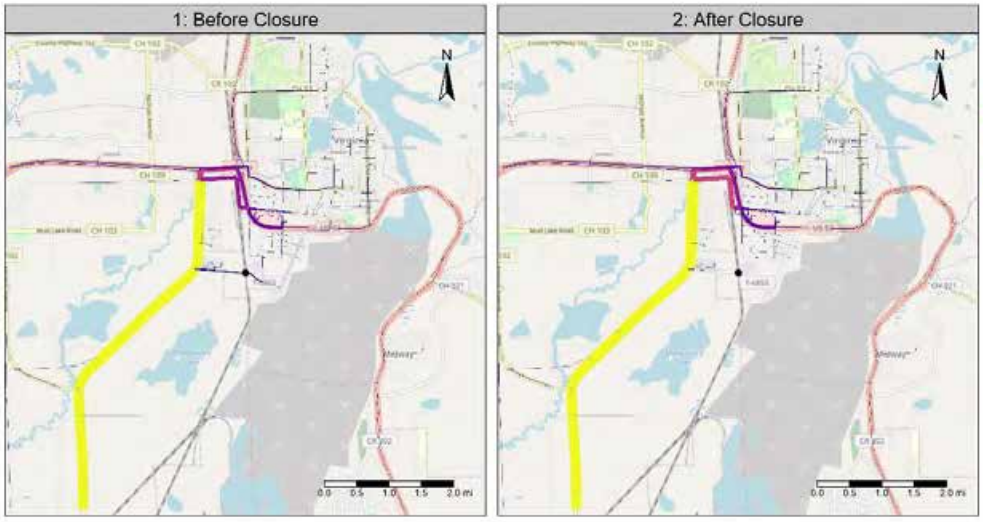

1: Before Closure
2: After Closure
N
260087J
Est. ADT
1 to 5
6 to 10
11 to 15
16 to 20
21 to 25
26 to 30
31 to 35


1: Before Closure
2: After Closure
N
MN 194
260092F
Est. ADT
1 to 50
51 to 100
101 to 150
151 to 200


1: Before Closure
2: After Closure
N
0.0 0.5 1.0 1.5 2.0 mi
260122V
Est. ADT
1 to 5
6 to 10
11 to 15
16 to 20


1: Before Closure
2: After Closure
N
0.0 0.5 1.0 1.5 2.0 mi
260125R
Est. ADT
1
2
3
4
5
6
7
8

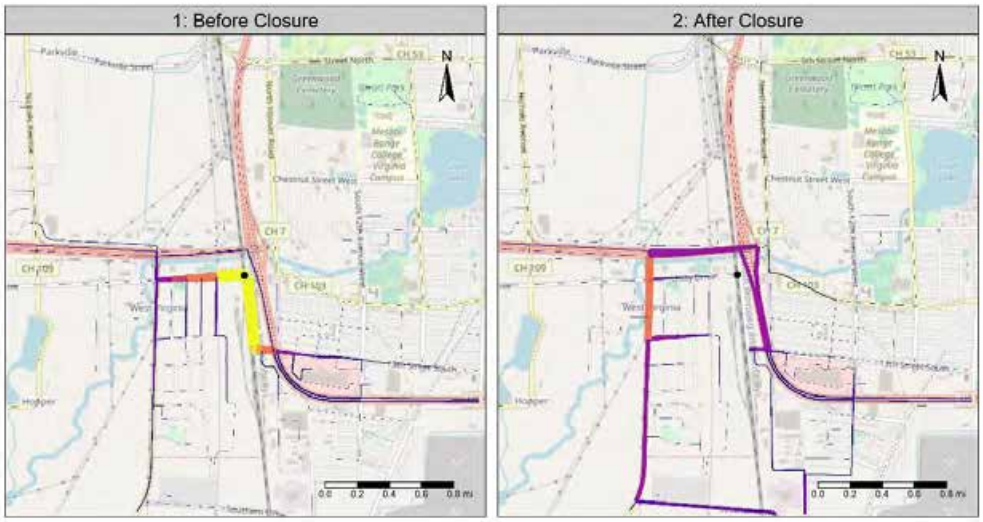

1: Before Closure
2: After Closure
N
0 1 2 3 4 mi
260126X
Est. ADT
1 to 200
201 to 400
401 to 600
601 to 800
801 to 1,000
1,001 to 1,200



260128L

Est. ADT

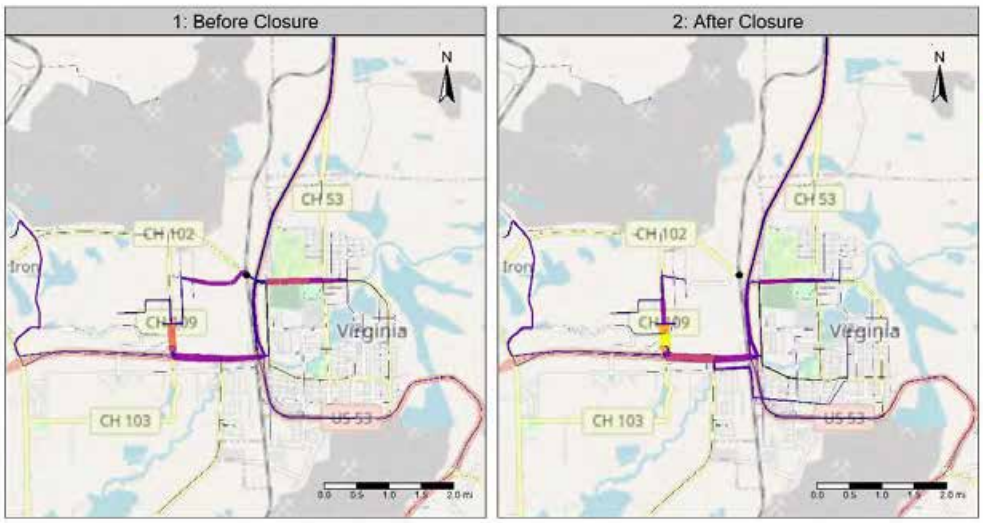
- 1 to 100
- 101 to 200
- 201 to 300
- 301 to 400
- 401 to 500
- 501 to 600
- 601 to 700



260146J

Est. ADT

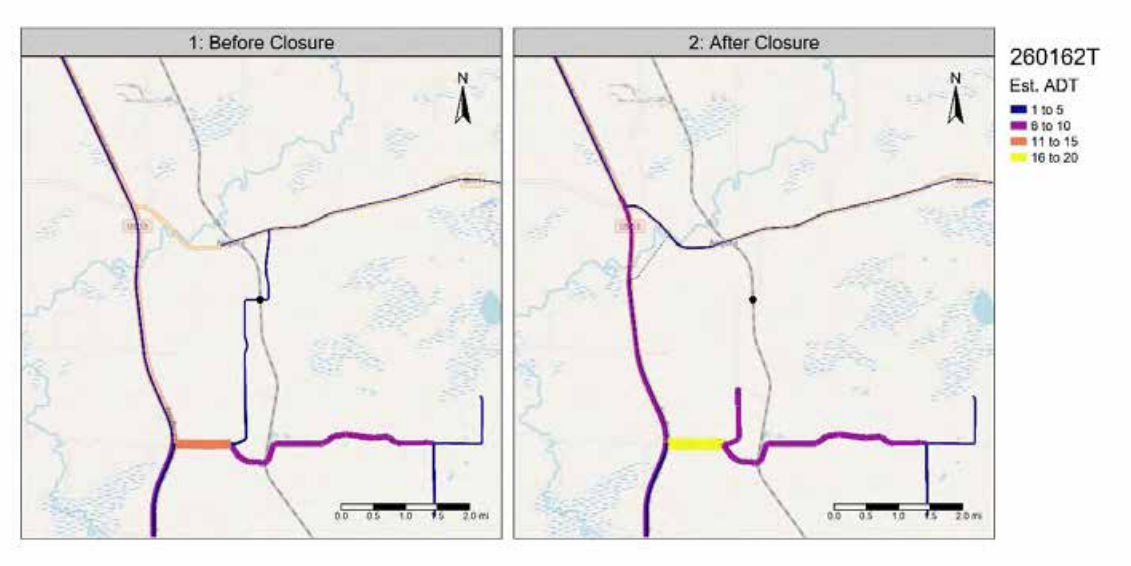
- 1 to 100
- 101 to 200
- 201 to 300
- 301 to 400
- 401 to 500
- 501 to 600
- 601 to 700



260149E

Est. ADT

- 1 to 50
- 51 to 100
- 101 to 150
- 151 to 200
- 201 to 250
- 251 to 300
- 301 to 350


1: Before Closure
2: After Closure
N
N
0.0 0.5 1.0 1.5 2.0 mi
0.0 0.5 1.0 1.5 2.0 mi
260162T
Est. ADT
1 to 5
6 to 10
11 to 15
16 to 20

Appendix D:

Township Meeting Presentation



St. Louis County Railroad Crossing Safety Plan
Meeting with Townships with Recommended Projects
Tuesday, October 24, 2023

HDR

SRF

SAINT LOUIS COUNTY MINNESOTA

News Tribune

NEWS LOCAL

Man killed in truck vs. train crash near Culver

The collision happened around 10 a.m. Thursday in Industrial Township.



Ambulance lights

By Staff reports
January 06, 2023 at 9:10 AM

Share | News reporting

INDUSTRIAL TOWNSHIP — A man died after the pickup truck he was driving was hit by a train Thursday, the St. Louis County Sheriff's Office reported.

Mesabi Tribune | News | Sports | Obituaries | Opinion | Local Events | Celebrations | E-Edition | Mine | COVID-19 | Contests | Classifieds

Man killed in truck vs train crash

Leah Ryan Dec 5, 2019 0



Dreamstime/TNS

McDAVITT TOWNSHIP — Adam Eugene Newton, 40, of Grand Rapids, died from injuries sustained in a train versus truck accident.

National Traffic Fatality Clock

- 2020 United States Traffic Fatalities (all roads) = 38,824
  - 3,235 fatalities a month
  - 747 fatalities a week
  - 106 fatalities a day
  - 4 fatalities an hour

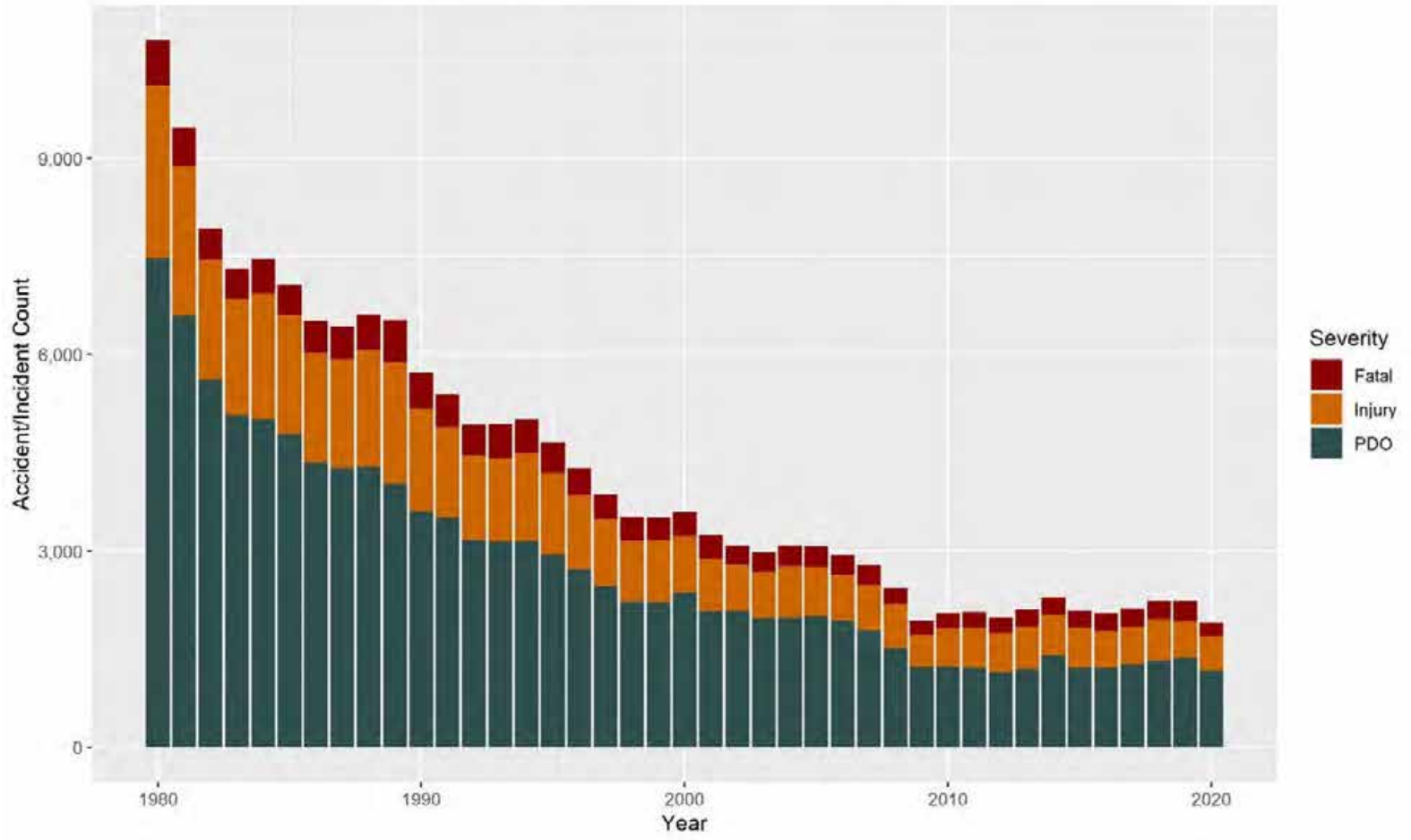
Data Source: NHTSA Fatality Analysis Reporting System (FARS)

Minnesota Toward Zero Deaths Initiatives

- The safety of the traveling public is the first priority.
- St. Louis County believes that traffic fatalities are unacceptable.
  - How many people have to die before you do something? None!
- Real improvements can only be achieved through a “data driven” approach.
- Focus should be on proactive versus reactive. Shouldn’t “chase fatal crashes”.
- The essence of TZD is a partnership of the 5 Es…
  - Education
  - Enforcement
  - Engineering
  - Emergency Response
  - Everyone!

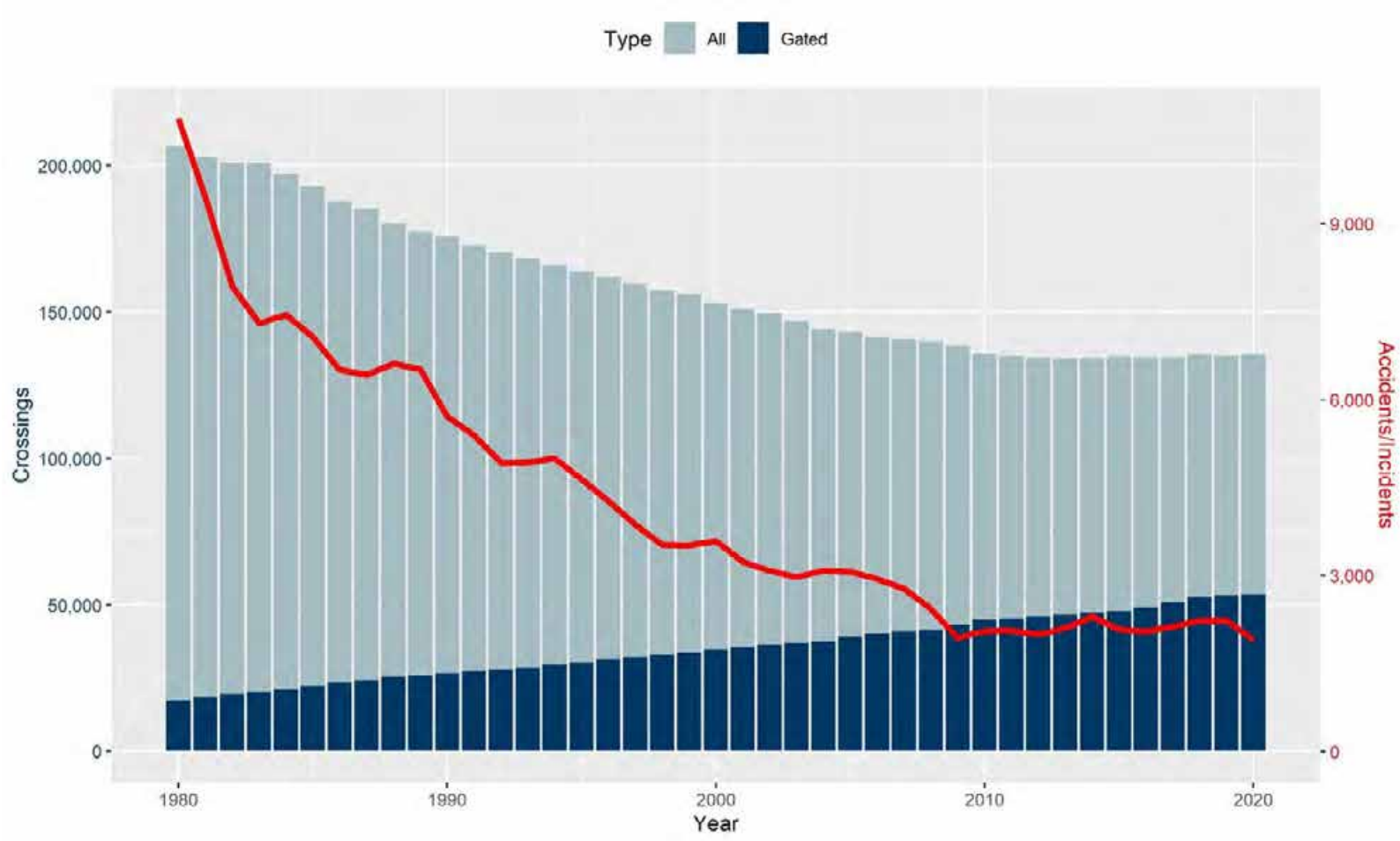
US Crossing Crashes by Severity (1980-2020)

- Highway-rail crashes down 80% between 1980 and 2020.
- National VMT doubled over this time period.
- Train ton-miles increased 75%.



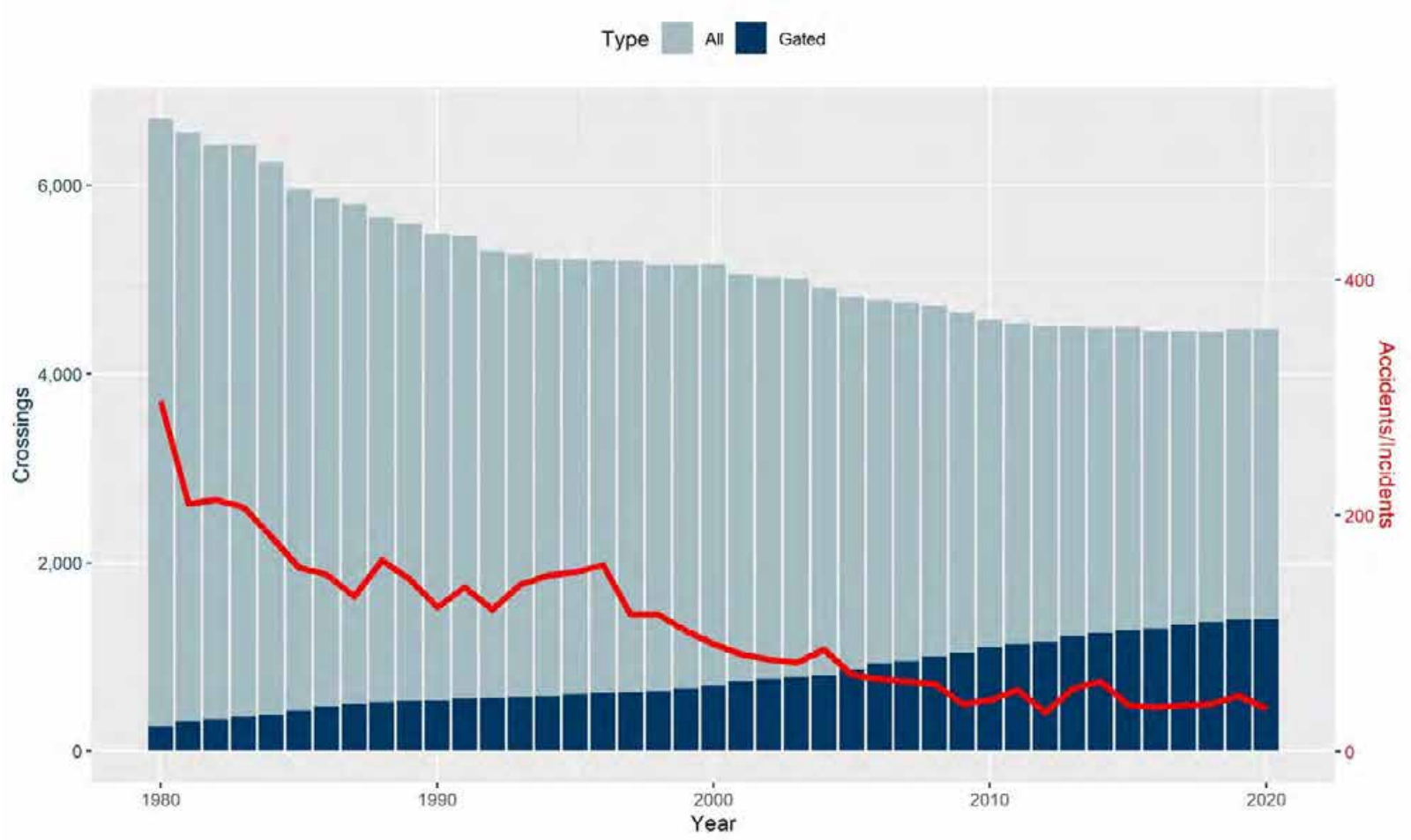
Crossing Closures vs. Crashes: National (1980-2020)

- Railroad crossings reduced from over 200,000 to 135,000.
- Beginning in 2010
  - Crossing closures have plateaued.
  - Crashes have similarly plateaued.
- Appears to be a correlation between number of railroad crossings and crashes.



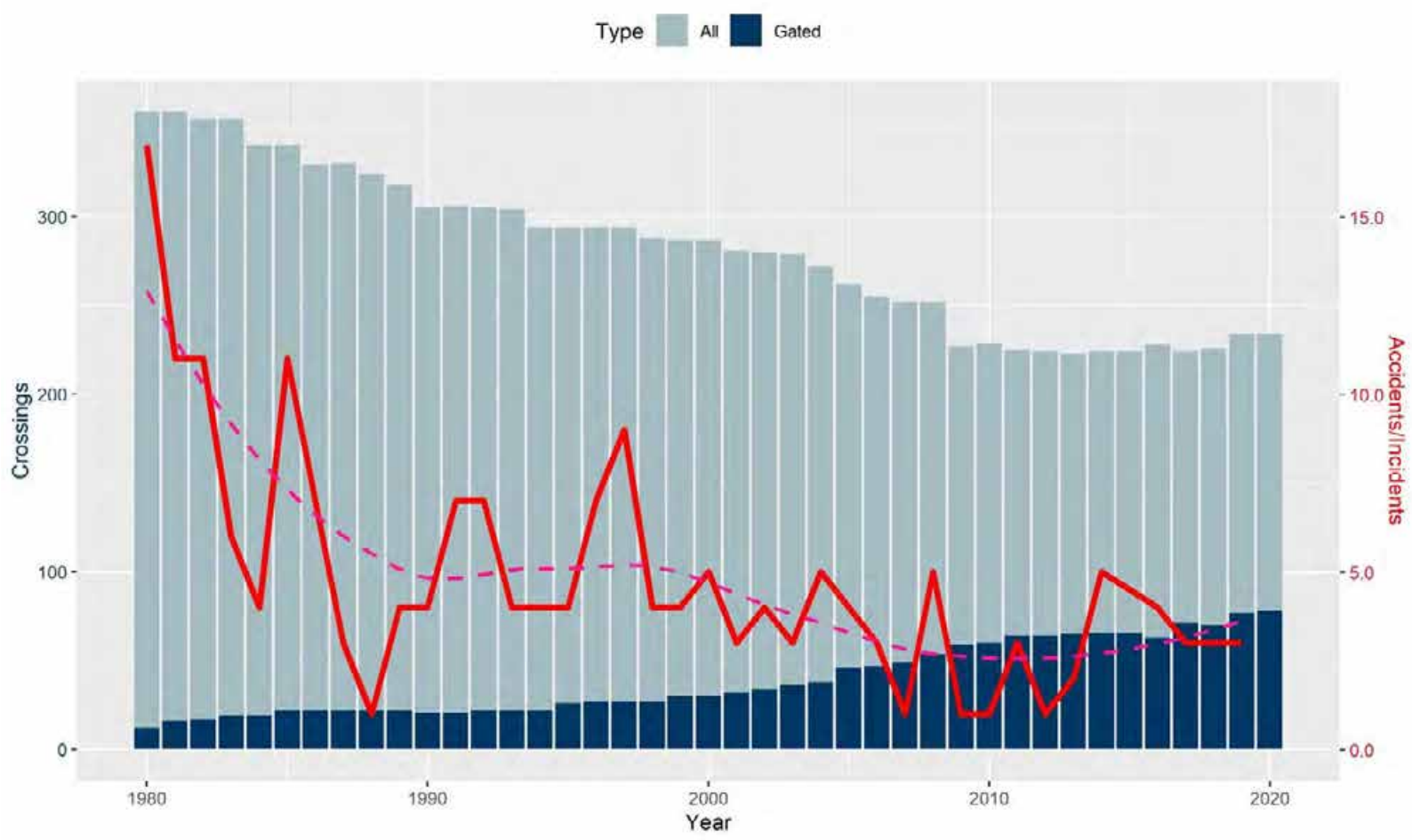
Crossing Closures vs. Crashes: Minnesota (1980-2020)

- Railroad crossings reduced from over 6,500 to about 4,500.
- Beginning in 2010
  - Crossing closures have plateaued.
  - Crashes have similarly plateaued.
- State pattern mimics the national pattern.



Crossing Closures vs. Crashes: St. Louis County (1980-2020)

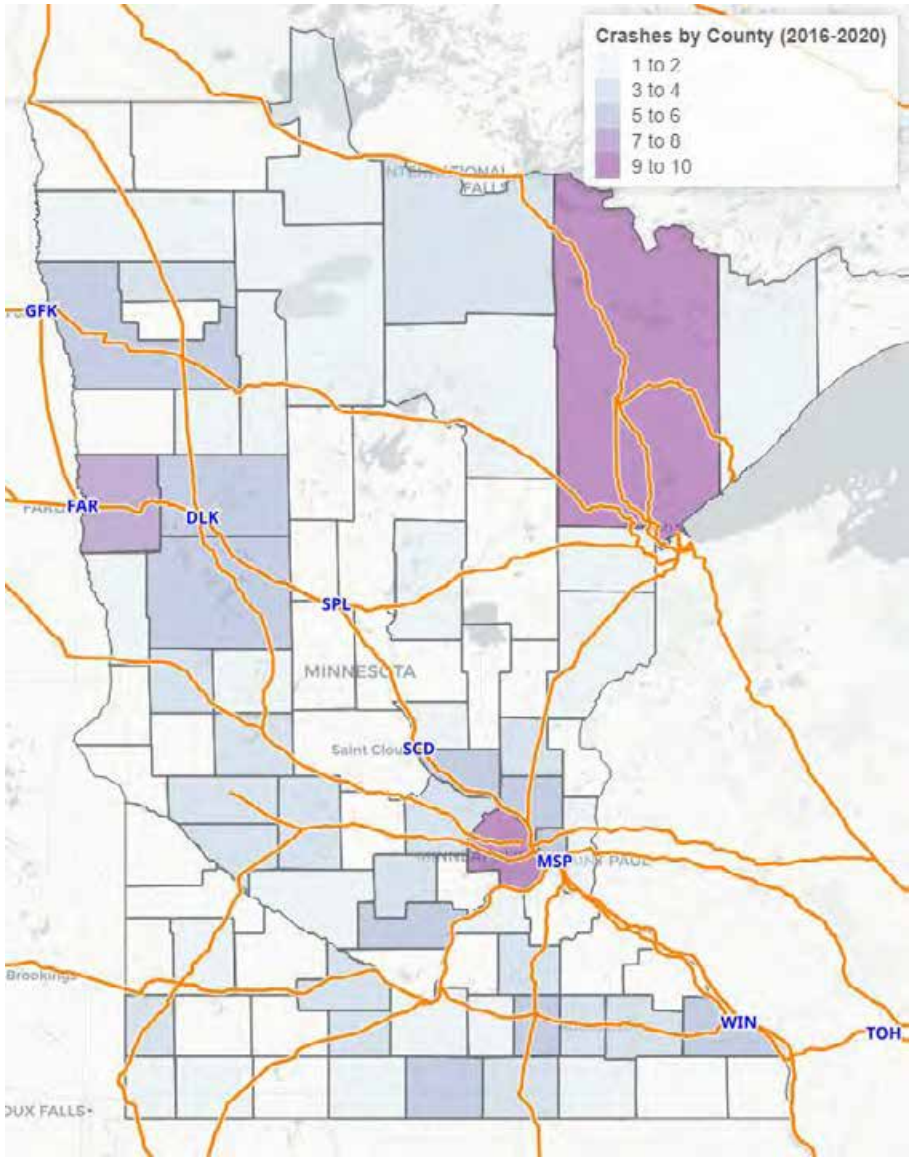
- Railroad crossings reduced from over 350 to 219.
- Beginning in 2009
  - Crossing closures have plateaued.
  - A slight increase in crossings in 2019 and 2020.
  - Crashes have similarly plateaued.
- County pattern mimics the state and national patterns.



Minnesota Crossings and Crashes by County

- ~4,500 public railroad crossings in Minnesota.
- 167 crashes involving vehicles and trains for the period of 2016 through 2020.
- St. Louis County ranks 2nd for number of crossings and ties for first for the number of crashes.

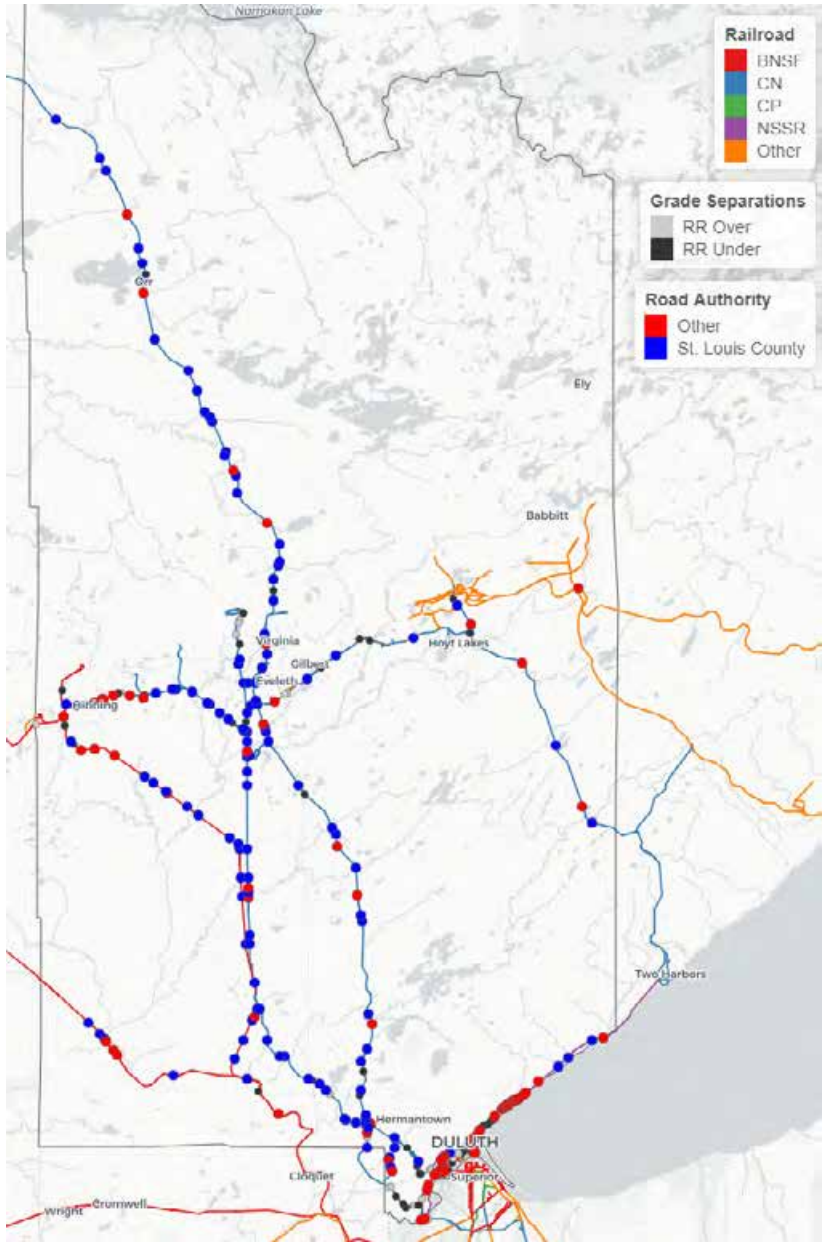
	Top 10 Counties	Crossings	Crashes (5-year)
1	Hennepin	238	10
2	St. Louis	219	10
3	Clay	118	7
4	Polk	167	6
5	Sherburne	37	6
6	Ramsey	134	5
7	Otter Tail	111	5
8	Faribault	99	5
9	Winona	74	5
10	Steele	70	5



St. Louis County Railroad Crossings

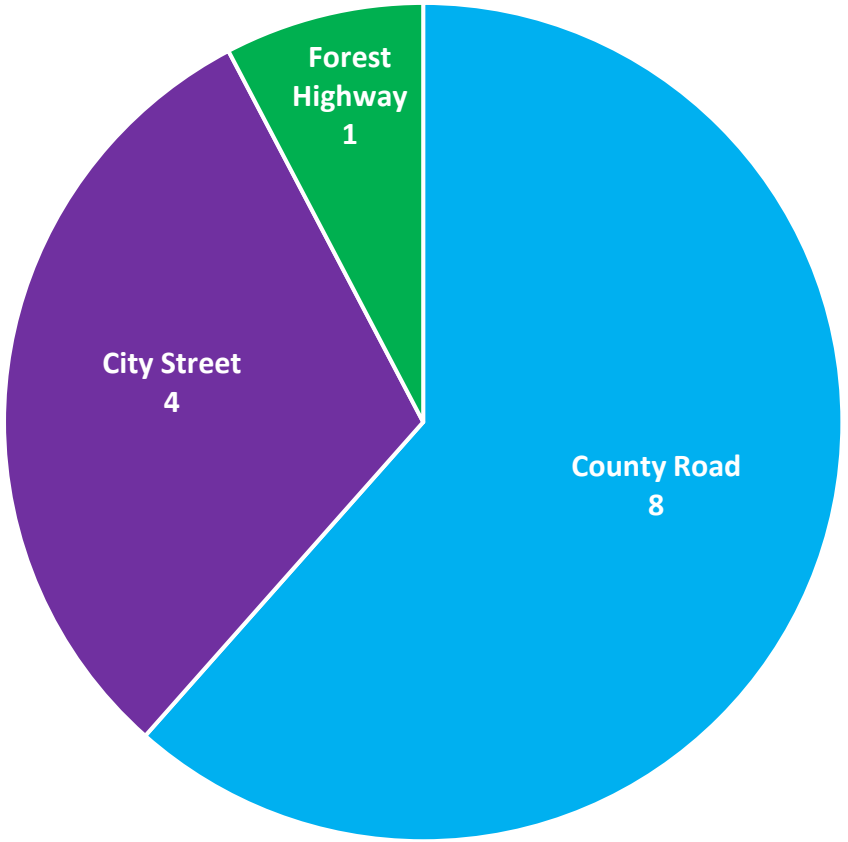
- Grade Separations = 83
  - Railroad Over = 24
  - Railroad Under = 59
- Railroad Crossings = 219
  - On a County Road = 122
  - Not on a County Road = 97

Control Type	County	Non-County	Total
Gates and Lights	65	11	**76**
Flashing Lights Only	1	11	**12**
Passive	56	75	**131**
Total	**122**	**97**	**219**



St. Louis County Railroad Crossing Crashes 10-year Period (2013-2022)

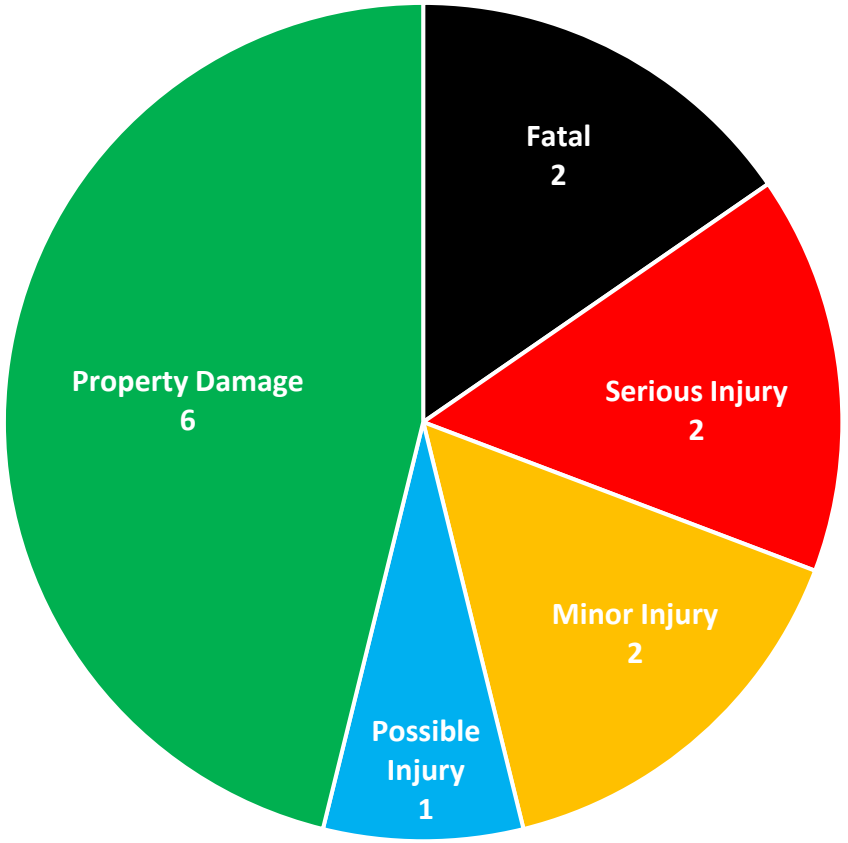
- All Crashes by Roadway Jurisdiction
- Total Crashes = 13
- ~1.3 crashes/year



*No reported Trunk Highway crashes.

St. Louis County Railroad Crossing Crashes 10-year Period (2013-2022)

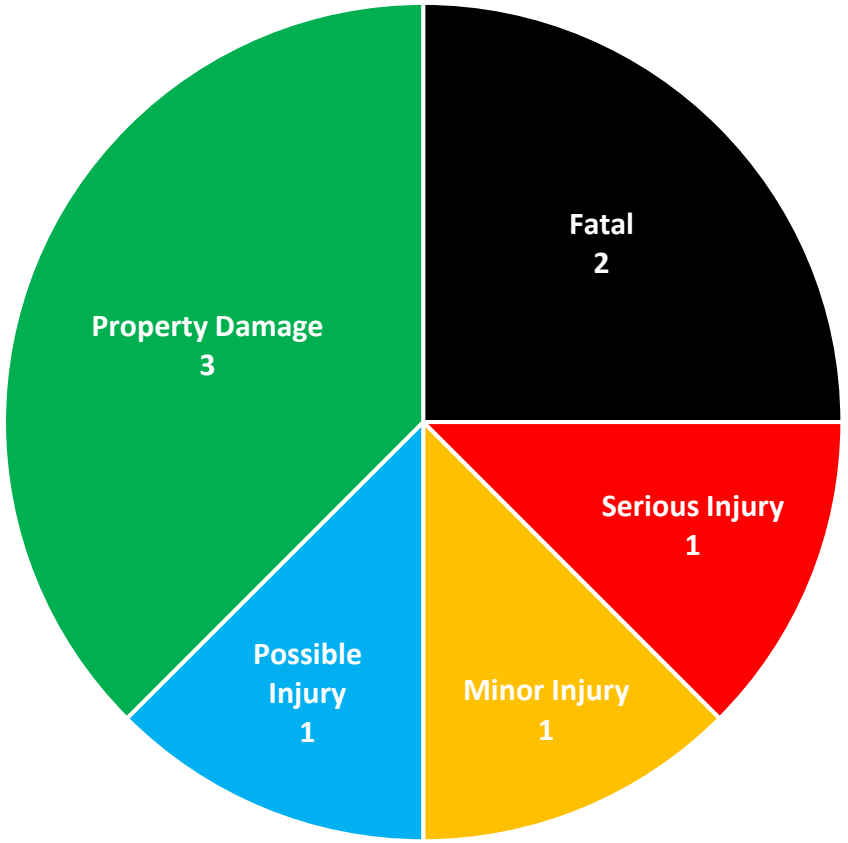
- All Crashes by Severity
- Total Crashes = 13
- Percentage of serious crashes
  - All crashes/All roads = 2%
  - Railroad crossing crashes = 31%
- Railroad crossing crashes are nearly 16 times as likely to result in a serious crash outcome.



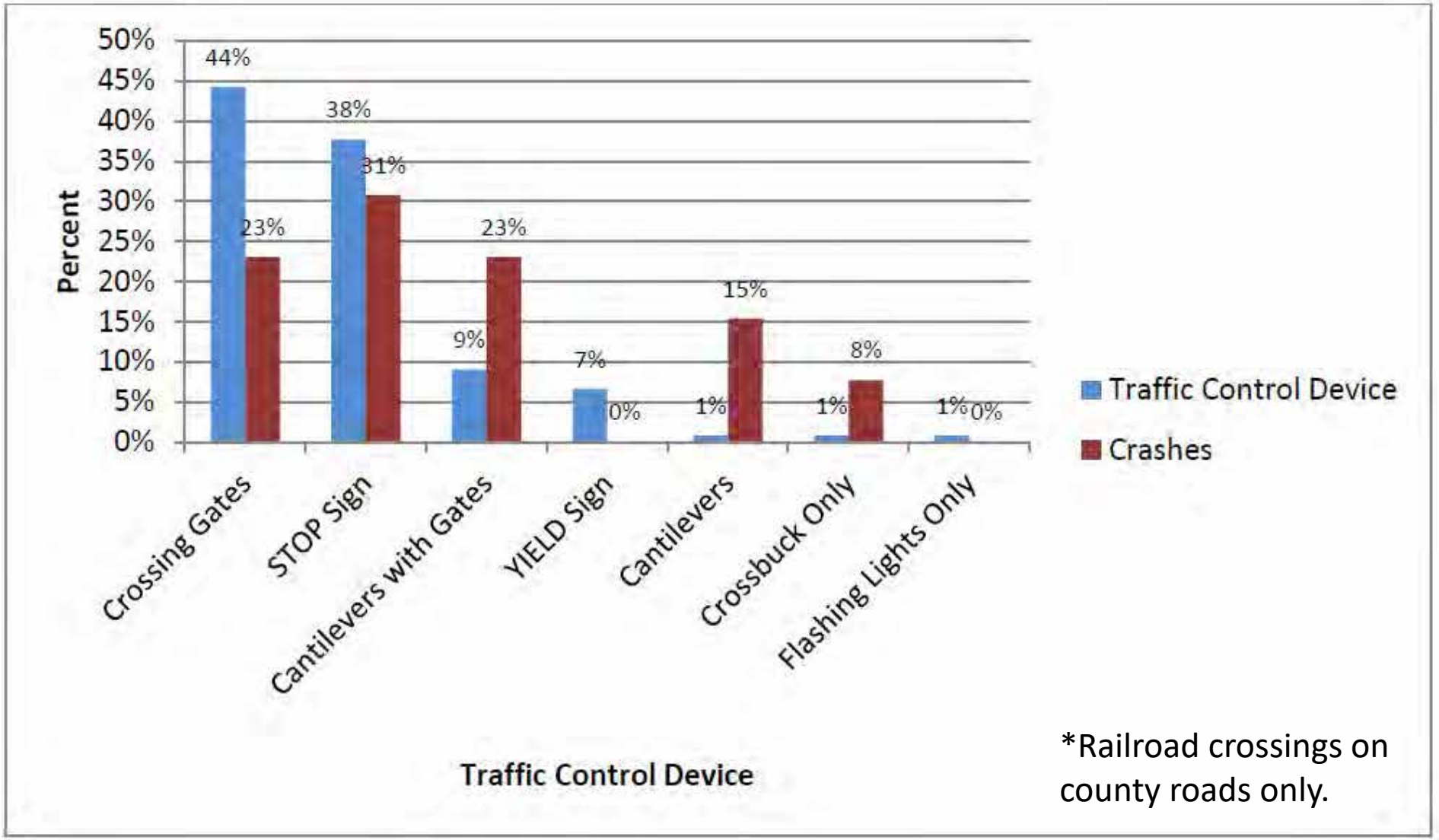
*No reported Trunk Highway crashes.

St. Louis County Railroad Crossing Crashes 10-year Period (2013-2022)

- County Road Crashes by Severity
- Total Crashes = 8
- Percentage of serious crashes
  - All crashes/All roads = 5%
  - Railroad crossing crashes = 38%
- Railroad crossing crashes are nearly 8 times as likely to result in a serious crash outcome.
- Experiencing about 1 serious crash every 5 years.



St. Louis County Railroad Crossing Crashes By Traffic Control Device (2011-2020)



*Railroad crossings on county roads only.

Active Crossings

- 55% of crossings
- 61% of crashes

Passive Crossings

- 46% of crossings
- 39% of crashes

Historical Safety Efforts on County Roads

- Installed STOP and YIELD signs at passive railroad crossings.
- Meet annually with representatives from the railroads and MnDOT Rail Office to perform railroad diagnostics.
- St. Louis County competes for federal funding to install gates/signals.



Results of Historical Safety Efforts on County Roads

- Gates/signals have historically been considered the “gold standard”.
  - The goal of MnDOT’s Rail Safety Program is to install signals/gates at all public railroad crossings.
- St. Louis County typically receives funding to install new signals/gates system every ~2-3 years.
  - There are ~56 passive railroad crossings remaining.
  - Would take over 110 years to complete the crossings on county roads.
- Safety performance of railroad crossings on county roads
  - STOP Controlled Crossings = 0.0087 crashes/year/crossing
  - Signals/Gates Crossings = 0.0056 crashes/year/crossing
  - Safety performance of signals/gates only 36% better than STOP controlled crossings.
  - Experience a fatal crash between a vehicle and train ~3-5 years.

Railroad Crossing Safety Plan Highlights

- View railroad crossings through the perspective of a rail corridor.
- Prioritize closures and grade separation.
- Realize railroad crossing safety improvements must be made within a rail corridor “system”.
- Leverage closures and grade separations to install signals/gates at crossings that likely never would have had them installed.
- Focus on being proactive versus reactive.



Railroad Crossing Safety Plan Components

- Prioritize railroad crossings by potential for…
  - Closure
  - Grade Separation
- For those railroad crossings not recommended for closure or grade separation, prioritize for gates/signals.
- Prioritize existing signals/gates systems for replacement.

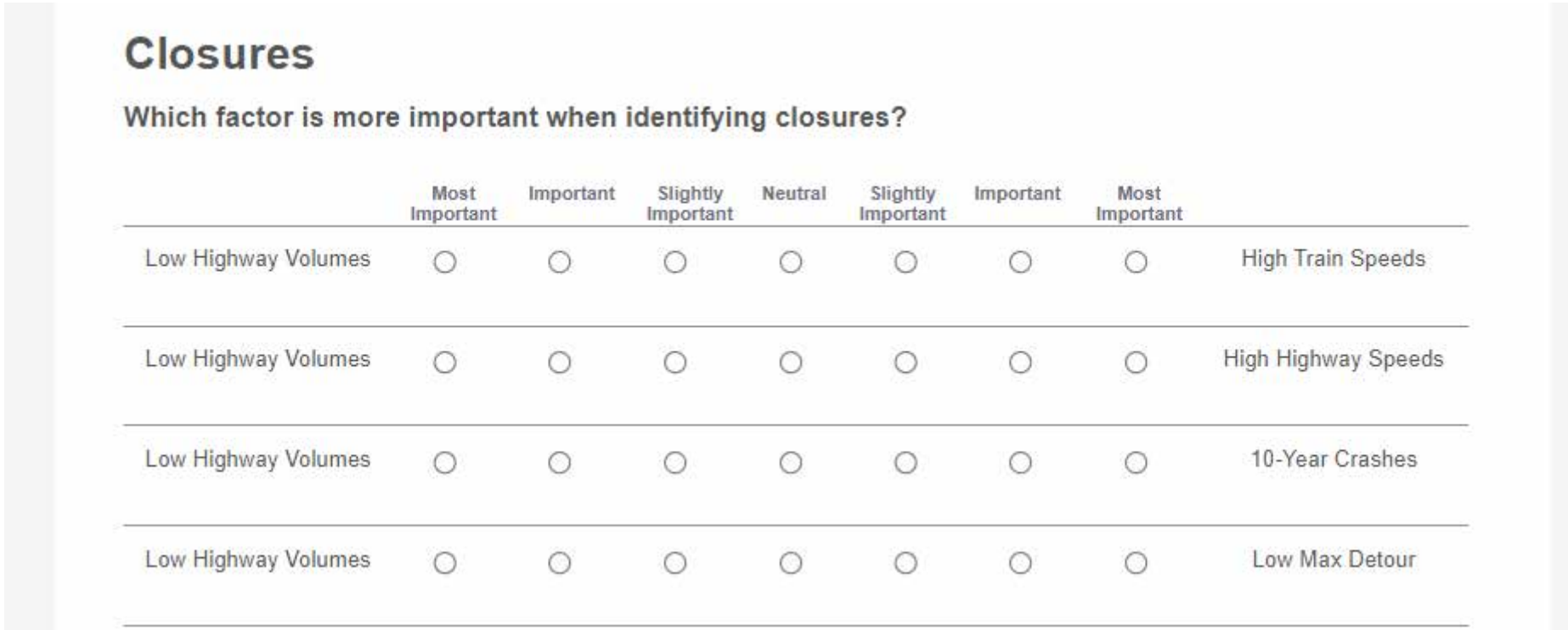
How Should We Prioritize Closure and Grade Separation?

CROSSING CHARACTERISTICS	RISK Crossings with high risk levels should be prioritized for closure, grade separation, or other safety improvements	MOBILITY Crossings that function as critical links in the transportation network should not be closed, but may be appropriate for grade separation	PHYSICAL CONDITION Factors such as warning device age may impact the timeline for improvement recommendations
MOBILITY FACTORS	▪ Train volumes and speed ▪ Highway volumes and speed ▪ Exposure Index (Highway ADT x Train ADT) ▪ MnDOT Risk Rating ▪ Crash history	▪ Network distance to nearest crossings ▪ Crossing density (crossings/mile) ▪ Impact to emergency response times ▪ Average detour length ▪ Number of switching trains per day and stakeholder feedback on blocked crossing issues ▪ Proximity of major pedestrian generators ▪ Proximity to proposed closure (Task 1)	▪ Current warning devices ▪ Age of current warning devices ▪ Crossing surface condition ▪ Highway functional classification

2

Variable Ranking

- Pair-wise comparison between all variables.
- Final ranking based on combined results.

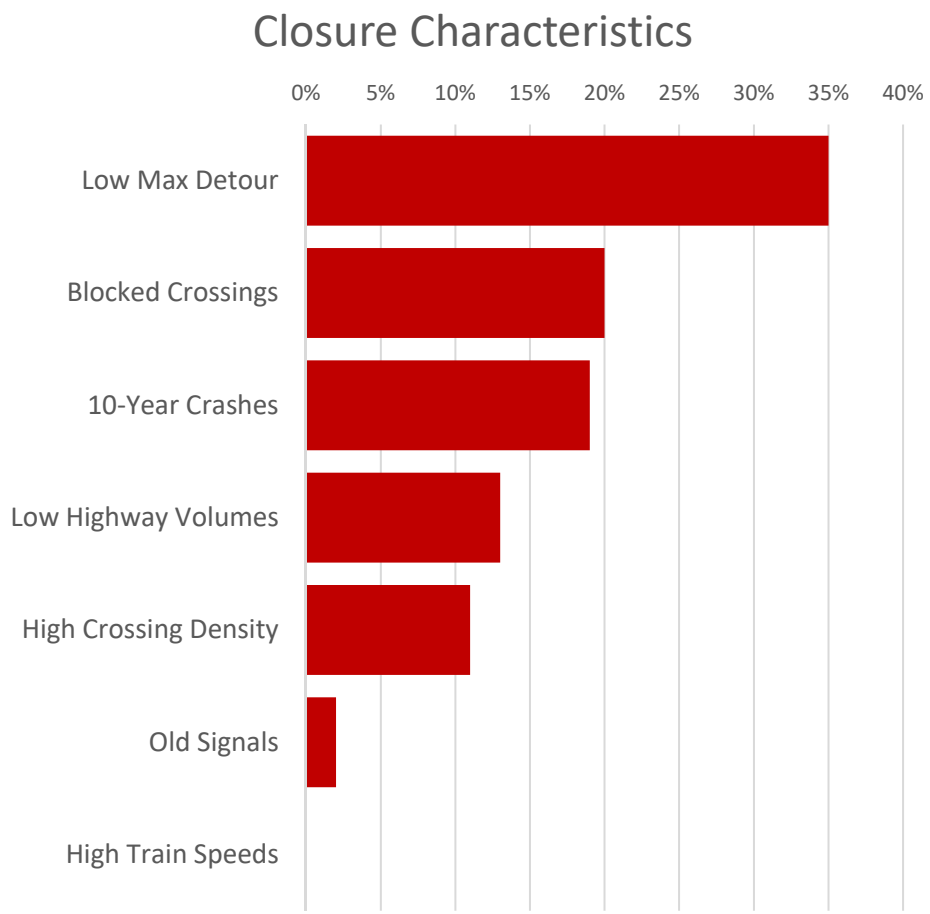


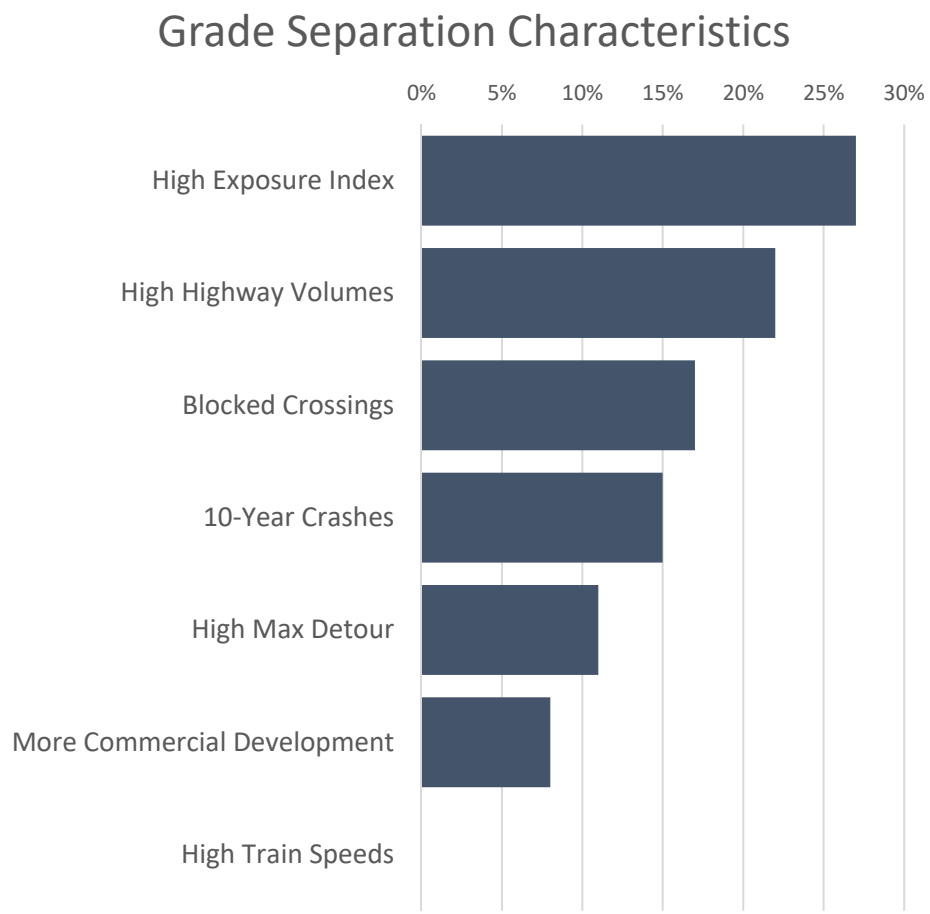
Closures

Which factor is more important when identifying closures?

	Most Important	Important	Slightly Important	Neutral	Slightly Important	Important	Most Important	
Low Highway Volumes	○	○	○	○	○	○	○	High Train Speeds
Low Highway Volumes	○	○	○	○	○	○	○	High Highway Speeds
Low Highway Volumes	○	○	○	○	○	○	○	10-Year Crashes
Low Highway Volumes	○	○	○	○	○	○	○	Low Max Detour

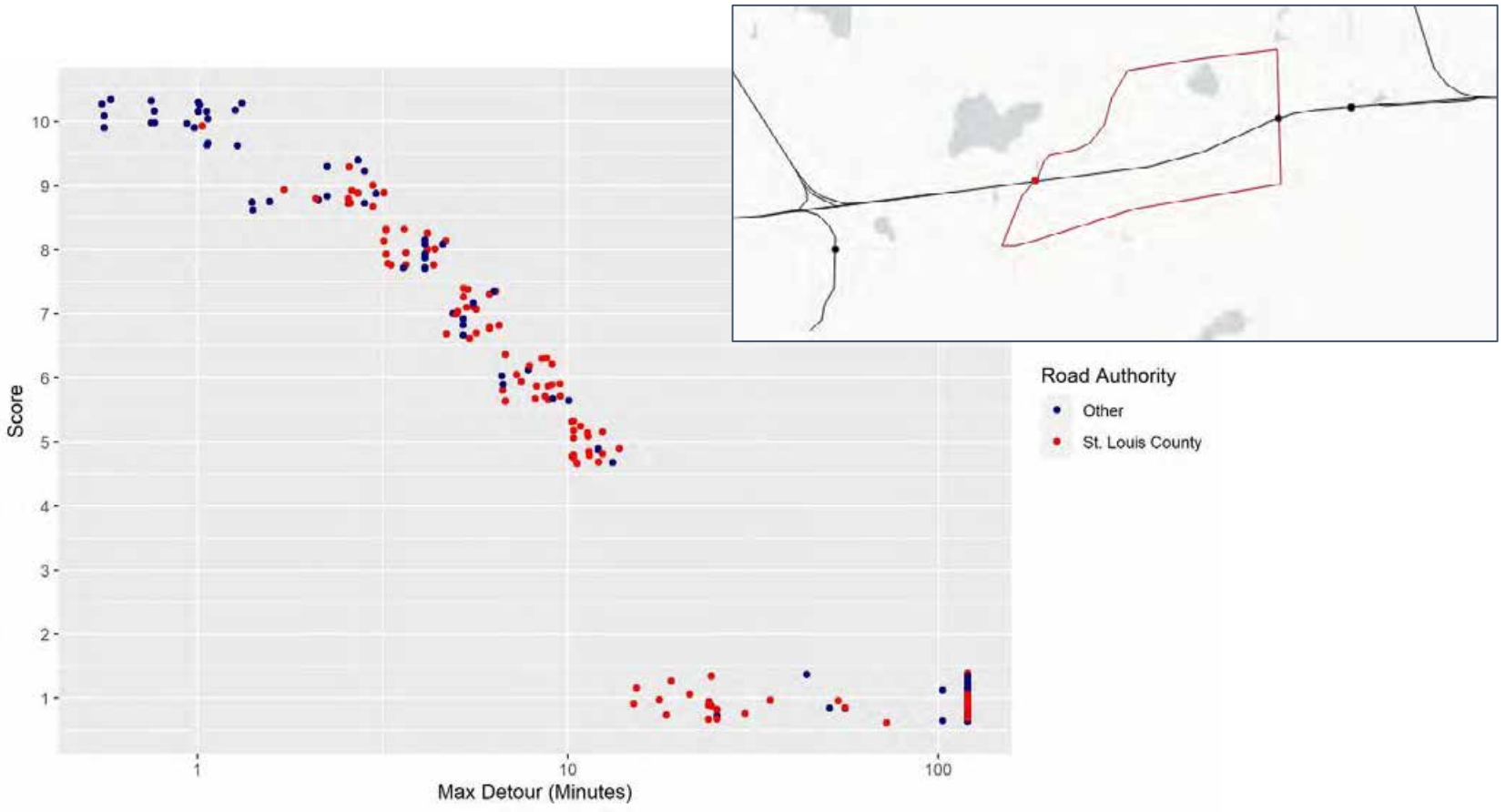
Pair-Wise Comparison Results

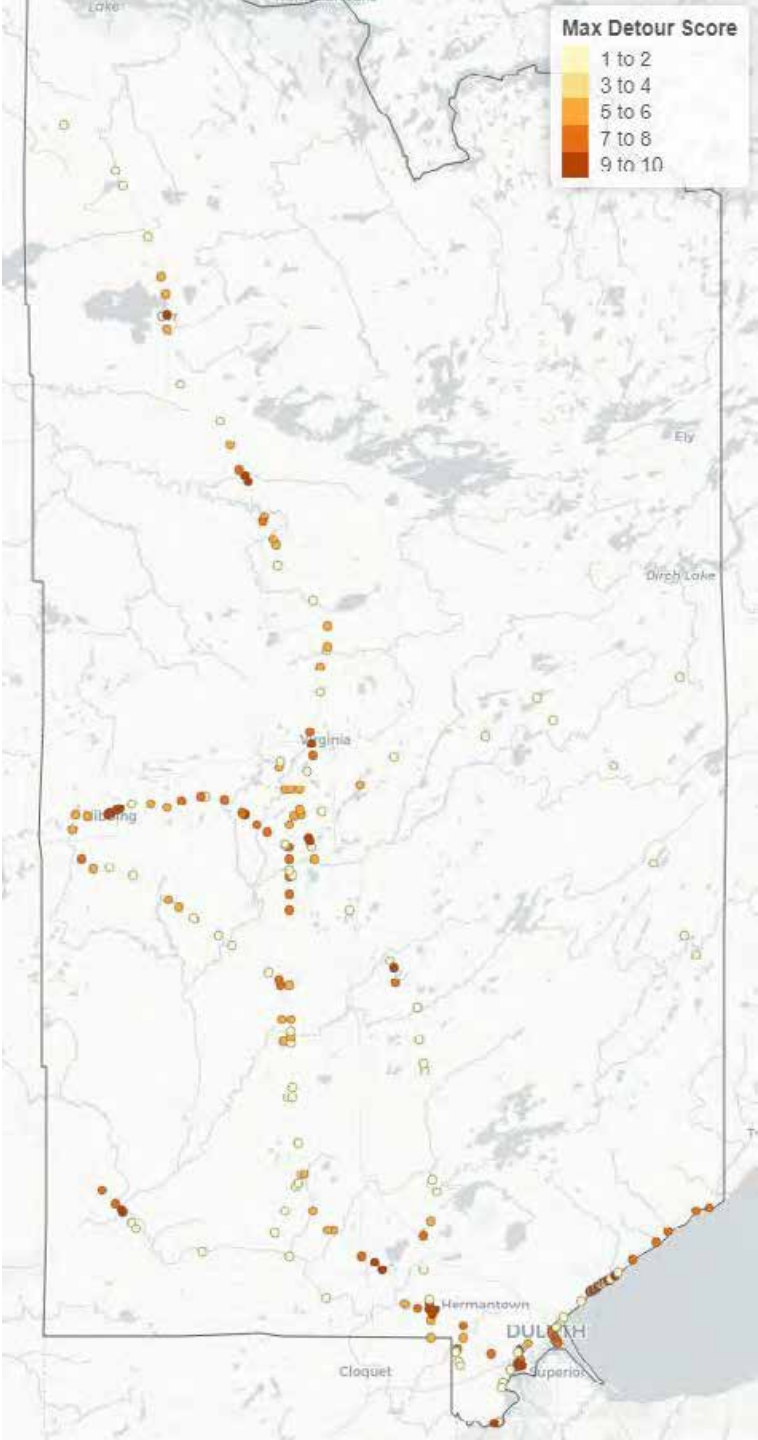




Closure Scoring: Low Max Detour

- Detours >15 min assigned lowest score





Final Closure Score

- 0.35 x Max Detour Score
- 0.12 x Blocked Crossing Score
  - Reduced from 0.20 due to results not matching expected findings and scoring criteria being a proxy measure.
- 0.19 x 10 year Crash Score
- 0.13 x Highway AADT Score
- 0.11 x Crossing Density Score
- 0.10 x Estimated Max Hours of Delay Score
  - Additional variable included to estimate potential traffic impacts.
  - Max hours of delay = max detour (minutes) x highway AADT.

Final Closure Score

Street	Crossing ID	Highway AADT	Highway Speed	Train Volumes	Train Speed	Warning Device	Max Detour (min)	Hours of Delay	10-Year Crashes	Max Detour Score	Blocked Crossing Score	Crash Score	Highway AADT Score	Crossing Density Score	Hours of Delay Score	Closure Score
Hermantown Rd (CR846)	260087J	5	55	11	60	StopSign	2.6	0.2	0	9	2.75	0	9	7	10	6.4
Woodland Rd (CR382)	260122V	45	45	11	60	StopSign	2.7	2.0	0	9	3.25	0	8	8	9	6.4
Allavus Rd (CR592)	252016S	50	50	1	35	StopSign	3.2	2.7	0	8	5.25	0	8	8	9	6.3
Remshaw RD (CR755)	260125R	70	55	11	60	StopSign	6.8	7.9	1	6	3.5	5	7	7	9	6.1
Mc Sweeney Rd (CR592)	252027E	5	30	1	35	StopSign	5.7	0.5	0	7	4.75	0	9	7	10	6.0
Admiral Rd (CSAH62)	252013W	40	30	1	35	StopSign	4.2	2.8	0	8	5.75	0	8	4	9	5.9
Kolu Rd (CR207)	061248D	5	30	4	50	Crossbuck	3.2	0.3	0	8	1.5	0	9	6	10	5.8
Fermoy Rd (CR311)	251952A	85	55	16	40	StopSign	5.2	7.4	0	7	4.75	0	7	8	9	5.7
Seville Rd (CR873)	251917L	116	40	16	35	Gates	3.0	5.8	0	9	2.5	0	6	5	9	5.7
Vibert Rd (CR875)	251920U	111	30	16	35	StopSign	3.0	5.5	0	9	2.5	0	6	5	9	5.7
Stark Rd (CR894)	251852V	363	55	30	25	Gates	3.3	20.2	0	8	4.75	0	5	8	6	5.5
Shaw Rd (CR451)	252028L	5	55	1	35	StopSign	5.7	0.5	0	7	4.75	0	9	2	10	5.4
Saint Vincent Rd (CR260)	097753A	75	30	4	50	StopSign	3.7	4.6	0	8	1.75	0	7	5	9	5.4
Burghardt Rd (CR430)	260162T	5	15	15	60	StopSign	8.2	0.7	0	6	3	0	9	5	10	5.2
Independence RD (CR874)	251923P	265	55	16	35	Gates	3.3	14.4	0	8	2.5	0	5	3	7	4.8
Burnett Rd (CR867)	251930A	65	40	16	35	StopSign	8.8	9.6	0	6	2.5	0	7	6	8	4.8
Seville Rd (CR694)	260092F	217	55	11	60	StopSign	120	434	0	1	2.5	0	5	1	1	1.5

Final Grade Separation Score

- 0.27 x Exposure Index Score
- 0.22 x Highway AADT Score
- 0.17 x Blocked Crossing Score
- 0.15 x 10 year Crash Score
- 0.11 x Max Detour Score
- 0.08 x Commercial Development Score

Final Grade Separation Score

Street	Crossing ID	Highway AADT	Highway Speed	Train Volumes	Train Speed	Warning Device	Max Detour (min)	Hours of Delay	10-Year Crashes	Exposure Index Score	Highway AADT Score	Blocked Crossing Score	Crash Score	Max Detour Score	Commercial Development Score	Grade Separation Score
S Main St W (CSAH100)	252305T	5,100	30	12	35	Gates	30.1	2,559.5	0	10	10	4	0	7	9	7.1
N Cloquet Rd (CSAH45)	251854J	1,950	50	30	60	Gates	120.0	3,900.0	0	10	10	4.5	0	10	0	6.8
CSAH 7 (CSAH7)	251953G	900	55	24	49	Gates	17.7	265.1	0	10	9	7.25	0	7	0	6.7
Southern Dr (CR657)	260128L	1,050	45	15	60	Gates	6.5	114.2	0	10	9	4.5	0	4	9	6.6
CSAH 7 (CSAH7)	252375H	2,110	55	12	35	Gates	11.3	397.3	0	10	10	4.25	0	6	0	6.3
Canosia Rd (CSAH98)	251909U	1,650	55	16	42	Gates	5.4	149.6	0	10	9	4	0	4	6	6.3
Midway Rd (CSAH13)	251850G	6,900	55	30	60	Gates	6.7	766.7	0	10	10	4.75	0	5	0	6.3
CSAH 7 (CSAH7)	252070K	3,000	55	18	35	FourQuad	7.5	373.8	0	10	10	4.5	0	5	0	6.2
Midway Rd (CSAH13)	251905S	6,900	55	30	49	Gates	5.6	639.5	0	10	10	4.75	0	4	0	6.1
Fayal Rd (CSAH101)	260126X	1,600	55	11	60	Gates	6.8	180.7	0	10	9	4	0	5	0	5.9
Sparta Rd (CSAH97)	252001C	1,500	55	12	35	Gates	10.8	270.7	0	10	9	3	0	6	0	5.9
Ashawa Rd (CSAH115)	260175U	770	60	15	60	Gates	3.2	41.5	0	10	7	2.5	0	3	7	5.6
Town Line RD (CSAH16)	260120G	1,050	55	11	60	Gates	8.7	151.6	0	9	9	3.25	0	5	0	5.5
Town Line RD (CSAH16)	252261V	830	55	12	40	Gates	56.0	774.4	0	9	7	2.25	0	10	0	5.5
CSAH 15 (CSAH15)	260189C	680	55	15	60	Gates	35.2	398.7	0	9	7	3	0	7	0	5.3
CSAH 5 (CSAH5)	061254G	475	55	4	50	Gates	11.4	90.3	1	7	7	1.75	5	6	0	5.1
Brimson Rd (CSAH44)	252256Y	220	50	12	35	Gates	72.6	266.3	0	8	6	2.5	0	10	0	5.0
Comstock Lake Rd (CSAH52)	260106L	382	55	11	60	Gates	25.23685524	160.674645	0	8	6	2.25	0	7	0	4.6
CSAH 25 (CSAH25)	252017Y	680	55	1	35	FlashingOnly	6.4	72.4	0	6	7	5	0	4	0	4.5
Fraser Rd (CSAH137)	252015K	265	55	1	35	Gates	3.2	14.1	0	5	6	5.5	0	2	0	3.8
Zim Rd (CSAH27)	061253A	211	55	4	50	Gates	24.0313758	84.51033822	0	6	5	1.75	0	7	0	3.8

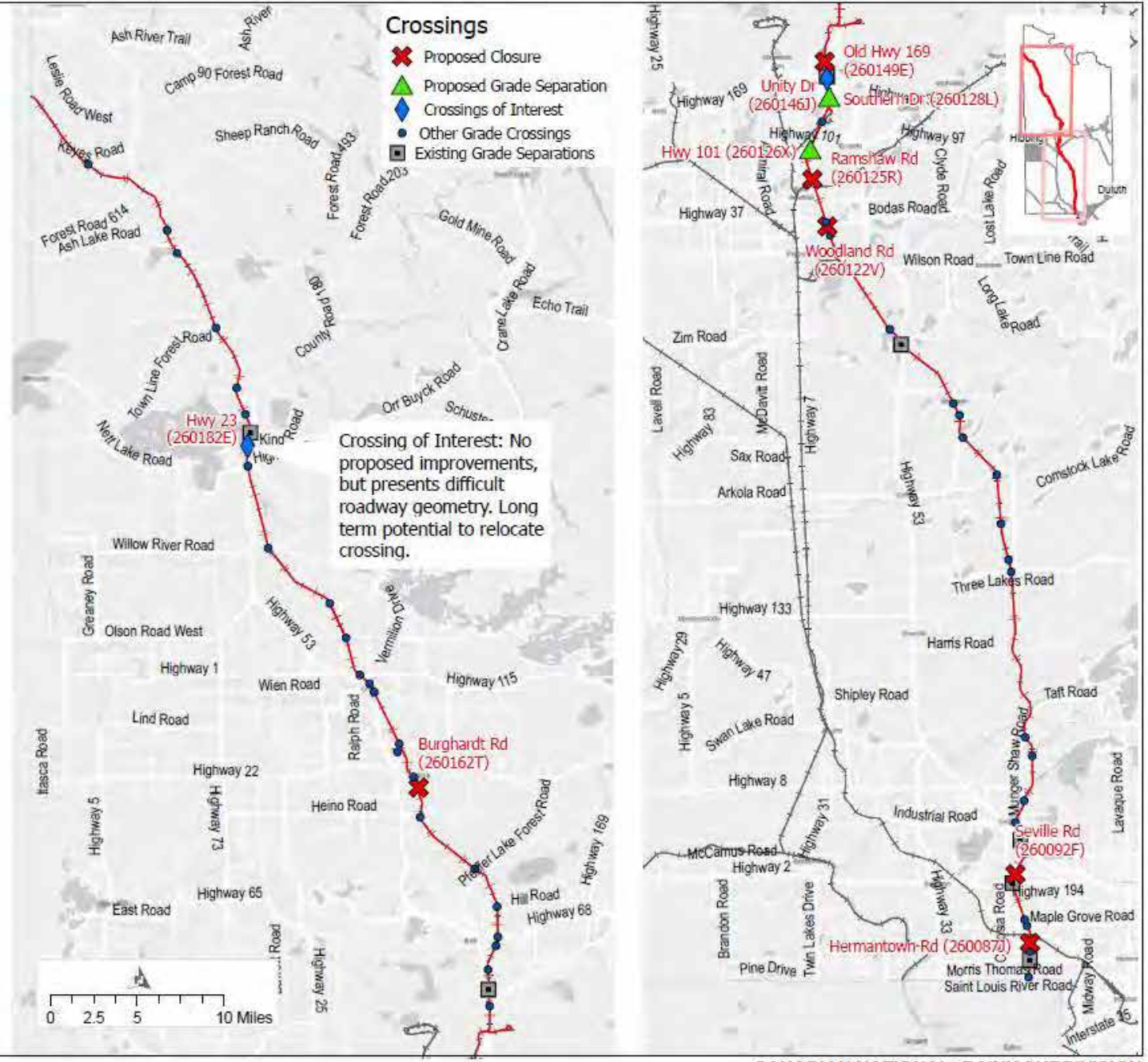
CN Rainy Sub

The CN Rainy Subdivision includes 53 grade crossings and eight grade separated crossings. This study reccomends closure of six crossings, grade separation of two crossings, and miscellaneous improvements at two crossings.

Over a 10-year period, the estimated number of crashes on this corridor is 2.53, close the two actual crashes experienced over the previous 10 year time period. The implementation of the closures and grade separations as proposed would reduce this estimated number by half to 1.26 crashes every 10 years.

The worst-case detour caused by these closures is at Burghardt Road (260162T) where the maximum potential detour is 8.16 minutes. The estimated average delay per vehicle at this crossing is 2.88 minutes. The closure of Burghardt Road would impact approximately 20 highway trips per day and result in a total estimated daily delay of 58 minutes.

Proposed Improvements	Crossing Count	10-Year Crashes (2011-2020)	Estimated 10-Year Crashes	
			Before	After
Closure	6	1	1.220	-
Grade Separation	2	0	0.060	-
Miscellaneous	2	0	0.027	0.027
None	43	1	1.219	1.219
TOTAL	**53**	**2**	**2.526**	**1.246**



CANADIAN NATIONAL: RAINY SUBDIVISION
PROPOSED IMPROVEMENTS

Railroad Crossing Safety Plan Process

Kickoff Meeting

- **Meet with PMT members for voting exercise for factors (March 2022).**

Workshop A

- **Meet with PMT members to review recommended closures and grade separations (September 2022).**

Rail Corridor Estimates

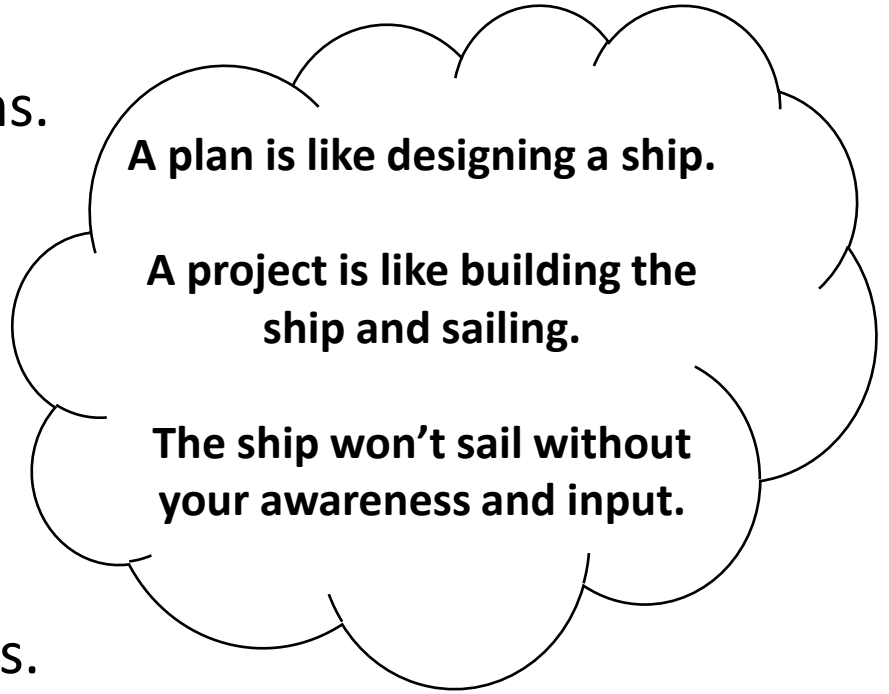
- **Create rail corridor safety performance estimates by implementing the Safety Plan (Summer 2023).**

Meet with Townships

- **Meet with Township representatives for where there is a recommended closure project.**

What is the difference between a plan and project?

- **Plan**
  - Prioritizes locations on the transportation system.
  - Recommends projects for the high priority locations.
  - Provides a “road map” for the agency.
  - Helps the agency compete for funding.
- **Project**
  - Includes input from key stakeholders.
  - Determines the final scope (what are we doing).
  - Funding has been obtained.
  - Received approvals from all key regulatory agencies.
  - Have a construction plan ready for bidding.



Questions?

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