Report on the

Improvements to Highway-Rail Grade Crossings and Rail Safety

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Legislative Request

This interim update is issued to comply with Laws of Minnesota 2014, Chapter 312, Article 10, Section 10.

IMPROVEMENTS STUDY ON GRADE CROSSINGS AND RAIL SAFETY FOR OIL AND OTHER HAZARDOUS MATERIALS TRANSPORTATION.

(a) The commissioner of transportation shall conduct a study on highway-rail grade crossing improvement for oil and other hazardous materials transported by rail, and on rail safety. At a minimum, the study must:

(1) provide information that assists in risk management associated with transportation of oil and other hazardous materials by rail;

(2) develop criteria to prioritize needs and improvements at highway-rail grade crossings;

(3) consider alternatives for safety improvements, including but not limited to active warning devices such as gates and signals, closings, and grade separation;

(4) provide findings and recommendations that serve to direct accelerated investments in highway-rail grade crossing safety improvements; and

(5) analyze state inspection activities and staffing for track and hazardous materials under Minnesota Statutes, section 219.015

(b) The commissioner shall submit an interim update on the study by August 31, 2014, and a final report by October 31, 2014, to the chairs and ranking minority members of the legislative committees with jurisdiction over transportation policy and finance.

Report cost

The total cost to produce this study is approximately $93,000, which includes all the drafts and previous iterations. All work performed to create this report was done as part of normal assigned duties for MnDOT staff and includes all GIS analysis and field work.

Summary

The 2014 Minnesota Legislature directed the Minnesota Department of Transportation to conduct a study of highway-rail grade crossings improvements for rail corridors carrying unit trains of crude oil and other hazardous materials[1]. The legislature also appropriated $2 million for implementation of safety improvements at these grade crossings specifically along crude-by-rail corridors[2]. It is estimated that this appropriation will fund the installation of approximately 10 lower cost grade crossing improvements.

The MnDOT study identified more than 700 miles of train routes that carry the Bakken crude oil across Minnesota to refinery destinations on the East and Gulf coasts. These routes have 683 at-grade crossings of roads and railroads. Each grade crossing has the potential risk of a train and vehicle collision, or a train derailment. If a train filled with Bakken oil has an incident such as a derailment, there is a high probability that the oil, a highly volatile, hazardous material, would be released in significant volumes.

The volatility of the Bakken crude oil makes it highly prone to catching fire in the presence of an ignition source, including sparks and heated metal common at accident sites. The volatile makeup of Bakken crude oil and recent train accidents bring this issue to the forefront and raise safety concerns about transporting the oil across the state.

Most of the Bakken crude oil is going to the Gulf Coast or the East Coast, but it passes through the state. Trains carrying the oil travel through major metropolitan areas, such as the Twin Cities, but also travel through rural Minnesota where response times to an accident may be an issue. The study is designed to address concerns about rail grade crossings and the safety needed to ensure trains carrying hazardous material reach their destinations while the citizens of the state are assured of the safety of the operation.

The study focuses on the transportation of Bakken crude oil by train since the volume exceeds any other flammable or hazardous material being transported through Minnesota by several times over. The recommended improvements to grade crossings cover some of the most heavily trafficked railroad mainlines in the state and will provide similar safety improvement to the transport of all hazardous materials on these key routes.

The study focuses on prioritizing risks, while also reducing potential collisions by improving the overall safety of each grade crossing. The risks are assessed by focusing on the people who would potentially be most affected by an accident involving a train, such as nearby residents, workers and emergency responders in the vicinity of the rail crossing. The focus on risk assessment for those people most likely impacted by any possible incidents is the key difference in the study from a conventional grade crossing safety assessment; therefore, the areas with the highest potential risk to the population informed all of the evaluations that identified improvable crossings in the recommendations. Due to this new focus in the risk assessments, all recommended improvements to specific crossings improve public safety in the presence of transporting the highly flammable Bakken crude oil by rail.

[1] Laws of Minnesota, 2014 Chapter 312, Article 10; https://www.revisor.mn.gov/laws/?id=312&year=2014&type=0
[2] Laws of Minnesota, 2014 Chapter 312, Article 9; https://www.revisor.mn.gov/laws/?id=312&year=2014&type=0

Background

Bakken crude oil is identified by the federal government as a highly volatile flammable material. The transport of the oil accounts for significant new rail business, which increased from almost no rail transport in 2005 to nine fully loaded crude oil trains originating from North Dakota daily in 2014. Of the nine trains originating in North Dakota, five to seven of those trains cross Minnesota on a daily basis, destined for refineries on the East Coast and Gulf Coast.

There were several catastrophic incidents involving trains carrying crude oil, including the Lac Megantic, Quebec, derailment and fire that killed 47 persons in July 2013. There was also the fire in Casselton, N.D. in January 2014. Since Lac Megantic, six other incidents involving spills and fires from derailed and ruptured loaded crude oil tank cars were recorded in North America. None of the other recent incidents resulted in additional injuries or deaths, due to either unpopulated locations or limited and contained spills and fires. However, these incidents highlight the potential safety risks due to the substantial increase in traffic and large volumes of hazardous material transported by railroads.

The volatility of Bakken crude oil is the subject of debate, but it has consistently been shown to be more prone to vaporization and ignition compared to other heavier crude oil. Bakken crude has these characteristics that make it categorized as volatile:

- An average flash point of 73 degrees Fahrenheit, the point where natural atmospheric vaporization creates an ignitable air/fuel mix at the surface of the liquid
- A boiling point of 120 to 140 degrees Fahrenheit, the point where heating the liquid produces significant volumes of vaporization
- A specific gravity of 40, lighter than water and analogous to light motor fuels including gasoline, jet fuel, and diesel

It is notable that crude oil by definition is a natural mix of hydrocarbon compounds, ranging from ethanes, butanes and methanes through natural gasoline to heavy oils and bitumens, combined in a liquid mix. This often complicates the handling and emergency response requirements because of the wide range of chemical reactions exhibited by different compounds within the mix of crude oil.

As a result of these findings, the Federal Rail Administration, in conjunction with the Pipeline and Hazardous Material Safety Administration, issued emergency orders requiring documentation and labeling of all rail shipments carrying Bakken crude oil. The orders mandate that Bakken crude oil be classified under the most dangerous and highly controlled category of flammable liquids. This means the hazmat documentation must disclose a hazardous materials category of Flammable 3, Packing Group 1 without exception.

Increasing the risks associated with transporting Bakken crude oil is the design of the general purpose rail tank car carrying the crude oil. In 2005, there was virtually no Bakken crude oil to transport, so the majority of the general purpose rail tank car fleet is comprised of a DOT 111a car, with design specifications dating back to the 1960s. In recent years, the railroad industry recognized the design of the DOT 111a railcar as outdated and deficient, especially with regard to spill prevention and rupture protection. The industry adopted a new, more robust design standard in

2011, commonly referred to as the 1232 specification. Of the reported 90,000 tank cars currently used to transport Bakken crude oil, only an estimated 15,000 are the 1232 specification.

The federal agencies involved in railroad design and safety standards have not adopted the 1232 specification for rail tank cars. FRA and PHMSA are entered into the emergency rulemaking process. In part, the rulemaking process is to adopt improved rail tank car standards, which will most likely exceed the 1232 specification. The public and industry comment period on that rulemaking ended Sept. 29, 2014. Final rulemaking is expected to occur in the next several months, and a complete fleet transition to new safer cars is expected to take three years from the date of rule adoption.

The long term risks posed by the continuing presence of crude-by-rail shipments within Minnesota were researched internally by the Minnesota Department of Commerce and MnDOT. The research forecasts a potential range of outcomes over the next 10 years based on estimates of Bakken production growth, Alberta heavy oil production growth and potential capacity improvements in pipeline and rail transport systems.

The forecast assumes a long term continuing demand for crude oil production from these fields. The forecast also assumes that destinations for the crude oil movements remain roughly similar to current patterns, namely consumption by East Coast and Gulf Coast refineries for the majority of crude production. The forecast suggests that crude-by-rail traffic will, at best, stay at current levels, with five to seven loaded trains per day crossing Minnesota. However, if the demand and production doubles in volume, this doubling would strain the system. The report shows the new oil production will likely be equal to or possibly exceed planned new pipeline expansions; therefore, oil producers will continue to rely on the railroad's flexibility and capacity to transport the excess volumes in the next 10 years and beyond.

The analysis of the factors, influences and potential continuation of the transportation of Bakken crude oil via rail highlights the increased need for safety of at-grade highway-rail crossings. Along the three Bakken crude oil routes in Minnesota, there are 683 at -grade crossings, which means the intersection of railroad and highway traffic. Each crossing should be outfitted with appropriate warning devices and safety measures to prevent collisions. Collisions often cause a train derailment, ruptures of the loaded rail cars and subsequent spills and fires. The study specifically evaluates the top 100 crossings with the intent to improve current levels of safety at these key crossings.

Prior to the 2014 legislation, MnDOT only had one track inspector. With the added funding, provided through the state rail safety account, MnDOT hired an additional track inspector and a new hazardous materials inspector. Both track inspectors and the hazmat inspector all have previous experience in their fields, and were able to begin field work while undergoing FRA training. All the necessary training and federal certification are expected to be accomplished by the end of 2014.

The legislation allows the hiring of a third track inspector in 2015 after evaluating the effectiveness and workload of the new inspectors. That evaluation will take place beginning in spring 2015.

Scope of Study

The study focuses on the three rail corridors currently carrying five to seven unit trains of Bakken crude oil from North Dakota through Minnesota daily. The corridors are:

- BNSF mainline from the Twin Cities to Fargo/Moorhead via St Cloud, Staples and Detroit Lakes
- Canadian Pacific's mainline from La Crescent to the Twin Cities and then to North Dakota via Glenwood
- BNSF corridor from Fargo/Moorhead to Willmar to the South Dakota border via Marshal and Pipestone (Figure 1)

These three corridors represent more than 700 miles of the 4,450 miles of railroad track in Minnesota, and include 683 road crossings at grade, protected by a variety of installed at-grade crossing protection signage or equipment.

The statutory language included identifying sites where safety can be improved by one of four alternative strategies, with the goal of reducing public exposure to derailments, spills and fires in areas with the highest risks for personal injury and property damage. The named strategies include:

- Closing at-grade crossings
- Upgrading passive warnings to active signals
- Improving active protection with more effective safety treatments
- Constructing grade separations

As the study progressed, additional recognized and proven strategies were included for consideration. These strategies include:

- Improving the condition and signage of passive crossings (crossbucks combined with stop or yield traffic signs)
- Signal interconnects at adjacent traffic signals to reduce backups across grade crossings
- Programmed education and enforcement

The programmed education and enforcement strategy is a recognized FRA safety improvement, but requires proof and implementation of ongoing, systematic and sustainable actions by local education and enforcement agencies.

Conventional safety evaluations concentrate on reducing railroad and highway vehicle collisions at crossings. These evaluations and prevention strategies are well documented in a number of safety and design protocols and standards. These include:

- FHWA's Manual on Uniform Traffic Control Devices
- USDOT Technical Working Group reports on grade crossing traffic control
- FRA's Horn Rule and Quiet Zone Rules

This study is different because it expands the conventional evaluation scope to include the risk to adjacent residents and workers. The study shifts the focus to an area and population based risk assessment, rather than just an accident prediction assessment. The risk assessment for each grade crossing is defined by the population, facilities and activity within a half mile radius of each crossing It also encompasses a half mile wide buffer zone on either side of the railroad tracks. This distance represents the evacuation zone around an incident site for a flammable material spill and fire.

The size of the evacuation zone is specified in the "USDOT Emergency Response Guidebook," which is used by first responders reacting to the initial phases of a dangerous goods or hazardous materials transportation incident. The risk assessment also considered these influencing factors:

- Road usage, such as evacuation route and school bus routes
- Presence of heavy commercial vehicles in the traffic mix
- Volume and frequency of crude oil unit trains
- Overall traffic volumes and historic accident rates

Methodology

MnDOT used its internal expertise in rail and grade crossing safety to achieve a comprehensive evaluation of all the grade crossings in the targeted crude oil corridors. MnDOT completed a systematic evaluation of crossing safety based on an existing, detailed database, which was further expanded to accommodate the needs of the study. MnDOT is coordinating efforts with the Minnesota Department of Public Safety and surveyed MnDOT Districts, counties, and city engineers and administrators to isolate special conditions and concerns. The input provided through the Governor's Rail Safety Roundtables, which began on Aug. 11, 2014, was a valuable source of local feedback and is incorporated in the study findings. Other input is being integrated, such as the results of site visits and face-to-face communications with local officials, emergency responders and citizens along the corridors.

Crude-by-rail corridor grade crossings receive a multi-part comparative score involving three index numbers. The first score is the public risk assessment based on population density within one half mile of each crossing. This is from the federal hazmat response guidance for potential risk and recommended evacuation area for this particular hazardous material.

GIS mapping and satellite imagery were used to delineate the buffer zones and the number of households, businesses and other facilities within the threat area. Scores are given for residential population levels, fixed vulnerable populations such as hospitals, nursing homes and prisons, and transient vulnerable populations such as schools. The presence of public service facilities, including fire and police stations, were also located and counted. MnDOT analysts began with census population density figures, but in the case of high priority crossings identified for detailed study, actual building counts and city-level homestead occupancy rates were used to develop a site-specific population count.

The second score involves the use of the established Federal Railroad Administration Safety Index, a predictive index of possible grade crossing accidents. The FRA Safety Index also includes:

- Recorded accidents
- General vehicle counts
- Heavy commercial vehicle counts
- Special road uses such as emergency access
- Evacuation routes
- School bus routes
- Other nearby traffic generators

The FRA Safety Index includes consideration of train and highway vehicle counts and speeds specific to the location and the installed safety equipment, and allows for evaluation of variances in levels of traffic and levels of protection.

The third score evaluates the existing physical conditions, not specific to the first two indexes, which may influence accident risks and movements over the crossing. This score ranks the general crossing condition on a sliding scale, and includes evaluating the sight lines, the grades and approaches to the crossing, the crossing itself, the road surfaces and condition, and other variations

from the ideal specifications. On occasion, this score may include comments or scoring for unusual situations, such as proximity to refineries, truck terminals, power plants, special event venues, casinos, and chemical or fuel storage.

Each individual score is directly compared to the data about similar crossings, while the cumulative information gathered from the three scores together is designed to create the comprehensive picture of the safety of the crossing. The cumulative scores together informed the final evaluations and serves as the list of the top 102 crossings (Appendix D). An example of the evaluation template is included below for illustration (Figure1). The evaluation sheets for the 40 highest ranked grade crossings are included in Appendix E.

Figure1: Example of the form used to evaluate an at-grade rail crossing

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO — AADT _____
Railroad — HCADT _____
Milepost — Oil Trains/Day _____
Location

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	3
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	4
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	3
4	4
5	5

Emergency Services (Police Department, Fire station)

1	1
2	2
3	3
4	4
5	5

Total _____

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	3
0.030	4
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each _____
Near Misses - reported near misses by railroad; add 1 point each _____

Total _____

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	5
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each _____
Local designation as safety concern (county, city engineer call-out); add 2 points each _____

Total _____

Scoring Background

Each grade crossing received three numbers. These three numbers are scores that describe assigned point values for "Risk/Safety/Condition." Maximum values are 19 points for risk, 15 points for safety and 10 points for condition. For example, the worst possible crossing would have an R/S/C rank of "19/15/10"

Each high-risk crossing should be evaluated for recommended treatment:

1.	Close Crossing	C
2.	Upgrade Passive Crossing to Active Crossing	A
3.	Improve Active Crossing (ASM's, SSM's, Quads)	I
4.	Construct Grade Separation	S

The spreadsheet has relevant information about the top 100 high priority grade crossings, which handle either significant traffic or are in high population areas. The information includes:

- USDOT identity number
- Railroad name
- Crossing location
- Intersecting roadways identified
- Annual Average Daily Traffic or AADT
- Accident Prediction Index

The spreadsheet also lists the combined evaluation scores and the population score. For the at-grade crossings that were scored as the top 40 high priority crossings, MnDOT performed actual traffic counts to verify past reported traffic volumes data. The counts include AADT, all vehicular traffic and Heavy Commercial Annual Average Daily Traffic or HCAADT. Each of the top 100 crossings on the spreadsheet is supported by GIS mapping that collected information from a wide variety of state databases. The map information was used in scoring both population and conditions, including emergency response facilities and certain specified routes such as evacuation and school bus routes.

Status of Project

Work began on the study immediately following the adjournment of the 2014 Legislative Session. An initial survey of county and city engineers and administrators was circulated on May 30, 2014. The survey asked for feedback about issues within each official's scope of knowledge and the results highlighted a list of local concerns. GIS and traffic specialists mapped facilities and buffer zones, confirmed traffic counts, and, in particular, the counts of heavy commercial vehicle traffic. Commercial trucks posed a unique derailment risk during a collision with a train at grade crossings.

MnDOT's rail project managers conducted engineering and safety evaluations along with outreach to the railroads. The railroads voluntarily provided their own crossing evaluations, accident reports and near-miss reports. Railroad employees reported safety violations at crossings, which greatly enhanced the study data.

The score sheet was developed in collaboration with all involved parties, and further refined by test application to a variety of random crossing sites with known ranges of conditions. The MnDOT grade crossing database, updated annually by road authorities and railroads, was used to populate the spreadsheet of all the targeted crossings. The final spreadsheet includes basic data, as well as the cumulative scores. A file of individual score sheets will be maintained for reference. Analysts scored all mainline crossings, deleted non-involved local crossings (those on branch lines or spurs that cannot accommodate a through-routed unit train) and corrected other data inconsistencies. The initial scoring was completed in mid-September 2014. The evaluation was reviewed by the team and a list of the top 102 high-priority candidates for safety improvements was created based on that review.

Each of the 102 high-priority crossing candidates was studied in greater detail to determine whether the installed protection was appropriate or could it be improved. If an improvement was suggested, then the most effective safety improvement was explored. Among the top 102 high priority candidates, the top 40 were designated for extensive GIS mapping and actual traffic counts of general vehicle traffic, as well as heavy commercial vehicle traffic, to confirm historic or formulaic traffic counts.

Once the mapping and traffic counts were completed, a detailed review was conducted with the completed data. Each of the evaluation sheets for the top 40 projects is included in Appendix E.

Strategies for Safety

The application and design of safety measures at grade crossings have advanced significantly in the last 20 years, with a corresponding decline in grade crossing incidents and fatalities. The current options for safety and protection draw heavily on scientific and engineering studies. Prior to these advancements, "state- of- the-art" often meant a simple raised flashing light installation without gates, and visible from a long distance. These are often dubbed "cants" in crossing descriptions and equipment inventories, because the warning lights are anchored or cantilevered out from a roadside pole with the flashing warning lights directly over the traffic lane.

Now "state- of- the-art" is represented by extended gate arms, quad gates and traffic control measures to prevent attempts at bypassing the safety measures. These traffic control measures might include raised medians, traffic delineators, and right-turn-only entrances and exits to streets and parking lots near the crossing gates. Road closures and grade separations are highly recommended when they are appropriate.

The basic premise for the installation of these improved options is safety. More aggressive safety applications are needed as the frequency of train and vehicle interactions rises at a given crossing.

Passive protection is generally a device that consists of a traditional crossbuck supplemented by either a stop sign or yield sign posted below the crossbuck. Passive protection is usually the lowest cost option. The FRA considers passive protection an acceptable safety installation only if the vehicle count at the crossing is low, and sight lines and conditions allow motor vehicle operators sufficient opportunity to detect approaching trains.

When the frequency of vehicle crossings occurs just as train volumes and speeds increase, then passive protection is no longer an adequate safety measure. At this point, active warning devices consisting of flashing lights, bells and gates are recommended. Active protection places the emphasis on preventing vehicles from bypassing or driving around the gates, or excluding vehicles from the crossing entirely as in full-span or four quadrant (four quad) gates that block all accessible traffic lanes.

The one notable strategy not included in the list of safety options is grade separation, where road traffic and rail traffic are permanently separated by either an overpass or an underpass. The selection of alternatives and design components of the grade separation is considered site specific and was not evaluated in the study, other than to make informed assumptions on the grade separation design to estimate a rough cost.

Another option which can be a highly effective alternative is to close a crossing. The permanent closure creates an absolute level of safety, similar to a grade separation, with no ongoing maintenance expense for crossing equipment.

Other strategies were considered as the study progressed. A routine option is a signal interconnect. This is possible where an active traffic signal or light is in place on a nearby intersection close to the crossing, yet the traffic signal is not tied into the grade crossing activation circuitry. When a traffic signal is not tied into the grade crossing program, it can cause safety concerns at the light. This happens when the train gates are activated, yet the traffic light continues to go through its program, stopping traffic and trapping vehicles on the tracks in the path of an approaching train. An

interconnected signal can warn, hold or divert traffic away from a grade crossing when the grade crossing system is activated.

The final strategy suggested by the FRA is programmed education or programmed enforcement. Either of these is effective if the effort is local and sustained. If the program is not sustainable, then it has no lasting safety effect and must be discounted as an effective prevention tool. The state currently works with and partially funds "Operation Lifesaver," a nationwide rail safety and grade crossing program. This is a local program, and if sustained, shows good results.

Grade Separations

Grade separations are the complete and permanent separation of road and rail traffic, with an absolute level of crossing safety. The threshold for considering a grade separation is covered by Minnesota Rules 8830.2740[3]. The following is a summary of the criteria needed to consider the option of a grade separation from the Minnesota Rules:

- Train speeds are 40 mph or more and the roadway has four or more lanes of traffic
    - The road has a 30 mph or greater speed limit and an ADT of 5,000 or more vehicles
    - The road has a 55 mph or greater speed limit and an ADT of 3,000 or more vehicles
- There is already an active warning device, yet in the past five years, there was a serious vehicle-train accident at the crossing
- The construction of a grade separation would eliminate another safety problem in the immediate area

Many of the grade separations listed in this study fail to meet the thresholds listed in the Minnesota Rules., but, were included because of community concerns about grade crossing safety, connectivity to portions of the community, and emergency response access, which are negatively impacted by multiple, frequent train movements and blocked crossings due to stopped or slowly moving trains.

Installing a grade separation is a very expensive, but effective solution. In general, to install a grade separation on a rural, two-lane road costs $10 to15 million. Urbanized areas and multiple-lane construction are usually more expensive.

An example of a proposed grade separation project is the Moorhead downtown area. The at-grade crossings intersect two of the state's three oil train routes. Every day there are approximately six loaded oil trains that run through these crossings, as well as about 80 other train movements. The current at-grade crossings, while safe, experience up to 90 minutes per day of train blockages and are a serious detriment to emergency response in the city.

This project would construct two overpasses, each with four lanes, to remove any potential interaction between vehicles and trains. The estimated cost is around $40 million.

The at-grade crossing on the most densely populated segment of the entire oil train route is along Como Avenue in St. Paul. The Como Avenue at-grade crossing is one of two at-grade crossings between University Junction in Minneapolis and Hoffman Junction in St. Paul, which are about 12 miles apart. The Como Avenue crossing has a highly effective safety treatment, four quad gates, but in order to make improvements to the safety of this crossing, a grade separation is the most likely alternative.

The Como Avenue crossing experiences 55 to 70 trains per day, has high bus traffic, and has the highest residential population estimate of all the areas studied. The risks to people living near the crossing are high although there are other grade separations in the area that do allow emergency

[3] https://www.revisor.mn.gov/rules/?id=8830.2740

responder's access on either side of the tracks. A grade separation would reduce the risk to people living near the area by removing the need for vehicles and trains to interact.

The estimated cost of a grade separation for Como Avenue has yet to be determined. Constructing the Como Avenue grade separation poses unique challenges. The estimated costs and probable disruptions to vehicle and rail traffic make this project problematic because of its location within such a heavily populated area and along one of the busiest rail corridors. An overhead view (Figure 2) and the risk assessment mapping for the Como Avenue crossing show some of the factors and influences considered when making the recommendation about this crossing (Figure 3).

Figure 2: Overhead view of the Como Ave. at-grade crossing in St. Paul*

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Figure 3: Risk assessment map for the Como Avenue crossing*

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Project Recommendations

The analysis performed for this study, the data gathered, the feedback from the Governor's Rail Safety Roundtables, and the input from local stakeholders informed the recommendations in three specific areas related to rail safety. The first list of recommendations is for grade crossing improvement projects that can be funded using the $2 million allocated by the 2014 Legislature. These include substantial improvements to existing at-grade crossings and will enhance collision avoidance systems on rail corridors shipping crude oil.

When the preliminary recommendations for at-grade safety improvements were released in October, MnDOT then solicited feedback from each community to determine whether MnDOT's proposed safety improvement met community needs and expectations. Each of the communities was contacted and gave their initial approval to move forward with the recommended projects. The recommendations are listed in Appendix B.

The second set of recommendations to improve rail corridor safety is a list of priority grade separation projects. This list stems from data collected during a Risk Management Assessment analysis completed with the assistance of the Minnesota Department of Public Safety, and from local community input during the Governor's Rail Safety Roundtables.

This list of priority grade separation projects was compiled from findings indicating that grade crossing blockages on high traffic railroad mainlines, especially those railroad mainlines shipping crude oil, pose a substantial risk for emergency responders and the community. Generally, the blockages pose the most risk because they tend to be chronic and prolonged. This list can be found in Appendix C.

Lastly, the most comprehensive list of recommendations can be found in Appendix D, the top high priority grade crossings recommendations. This list was compiled using detailed evaluations about each grade crossing, including safety index scores, population data, public facilities mapping, traffic levels and possible improvement strategies. This list encompasses all of the recommendations from Appendix B and Appendix C.

Appendix A: Grade Crossing Safety Improvement Definitions

Adequate Safety: This indicates a grade crossing with the maximum possible level of collision avoidance already installed at the site. This may include four quadrant gates, two quadrant gates with 100-foot medians to channelize traffic and prevent drive-arounds at the gates, and complementary traffic signal interconnects.

Adequate/Improvable: This denotes a crossing that is adequately protected by warning devices that are appropriate to the current level of vehicular and train traffic, but could be further improved to reduce the likelihood of collisions by use of the maximum possible level of collision avoidance design and equipment, or a closure, or a grade separation which completely removes the conflict point.

Closures: Closing a road can be an effective strategy to eliminate a conflict point if low levels of traffic can be redirected on a reasonably short route to an adequately protected crossing.

Grade Separation: An underpass or overpass of the road with the rail line is a very high cost strategy but is effective in a high volume situation or on a critical route. It accomplishes three goals, all of which may represent high risks at the site. It eliminates vehicular/train conflict at the site, allows for unrestricted emergency access and evacuation, and preserves community traffic flows while providing an alternative to nearby at-grade crossings.

Medians: If no unusual geometric problems or traffic flows exist around a crossing, 100-foot raised medians to channelize traffic and prevent vehicles from driving around lowered gates can be approximately as effective as four quad gates.

Medium-Term: A recommended improvement that requires further development work or funding but could be delivered in two to five years under normal circumstances.

Long-Term: A recommended improvement that is suggested by current conditions, may be a lower risk and priority than Medium-Term projects, and requires further study and development. Reasonable delivery of these projects may be beyond 5 years in the future.

Short-Term ($2M): A recommendation that is included in the recommended list of projects funded by the 2014 $2 million appropriation.

Quad Gates-4: All four quadrants of a grade crossing are protected by active warning devices in the form of lights, bells, and gates. While the most expensive of a range of crossing safety options, it is particularly appropriate for multiple lane, high volume situations and can be designed to protect the crossing in situations close to intersections or involving local traffic entrances and exits.

At-Grade Crossing Safety Improvement Recommendations

Safety Improvement Type	Location for Safety Improvement	Assumed Improvement Cost	Total Cost for Improvement Type
Crossing Closure-closing the road that crosses the railroad tracks	St. Paul Park	$250,000	$250,000
Replacing Signs-missing, deteriorated or insufficient signing added or replaced	CP Corridor	$75,000	$75,000
Passive Warning Device upgraded to an Active Warning Device system-for example, upgrading things like signs with quad gates	None	$250,000	$0
Active Warning Device upgrade-interconnecting and coordinating rail signals with traffic lights to avoid backups on tracks	1st Street, Perham	$150,000	
	CR 11, near Big Lake	$500,000	
	2nd Street, Wadena	$150,000	$800,000
Active Warning Device upgrade-installing medians to prevent traffic from driving around lowered gates	TH 43, Winona	$100,000	
	TH 24, Clear Lake	$100,000	
	East St. Germaine, St. Cloud	$100,000	$300,000
Quad Gates (4)-installing lights, bells, and/or gates to ensure all four quadrants of a crossing are protected	Jackson Street, Elk River	$250,000	
	Main Street, Elk River	$250,000	$500,000
Grade Separations-creating an underpass or overpass to completely separate traffic from crossing the railroad tracks	None	Varies by crossing; very expensive	$0
Rail Safety Education Initiative-develop to educate the public about the dangers at railroad crossings	Statewide	$75,000	$75,000
		Total Cost	**$2,000,000**

NOTE: These are planning-level recommendations and have received initial concurrence from local agencies in all cases.

Priority Grade Separation Recommendations

RR	Location	Risk Level	Project Readiness	Prelim. Cost Est.	Funding Shortfall	Potential Letting Date	Grade Separation Will:	Status
BNSF	Moorhead - Main Avenue: 20th and 21st Streets	High	Ready	$43M	$24M	N/A	1. Allow a high volume of auto, pedestrian, transit and bicycle traffic to safely and efficiently move from one side of the tracks to the other;	Environmental approvals and right of way acquisition complete. Ready for final design.
							2. Improve freight mobility and efficiency by the use of Wye tracks	
							3. Removes at-grade crossings on three streets in Moorhead	
							4. Eliminates evacuation route blockages	
							5. Eliminates school routes being blocked	
BNSF	Willmar - US TH 12 & MN 40; construct railroad track and grade using Wye tracks	High	Ready	$49.8M	$33.8M	N/A	1. Directly connects west with south, which will allow 7-10 trains per day to avoid traveling through downtown Willmar	BNSF's consultant is completing the final design steps and the railroad is acquiring the right of way.
							2. Reduces the train movements in the yards and at crossings	
							3. The bypass of downtown Willmar keeps oil trains out of the busy area	
							4. Reduces emissions	
							5. Eliminates crossing delays which increases safety at 8 downtown crossings	

Priority Grade Separation Recommendations

RR	Location	Risk Level	Project Readiness	Prelim. Cost Est.	Funding Shortfall	Potential Letting Date	Grade Separation Will:	Status
CP	Red Wing - Sturgeon Lake Rd at Prairie Island	High	Ready	$14.2M	$14.2M	N/A	1. High number of both trains and vehicles	The 60% design milestone has been achieved. The right of way process will begin soon.
							2. Enhance safety at the Treasure Island Casino	
							3. Because the nuclear power plant is next to the tracks, this will enhance safety for the community	
BNSF	Moorhead - Downtown, 11th Street	High	In Process	$40M	$40M	2019	1. Eliminate blockages due to switch moves in the train yards	Grade separation study completed.
							2. Allows emergency responders access any time and clears the route in case of an evacuation.	
BNSF	Coon Rapids - Hanson Blvd. NW, CSAH 78	High	In Process	$23.17M	$23.17M		1. Increases safety	Grade separation study completed.
BNSF	Anoka - TH 47, Ferry Street	High	No Study Completed	$20M	$20M		1. Remove the humped crossing (geometric complication)	No planning study completed.
							2. Decreases congestion between vehicles and trains	
							3. Stops the vehicle backups and queing	
							4. Eliminates the seasonal impacts	
BNSF	St. Paul - Como Avenue	High	No Study Completed	$25M	$25M		1. Improves safety -this is a key oil route and the crossings are within a very dense populated area	No planning study completed.

Priority Grade Separation Recommendations

RR	Location	Risk Level	Project Readiness	Prelim. Cost Est.	Funding Shortfall	Potential Letting Date	Grade Separation Will:	Status
CP	Winona - Louisa Street	High	No Study Completed	$12M	$12M		1. Because this route has high train volumes, is a major truck route and provides rail access to the southern river terminals, this would improve safety	No planning study completed.
BNSF	Coon Rapids - Foley Blvd. NW, CSAH 11	Medium	In Process				1. Increases safety	Grade separation study completed.
CP	Glenwood - TH 29, TH 55	Medium	In Process	$10M	$10M	2018 or 2019	1. Increases safety	The conceptual layout is done but the project is not programmed.
BNSF	Perham - 6th Avenue NW	Medium	No Study Completed	$10M	$10M		1. Increases safety	No planning study has been completed.
BNSF	Elk River - Proctor Avenue NW	Medium	No Study Completed	Unknown	Unknown		1. Increases safety	No planning study has been completed.
BNSF	Benson - TH 29, 14th Street S	Medium	No Study Completed	$10M	$10M		1. Increases safety	No planning study has been completed.
BNSF	Ramsey - Ramsey Blvd. NW, CSAH 56	Medium	No Study Completed	$11.5M	$11.5M		1. Increases safety	No planning study has been completed.
BNSF	Ramsey - Sunfish Lake Road NW, CSAH 57	Medium	No Study Completed	$10M	$10M		1. Increases safety	No planning study has been completed.

TOTAL FUNDING SHORTFALL	$243.67M

High Priority Crude by Rail Grade Crossing List

DOT #	Location	City	Operator	Corridor	Score	AADT	HCADT	Accident Prediction	Current Warning Device	Pop. Rank	Recommendation
067927M	14th St S	Benson	BNSF	Moorhead - Hills	30	7373	5.50%	0.02426	Cants & Gates	20	Long-Term Grade Seperation
062826J	NW 6th Ave	Perham	BNSF	Moorhead - Prescott	29	482	2.90%	0.08823	Gates	14	Long-Term Grade Seperation
081018G	Washington Ave	Detroit Lakes	BNSF	Moorhead - Prescott	28	4769	3.50%	0.09122	Gates, Medians	15	Adequate Safety
097668K	Broadway W	Little Falls	BNSF	Moorhead - Prescott	28	12607	7.30%	0.13097	Cants & Gates	13	Medium-Term 4 Quad Gates
082944R	Jackson St	Elk River	BNSF	Moorhead - Prescott	27	4155	9.50%	0.09184	Gates	11	4 Quad Gates, Interconnect ($2M)
062773M	1st St SE	Wadena	BNSF	Moorhead - Prescott	27	3995	5.50%	0.03286	Gates	13	Adequate/Improvable
391080X	5th St S	Winona	CP/SOO	Tenney - La Crescent	27	6204	2.60%	0.06472	Cants & Gates, Medians	12	Adequate Safety
067928U	13th St S	Benson	BNSF	Moorhead - Hills	27	416	No Data	0.00927	Cants & Gates	20	Adequate/Improvable
062779D	2nd St SW	Wadena	BNSF	Moorhead - Prescott	27	6586	7.30%	0.03409	Gates	14	Interconnect ($2M)
067834T	7th St SW	Willmar	BNSF	Moorhead - Hills	27	2004	1.90%	0.02414	Cants & Gates	15	Adequate Safety (Oil Traffic Diversion via Willmar WYE)
062949V	11th St S	Moorhead	BNSF	Moorhead - Prescott	26	3639	9.20%	0.04004	4 Quad Gates, Cants, Ped Gates	16	Medium-Term Grade Seperation
097617A	6th St N	Staples	BNSF	Moorhead - Prescott	26	2728	6.70%	0.03713	Cants & Gates, Medians	11	Adequate Safety
062822G	N 1st Ave	Perham	BNSF	Moorhead - Prescott	26	5299	No Data	0.0337	Gates	15	Interconnect ($2M), (Medium-Term 4 Quad Gates)
082992F	Como Ave	St Paul	BNSF	Moorhead - Prescott	26	4800	4.10%	0.03281	4 Quad Gates, Ped Gates	11	Long-Term Grade Seperation
067929B	12th St S	Benson	BNSF	Moorhead - Hills	26	416	No Data	0.00927	Cants & Gates	18	Adequate/Improvable

High Priority Crude by Rail Grade Crossing List

DOT #	Location	City	Operator	Corridor	Score	AADT	HCADT	Accident Prediction	Current Warning Device	Pop. Rank	Recommendation
062952D	8th St S	Moorhead	BNSF	Moorhead - Prescott	25	7629	10.70%	0.04991	4 Quad Gates, Cants, Ped Gates	14	Adequate Safety
689180F	Central Ave	Buffalo	CP/SOO	Tenney - La Crescent	25	11259	4.20%	0.02754	Cants & Gates	14	Adequate/Improvable
391055P	Mankato St	Winona	CP/SOO	Tenney - La Crescent	25	12699	No Data	0.08249	Cants & Gates, Medians	13	Adequate Safety
082946E	Proctor Ave	Elk River	BNSF	Moorhead - Prescott	24	13020	No Data	0.16484	Cants & Gates	8	Long-Term Grade Seperation
062775B	Jefferson St S	Wadena	BNSF	Moorhead - Prescott	24	5045	5.00%	0.04146	Gates	13	Medium-Term Interconnect
082943J	Main St	Elk River	BNSF	Moorhead - Prescott	23	10237	No Data	0.0443	Cants & Gates	11	4 Quad Gates, Interconnect ($2M), (Long-Term Grade Seperation)
067933R	W 5th St	Morris	BNSF	Moorhead - Hills	23	3094	2.50%	0.0488	Cants & Gates	10	Long-Term 4 Quad Gates
688954Y	Winnetka Ave	New Hope	CP/SOO	Tenney - La Crescent	23	9748	6.10%	0.12275	Cants & Gates	9	Long-Term 4 Quad Gates
070798D	5th St S	Moorhead	BNSF	Moorhead - Prescott	22	1707	2.30%	0.03559	4 Quad Gates, Ped Gates	13	Adequate Safety
696288G	5th St NE	Buffalo	CP/SOO	Tenney - La Crescent	22	8329	3.40%	0.02862	Gates, Medians, Ped Gates	12	Adequate Safety
067255J	10th St N	Sauk Rapids	BNSF	Moorhead - Prescott	22	750	No Data	0.05049	Gates, Medians	9	Adequate Safety
070799K	4th St S	Moorhead	BNSF	Moorhead - Prescott	22	1604	No Data	0.03078	4 Quad Gates, Ped Gates	13	Adequate Safety
082810S	Egret Blvd	Coon Rapids	BNSF	Moorhead - Prescott	21	6996	3.20%	0.08921	Cants & Gates, Medians	7	Adequate Safety
062847C	Lake St N	Frazee	BNSF	Moorhead - Prescott	21	1663	2.50%	0.03145	Gates	10	Adequate/Improvable
391204N	Broad St	Red Wing	CP/SOO	Tenney - La Crescent	21	890	91.70%	0.02975	4 Quad Gates	13	Adequate Safety

High Priority Crude by Rail Grade Crossing List

DOT #	Location	City	Operator	Corridor	Score	AADT	HCADT	Accident Prediction	Current Warning Device	Pop. Rank	Recommendation
391154M	Gambia Ave	Wabasha	CP/SOO	Tenney - La Crescent	21	770	No Data	0.04603	Gates	8	Adequate/Improvable
082517B	165th Ave SE	Big Lake	BNSF	Moorhead - Prescott	21	11231	No Data	0.08144	Gates	1	Interconnect ($2M)
391174Y	W Lyon Ave	Lake City	CP/SOO	Tenney - La Crescent	21	5510	5.30%	0.02419	Cants & Gates	10	Long-Term 4 Quad Gates
062796U	S Main Ave	New York Mills	BNSF	Moorhead - Prescott	21	2199	No Data	0.03454	Gates	8	Long-Term 4 Quad Gates
062923T	Main Ave	Moorhead	BNSF	Moorhead - Hills	21	7722	No Data	0.05831	Flashing Lights	6	Long-Term Grade Seperation
062849R	5th St W	Frazee	BNSF	Moorhead - Prescott	21	1123	No Data	0.02465	Gates	10	Long-Term Medians
097588S	W 6th St	Randall	BNSF	Moorhead - Prescott	20	729	No Data	0.05028	Gates	5	Adequate/Improvable
391075B	10th St	Winona	CP/SOO	Tenney - La Crescent	20	750	No Data	0.01573	Cants & Gates	10	Adequate/Improvable
391093Y	Bierce St	Winona	CP/SOO	Tenney - La Crescent	20	750	No Data	0.01573	Gates	11	Adequate/Improvable
391078W	S Baker St	Winona	CP/SOO	Tenney - La Crescent	20	1599	No Data	0.01885	Cants & Gates, Medians	10	Adequate Safety
391072F	Sioux St	Winona	CP/SOO	Tenney - La Crescent	20	1399	No Data	0.01827	Cants & Gates	9	Long-Term 4 Quad Gates
391216H	Sturgeon Lake Rd	Red Wing	CP/SOO	Tenney - La Crescent	20	12599	No Data	0.03467	Cants & Gates	6	Medium-Term Grade Seperation
067836G	10th St SW	Willmar	BNSF	Moorhead - Hills	20	2101	No Data	0.01782	Gates	11	Adequate Safety (Oil Traffic Diversion via Willmar WYE)
391052U	Louisa St	Winona	CP/SOO	Tenney - La Crescent	20	1949	No Data	0.05398	Cants & Gates, Medians	5	Long-Term Grade Seperation
067245D	15th Ave SE	St Cloud	BNSF	Moorhead - Prescott	19	8547	No Data	0.03346	Gates, Medians	8	Adequate Safety

High Priority Crude by Rail Grade Crossing List

DOT #	Location	City	Operator	Corridor	Score	AADT	HCADT	Accident Prediction	Current Warning Device	Pop. Rank	Recommendation
689257R	State St	Eden Valley	CP/SOO	Tenney - La Crescent	19	2341	3.20%	0.03202	Gates	5	Adequate/Improvable
391079D	6th St	Winona	CP/SOO	Tenney - La Crescent	19	5760	3.10%	0.02657	Cants & Gates	10	Adequate/Improvable
097916G	S Hiawatha Ave	Pipestone	BNSF	Moorhead - Hills	19	456	No Data	0.0097	Gates	10	Adequate/Improvable
062798H	S Walker Ave	New York Mills	BNSF	Moorhead - Prescott	19	416	No Data	0.01974	Gates	8	Adequate/Improvable
691738J	Hawkins Ave	Barrett	CP/SOO	Tenney - La Crescent	19	810	No Data	0.01104	Gates	8	Adequate/Improvable
082811Y	Hanson Blvd	Coon Rapids	BNSF	Moorhead - Prescott	19	28854	4.00%	0.05259	Cants & Gates, Medians	8	Long-Term Grade Seperation
689233C	Main St	Kimball	CP/SOO	Tenney - La Crescent	19	4512	13.70%	0.02335	Cants & Gates	8	Long-Term Medians
067934X	CSAH 22	Morris	BNSF	Moorhead - Hills	19	1755	No Data	0.01345	Cants & Gates	9	Long-Term Medians
391062A	Main St	Winona	CP/SOO	Tenney - La Crescent	19	4648	5.30%	0.02657	Cants & Gates	9	Medians ($2M)
067248Y	E Saint Germain St	St Cloud	BNSF	Moorhead - Prescott	19	10999	No Data	0.09299	Cants & Gates	6	Medians ($2M)
067709F	Trott Ave SW	Willmar	BNSF	Moorhead - Hills	18	2177	3.60%	0.02	Gates, Medians	8	Adequate Safety
688936B	Humboldt Ave	Minneapolis	CP/SOO	Tenney - La Crescent	18	2949	No Data	0.0199	Gates	7	Adequate/Improvable
062867N	4th St	Audubon	BNSF	Moorhead - Prescott	18	2344	No Data	0.02875	Gates	5	Adequate Safety
082543R	Lake St S	Big Lake	BNSF	Moorhead - Prescott	18	10227	No Data	0.08037	Cants & Gates, Medians	5	Adequate Safety
689212J	S Myrtle Dr	Annandale	CP/SOO	Tenney - La Crescent	18	416	No Data	0.02773	Stop Signs	6	Long -Term Closure

High Priority Crude by Rail Grade Crossing List

DOT #	Location	City	Operator	Corridor	Score	AADT	HCADT	Accident Prediction	Current Warning Device	Pop. Rank	Recommendation
689278J	Washburne Ave	Paynesville	CP/SOO	Tenney - La Crescent	18	416	No Data	0.01235	Gates	7	Adequate/Improvable
067931C	W 7th St	Morris	BNSF	Moorhead - Hills	18	1252	0.40%	0.01484	Gates	8	Long-Term 4 Quad Gates
688930K	Lyndale Ave N	Minneapolis	CP/SOO	Tenney - La Crescent	18	5667	No Data	0.06941	Cants & Gates	5	Long-Term 4 Quad Gates
082926T	Ferry St N	Anoka	BNSF	Moorhead - Prescott	18	16372	7.80%	0.0489	Cants & Gates, Medians	4	Long-Term Grade Seperation
062943E	Main St S	Dilworth	BNSF	Moorhead - Prescott	17	425	No Data	0.02096	Gates, Medians	8	Adequate Safety
082914Y	Crooked Lane Blvd NW	Coon Rapids	BNSF	Moorhead - Prescott	17	5999	No Data	0.08595	Cants & Gates, Medians	5	Adequate Safety
082803G	Osborne Rd NE	Fridley	BNSF	Moorhead - Prescott	17	6199	No Data	0.10122	Cants & Gates, Medians, Ped Gates	4	Adequate Safety
689197J	Birch Ave	Maple Lake	CP/SOO	Tenney - La Crescent	17	416	No Data	0.01235	Cants & Gates	7	Adequate/Improvable
688952K	Broadway Ave	Crystal	CP/SOO	Tenney - La Crescent	17	7999	No Data	0.04818	Cants & Gates	6	Adequate/Improvable
689118V	Vicksburg La	Plymouth	CP/SOO	Tenney - La Crescent	17	8449	No Data	0.09574	Gates	3	Adequate/Improvable
688953S	Douglas Dr	Crystal	CP/SOO	Tenney - La Crescent	17	9699	No Data	0.05068	Cants & Gates	5	Adequate/Improvable
097910R	E Main St	Pipestone	BNSF	Moorhead - Hills	17	2788	2.00%	0.01637	Cants & Gates	7	Long-Term 4 Quad Gates E/W, Long-Term Gates & Medians N/S
062760L	S Brown St	Verndale	BNSF	Moorhead - Prescott	17	1309	No Data	0.02817	Cants & Gates	5	Long-Term Medians
062920X	Parke Ave S	Glyndon	BNSF	Moorhead - Prescott	17	1855	No Data	0.0274	Gates	6	Long-Term Medians
689196C	Oak Ave	Maple Lake	CP/SOO	Tenney - La Crescent	17	2255	No Data	0.01869	Gates	7	Long-Term Medians

High Priority Crude by Rail Grade Crossing List

DOT #	Location	City	Operator	Corridor	Score	AADT	HCADT	Accident Prediction	Current Warning Device	Pop. Rank	Recommendation
N/A	TH 12	Willmar	BNSF	Moorhead - Hills	17	12000	No Data	0.03	N/A	4	Willmar WYE - Grade Seperation (B)
082807J	Foley Blvd	Coon Rapids	BNSF	Moorhead - Prescott	17	4799	No Data	0.04424	Cants & Gates, Medians	3	Long-Term Grade Seperation
061138T	Hastings Ave	St Paul Park	BNSF	Moorhead - Prescott	16	2926	29.50%	0.0208	Flashing Lights	2	Closure ($2M)
097834A	Hancock St	Becker	BNSF	Moorhead - Prescott	16	416	No Data	0.01544	Gates	6	Adequate/Improvable
062909X	Partridge Ave	Glyndon	BNSF	Moorhead - Prescott	16	416	No Data	0.01974	Gates	6	Adequate/Improvable
689211C	S Poplar La	Annandale	CP/SOO	Tenney - La Crescent	16	416	No Data	0.01514	Gates	6	Adequate/Improvable
391206C	Jackson St	Red Wing	CP/SOO	Tenney - La Crescent	16	799	No Data	0.02321	Cants & Gates	9	Adequate/Improvable
691749W	Central Ave	Elbow Lake	CP/SOO	Tenney - La Crescent	16	1991	No Data	0.01388	Gates	6	Adequate/Improvable
689244P	Central Ave N	Watkins	CP/SOO	Tenney - La Crescent	16	2149	No Data	0.01848	Cants & Gates	6	Long-Term 4 Quad Gates
067230N	Center St	Clear Lake	BNSF	Moorhead - Prescott	16	11021	No Data	0.03507	Cants & Gates	3	Medians ($2M)
067282F	W Main St	Marshall	BNSF	Moorhead - Hills	15	9618	6.40%	0.02554	Cants & Gates, Medians	7	Adequate Safety
082978K	Talmadge Ave SE	Minneapolis	BNSF	Moorhead - Prescott	15	186	2.70%	0.02377	Gates, Medians	4	Adequate Safety
067283M	Legion Field Rd	Marshall	BNSF	Moorhead - Hills	15	674	No Data	0.01074	Gates	9	Adequate/Improvable
688956M	Boone Ave	New Hope	CP/SOO	Tenney - La Crescent	15	5834	No Data	0.03417	Cants & Gates, Medians	6	Adequate Safety
097911X	3rd St SE	Pipestone	BNSF	Moorhead - Hills	14	416	No Data	0.00947	Gates	7	Adequate/Improvable

High Priority Crude by Rail Grade Crossing List

DOT #	Location	City	Operator	Corridor	Score	AADT	HCADT	Accident Prediction	Current Warning Device	Pop. Rank	Recommendation
097913L	5th St SE	Pipestone	BNSF	Moorhead - Hills	14	416	No Data	0.00947	Gates	7	Adequate/Improvable
082932W	Armstrong Blvd NW	Ramsey	BNSF	Moorhead - Prescott	14	6599	No Data	0.04133	Gates	1	Adequate/Improvable
082930H	Ramsey Blvd	Ramsey	BNSF	Moorhead - Prescott	14	6999	No Data	0.04826	Cants & Gates, Medians	4	Long-Term Grade Seperation
689133X	Medina St	Loretto	CP/SOO	Tenney - La Crescent	14	6999	No Data	0.02415	Gates, Medians	4	Adequate Safety
062758K	Farwell St	Verndale	BNSF	Moorhead - Prescott	14	1207	No Data	0.0277	Cants & Gates	5	Long-Term Medians
N/A	MNTH 40	Willmar	BNSF	Moorhead - Hills	14	5000	No Data	0.03	N/A	1	Willmar WYE - Grade Seperation (A)
067449P	MN 55	Nashua	BNSF	Moorhead - Hills	13	991	No Data	0.1213	Flashing Lights	1	Adequate/Improvable
082928G	Sunfish Lake Blvd NW	Ramsey	BNSF	Moorhead - Prescott	13	9099	No Data	0.05004	Cants & Gates, Medians	2	Long-Term Grade Seperation
391066C	Huff St	Winona	CP/SOO	Tenney - La Crescent	13	11499	No Data	0.02902	Cants & Gates, Medians	7	Adequate Safety
103817B	30th Ave S	Moorhead	BNSF	Moorhead - Hills	13	6719	No Data	0.02178	Gates	4	Long-Term Grade Seperation
061089Y	30th St NW	Willmar	BNSF	Moorhead - Hills	13	7707	No Data	0.02657	Cants & Gates	2	Adequate Safety (Oil Traffic Diversion via Willmar WYE)
689355G	MNTH 29	Glenwood	CP/SOO	Tenney - La Crescent	11	6699	No Data	0.07314	Cants & Gates, Median	1	Grade Separation

TOTALS 4 / 6 / 8

GRAND TOTAL 18

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 082926T

Railroad BNSF

Milepost 27.52

Location Ferry St, Anoka

AADT 20,159

HCADT _____

Oil Trains/Day 6

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	(1)
500-1,500	2
1,500-3,000	3
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	4
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	(3)
4	4
5	5

Emergency Services (Police Department, Fire station)

1	1
2	2
3	3
4	4
5	5

Total 4

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	3
0.030	(4)
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 0

Near Misses - reported near misses by railroad; add 1 point each 2

Total 6

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	5
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	(7)

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 1

Local designation as safety concern (county, city engineer call-out); add 2 points each 0

Total (8)

TOTALS 20 / 3 / 7

GRAND TOTAL 30

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 067927M

Railroad BNSF

Milepost 132.7

Location 14th St S, Benson

AADT 8,199

HCADT _____

Oil Trains/Day 1

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	4
3	6
4	8
5	(10)

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	3
4	(4)
5	5

Emergency Services (Police Department, Fire station)

1	1
2	2
3	(3)
4	4
5	5

Total 20

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	(3)
0.030	4
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 0

Near Misses - reported near misses by railroad; add 1 point each 0

Total 3

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	(5)
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 2

Local designation as safety concern (county, city engineer call-out); add 2 points each ____

Total 7

TOTALS 14 / 3 / 8

GRAND TOTAL 25

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 689 180 F
Railroad CP
Milepost 36.94
Location Central Ave, Buffalo

AADT 13,007
HCADT _____
Oil Trains/Day 1

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	(4)
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	3
4	4
5	(5)

Emergency Services (Police Department, Fire station)

1	1
2	(2)
3	3
4	4
5	5

Total 14

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	(3)
0.030	4
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 0
Near Misses - reported near misses by railroad; add 1 point each 0

Total 3

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	(5)
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each ~~8~~ 3
Local designation as safety concern (county, city engineer call-out); add 2 points each ____

Total 8

TOTALS 12 / 3 / 7

GRAND TOTAL 22

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO696288G

Railroad CP

Milepost 36.4

Location 5th St NE, Buffalo

AADT 5983

HCADT _____

Oil Trains/Day 1

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	(2)
2	4
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	3
4	4
5	(5)

Emergency Services (Police Department, Fire station)

1	1
2	(2)
3	3
4	4
5	5

Total 12

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	(3)
0.030	4
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 0

Near Misses - reported near misses by railroad; add 1 point each 0

Total 3

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	(4)
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	5
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 3

Local designation as safety concern (county, city engineer call-out); add 2 points each ____

Total 7

TOTALS 7 / 7 / 7

GRAND TOTAL 21

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 682816S

Railroad BNSF

Milepost 21.84

Location Egret Blvd, Coon Rapids

AADT 7893

HCADT _____

Oil Trains/Day 6

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	4
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	(2)
3	3
4	4
5	5

Emergency Services (Police Department, Fire station)

1	1
2	(2)
3	3
4	4
5	5

Total 7

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	3
0.030	4
0.050	(5)

Safety Record – Recorded crashes in last 5 years; add 2 points each 2

Near Misses - reported near misses by railroad; add 1 point each 0

Total 7

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	(4)
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	5
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 3

Local designation as safety concern (county, city engineer call-out); add 2 points each 0

Total 7

TOTALS 8 / 5 / 6

GRAND TOTAL 19

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 082811Y

Railroad BNSF

Milepost 22.82

Location Hanson Blvd, Coon Rapids

AADT 13249

HCADT _____

Oil Trains/Day 6

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(4)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	(2)
2	4
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	(3)
4	4
5	5

Emergency Services (Police Department, Fire station)

1	1
2	2
3	3
4	4
5	5

Total 8

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	3
0.030	4
0.050	(5)

Safety Record – Recorded crashes in last 5 years; add 2 points each 0

Near Misses - reported near misses by railroad; add 1 point each 0

Total 5

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	(4)
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	5
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 2

Local designation as safety concern (county, city engineer call-out); add 2 points each 0

Total 6

TOTALS 15 / 7 / 6

GRAND TOTAL 28

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 381018G

Railroad BNSF

Milepost 210.02

Location Washington Ave, Detroit Lakes

AADT 5666

HCADT _____

Oil Trains/Day 6

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	(4)
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	3
4	4
6 5	(5)

Emergency Services (Police Department, Fire station)

1	1
2	2
3	(3)
4	4
5	5

Total 15

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	3
0.030	4
0.050	(5)

Safety Record – Recorded crashes in last 5 years; add 2 points each 2

Near Misses - reported near misses by railroad; add 1 point each 0

Total 7

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	(4)
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	5
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 2

Local designation as safety concern (county, city engineer call-out); add 2 points each 0

Total 16

TOTALS 5 / 6 / 8

GRAND TOTAL 19

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 689257R

Railroad CP

Milepost 73.21

Location State st, Eden Valley

AADT 3049

HCADT _____

Oil Trains/Day 1

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	(2)
1,500-3,000	3
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	4
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	(1)
2	2
3	3
4	4
5	5

Emergency Services (Police Department, Fire station)

1	1
2	(2)
3	3
4	4
5	5

Total 5

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	3
0.030	(4)
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 2

Near Misses - reported near misses by railroad; add 1 point each 0

Total 6

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	(5)
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 3

Local designation as safety concern (county, city engineer call-out); add 2 points each ____

Total 8

TOTALS 11 / 9 / 7

GRAND TOTAL 27

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 082944R

Railroad BNSF

Milepost 38.67

Location Jackson st, Elk River

AADT 16062

HCADT _____

Oil Trains/Day 6

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	(2)
2	4
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	3
4	4
5	(5)

Emergency Services (Police Department, Fire station)

1	(1)
2	2
3	3
4	4
5	5

Total 11

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	3
0.030	4
0.050	(5)

Safety Record – Recorded crashes in last 5 years; add 2 points each 2

Near Misses - reported near misses by railroad; add 1 point each 2

Total 9

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	(5)
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 2

Local designation as safety concern (county, city engineer call-out); add 2 points each 0

Total 7

TOTALS 11 / 5 / 7

GRAND TOTAL 23

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 082943J

Railroad BNSF

Milepost 38.46

Location main st, Elk River

AADT 10237

HCADT _____

Oil Trains/Day 6

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	(2)
2	4
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	3
4	4
5	(5)

Emergency Services (Police Department, Fire station)

1	(1)
2	2
3	3
4	4
5	5

Total 11

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	3
0.030	(4)
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 0

Near Misses - reported near misses by railroad; add 1 point each 1

Total 5

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	(5)
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 2

Local designation as safety concern (county, city engineer call-out); add 2 points each 0

Total 7

TOTALS 8 / 9 / 7

GRAND TOTAL 24

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 082946E

Railroad BNSF

Milepost 39.31

Location Proctor Ave, Elk River

AADT 13020

HCADT _____

Oil Trains/Day 6

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	4
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	3
4	4
5	(5)

Emergency Services (Police Department, Fire station)

1	1
2	2
3	3
4	4
5	5

Total 8

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	3
0.030	4
0.050	(5)

Safety Record – Recorded crashes in last 5 years; add 2 points each 4

Near Misses - reported near misses by railroad; add 1 point each 0

Total 9

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	(5)
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 2

Local designation as safety concern (county, city engineer call-out); add 2 points each ____

Total 7

TOTALS 10 / 4 / 7

GRAND TOTAL 21

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 062947C

Railroad BNSF

Milepost 200.39

Location Lake St N, Frazee

AADT 3684

HCADT _____

Oil Trains/Day 6

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	(2)
1,500-3,000	3
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	(4)
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	(2)
3	3
4	4
5	5

Emergency Services (Police Department, Fire station)

1	1
2	(2)
3	3
4	4
5	5

Total 10

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	3
0.030	(4)
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 0

Near Misses - reported near misses by railroad; add 1 point each 0

Total 4

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	(5)
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 2

Local designation as safety concern (county, city engineer call-out); add 2 points each ____

Total 7

TOTALS 8 / 3 / 8

GRAND TOTAL 19

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 684273C

Railroad CP

Milepost 60.91

Location Main St, Kimball

AADT 5999

HCADT _____

Oil Trains/Day 1

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	(2)
1,500-3,000	3
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	(2)
2	4
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	(2)
3	3
4	4
5	5

Emergency Services (Police Department, Fire station)

1	1
2	(2)
3	3
4	4
5	5

Total 8

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	(3)
0.030	4
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 0

Near Misses - reported near misses by railroad; add 1 point each 0

Total 3

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	(5)
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 3

Local designation as safety concern (county, city engineer call-out); add 2 points each ____

Total 8

TOTALS 10 / 3 / 8

GRAND TOTAL 21

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 341174 Y
Railroad CP
Milepost 353.73
Location W Lyon Ave, Lake City

AADT 5510
HCADT _____
Oil Trains/Day 1

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	(2)
2	4
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	(3)
4	4
5	5

Emergency Services (Police Department, Fire station)

1	1
2	(2)
3	3
4	4
5	5

Total 10

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	(3)
0.030	4
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 0
Near Misses - reported near misses by railroad; add 1 point each 0

Total 3

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	(5)
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 3
Local designation as safety concern (county, city engineer call-out); add 2 points each 0

Total 8

TOTALS 13 / 7 / 8

GRAND TOTAL 28

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 097668K

Railroad BNSF

Milepost 105.97

Location Broadway W, Little Falls

AADT 13499

HCADT _____

Oil Trains/Day 6

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	(4)
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	(2)
3	3
4	4
5	5

Emergency Services (Police Department, Fire station)

1	1
2	2
3	3
4	(4)
5	5

Total 13

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	3
0.030	4
0.050	(5)

.063

Safety Record – Recorded crashes in last 5 years; add 2 points each 2

Near Misses - reported near misses by railroad; add 1 point each 0

Total 7

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	(5)
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 3

Local designation as safety concern (county, city engineer call-out); add 2 points each ____

Total 8

TOTALS 7 / 3 / 5

GRAND TOTAL 15

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 067282F

Railroad BNSF

Milepost 62.63

Location W main st, Marshall

AADT 9618

HCADT _____

Oil Trains/Day 1

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	(2)
2	4
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	(1)
2	2
3	3
4	4
5	5

Emergency Services (Police Department, Fire station)

1	(1)
2	2
3	3
4	4
5	5

Total 7

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	(3)
0.030	4
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 0

Near Misses - reported near misses by railroad; add 1 point each 0

Total 3

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	(3)
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	5
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 2

Local designation as safety concern (county, city engineer call-out); add 2 points each 0

Total 5

TOTALS 7 / 3 / 8

GRAND TOTAL 18

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 688936B

Railroad CP

Milepost 3.94

Location Humboldt Ave N, Minneapolis

AADT 2949

HCADT _____

Oil Trains/Day 1

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	3
3,000-5,000	(4)
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	4
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	(2)
3	3
4	4
5	5

Emergency Services (Police Department, Fire station)

1	(1)
2	2
3	3
4	4
5	5

Total 7

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	(3)
0.030	4
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 0

Near Misses - reported near misses by railroad; add 1 point each 0

Total 3

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	(5)
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 3

Local designation as safety concern (county, city engineer call-out); add 2 points each 0

Total 8

TOTALS 4 / 3 / 8

GRAND TOTAL 15

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 082978K

Railroad BNSF

Milepost 9.0

Location Talmage Ave SE, Minneapolis

AADT 899

HCADT _____

Oil Trains/Day 6

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	4
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	(1)
2	2
3	3
4	4
5	5

Emergency Services (Police Department, Fire station)

1	1
2	2
3	3
4	4
5	5

Total 4

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	(3)
0.030	4
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 0

Near Misses - reported near misses by railroad; add 1 point each 0

Total 3

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	5
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	(7)

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 1

Local designation as safety concern (county, city engineer call-out); add 2 points each 0

Total 8

TOTALS 13 / 4 / 5

GRAND TOTAL 22

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 070798 D
Railroad BNSF
Milepost 6.83
Location 5th St S, Moorhead

AADT 34164
HCADT _____
Oil Trains/Day 6

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	4
3	(6)
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	3
4	(4)
5	5

Emergency Services (Police Department, Fire station)

1	1
2	2
3	3
4	4
5	5

Total 13

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	3
0.030	(4)
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 0
Near Misses - reported near misses by railroad; add 1 point each 0

Total 4

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	(4)
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	5
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 1
Local designation as safety concern (county, city engineer call-out); add 2 points each 0

Total 5

TOTALS 14 / 5 / 6

GRAND TOTAL 25

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO662952D

Railroad BNSF

Milepost 6.62

Location 8th st S, Moorhead

AADT 11,199

HCADT _____

Oil Trains/Day 6

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	4
3	(6)
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	3
4	(4)
5	5

Emergency Services (Police Department, Fire station)

1	(1)
2	2
3	3
4	4
5	5

Total 14

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	3
0.030	4
0.050	(5)

Safety Record – Recorded crashes in last 5 years; add 2 points each 0

Near Misses - reported near misses by railroad; add 1 point each 0

Total 5

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	(4)
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	5
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 2

Local designation as safety concern (county, city engineer call-out); add 2 points each ____

Total 6

TOTALS 16 / 4 / 6

GRAND TOTAL 26

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 062949V

Railroad BNSF

Milepost 6.37

Location 11th St S, moorhead

AADT 4211

HCADT _____

Oil Trains/Day 6

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	4
3	(6)
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	3
4	4
5	(5)

Emergency Services (Police Department, Fire station)

1	1
2	(2)
3	3
4	4
5	5

Total 16

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	3
0.030	(4)
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 0

Near Misses - reported near misses by railroad; add 1 point each 0

Total 4

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	(4)
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	5
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 2

Local designation as safety concern (county, city engineer call-out); add 2 points each 0

Total 6

TOTALS 8 / 3 / 7

GRAND TOTAL 18

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 067931C

Railroad BNSF

Milepost 157.29

Location W 7th St, Morris

AADT 2607

HCADT _____

Oil Trains/Day 1

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	4
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	(3)
4	4
5	5

Emergency Services (Police Department, Fire station)

1	1
2	(2)
3	3
4	4
5	5

Total 8

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	(3)
0.030	4
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 0

Near Misses - reported near misses by railroad; add 1 point each 0

Total 3

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	(5)
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 2

Local designation as safety concern (county, city engineer call-out); add 2 points each 0

Total 7

TOTALS 10 / 6 / 7

GRAND TOTAL 23

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 047933R

Railroad BNSF

Milepost 157.15

Location W 5th St, Morris

AADT 4399

HCADT _____

Oil Trains/Day 1

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	(2)
2	4
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	(3)
4	4
5	5

Emergency Services (Police Department, Fire station)

1	1
2	(2)
3	3
4	4
5	5

Total 10

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	3
0.030	(4)
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 2

Near Misses - reported near misses by railroad; add 1 point each ____

Total 6

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	(5)
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 2

Local designation as safety concern (county, city engineer call-out); add 2 points each ____

Total 7

TOTALS 9 / 7 / 7

GRAND TOTAL 23

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 688954 Y

Railroad CP

Milepost 8.1

Location Winnetka Ave, New Hope

AADT 10,399

HCADT _____

Oil Trains/Day 1

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	(2)
2	4
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	3
4	(4)
5	5

Emergency Services (Police Department, Fire station)

1	1
2	2
3	3
4	4
5	5

Total 9

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	3
0.030	4
0.050	(5)

Safety Record – Recorded crashes in last 5 years; add 2 points each 2

Near Misses - reported near misses by railroad; add 1 point each 0

Total 7

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	(5)
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 2

Local designation as safety concern (county, city engineer call-out); add 2 points each 0

Total 7

TOTALS 15 / 4 / 7

GRAND TOTAL 26

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 062822G
Railroad BNSF
Milepost 189.16
Location 1st Ave, Perham

AADT 5299
HCADT _____
Oil Trains/Day 6

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	(4)
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	3
4	4
5	(5)

Emergency Services (Police Department, Fire station)

1	1
2	2
3	(3)
4	4
5	5

Total 15

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	3
0.030	(4)
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 0
Near Misses - reported near misses by railroad; add 1 point each 0

Total 4

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	(5)
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 2
Local designation as safety concern (county, city engineer call-out); add 2 points each 0

Total 7

TOTALS 11 / 11 / 7

GRAND TOTAL 29

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 062826J

Railroad BNSF

Milepost 189.52

Location NW 6th Ave, Perham

AADT 482

HCADT _____

Oil Trains/Day 6

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	(2)
1,500-3,000	3
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	(4)
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	3
4	(4)
5	5

Emergency Services (Police Department, Fire station)

1	(1)
2	2
3	3
4	4
5	5

Total 11

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	3
0.030	4
0.050	(5)

Safety Record – Recorded crashes in last 5 years; add 2 points each 4

Near Misses - reported near misses by railroad; add 1 point each 2

Total 11

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	(5)
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 2

Local designation as safety concern (county, city engineer call-out); add 2 points each 0

Total 7

TOTALS 7 / 3 / 7

GRAND TOTAL 17

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 097910R

Railroad BNSF

Milepost 104.58

Location E Main st, Pipestone

AADT 3597

HCADT _____

Oil Trains/Day 1

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	(2)
1,500-3,000	3
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	(2)
2	4
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	(1)
2	2
3	3
4	4
5	5

Emergency Services (Police Department, Fire station)

1	1
2	(2)
3	3
4	4
5	5

Total 7

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	(3)
0.030	4
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 0

Near Misses - reported near misses by railroad; add 1 point each 0

Total 3

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	5
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	(6)
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 1

Local designation as safety concern (county, city engineer call-out); add 2 points each 0

Total 7

TOTALS 13 / 3 / 5

GRAND TOTAL 21

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 391204N

Railroad CR

Milepost 370.64

Location Broad St, Red Wing

AADT 2749

HCADT _____

Oil Trains/Day 1

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	(4)
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	(3)
4	4
5	5

Emergency Services (Police Department, Fire station)

1	1
2	2
3	(3)
4	4
5	5

Total 13

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	(3)
0.030	4
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 0

Near Misses - reported near misses by railroad; add 1 point each 0

Total 3

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	(4)
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	5
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 1

Local designation as safety concern (county, city engineer call-out); add 2 points each 0

Total 5

TOTALS 8 / 5 / 6

GRAND TOTAL 19

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 067 2450 D

Railroad BNSF

Milepost 72.7

Location 15th Ave SE, St. Cloud

AADT 8,547

HCADT _____

Oil Trains/Day 6

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	(2)
1,500-3,000	3
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	(4)
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	(1)
2	2
3	3
4	4
5	5

Emergency Services (Police Department, Fire station)

1	(1)
2	2
3	3
4	4
5	5

Total 8

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	3
0.030	(4)
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 0

Near Misses - reported near misses by railroad; add 1 point each 1

Total 5

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	(4)
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	5
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 2

Local designation as safety concern (county, city engineer call-out); add 2 points each 0

Total 6

TOTALS 11 / 7 / 8

GRAND TOTAL 26

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 082492F

Railroad BNSF

Milepost 4.76

Location W Como Ave, St Paul

AADT 4,351

HCADT _____

Oil Trains/Day 6

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	3
3,000-5,000	(4)
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	(2)
2	4
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	(3)
4	4
5	5

Emergency Services (Police Department, Fire station)

1	1
2	2
3	3
4	4
5	5

Total 11

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	3
0.030	(4)
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 2

Near Misses - reported near misses by railroad; add 1 point each 1

Total 7

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	5
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	(7)

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 1

Local designation as safety concern (county, city engineer call-out); add 2 points each 0

Total 8

TOTALS 2 / 5 / 9

GRAND TOTAL 16

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 041138T

Railroad BNSF

Milepost 421.6

Location Hastings Ave, St. Paul Park

AADT 6741

HCADT _____

Oil Trains/Day 6

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	(1)
500-1,500	2
1,500-3,000	3
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	4
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	3
4	4
5	5

Emergency Services (Police Department, Fire station)

1	(1)
2	2
3	3
4	4
5	5

Total 2

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	(3)
0.030	4
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 0

Near Misses - reported near misses by railroad; add 1 point each 2

Total 5

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	(5)
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	(6)
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 3

Local designation as safety concern (county, city engineer call-out); add 2 points each 0

Total 9

TOTALS 11 / 6 / 9

GRAND TOTAL 26

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 697617A

Railroad BNSF

Milepost 147.89

Location 6th St N, Staples

AADT 5,577

HCADT _____

Oil Trains/Day 6

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	4
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	3
4	4
(5)	(5)

Emergency Services (Police Department, Fire station)

1	1
2	2
3	(3)
4	4
5	5

Total 11

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	3
0.030	(4)
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 0

Near Misses - reported near misses by railroad; add 1 point each 2

Total 6

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	(4)
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	5
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 3

Local designation as safety concern (county, city engineer call-out); add 2 points each 2

Total 9

TOTALS 13 / 7 / 7

GRAND TOTAL 27

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 062773M
Railroad BNSF
Milepost 145.49
Location 1st St SE, Wadena

AADT 4,631
HCADT _____
Oil Trains/Day 6

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	(4)
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	(3)
4	4
5	5

Emergency Services (Police Department, Fire station)

1	1
2	2
3	(3)
4	4
5	5

Total 13

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	3
0.030	(4)
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 0
Near Misses - reported near misses by railroad; add 1 point each 3

Total 7

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	(5)
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 2
Local designation as safety concern (county, city engineer call-out); add 2 points each _____

Total 7

TOTALS 13 / 4 / 7

GRAND TOTAL 24

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 062775B

Railroad BNSF

Milepost 165.56

Location Jefferson st S, Wadena

AADT 10,723

HCADT _____

Oil Trains/Day 6

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	(4)
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	(3)
4	4
5	5

Emergency Services (Police Department, Fire station)

1	1
2	2
3	(3)
4	4
5	5

Total 13

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	3
0.030	(4)
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 0

Near Misses - reported near misses by railroad; add 1 point each 0

Total 4

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	(5)
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 2

Local designation as safety concern (county, city engineer call-out); add 2 points each 0

Total 7

TOTALS 14 / 6 / 7

GRAND TOTAL 27

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 062779D

Railroad BNSF

Milepost 165.71

Location 2nd St SW, Wadena

AADT 5638

HCADT _____

Oil Trains/Day 6

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	(4)
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	3
4	(4)
5	5

Emergency Services (Police Department, Fire station)

1	1
2	2
3	(3)
4	4
5	5

Total 14

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	3
0.030	(4)
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 0

Near Misses - reported near misses by railroad; add 1 point each 2

Total 6

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	(5)
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 2

Local designation as safety concern (county, city engineer call-out); add 2 points each 0

Total 7

TOTALS 15 / 4 / 8

GRAND TOTAL 27

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 067834T
Railroad BNSF
Milepost 102.54
Location 7th St SW, Willmar

AADT 2852
HCADT _____
Oil Trains/Day ~~0~~ 1

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	4
3	6
4	(8)
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	(3)
4	4
5	5

Emergency Services (Police Department, Fire station)

1	(1)
2	2
3	3
4	4
5	5

Total 15

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	(3)
0.030	4
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 0
Near Misses - reported near misses by railroad; add 1 point each 1

Total 4

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	5
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	(5)
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 2
Local designation as safety concern (county, city engineer call-out); add 2 points each 0

Total 8

TOTALS 8 / 3 / 7

GRAND TOTAL 18

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 772096

Railroad BNSF

Milepost 46

Location Trott Ave SW, Willmar

AADT 2351

HCADT _____

Oil Trains/Day 1

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	(2)
1,500-3,000	3
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	4
3	(6)
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	3
4	4
5	5

Emergency Services (Police Department, Fire station)

1	1
2	2
3	3
4	4
5	5

Total 8

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	(3)
0.030	4
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 0

Near Misses - reported near misses by railroad; add 1 point each 0

Total 3

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	(5)
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 2

Local designation as safety concern (county, city engineer call-out); add 2 points each 0

Total 7

TOTALS 12 / 7 / 8

GRAND TOTAL 27

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 391080X
Railroad CP
Milepost 309.65
Location 5th St, Winona

AADT 6349
HCADT _____
Oil Trains/Day 1

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	(2)
2	4
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	3
4	4
6 5	(5)

Emergency Services (Police Department, Fire station)

1	1
2	(2)
3	3
4	4
5	5

Total 12

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	3
0.030	4
0.050	(5)

Safety Record – Recorded crashes in last 5 years; add 2 points each 2
Near Misses - reported near misses by railroad; add 1 point each 0

Total 7

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	5
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	(6)
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 2
Local designation as safety concern (county, city engineer call-out); add 2 points each 0

Total 8

TOTALS 9 / 3 / 7

GRAND TOTAL 19

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 341042A

Railroad CP

Milepost 308.34

Location main St, Winona

AADT 7499

HCADT _____

Oil Trains/Day 1

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	(2)
2	4
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	3
4	(4)
5	5

Emergency Services (Police Department, Fire station)

1	1
2	2
3	3
4	4
5	5

Total 9

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	(3)
0.030	4
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 0

Near Misses - reported near misses by railroad; add 1 point each 0

Total 3

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	(5)
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 2

Local designation as safety concern (county, city engineer call-out); add 2 points each ____

Total 7

TOTALS 10 / 3 / 6

GRAND TOTAL 19

Crude Oil by Rail Study
Railroad – Highway Grade Crossings Analysis

Location

USDOTNO 391079D

Railroad CP

Milepost 309.55

Location 6th St, Winona

AADT 7499

HCADT _____

Oil Trains/Day 1

Criteria

A. Population Density (area within ½ mile/800 yard radius of crossing)

General Population Density (Per Sq. Mi.)

<500	1
500-1,500	2
1,500-3,000	(3)
3,000-5,000	4
>5,000	5

Vulnerable fixed population (hospital, nursing home, prison)

1	2
2	4
3	6
4	8
5	10

Vulnerable temporary population (schools, city halls)

1	1
2	2
3	3
4	4
5	(5)

Emergency Services (Police Department, Fire station)

1	1
2	(2)
3	3
4	4
5	5

Total 10

B. Safety (Safety Index – Per USDOT Crash Prediction Model)

0.005	1
0.008	2
0.010	(3)
0.030	4
0.050	5

Safety Record – Recorded crashes in last 5 years; add 2 points each 0

Near Misses - reported near misses by railroad; add 1 point each 0

Total 3

C. Conditions at Crossing (appropriate signal applications & safety-related conditions)

Appropriate safety application for condition (passive signals for low ADT, etc.)	1
Poor physical condition (poor geometry, surface, line of sight)	2
Very poor physical condition (inadequate geometry, stacking distance, line of sight)	3
Multiple crossings (two or more active tracks, especially main line, high speed	4
Inadequate protection for vehicular traffic (allows drive-arounds, turn onto tracks, etc.)	(5)
Inappropriate safety application for traffic (passive needs active, 2 quad to 4 quad)	6
Grade separation needed (high speed, 20+ daily trains, high ADT or EMS access)	7

Special Highway Status (school bus route, evacuation, emergency access, designated truck route); add 1 point each 1

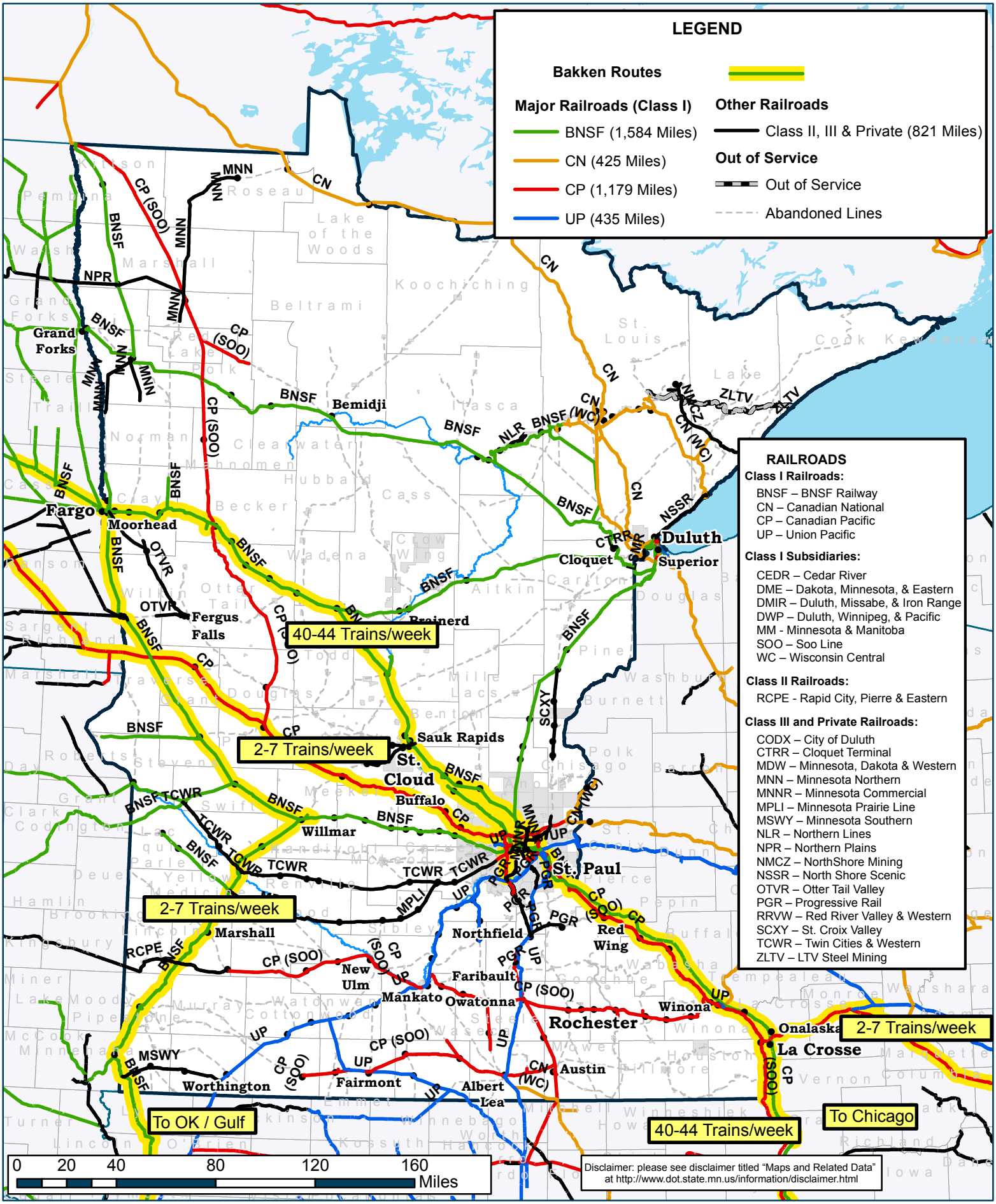
Local designation as safety concern (county, city engineer call-out); add 2 points each 0

Total 6

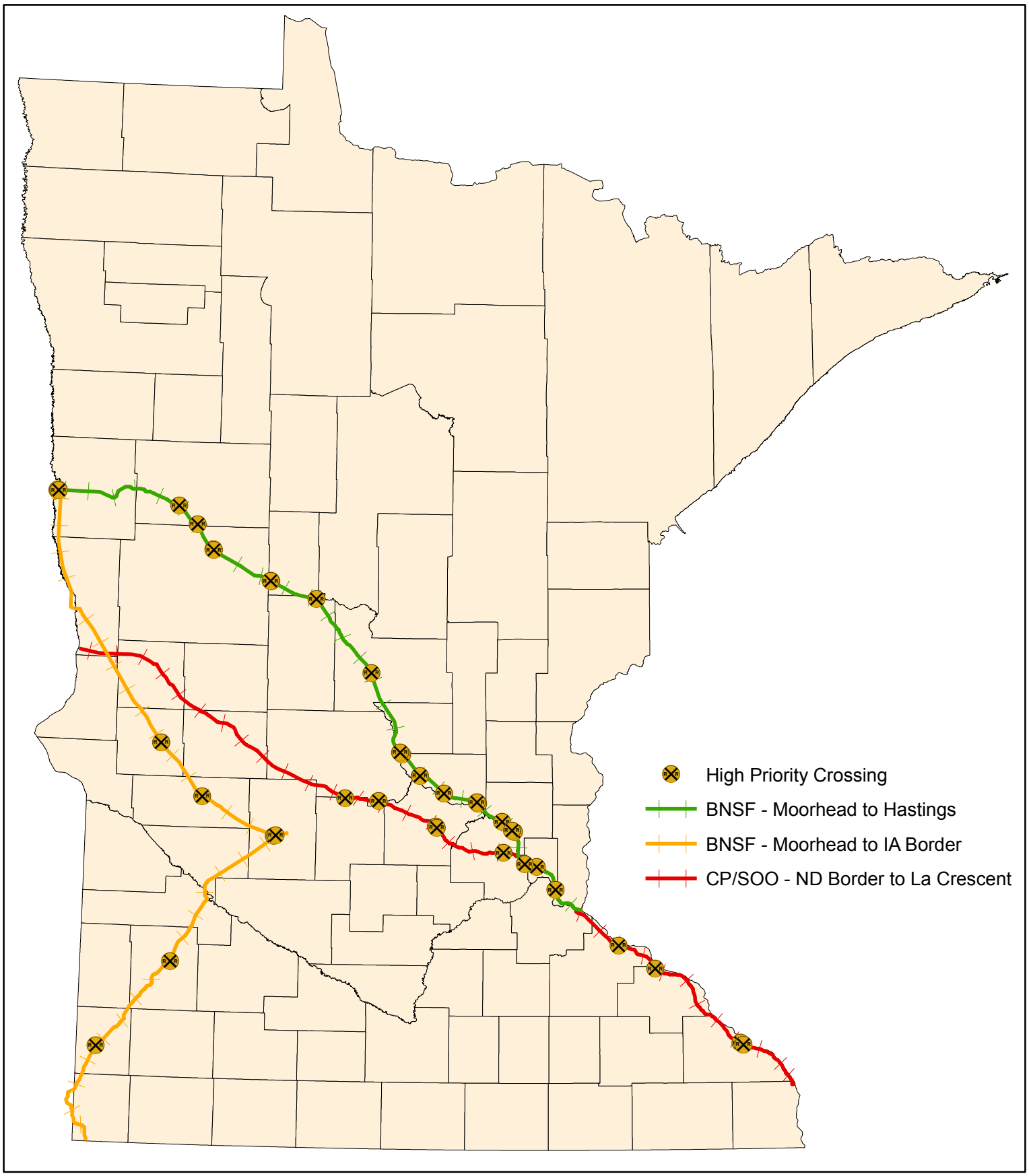
MINNESOTA FREIGHT RAILROAD MAP

Bakken Oil Routes

Office of Freight and Commercial Vehicle Operations, August 2014

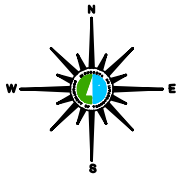


Minnesota Rail Oil Corridors and Recommended Project Crossings



0 50 100 150 200 Miles

BNSF Rail Oil Corridor: Moorhead to Hastings



Rail Crossing

BNSF Rail Route

Interstate

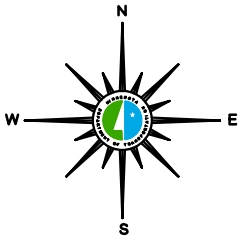
Major River

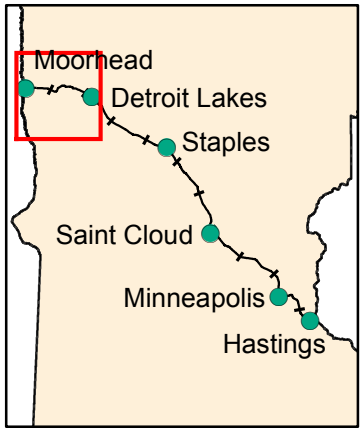
0 25 50 100 Miles

Moorhead
Detroit Lakes
Staples
Saint Cloud
Minneapolis
Saint Paul
Hastings
Red River
Mississippi River
Minnesota River
94
35
35

Disclaimer: please see disclaimer titled "Maps and Related Data" at http://www.dot.state.mn.us/information/disclaimer.html

BNSF Rail Route and Crossings: Moorhead to Detroit Lakes Segment





Rail Crossing

BNSF Rail Route

Interstate

US Highway

State Highway

Major River

City

0 5 10 20 Miles

Moorhead pop.39,398

Dilworth pop.4124

Glyndon pop.1049

Hawley pop.1882

Hitterdal pop.201

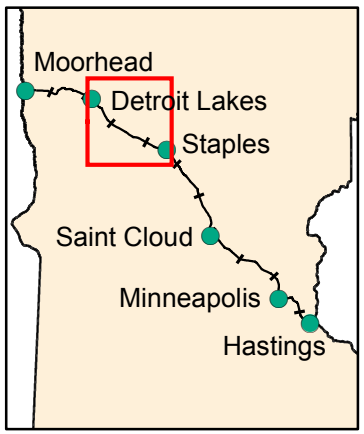
Lake Park pop.782

Audubon pop.445

Detroit Lakes pop.8899

Disclaimer: please see disclaimer titled "Maps and Related Data" at http://www.dot.state.mn.us/information/disclaimer.html

BNSF Rail Route and Crossings: Detroit Lakes to Staples Segment



Rail Crossing

BNSF Rail Route

Interstate

US Highway

State Highway

Major River

City

0 5 10 20 Miles

Detroit Lakes pop.8899

Frazee pop.1377

Vergas pop.311

Perham pop.3087

Dent pop.192

New York Mills pop.1158

Richville pop.124

Bluffton pop.210

Wadena pop.4133

Deer Creek pop.328

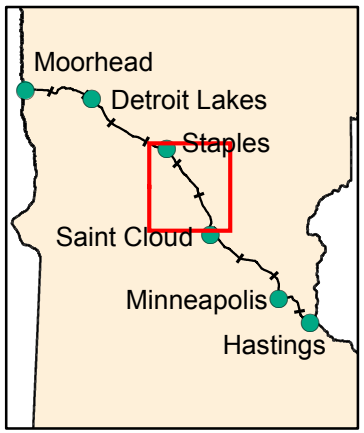
Verndale pop.575

Aldrich pop.53

Staples pop.2907

Hewitt pop.267

BNSF Rail Route and Crossings: Staples to Sartell Segment



Rail Crossing

BNSF Rail Route

Interstate

US Highway

State Highway

Major River

City

0 5 10 20 Miles

Staples pop.2907

Motley pop.585

Brainerd

Randall pop.535

Little Falls pop.7719

Royalton pop.816

Bowlus pop.260

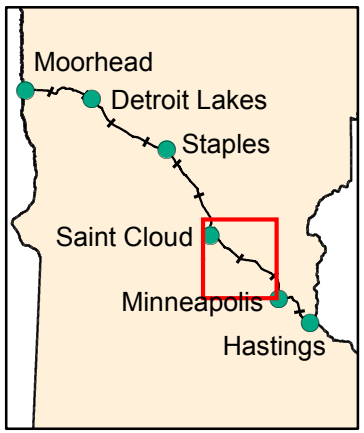
Rice pop.711

Saint Stephen pop.860

Sartell pop.9641

Disclaimer: please see disclaimer titled "Maps and Related Data" at http://www.dot.state.mn.us/information/disclaimer.html

BNSF Rail Route and Crossings: Sartell to Anoka Segment



Rail Crossing

BNSF Rail Route

Interstate

US Highway

State Highway

Major River

City

0 5 10 20 Miles

Sartell pop.9641

Sauk Rapids pop.10213

Saint Cloud pop.59107

Saint Augusta pop.3057

Clear Lake pop.266

Becker pop.2673

Clearwater pop.858

Big Lake pop.6063

Elk River pop.16447

Monticello pop.7868

Otsego pop.6389

Ramsey pop.18510

Andover pop.26588

Albertville pop.3621

Anoka pop.18076

Saint Michael pop.9099

Rogers pop.3588

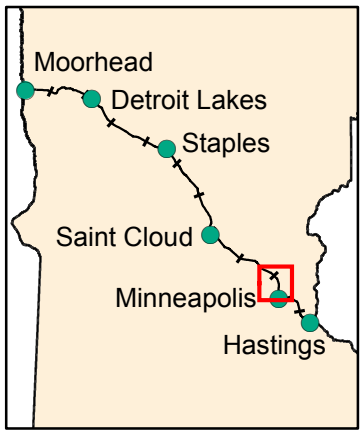
Dayton pop.4699

Champlin pop.22193

Brooklyn Park pop.78373

Disclaimer: please see disclaimer titled "Maps and Related Data" at http://www.dot.state.mn.us/information/disclaimer.html

BNSF Rail Route and Crossings: Anoka to Minneapolis Segment



Rail Crossing

BNSF Rail Route

Interstate

US Highway

State Highway

Major River

City

0 5 10 Miles

Ramsey pop.18510

Andover pop.26588

Anoka pop.18076

Coon Rapids pop.61607

Dayton pop.4699

Champlin pop.22193

Blaine pop.44942

Brooklyn Park pop.67388

Spring Lake Park pop.6772

Fridley pop.27449

Arden Hills pop.9652

Shoreview pop.25924

New Brighton pop. 22206

Brooklyn Center pop.29172

Columbia Heights pop.18520

Robbinsdale pop.14123

Saint Anthony pop.8012

Roseville pop.33690

Lauderdale pop.2364

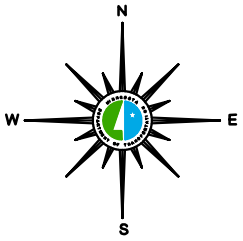
Falcon Heights pop.5572

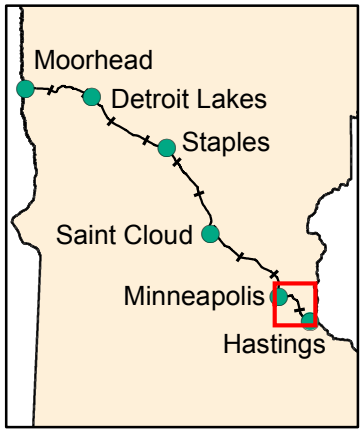
Minneapolis pop.382618

Saint Paul pop.287151

Disclaimer: please see disclaimer titled "Maps and Related Data" at http://www.dot.state.mn.us/information/disclaimer.html

BNSF Rail Route and Crossings: Minneapolis to Hastings Segment





Rail Crossing

BNSF Rail Route

Interstate

US Highway

State Highway

Major River

City

0 5 10 Miles

Falcon Heights pop.5572

Minneapolis pop.382618

Saint Paul pop.287151

Maplewood pop.34947

Woodbury pop.46463

West Saint Paul pop.19549

South Saint Paul pop.20167

Newport pop.3715

Inver Grove Heights pop.29751

Saint Paul Park pop.5070

Cottage Grove pop.30582

Rosemount pop.14619

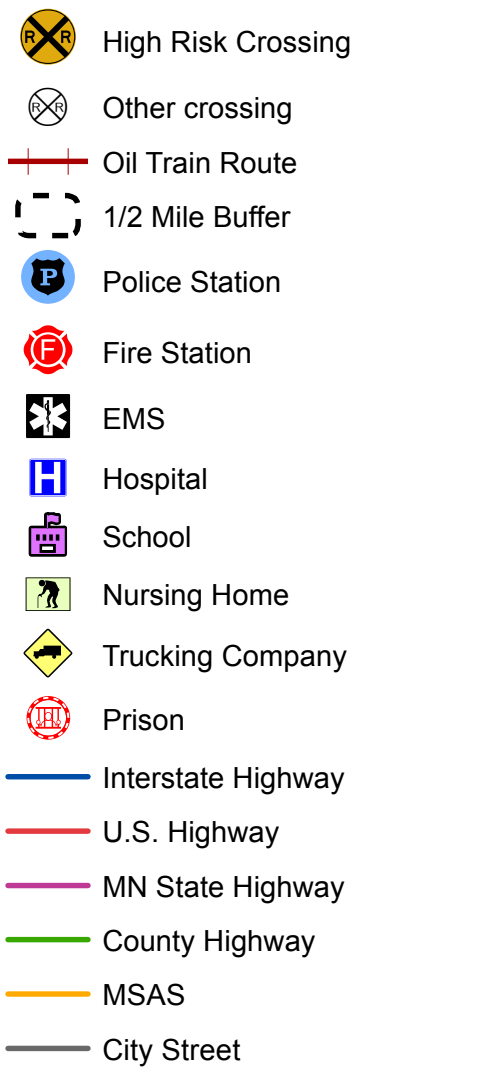
Hastings pop.18204

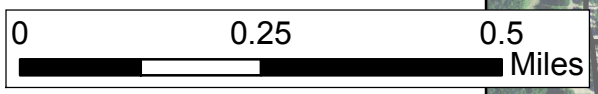
Disclaimer: please see disclaimer titled "Maps and Related Data" at http://www.dot.state.mn.us/information/disclaimer.html

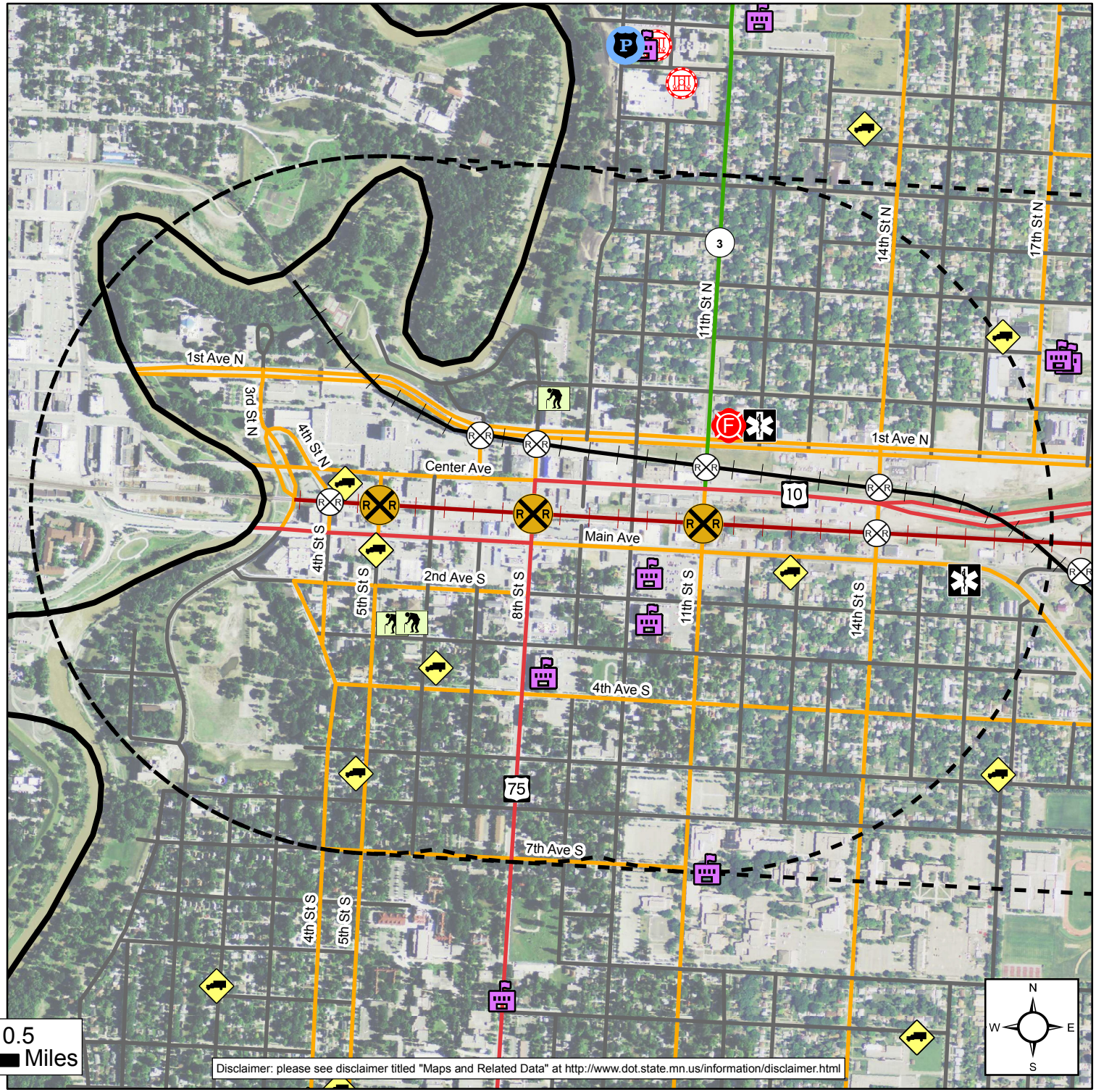
Moorhead

BNSF

5th St S, 8th St S (US 75), 11th St N
Moorhead, Clay County
USDOT# 070798D, 062952D, 062949V
Existing Warning Device(s):
4 Quad Gates, Ped Gates (5th St S)
4 Quad Gates, Cants, Ped Gates (8th St S)
4 Quad Gates, Cants, Ped Gates (11th St N)



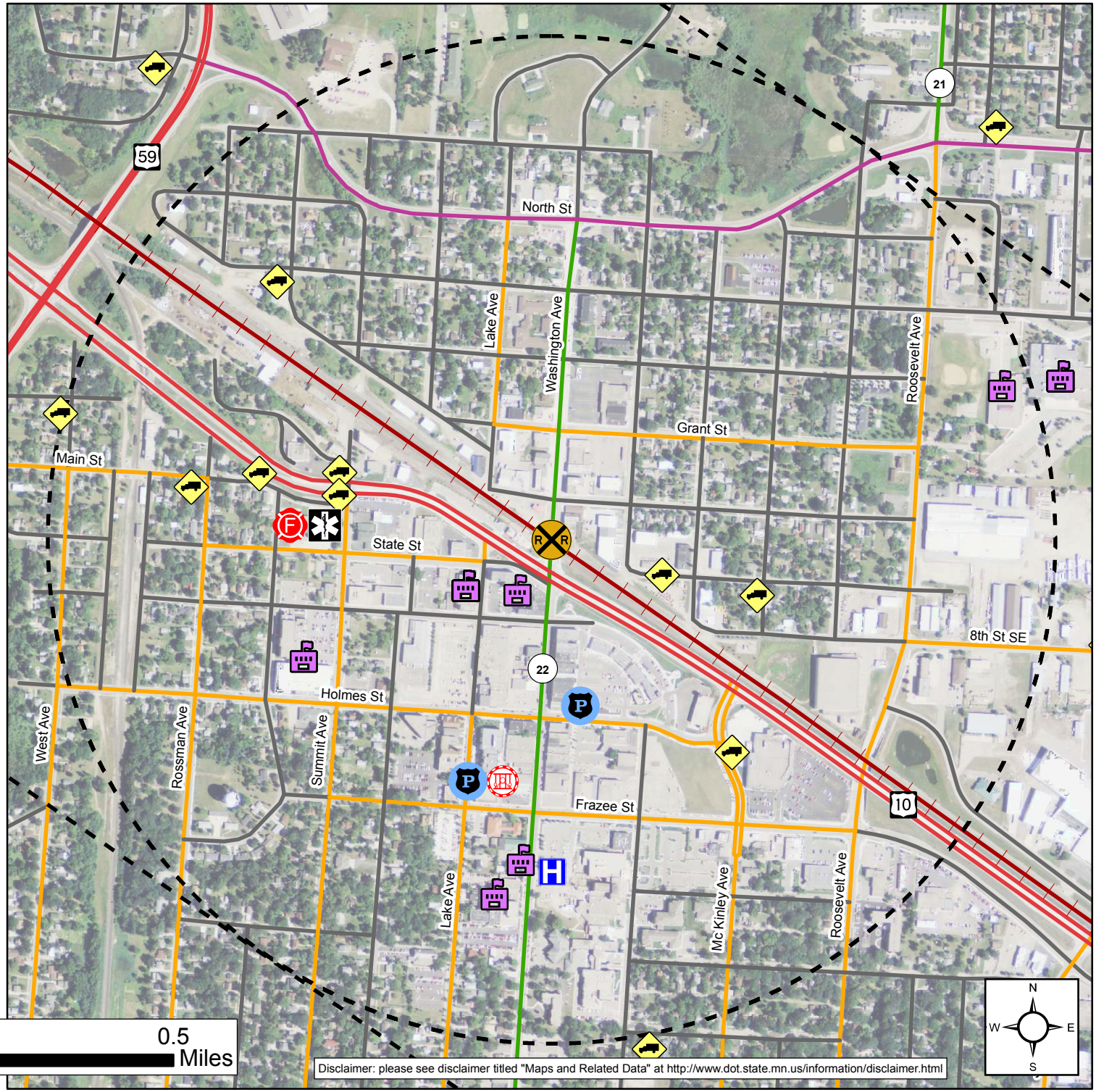




BNSF

Washington Ave
Detroit Lakes, Becker County
USDOT# 081018G
Existing Warning Device(s):
Gates, Medians

Detroit Lakes



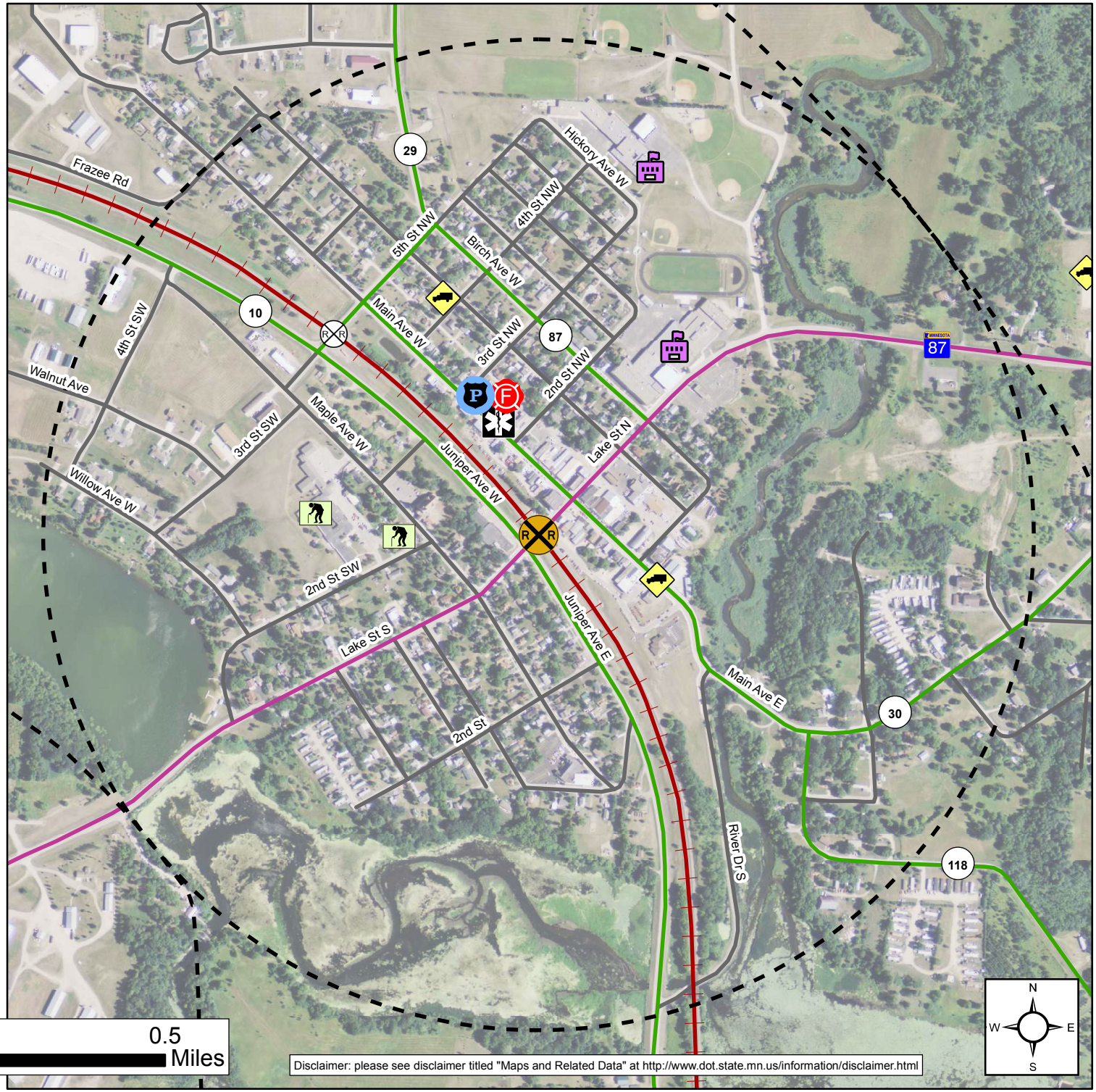
- High Risk Crossing
- Other crossing
- Oil Train Route
- 1/2 Mile Buffer
- Police Station
- Fire Station
- EMS
- Hospital
- School
- Nursing Home
- Trucking Company
- Prison
- Interstate Highway
- U.S. Highway
- MN State Highway
- County Highway
- MSAS
- City Street

0 0.25 0.5 Miles

BNSF

Lake Street N (MN 87)
Frazee, Becker County
USDOT# 062847C
Existing Warning Device(s): Gates

Frazee



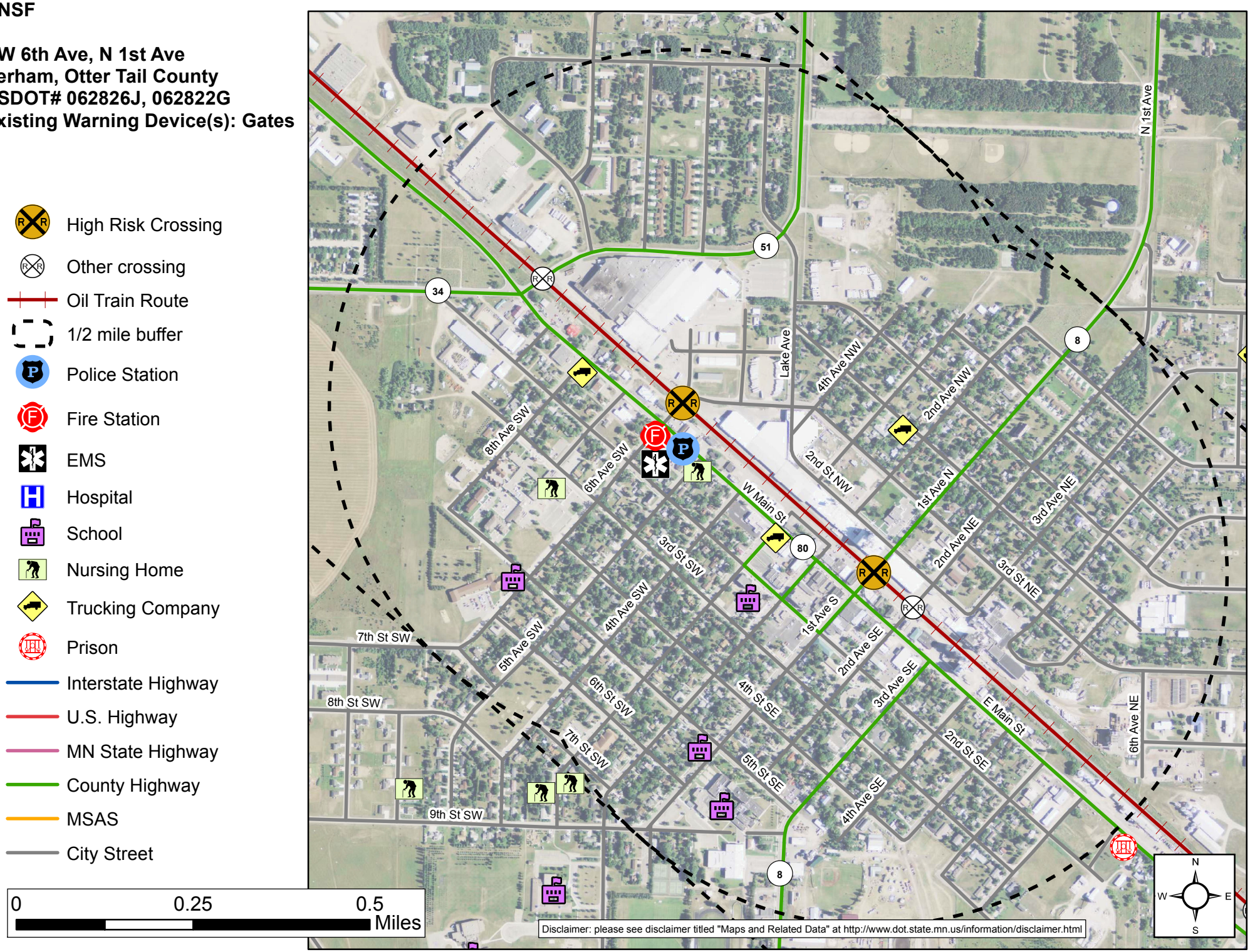
- High Risk Crossing
- Other crossing
- Oil Train Route
- 1/2 Mile Buffer
- Police Station
- Fire Station
- EMS
- Hospital
- School
- Nursing Home
- Trucking Company
- Prison
- Interstate Highway
- U.S. Highway
- MN State Highway
- County Highway
- MSAS
- City Street

0 0.25 0.5 Miles

Perham

BNSF

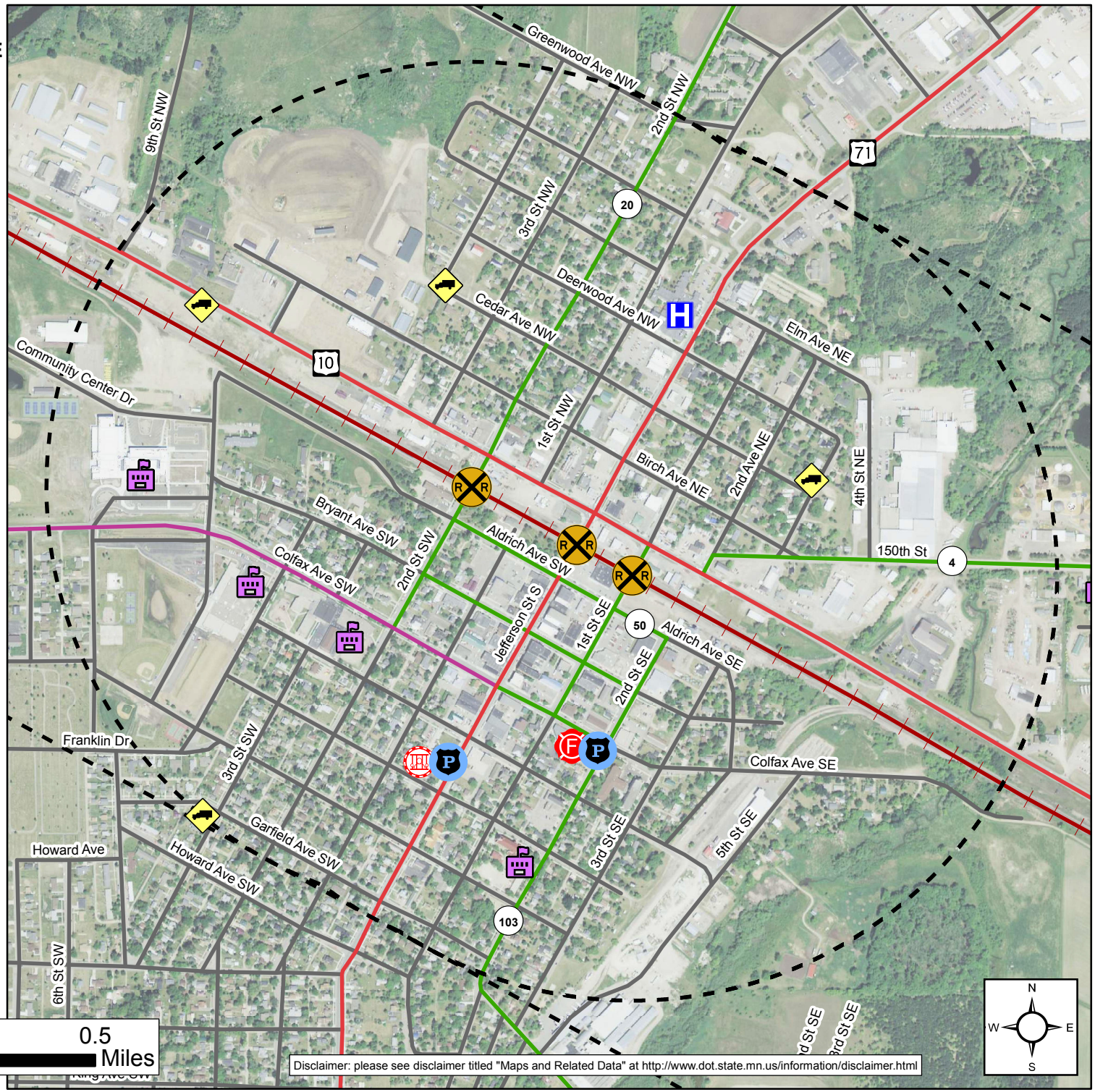
NW 6th Ave, N 1st Ave
Perham, Otter Tail County
USDOT# 062826J, 062822G
Existing Warning Device(s): Gates



Wadena

BNSF

2nd St SW, Jefferson St S (US 71), 1st St SE
Wadena, Wadena County
USDOT# 062779D, 062775B, 062773M
Existing Warning Device(s): Gates

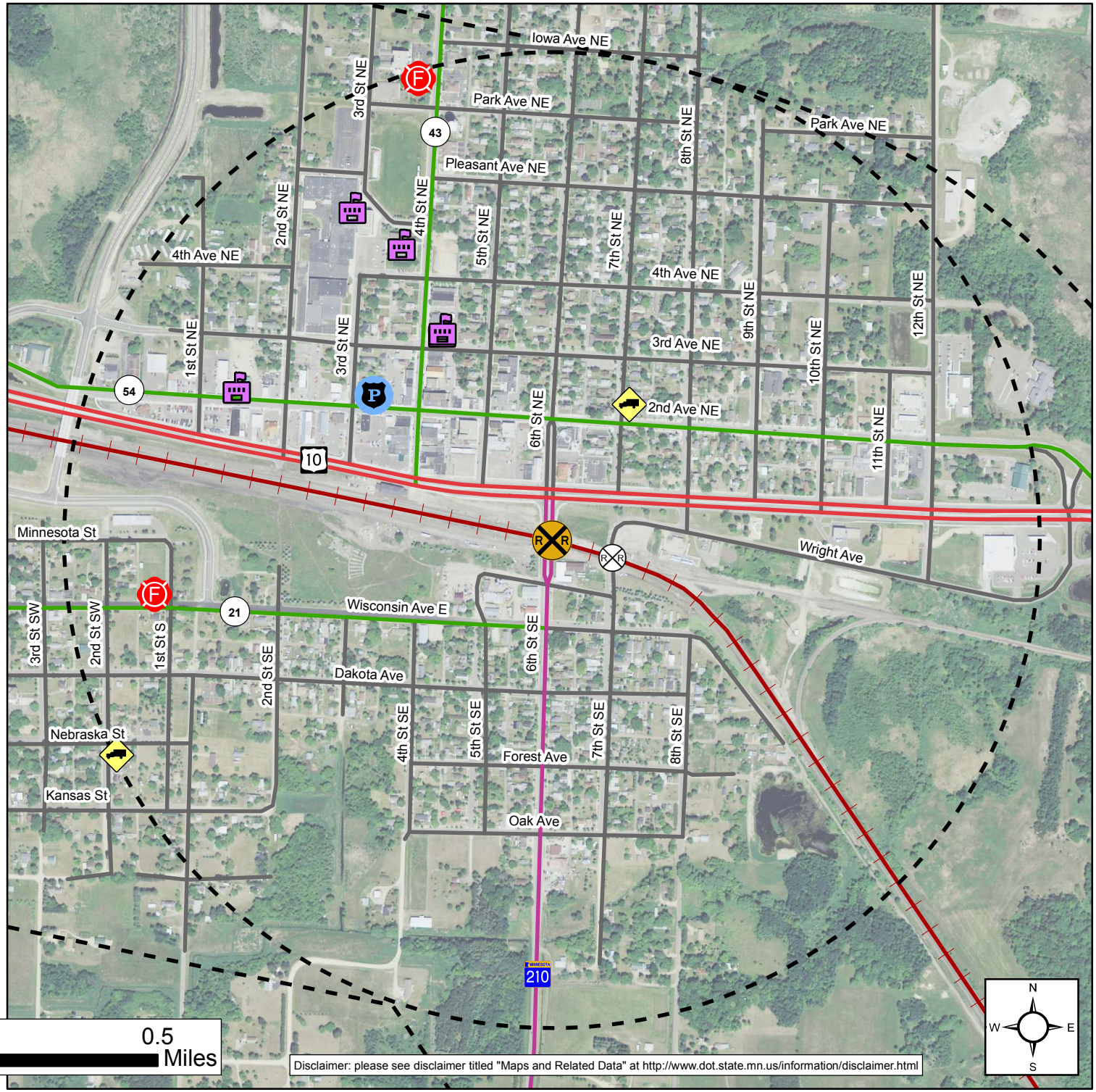


- High Risk Crossing
- Other crossing
- Oil Train Route
- 1/2 Mile Buffer
- Police Station
- Fire Station
- EMS
- Hospital
- School
- Nursing Home
- Trucking Company
- Prison
- Interstate Highway
- U.S. Highway
- MN State Highway
- County Highway
- MSAS
- City Street

Staples

BNSF

6th Street NE (MN 210)
Staples, Todd County
USDOT# 097617A
Existing Warning Device(s):
Cants & Gates, Medians

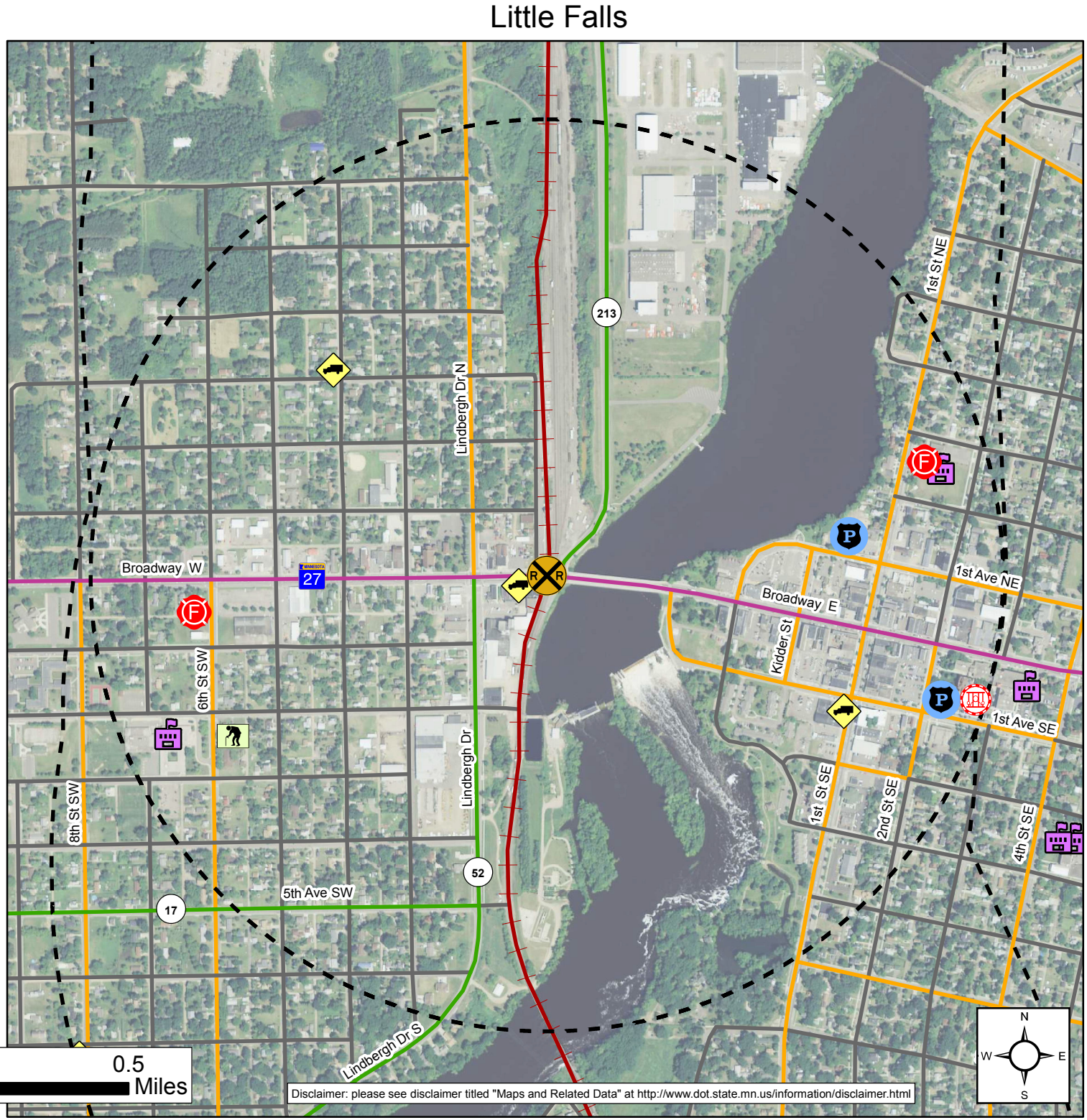


- Rail Oil Crossing
- Other crossing
- Oil Train Route
- 1/2 Mile Buffer
- Police Station
- Fire Station
- EMS
- Hospital
- School
- Nursing Home
- Trucking Company
- Prison
- Interstate Highway
- U.S. Highway
- MN State Highway
- County Highway
- MSAS
- City Street

0 0.25 0.5 Miles

BNSF

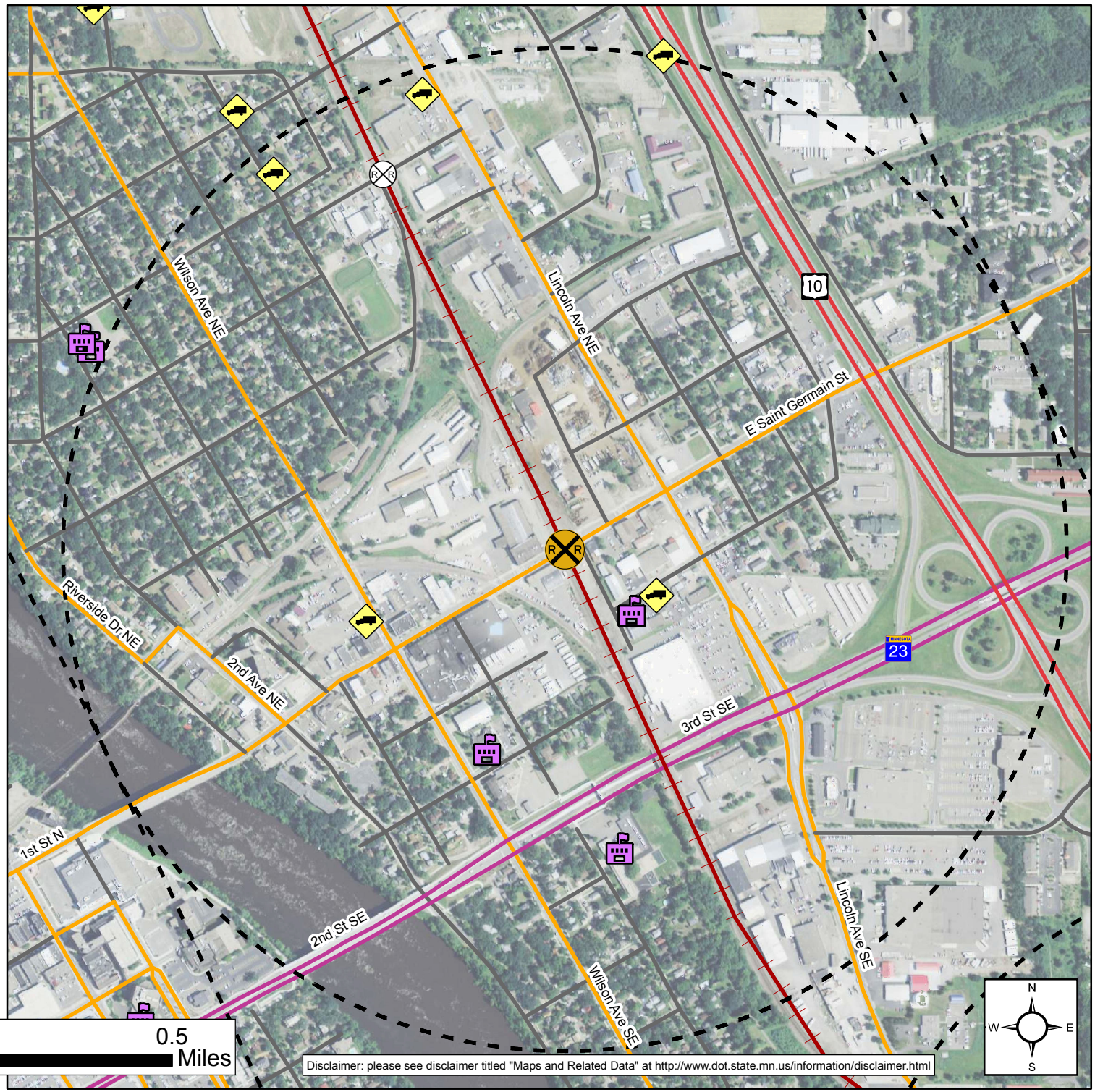
Broadway W (MN 27)
Little Falls, Morrison County
USDOT# 097668K
Existing Warning Device(s):
Cants & Gates



BNSF

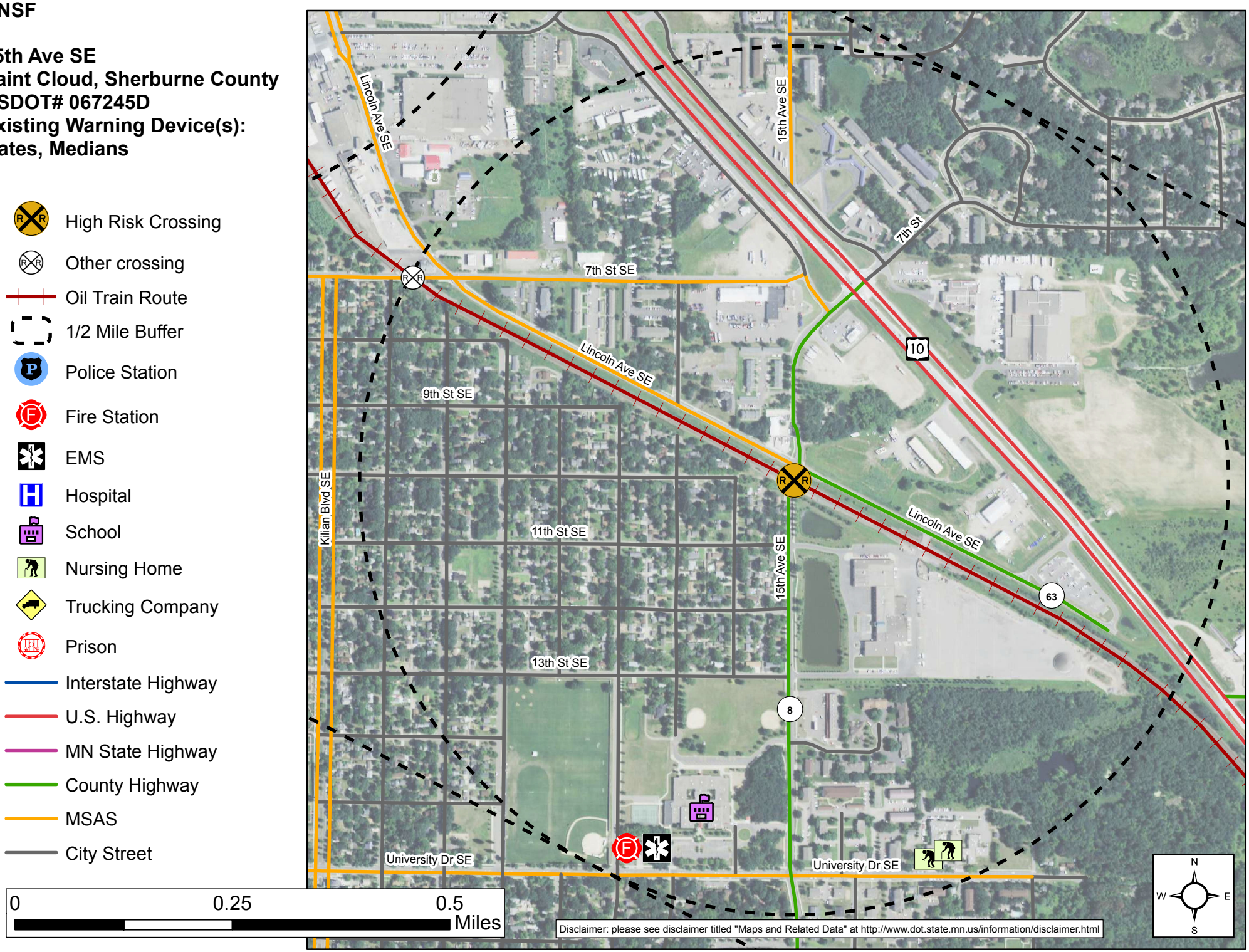
Saint Germain Street
Saint Cloud, Sherburne County
USDOT# 067248Y
Existing Warning Device(s):
Cants & Gates

- High Risk Crossing
- Other crossing
- Oil Train Route
- 1/2 Mile Buffer
- Police Station
- Fire Station
- EMS
- Hospital
- School
- Nursing Home
- Trucking Company
- Prison
- Interstate Highway
- U.S. Highway
- MN State Highway
- County Highway
- MSAS
- City Street



BNSF

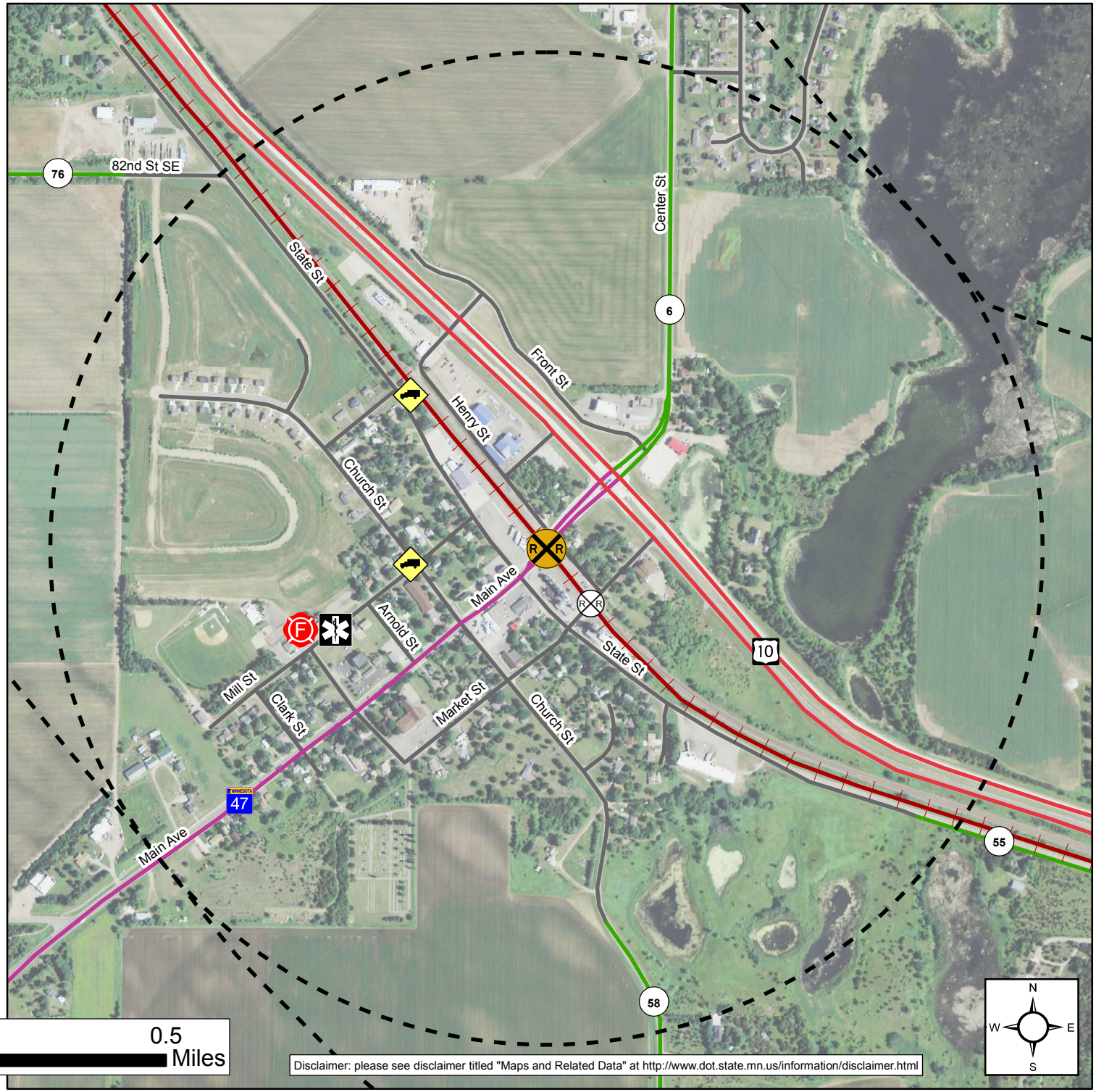
15th Ave SE
Saint Cloud, Sherburne County
USDOT# 067245D
Existing Warning Device(s):
Gates, Medians



BNSF

Main Ave (MN 24)
Clear Lake, Sherburne County
USDOT# 067230N
Existing Warning Device(s):
Cants & Gates

Clear Lake



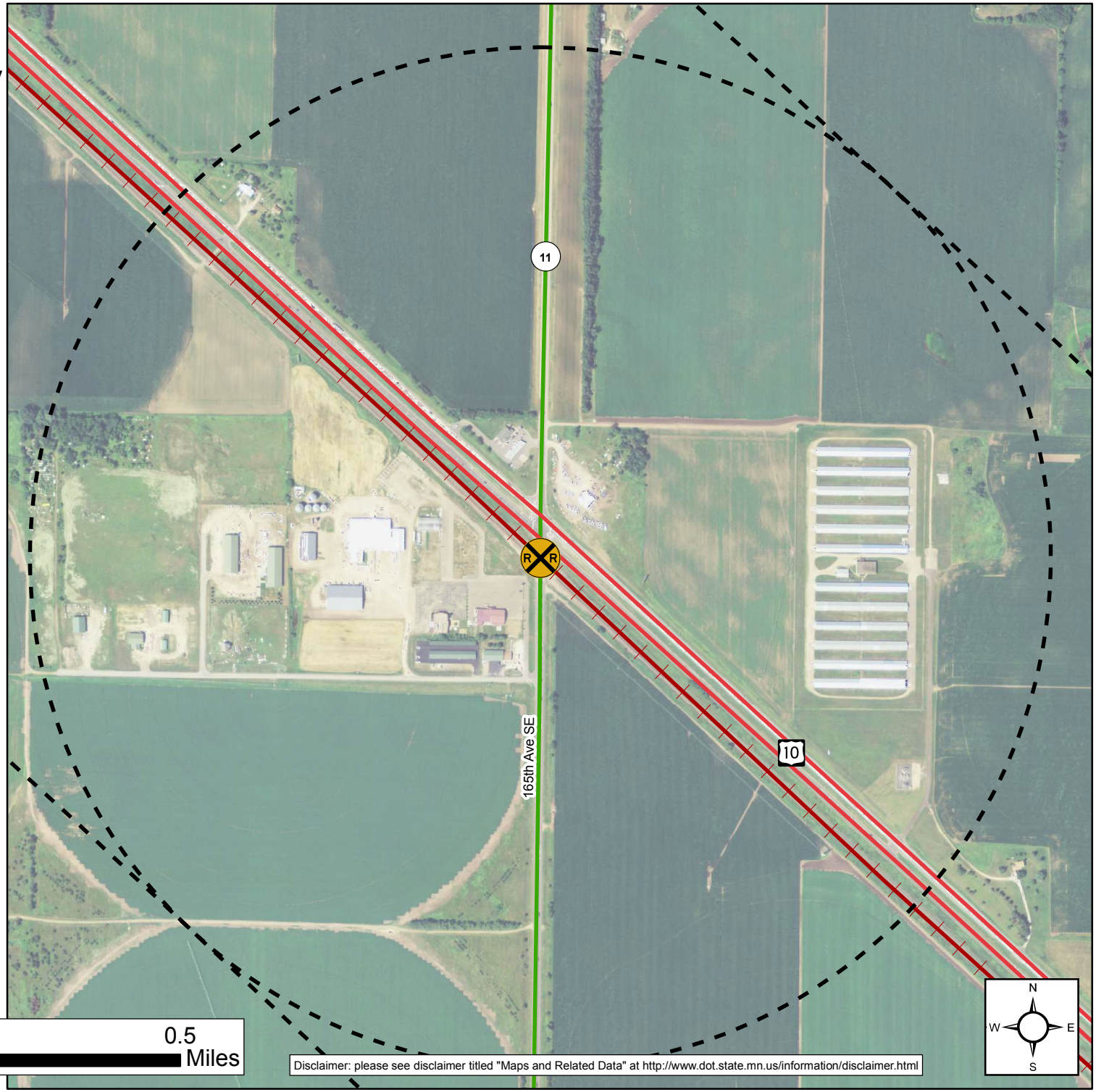
- High Risk Crossing
- Other crossing
- Oil Train Route
- 1/2 Mile Buffer
- Police Station
- Fire Station
- EMS
- Hospital
- School
- Nursing Home
- Trucking Company
- Prison
- Interstate Highway
- U.S. Highway
- MN State Highway
- County Highway
- MSAS
- City Street

0 0.25 0.5 Miles

BNSF

165th Ave SE
Becker Township, Sherburne County
USDOT# 082517B
Existing Warning Device(s):
Gates

Becker Township



- High Risk Crossing
- Other crossing
- Oil Train Route
- 1/2 Mile Buffer
- Police Station
- Fire Station
- EMS
- Hospital
- School
- Nursing Home
- Trucking Company
- Prison
- Interstate Highway
- U.S. Highway
- MN State Highway
- County Highway
- MSAS
- City Street

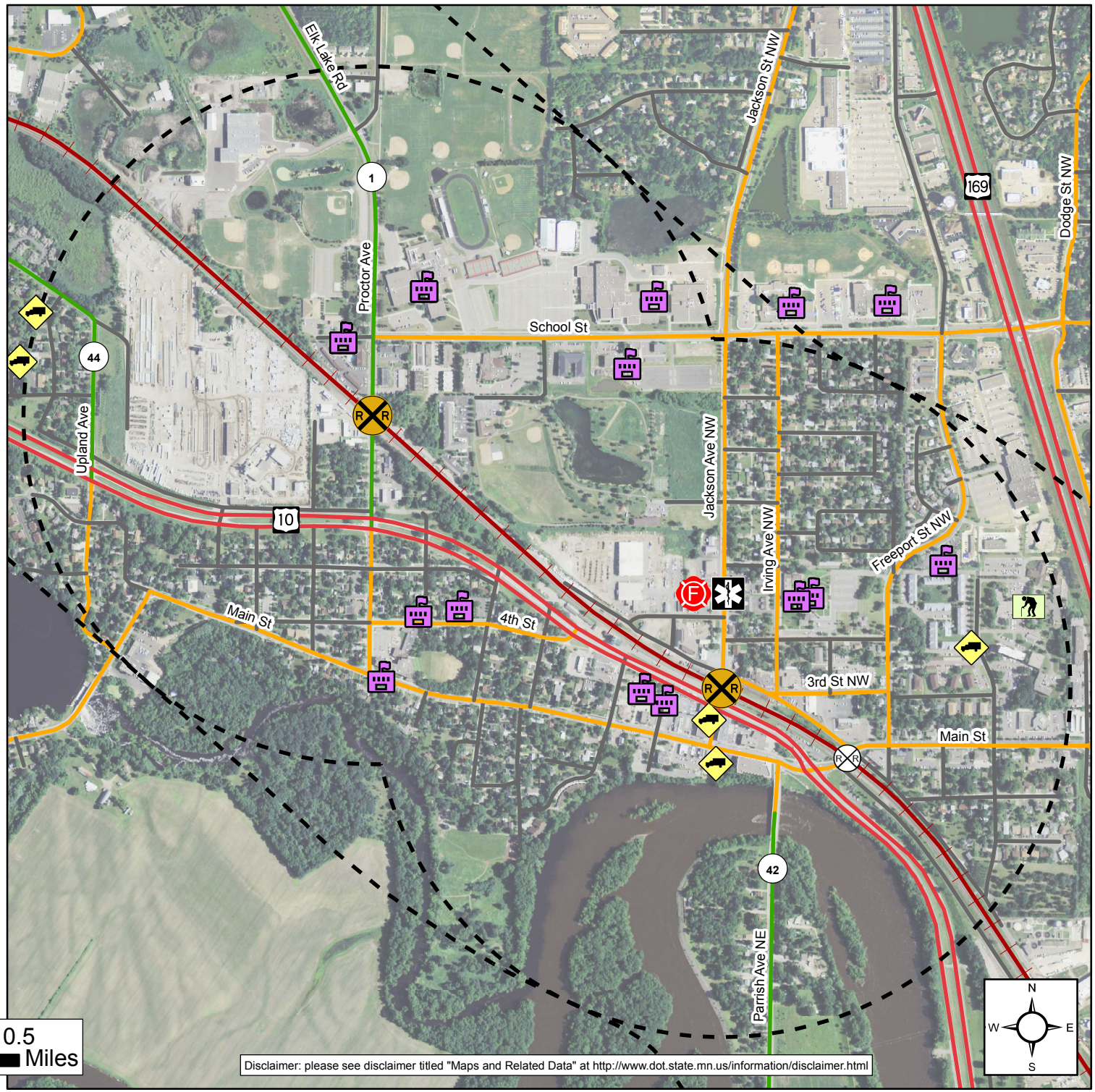
0 0.25 0.5 Miles

BNSF

Proctor Ave, Jackson St NW
Elk River, Sherburne County
USDOT# 082946E, 082944R
Existing Warning Device(s):
Cants & Gates (Proctor Ave)
Gates (Jackson St NW)

- High Risk Crossing
- Other crossing
- Oil Train Route
- 1/2 Mile Buffer
- Police Station
- Fire Station
- EMS
- Hospital
- School
- Nursing Home
- Trucking Company
- Prison
- Interstate Highway
- U.S. Highway
- MN State Highway
- County Highway
- MSAS
- City Street

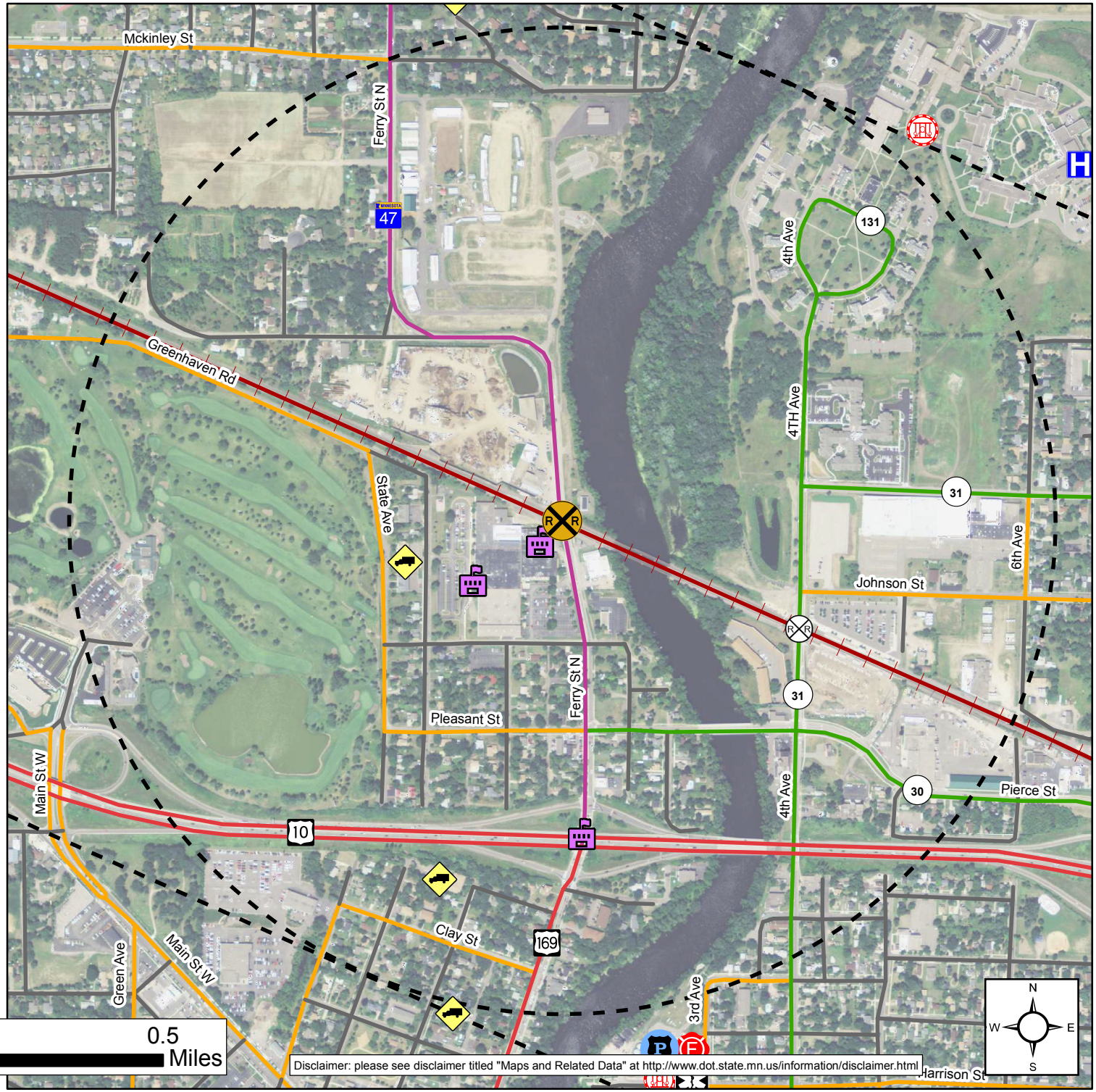
0 0.25 0.5 Miles



Anoka

BNSF

Ferry Street N (MN 47)
Anoka, Anoka County
USDOT# 082926T
Existing Warning Device(s):
Cants & Gates, Medians

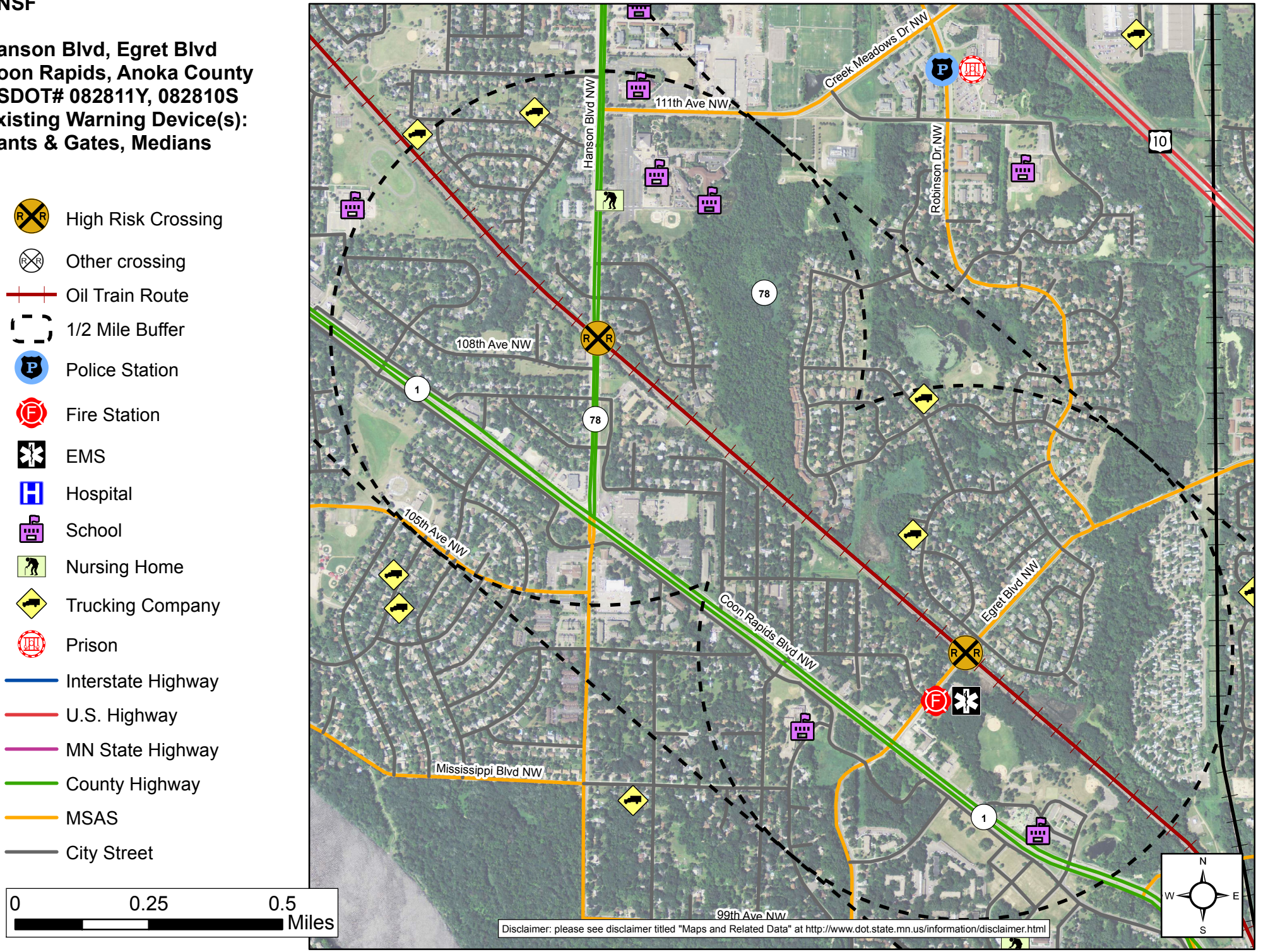


- High Risk Crossing
- Other crossing
- Oil Train Route
- 1/2 Mile Buffer
- Police Station
- Fire Station
- EMS
- Hospital
- School
- Nursing Home
- Trucking Company
- Prison
- Interstate Highway
- U.S. Highway
- MN State Highway
- County Highway
- MSAS
- City Street

0 0.25 0.5 Miles

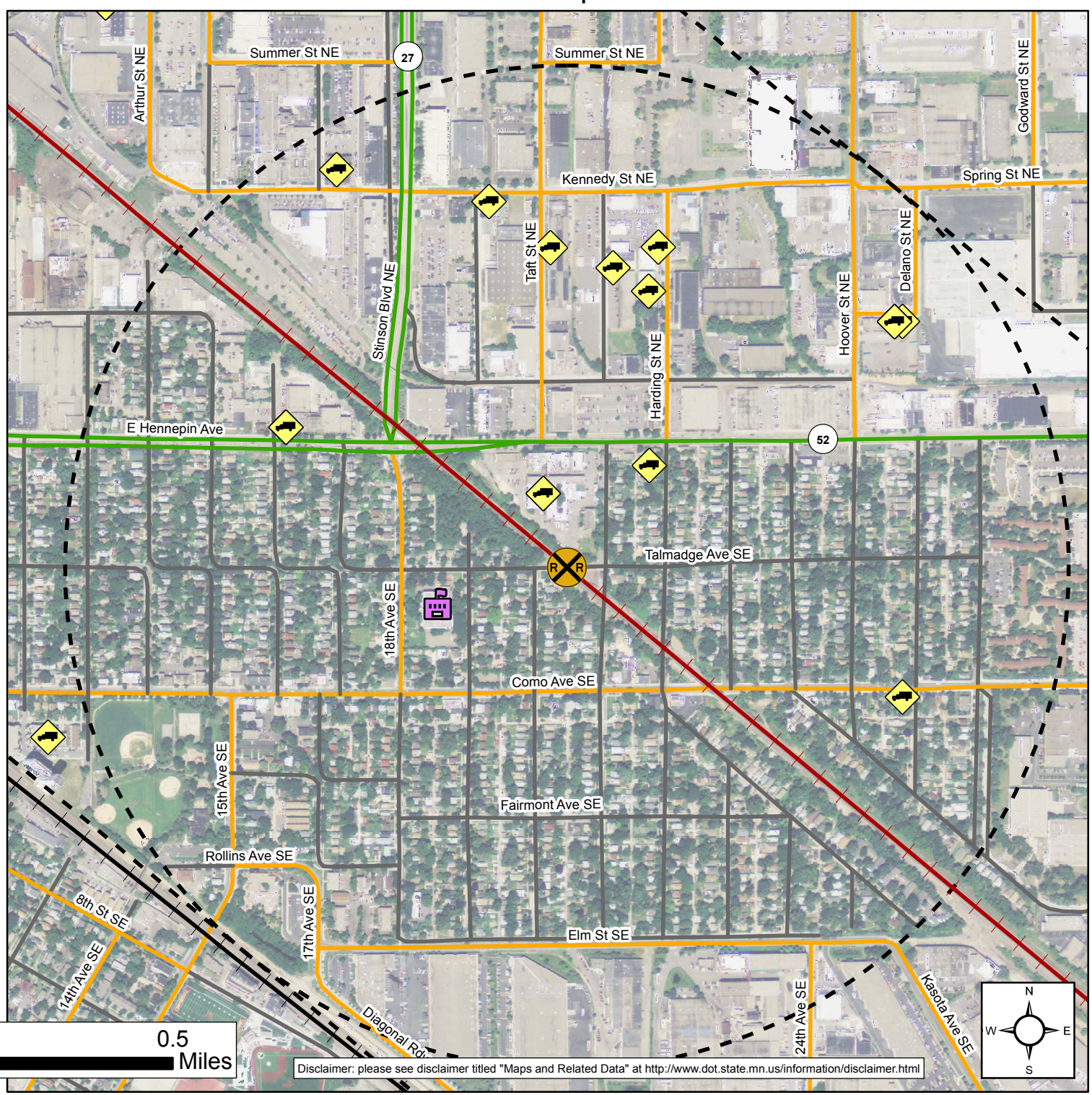
BNSF

Hanson Blvd, Egret Blvd
Coon Rapids, Anoka County
USDOT# 082811Y, 082810S
Existing Warning Device(s):
Cants & Gates, Medians



BNSF

Talmadge Avenue SE
Minneapolis, Hennepin County
USDOT# 082978K
Existing Warning Device(s):
Gates, Medians



- High Risk Crossing
- Other crossing
- Oil Train Route
- 1/2 mile buffer
- Police Station
- Fire Station
- EMS
- Hospital
- School
- Nursing Home
- Trucking Company
- Prison
- Interstate Highway
- U.S. Highway
- MN State Highway
- County Highway
- MSAS
- City Street

0 0.25 0.5 Miles

BNSF

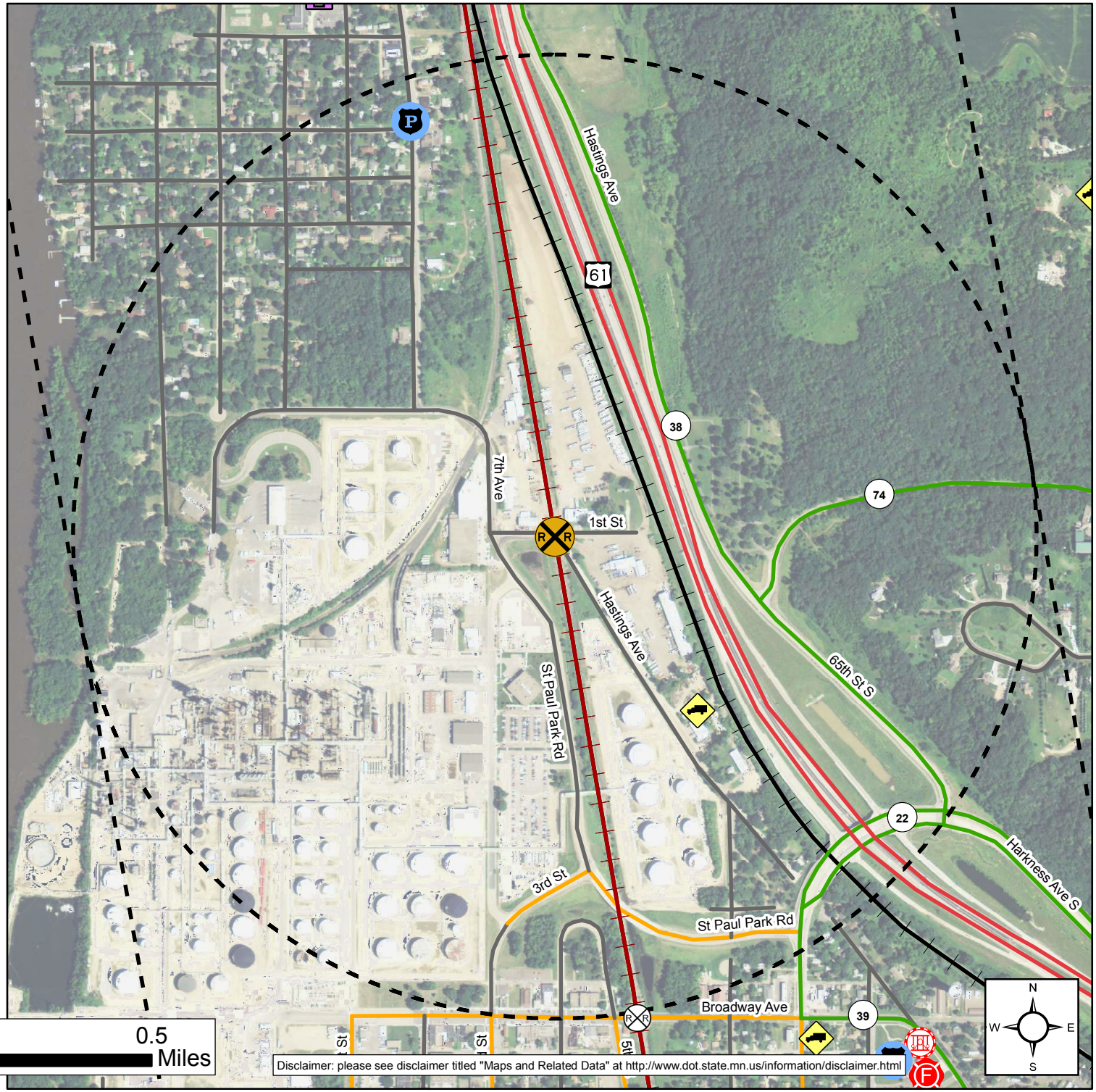
Como Avenue
St. Paul, Ramsey County
USDOT# 082992F
Existing Warning Devices:
4 Quad Gates, Ped Gates

- High Risk Crossing
- Other crossing
- Oil Train Route
- 1/2 Mile Buffer
- Police Station
- Fire Station
- EMS
- Hospital
- School
- Nursing Home
- Trucking Company
- Prison
- Interstate Highway
- U.S. Highway
- MN State Highway
- County Highway
- MSAS
- City Street

Saint Paul Park / Newport

BNSF

Hastings Avenue
Saint Paul Park / Newport, Washington Co
USDOT# 061138T
Existing Warning Device(s):
Flashers

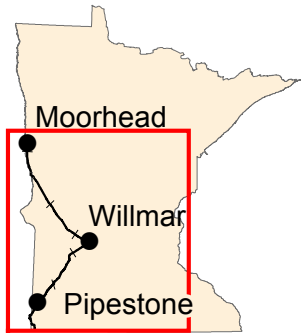


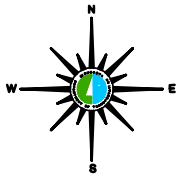
- High Risk Crossing
- Other crossing
- Oil Train Route
- 1/2 Mile Buffer
- Police Station
- Fire Station
- EMS
- Hospital
- School
- Nursing Home
- Trucking Company
- Prison
- Interstate Highway
- U.S. Highway
- MN State Highway
- County Highway
- MSAS
- City Street

0 0.25 0.5 Miles

Disclaimer: please see disclaimer titled "Maps and Related Data" at http://www.dot.state.mn.us/information/disclaimer.html

BNSF Rail Oil Corridor: Moorhead to Iowa State Line





Rail Crossing

BNSF Rail Route

Interstate

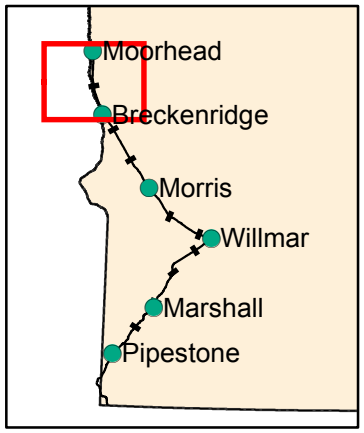
Major River

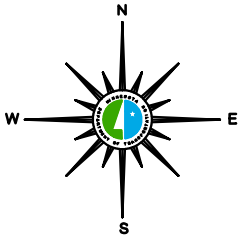
0 25 50 100 Miles

Moorhead
Breckenridge
Morris
Willmar
Marshall
Pipestone
Minneapolis
Saint Paul
Red River
Minnesota River
Mississippi River
94
35
35
90

Disclaimer: please see disclaimer titled "Maps and Related Data" at http://www.dot.state.mn.us/information/disclaimer.html

BNSF Rail Route and Crossings: Moorhead to Breckenridge Segment





Rail Crossing

BNSF Rail Route

Interstate

US Highway

State Highway

City

Major River

0 5 10 20 Miles

Dilworth
pop. 3001

Moorhead
pop. 32177

Comstock
pop. 123

Wolverton
pop. 122

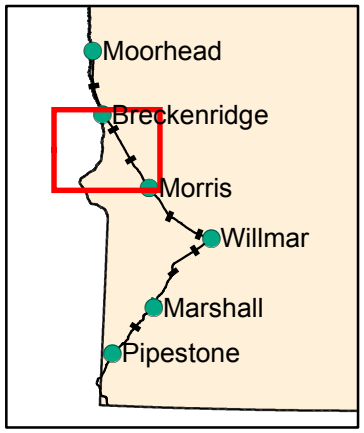
Kent
pop. 120

Breckenridge
pop. 3559

Fergus Falls

Disclaimer: please see disclaimer titled "Maps and Related Data" at http://www.dot.state.mn.us/information/disclaimer.html

BNSF Rail Route and Crossings: Breckenridge to Morris Segment



N
W
E
S

Rail Crossing

BNSF Rail Route

Interstate

US Highway

State Highway

City

Major River

0 5 10 20 Miles

Breckenridge
pop. 3559

Doran
pop. 55

Campbell
pop. 159

Nashua
pop. 69

Tintah
pop. 61

Norcross
pop. 70

Herman
pop. 452

Donnelly
pop. 254

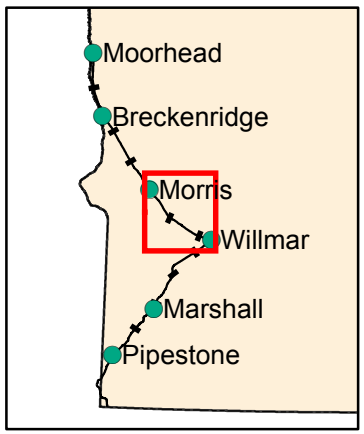
Morris
pop. 5068

Fergus Falls

210 210 94 59 55 55 78 79 55 75 54 27 27 59 75 27 28 28

Disclaimer: please see disclaimer titled "Maps and Related Data" at http://www.dot.state.mn.us/information/disclaimer.html

BNSF Rail Route and Crossings: Morris to Willmar Segment



Rail Crossing

BNSF Rail Route

Interstate

US Highway

State Highway

City

Major River

0 5 10 20 Miles

Glenwood

Morris pop. 5068

Hancock pop. 717

Clontarf pop. 173

Benson pop. 3376

De Graff pop. 133

Murdock pop. 303

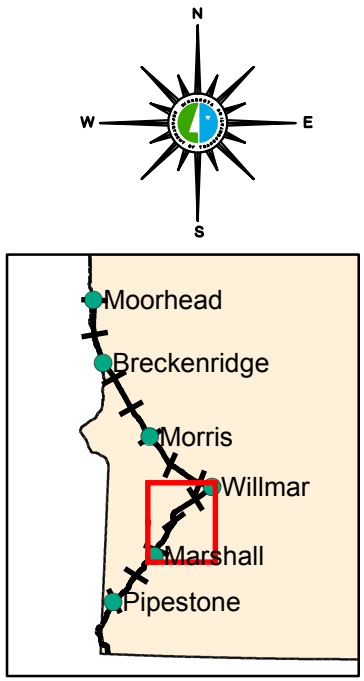
Kerkhoven pop. 737

Pennock pop. 509

Willmar pop. 19,680

Disclaimer: please see disclaimer titled "Maps and Related Data" at http://www.dot.state.mn.us/information/disclaimer.html

BNSF Rail Route and Crossings: Willmar to Marshall Segment



Rail Crossing

BNSF Rail Route

Interstate

US Highway

State Highway

City

Major River

0 5 10 20 Miles

Willmar
pop. 18,351

Pennock
pop. 509

Raymond
pop. 803

Clara City
pop. 1393

Maynard
pop. 388

Granite Falls
pop. 3070

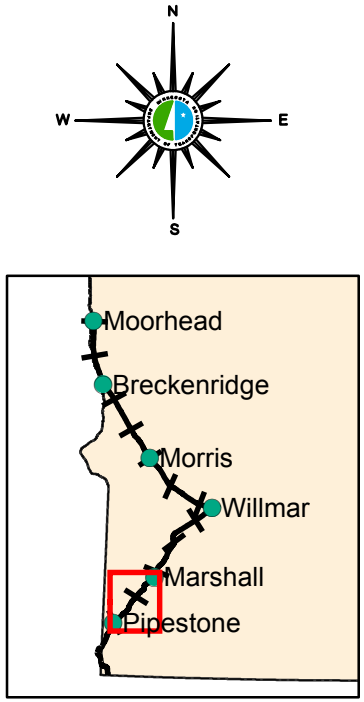
Hanley Falls
pop. 289

Cottonwood
pop. 1148

Marshall
pop. 12,735

Disclaimer: please see disclaimer titled "Maps and Related Data" at http://www.dot.state.mn.us/information/disclaimer.html

BNSF Rail Route and Crossings: Marshall to Pipestone Segment



Rail Crossing

BNSF Rail Route

Interstate

US Highway

State Highway

City

Major River

0 5 10 20 Miles

Marshall
pop. 12735

Lynd
pop. 346

Russell
pop. 371

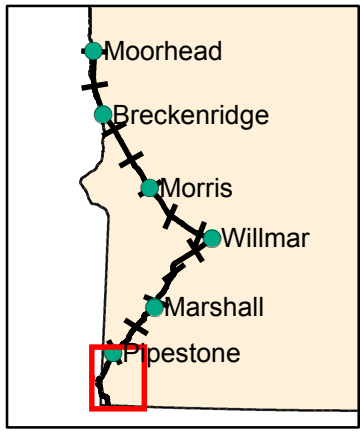
Florence
pop. 38

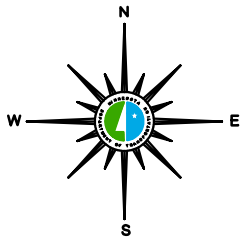
Ruthton
pop. 284

Holland
pop. 176

Pipestone
pop. 4280

BNSF Rail Route and Crossings: Pipestone to Iowa State Line Segment





Rail Crossing

BNSF Rail Route

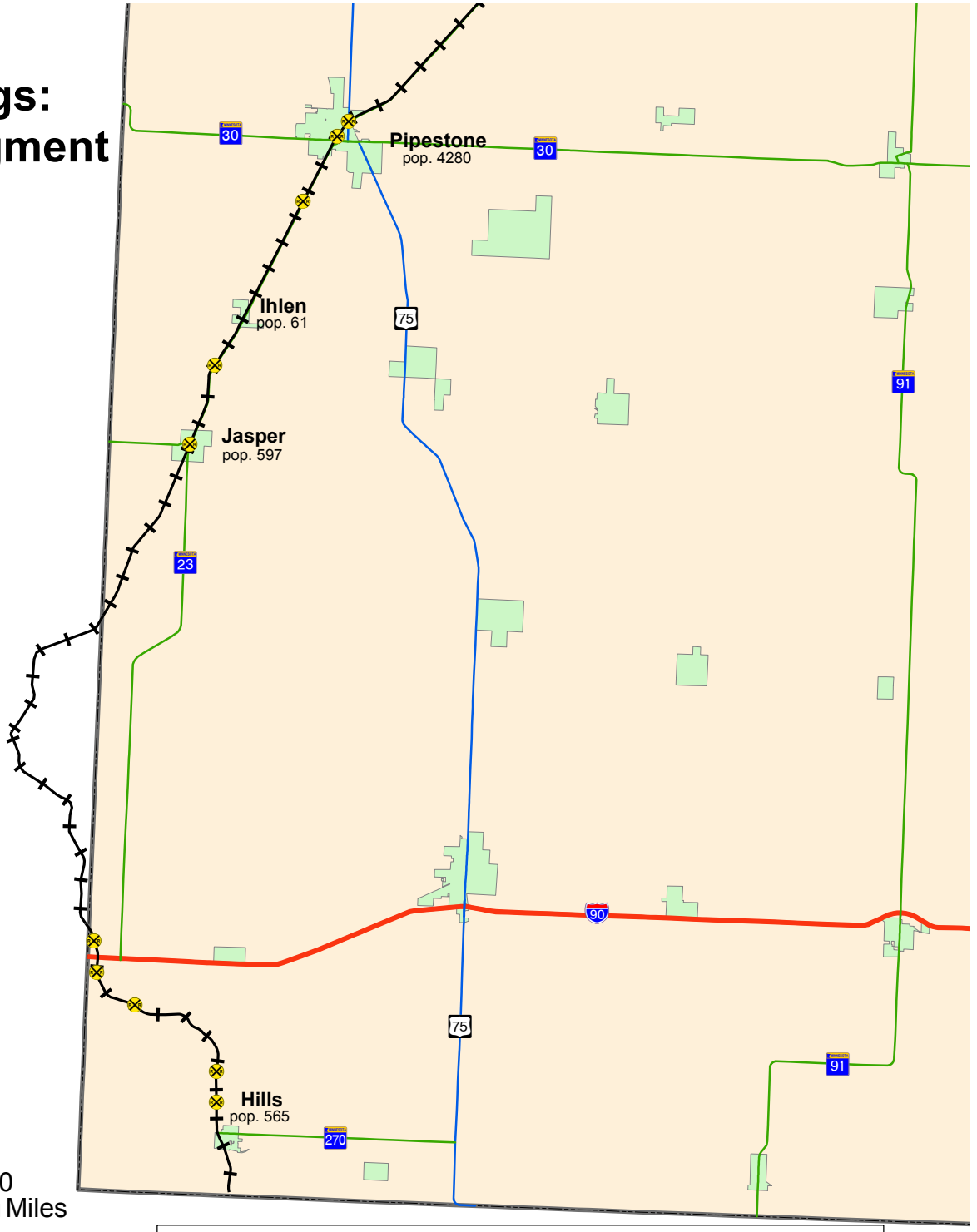
Interstate

US Highway

State Highway

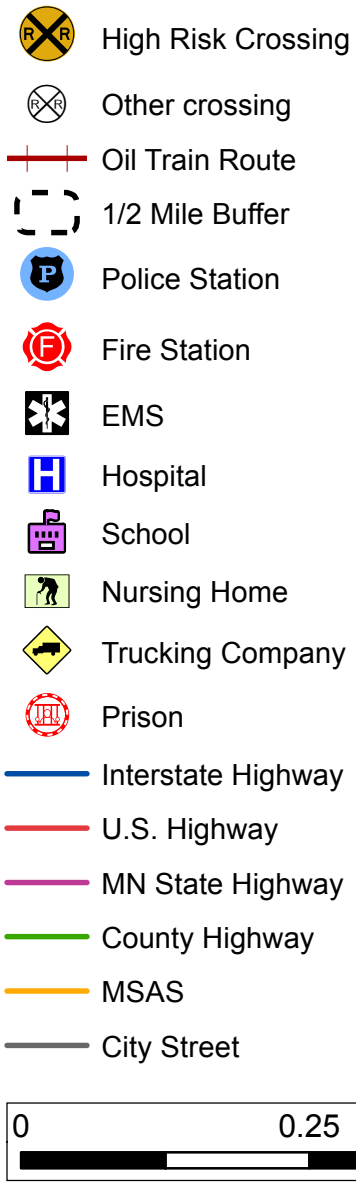
City

Major River

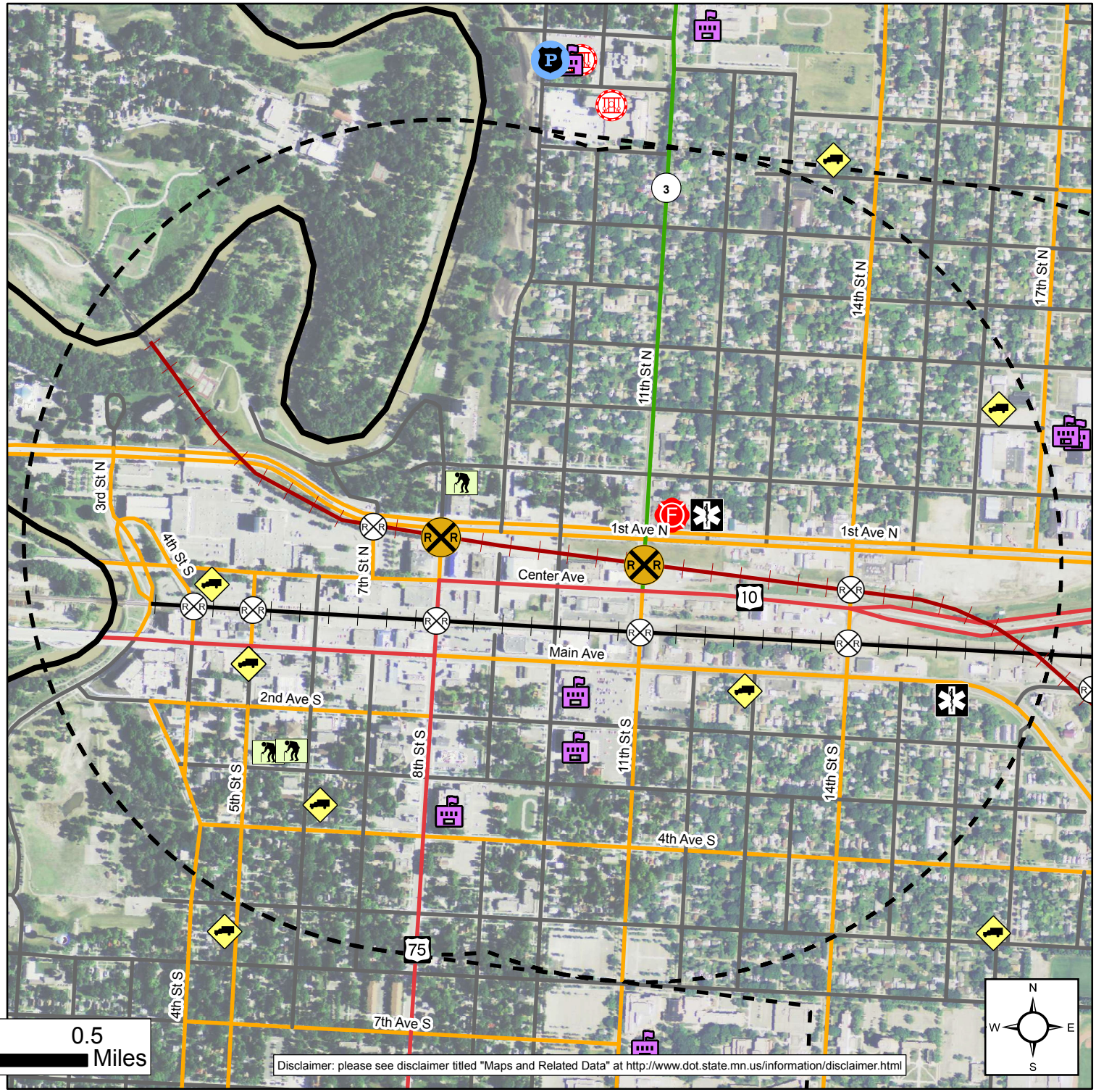


BNSF

8th St N, 11th St N
Moorhead, Clay County
USDOT# 062936U, 062930D
Existing Warning Device(s):
4 Quad Gates, Cants, Ped Gates



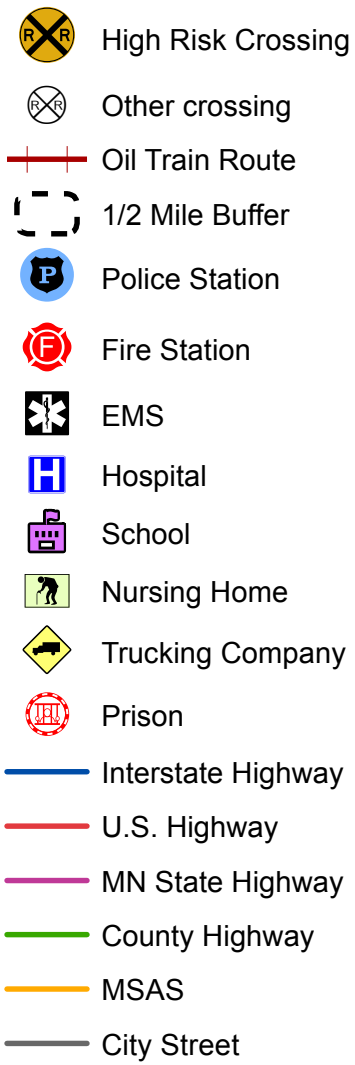
Moorhead

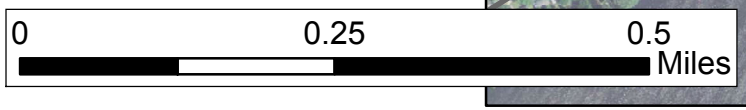


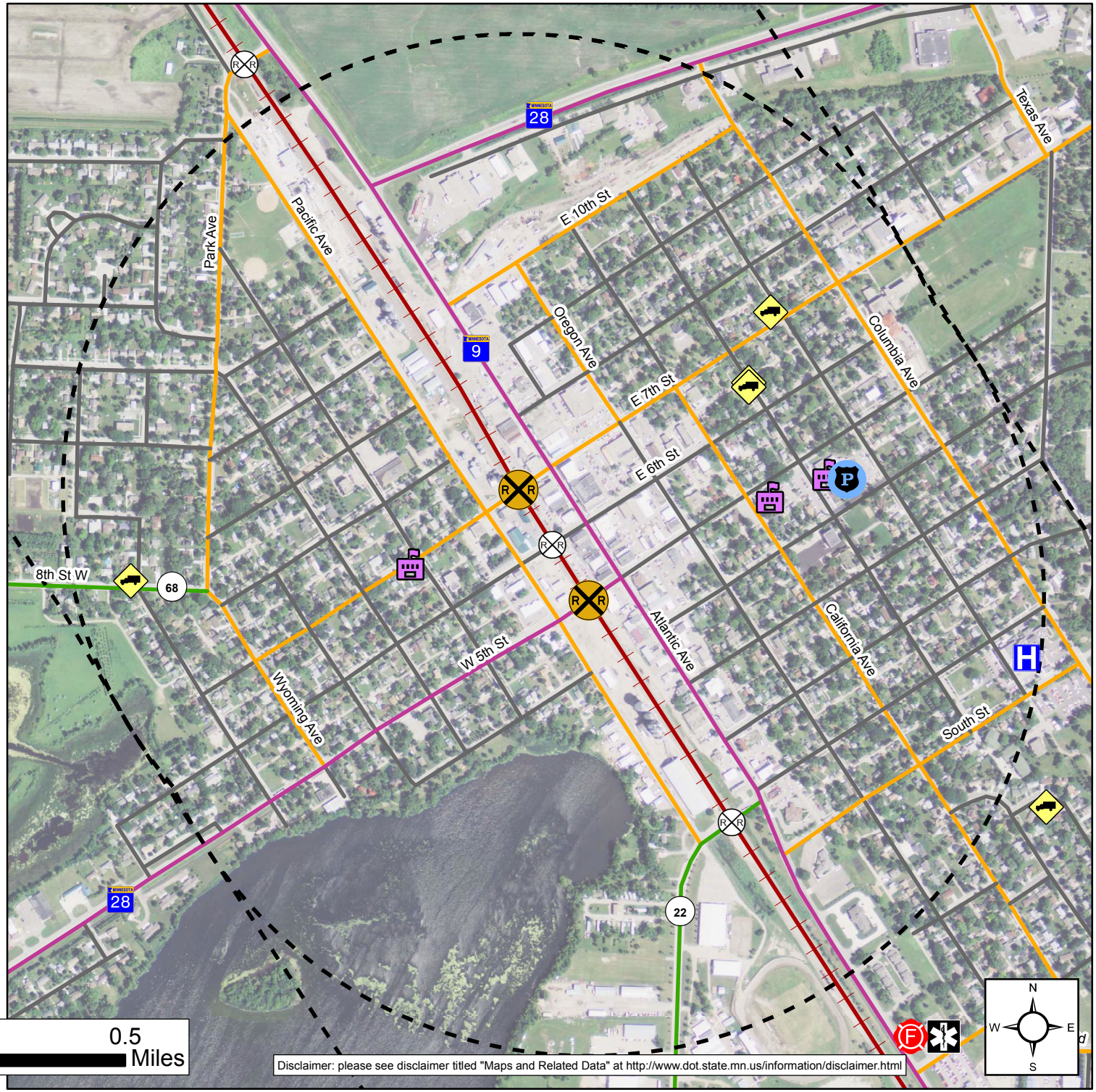
Morris

BNSF

W 7th S, W 5th St (MN 28)
Morris, Stevens County
USDOT# 067931C, 067933R
Existing Warning Device(s):
Gates (W 7th St)
Cants & Gates (W 5th St)





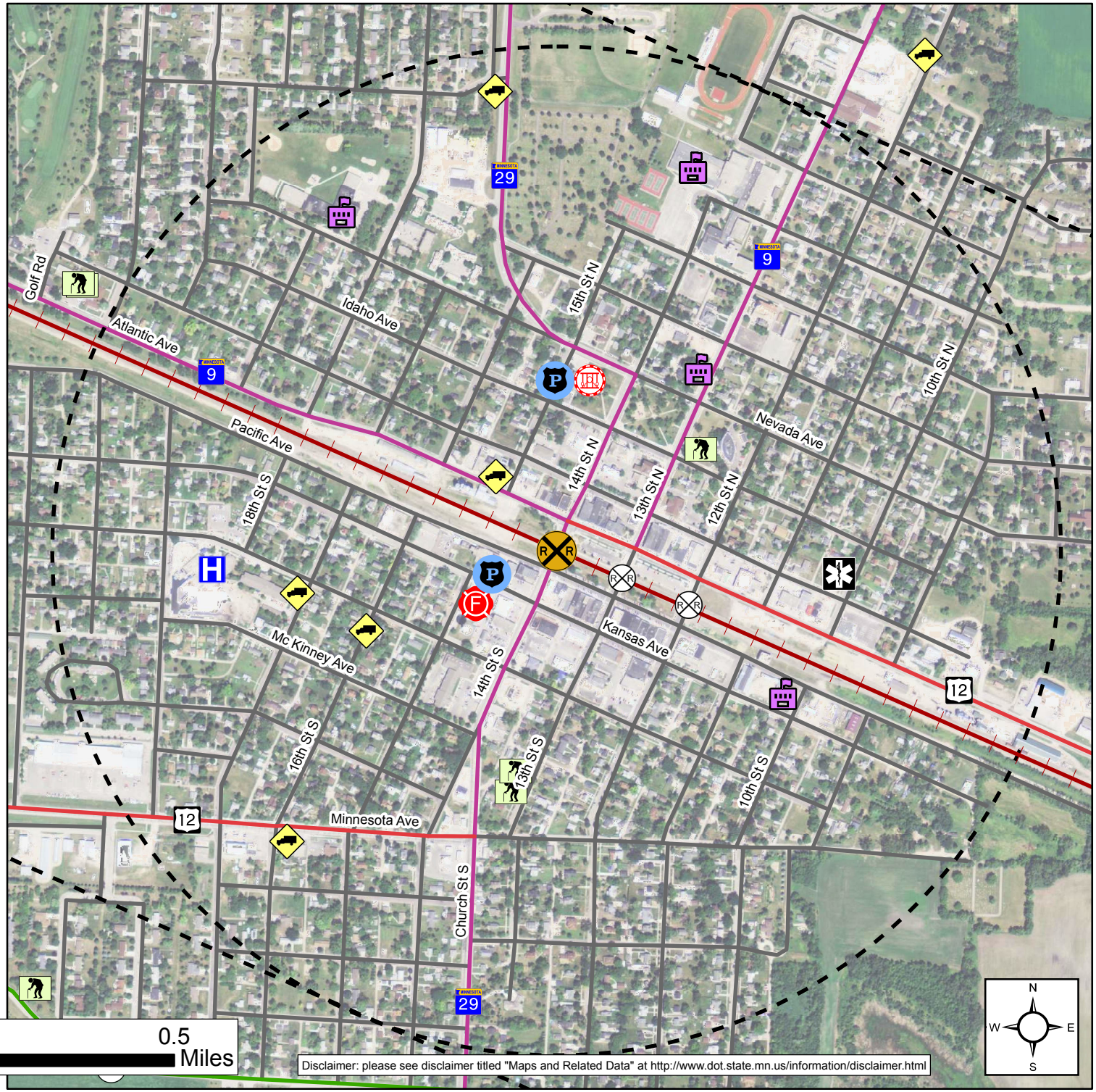


Disclaimer: please see disclaimer titled "Maps and Related Data" at http://www.dot.state.mn.us/information/disclaimer.html

Benson

BNSF

14th Street S (MN 29)
Benson, Swift County
USDOT# 067927M
Existing Warning Device(s):
Cants & Gates



- High Risk Crossing
- Other crossing
- Oil Train Route
- 1/2 Mile Buffer
- Police Station
- Fire Station
- EMS
- Hospital
- School
- Nursing Home
- Trucking Company
- Prison
- Interstate Highway
- U.S. Highway
- MN State Highway
- County Highway
- MSAS
- City Street

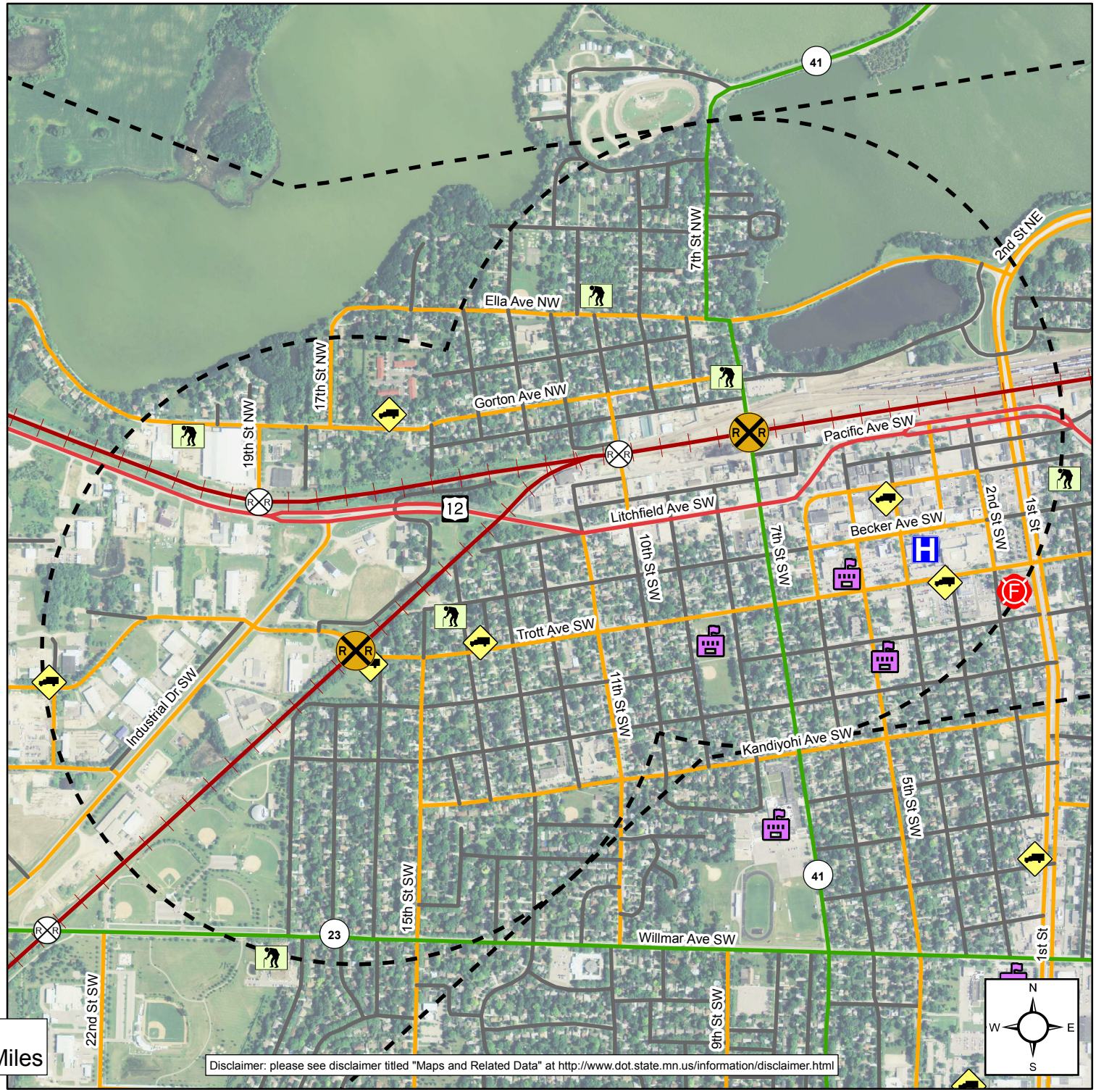
0 0.25 0.5 Miles

Disclaimer: please see disclaimer titled "Maps and Related Data" at http://www.dot.state.mn.us/information/disclaimer.html

Willmar

BNSF

Trott Ave SW, 7th St SW
Willmar, Kandiyohi County
USDOT# 367709F, 067834T
Existing Warning Device(s):
Gates, Medians (Trott Ave SW)
Cants & Gates (7th St SW)



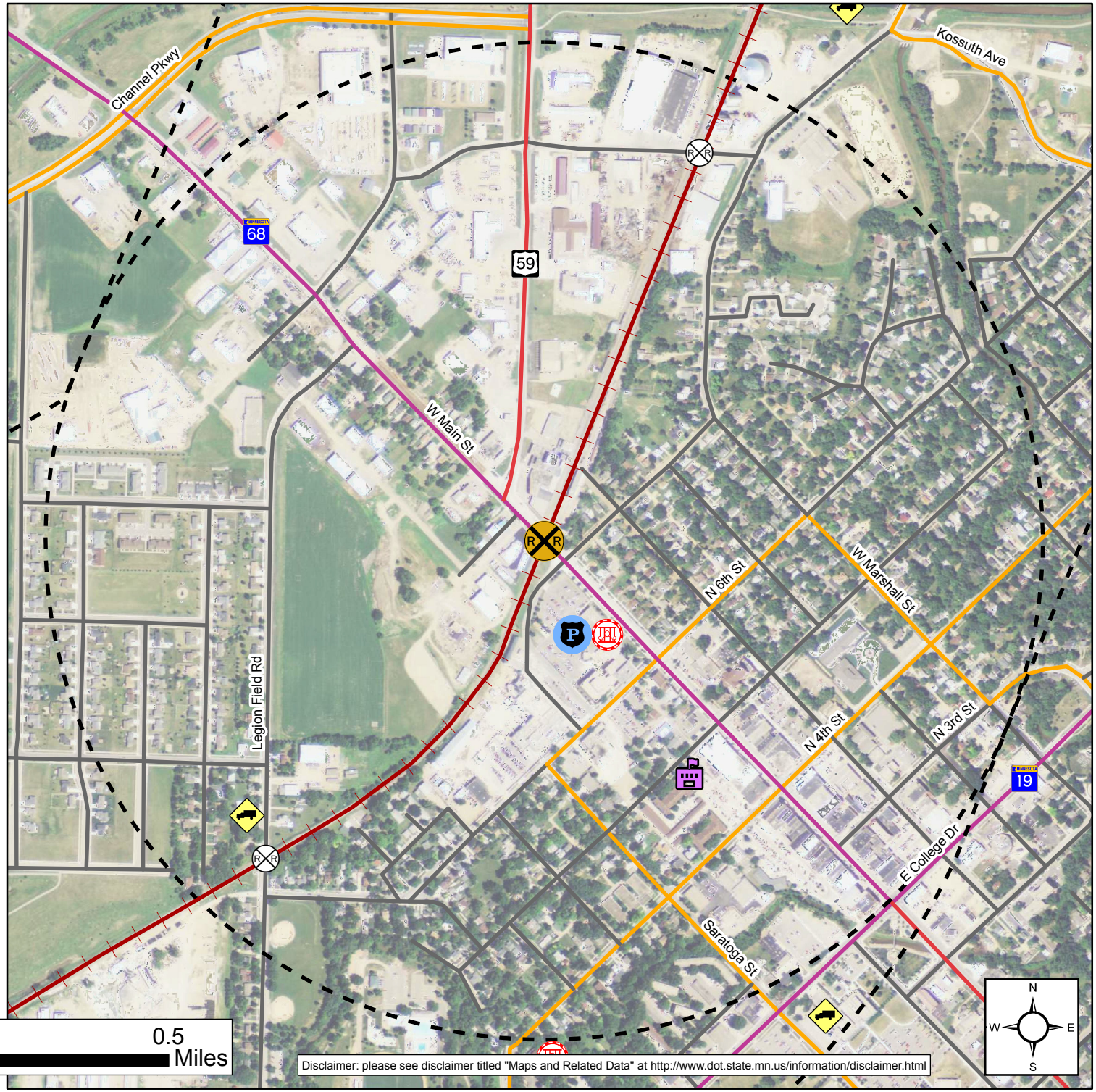
- High Risk Crossing
- Other crossing
- Oil Train Route
- 1/2 Mile Buffer
- Police Station
- Fire Station
- EMS
- Hospital
- School
- Nursing Home
- Trucking Company
- Prison
- Interstate Highway
- U.S. Highway
- MN State Highway
- County Highway
- MSAS
- City Street

0 0.25 0.5 Miles

BNSF

W Main Street (MN 68)
Marshall, Lyon County
USDOT# 067292F
Existing Warning Device(s):
Cants & Gates, Medians

Marshall



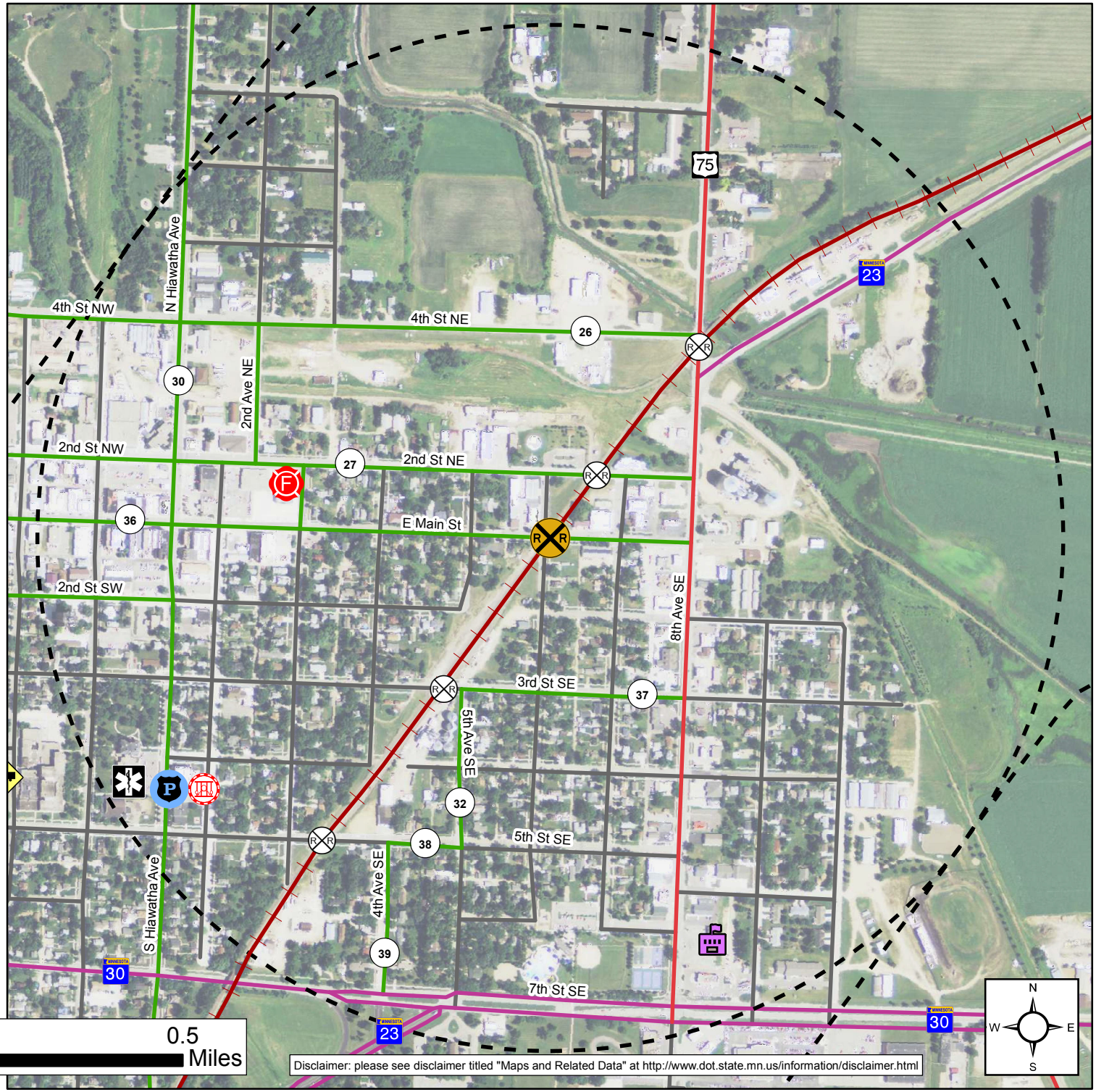
- High Risk Crossing
- Other crossing
- Oil Train Route
- 1/2 Mile Buffer
- Police Station
- Fire Station
- EMS
- Hospital
- School
- Nursing Home
- Trucking Company
- Prison
- Interstate Highway
- U.S. Highway
- MN State Highway
- County Highway
- MSAS
- City Street

0 0.25 0.5 Miles

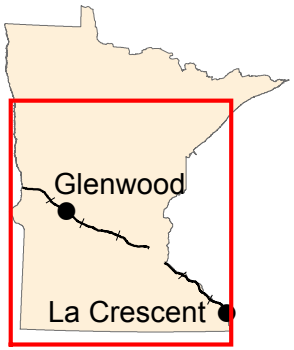
Pipestone

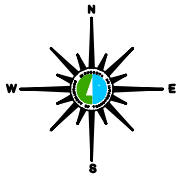
BNSF

E Main Street
Pipestone, Pipestone Co
USDOT# 097910R
Existing Warning Device(s):
Cants & Gates



CP/SOO Rail Oil Corridor: North Dakota Border to La Crescent





Rail Crossing

CP/SOO Rail Route

Interstate

Major River

0 25 50 100 Miles

Mississippi River

Red River

Minnesota River

Glenwood

Buffalo

Minneapolis

Saint Paul

Red Wing

Winona

La Crescent

94

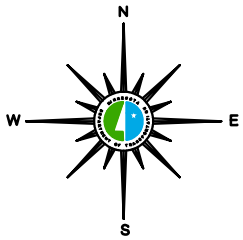
35

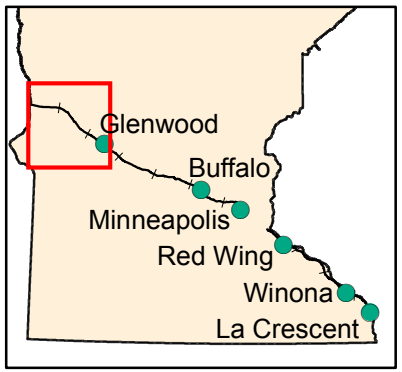
35

90

Disclaimer: please see disclaimer titled "Maps and Related Data" at http://www.dot.state.mn.us/information/disclaimer.html

CP/SOO Rail Route and Crossings: North Dakota Border to Glenwood Segment





Rail Crossing

CP/SOO Rail Route

Interstate

US Highway

MN Highway

City

Major River

0 5 10 20 Miles

Fergus Falls

Nashua
pop.69

Wendell
pop.177

Tintah
pop.79

Elbow Lake
pop.1275

Barrett
pop.335

Alexandria

Hoffman
pop.672

Kensington
pop.286

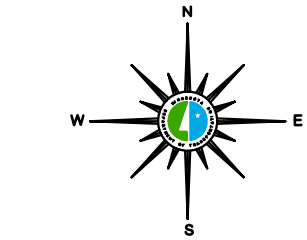
Farwell
pop.57

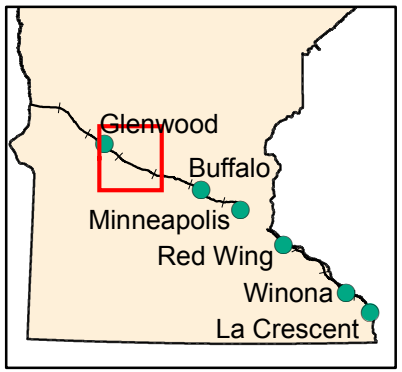
Lowry
pop.271

Glenwood
pop.2557

Disclaimer: please see disclaimer titled "Maps and Related Data" at http://www.dot.state.mn.us/information/disclaimer.html

CP/SOO Rail Route and Crossings: Glenview to Eden Valley Segment





Rail Crossing

CP/SOO Rail Route

Interstate

US Highway

MN Highway

City

Major River

0 5 10 20 Miles

Glenview
pop.2557

Sedan
pop.65

Brooten
pop.649

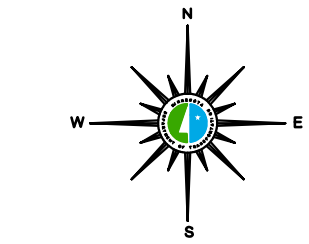
Belgrade
pop.750

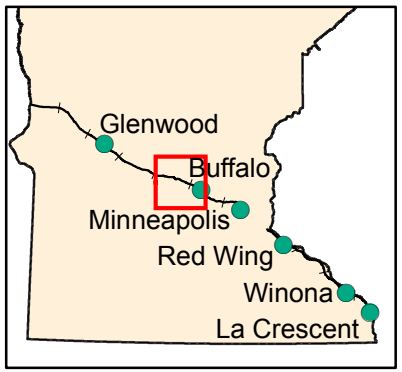
Regal
pop.40

Paynesville
pop.2267

Eden Valley
pop.866

CP/SOO Rail Route and Crossings: Eden Valley to Buffalo Segment





Rail Crossing

CP/SOO Rail Route

Interstate

US Highway

MN Highway

City

Major River

0 5 10 20 Miles

Eden Valley
pop.866

Watkins
pop.880

Kimball
pop.635

South Haven
pop.204

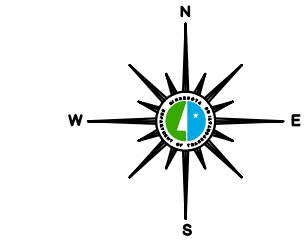
Annandale
pop.2684

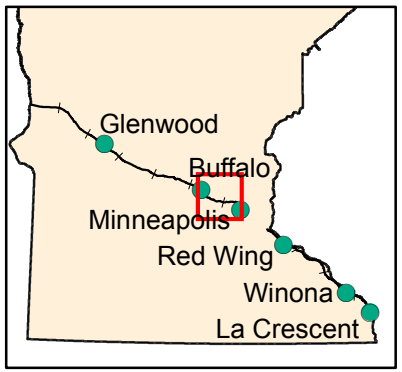
Maple Lake
pop.1633

Buffalo
pop.10,097

Disclaimer: please see disclaimer titled "Maps and Related Data" at http://www.dot.state.mn.us/information/disclaimer.html

CP/SOO Rail Route and Crossings: Buffalo to Minneapolis Segment





Rail Crossing

CP/SOO Rail Route

Interstate

US Highway

MN Highway

City

Major River

0 5 10 20 Miles

Buffalo
pop.10,097

Rockford
pop.3484

Greenfield
pop.2544

Corcoran
pop.5630

Independence
pop.3236

Medina
pop.4005

Maple Grove
pop.50,365

Plymouth
pop.65,849

Brooklyn Center
pop.29,172

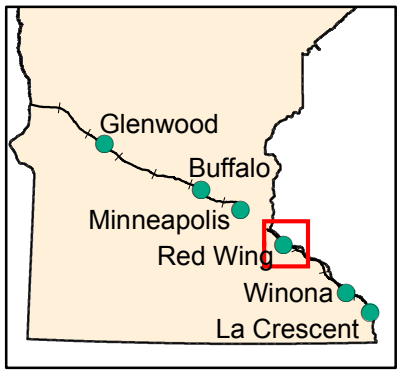
Crystal
pop.22,698

New Hope
pop.20,873

Robbinsdale
pop.14,123

Minneapolis
pop.382,618

CP/SOO Rail Route and Crossings: Hastings to Lake City Segment



Rail Crossing

CP/SOO Rail Route

Interstate

US Highway

MN Highway

City

Major River

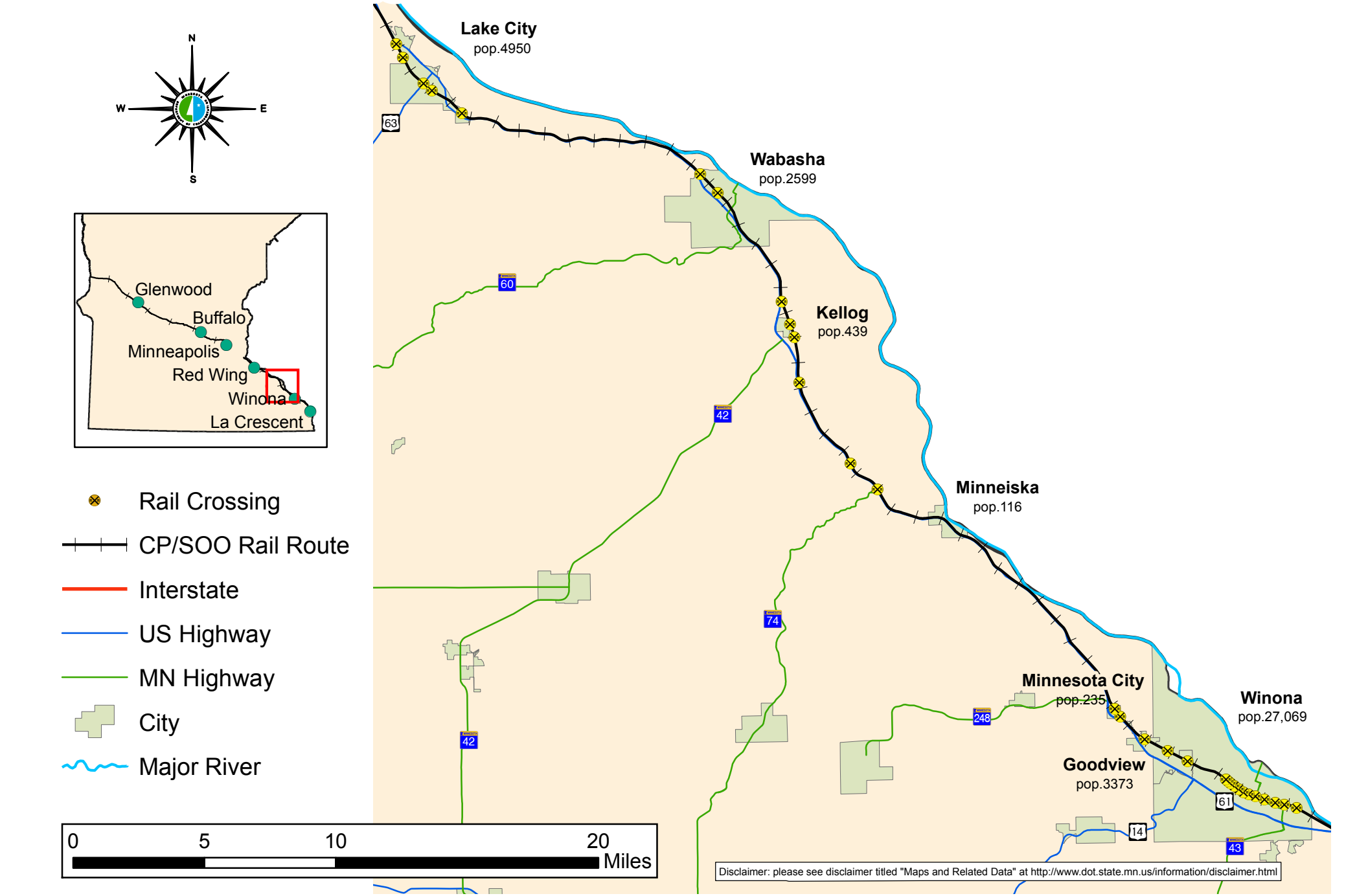
0 5 10 20 Miles

Hastings
pop.18,204

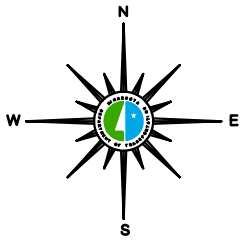
Red Wing
pop.16,116

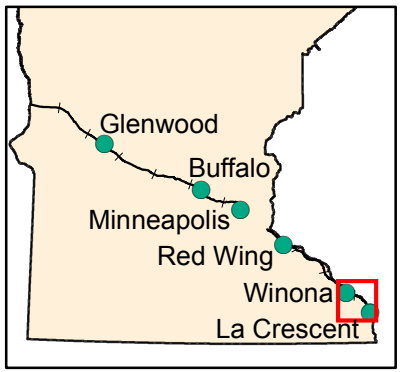
Lake City
pop.4950

CP/SOO Rail Route and Crossings:
Lake City to Winona Segment



CP/SOO Rail Route and Crossings:
Winona to La Crescent Segment





Rail Crossing

CP/SOO Rail Route

Interstate

US Highway

MN Highway

City

Major River

Winona
pop.27,069

Goodview
pop.3373

Dakota
pop.329

La Crescent
pop.4923

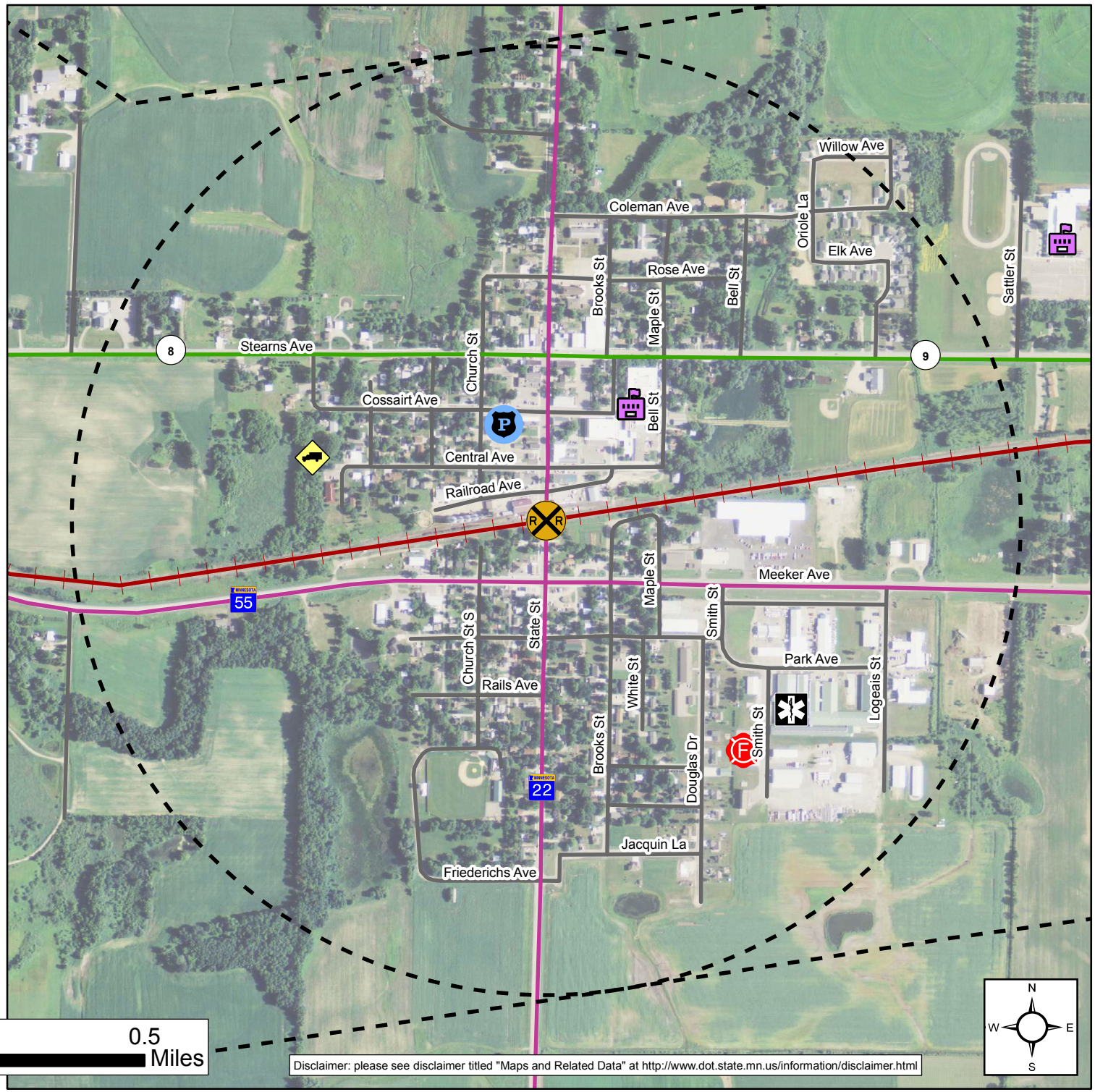
0 5 10 20 Miles

Disclaimer: please see disclaimer titled "Maps and Related Data" at http://www.dot.state.mn.us/information/disclaimer.html

Eden Valley

Canadian Pacific / SOO

State Street (MN 22)
Eden Valley, Meeker County
USDOT# 689257R
Existing Warning Device(s):
Gates



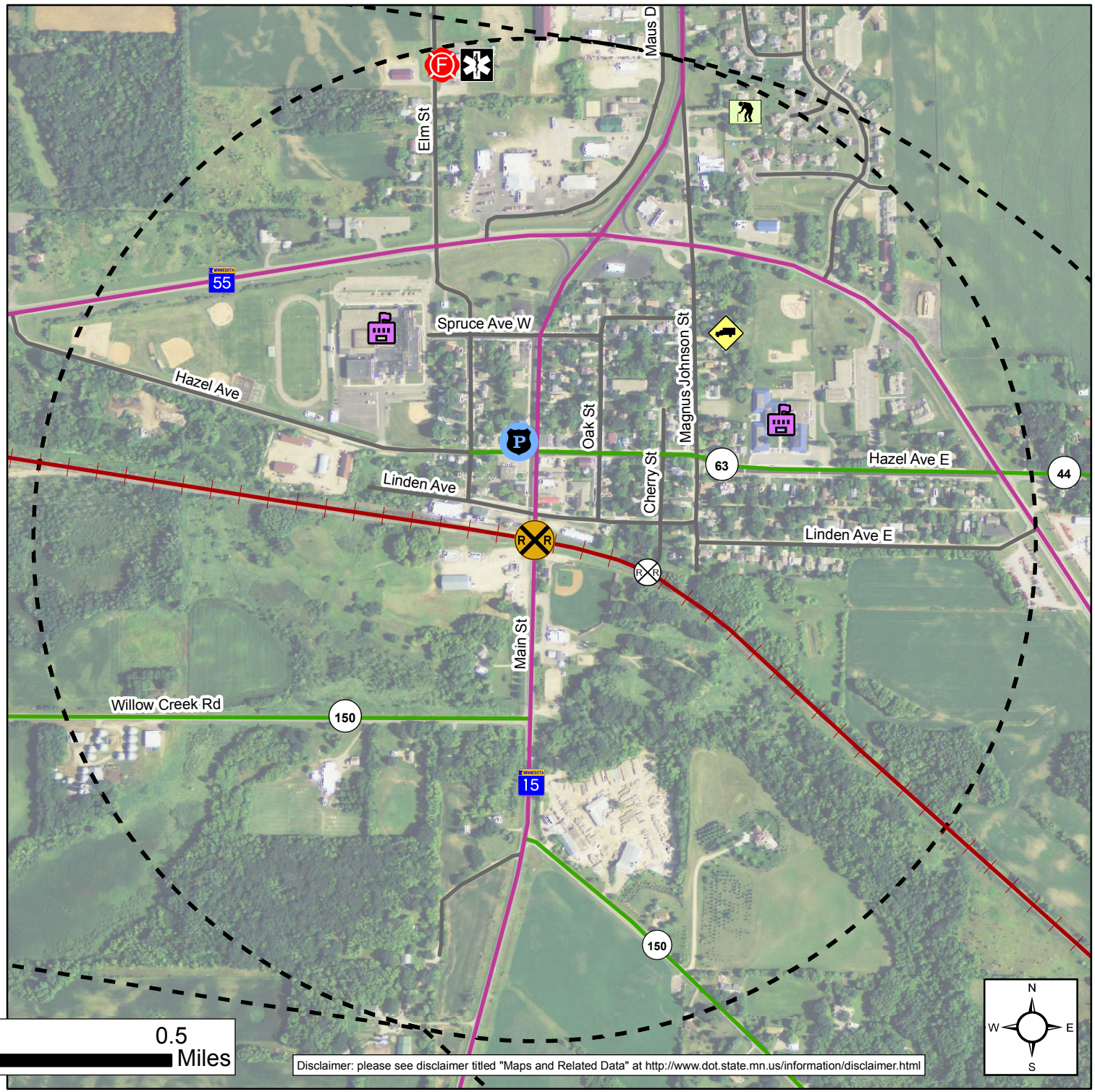
- High Risk Crossing
- Other crossing
- Oil Train Route
- 1/2 Mile Buffer
- Police Station
- Fire Station
- EMS
- Hospital
- School
- Nursing Home
- Trucking Company
- Prison
- Interstate Highway
- U.S. Highway
- MN State Highway
- County Highway
- MSAS
- City Street

0 0.25 0.5 Miles

Kimball

Canadian Pacific / SOO

Main Street (MN 15)
Kimball, Stearns County
USDOT# 689233C
Existing Warning Device(s):
Cants & Gates

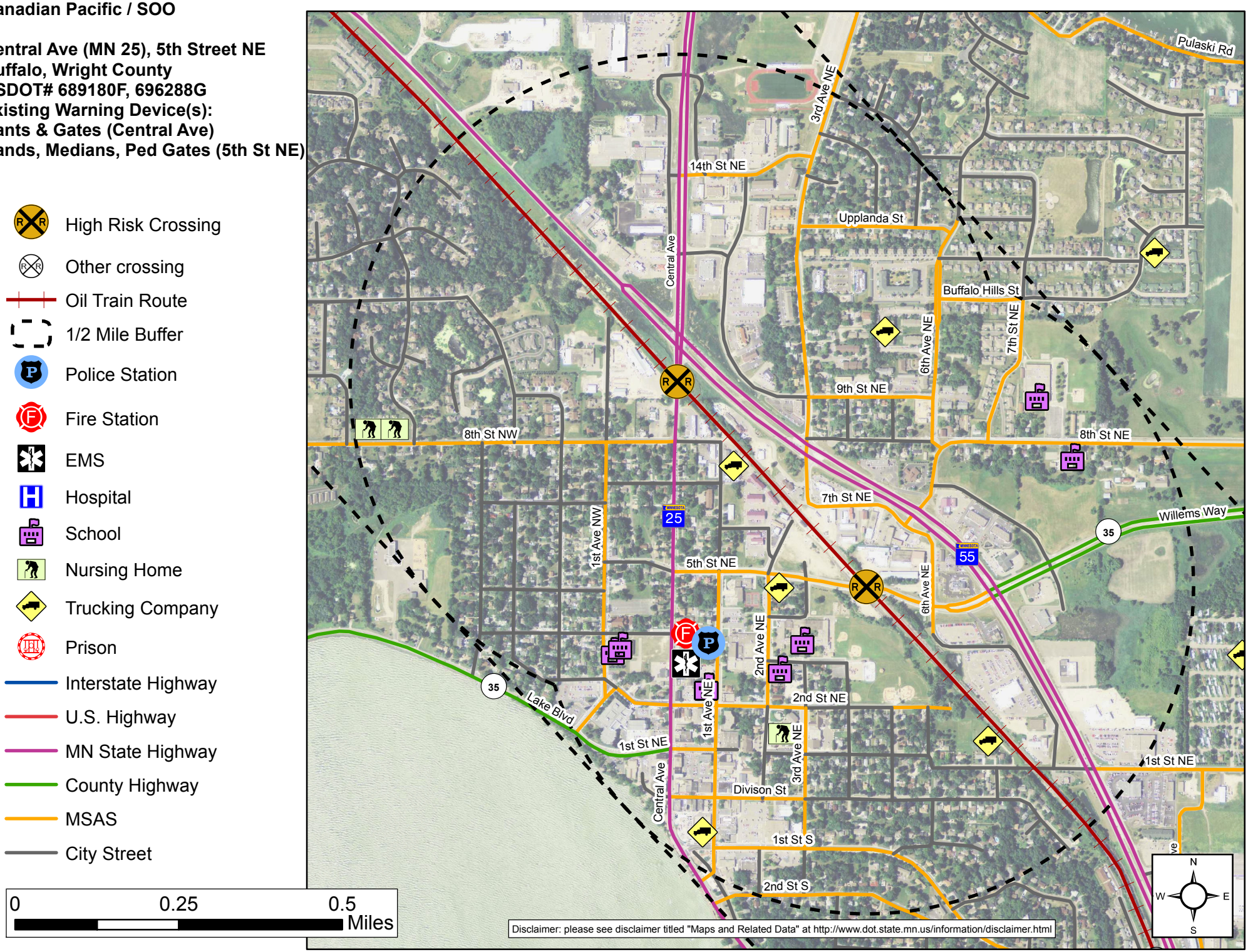


- High Risk Crossing
- Other crossing
- Oil Train Route
- 1/2 Mile Buffer
- Police Station
- Fire Station
- EMS
- Hospital
- School
- Nursing Home
- Trucking Company
- Prison
- Interstate Highway
- U.S. Highway
- MN State Highway
- County Highway
- MSAS
- City Street

Buffalo

Canadian Pacific / SOO

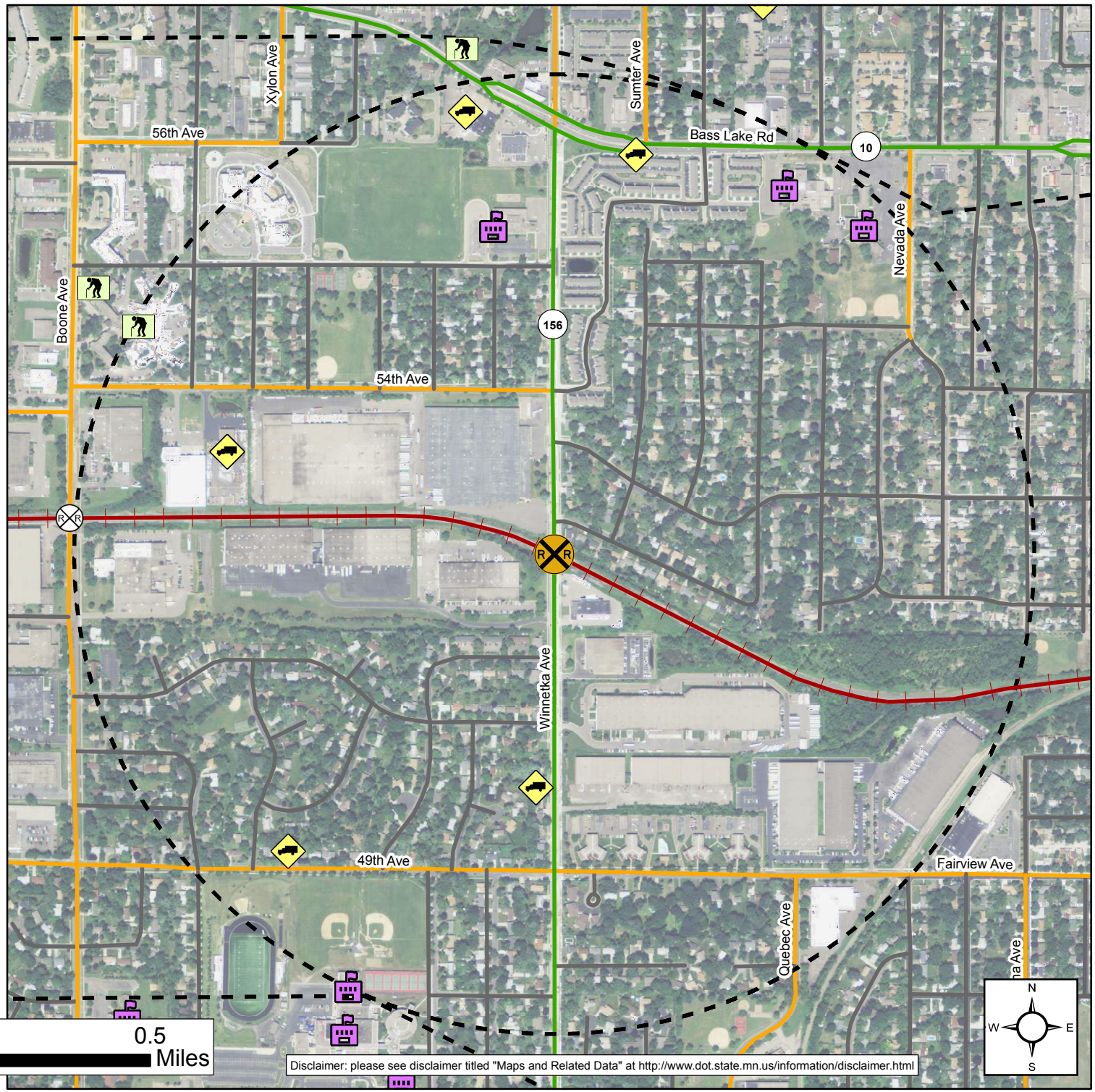
Central Ave (MN 25), 5th Street NE
Buffalo, Wright County
USDOT# 689180F, 696288G
Existing Warning Device(s):
Cants & Gates (Central Ave)
Cands, Medians, Ped Gates (5th St NE)



Canadian Pacific / SOO

Winnetka Avenue
New Hope, Hennpein County
USDOT# 688954Y
Existing Warning Device(s):
Cants & Gates

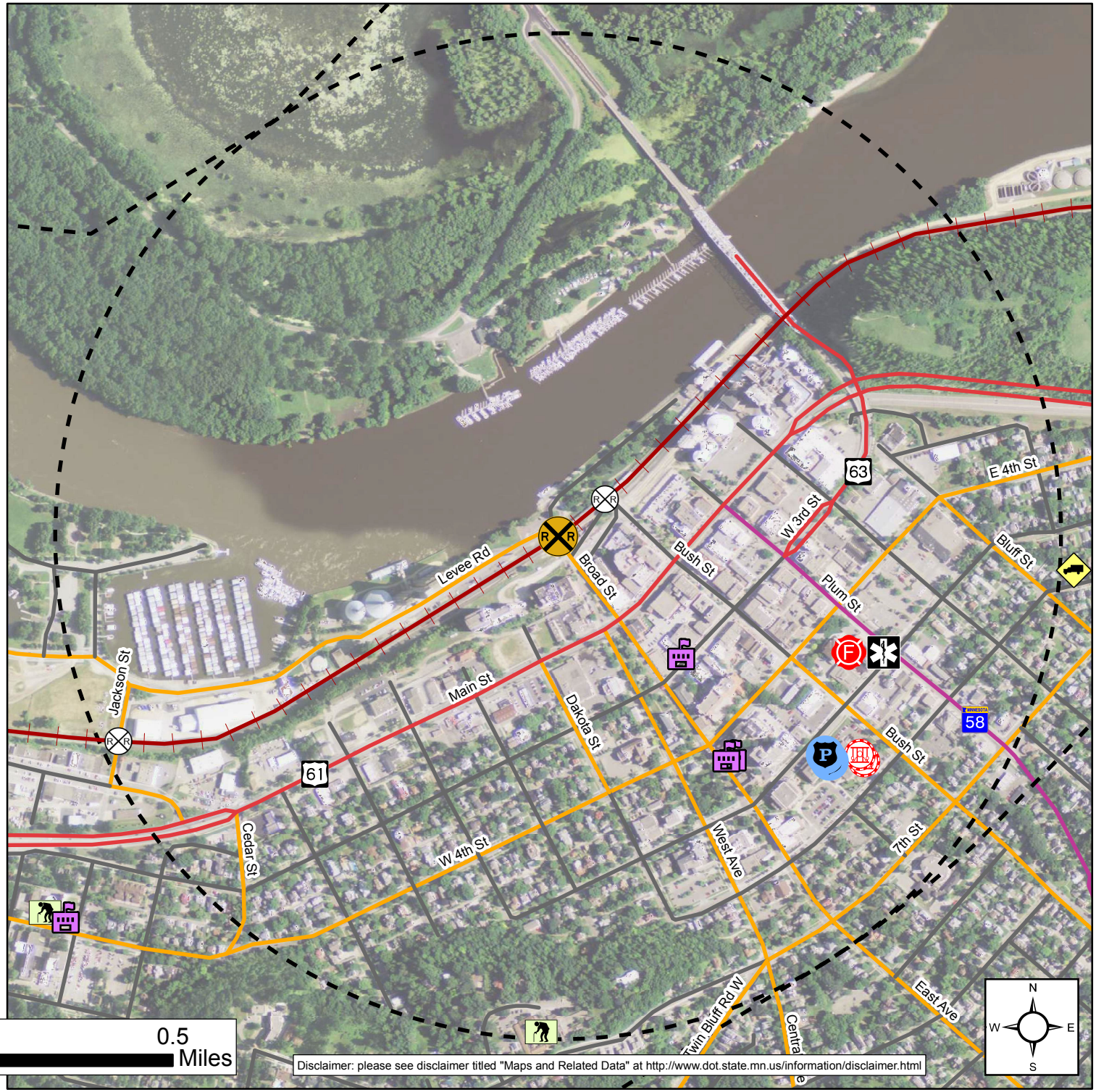
- High Risk Crossing
- Other crossing
- Oil Train Route
- 1/2 Mile Buffer
- Police Station
- Fire Station
- EMS
- Hospital
- School
- Nursing Home
- Trucking Company
- Prison
- Interstate Highway
- U.S. Highway
- MN State Highway
- County Highway
- MSAS
- City Street



Canadian Pacific / SOO

Broad Street
Red Wing, Goodhue County
USDOT# 391204N
Existing Warning Device(s):
4 Quad Gates

Red Wing



- High Risk Crossing
- Other crossing
- Oil Train Route
- 1/2 Mile Buffer
- Police Station
- Fire Station
- EMS
- Hospital
- School
- Nursing Home
- Trucking Company
- Prison
- Interstate Highway
- U.S. Highway
- MN State Highway
- County Highway
- MSAS
- City Street

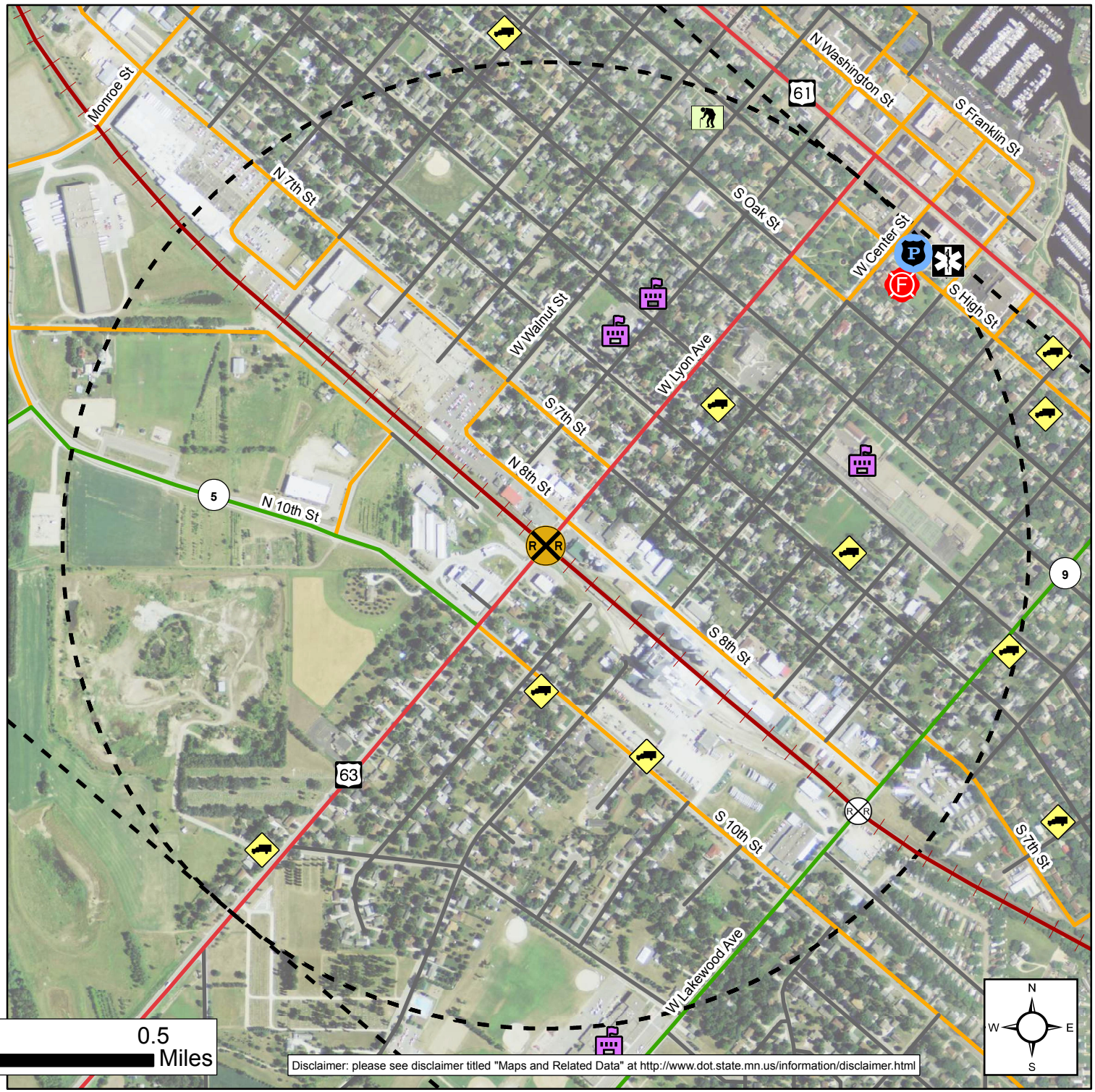
0 0.25 0.5 Miles

Canadian Pacific / SOO

W Lyon Avenue (US 63)
Lake City, Wabasha County
USDOT# 391174Y
Existing Warning Device(s):
Cants & Gates

- High Risk Crossing
- Other crossing
- Oil Train Route
- 1/2 Mile Buffer
- Police Station
- Fire Station
- EMS
- Hospital
- School
- Nursing Home
- Trucking Company
- Prison
- Interstate Highway
- U.S. Highway
- MN State Highway
- County Highway
- MSAS
- City Street

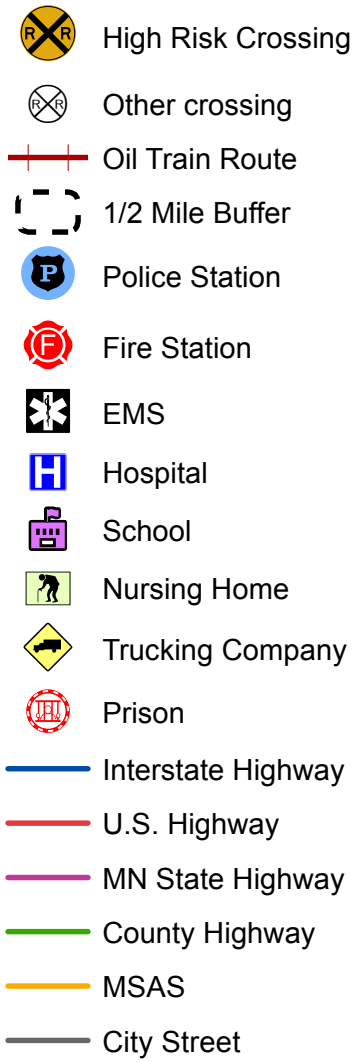
0 0.25 0.5 Miles

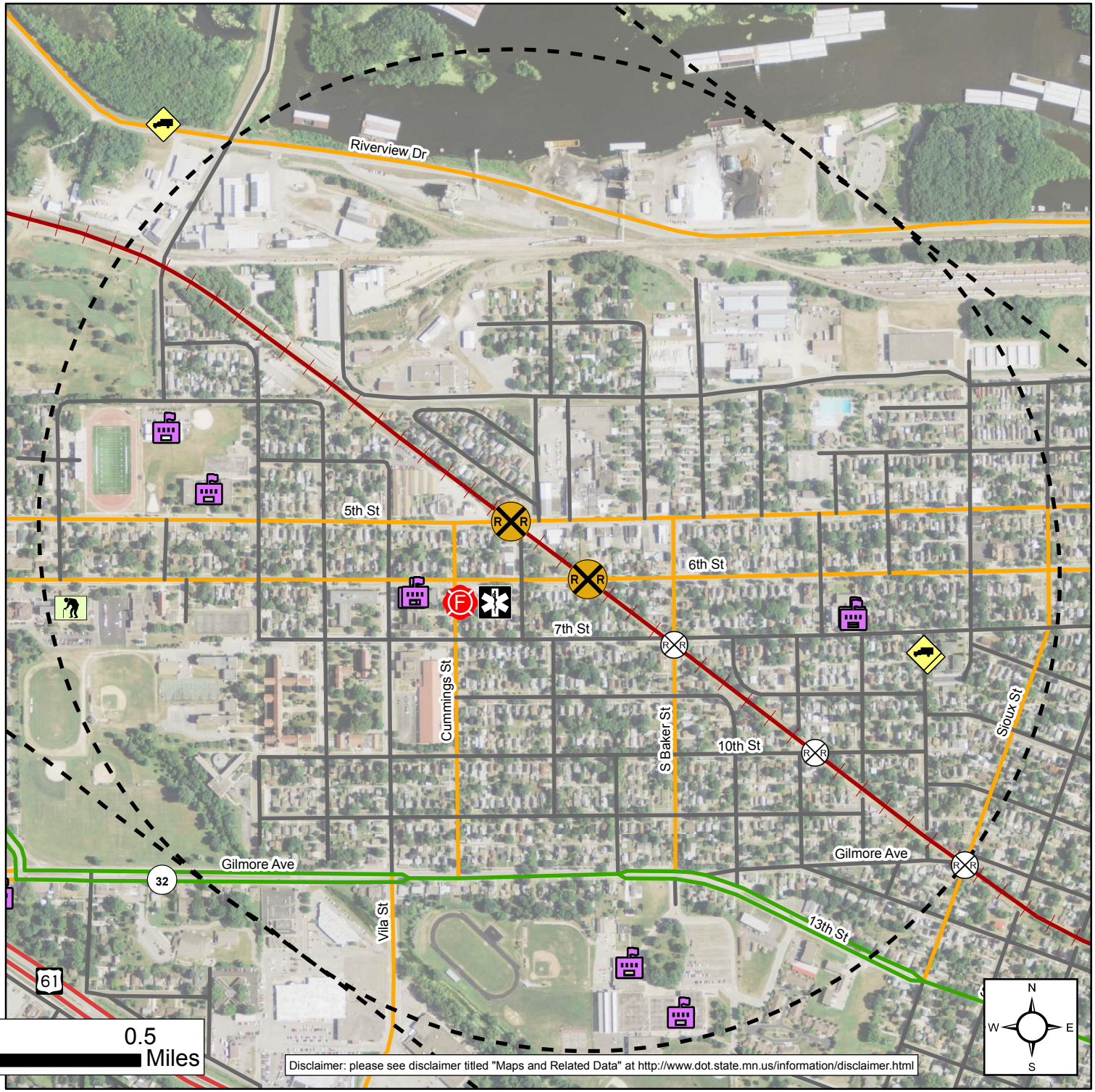


Winona

Canadian Pacific / SOO

5th St W, 6th S W
Winona, Winona County
USDOT# 391080X, 391079D
Existing Warning Device(s):
Cants & Gates, Medians (5th St W)
Cants & Gates (6th St W)





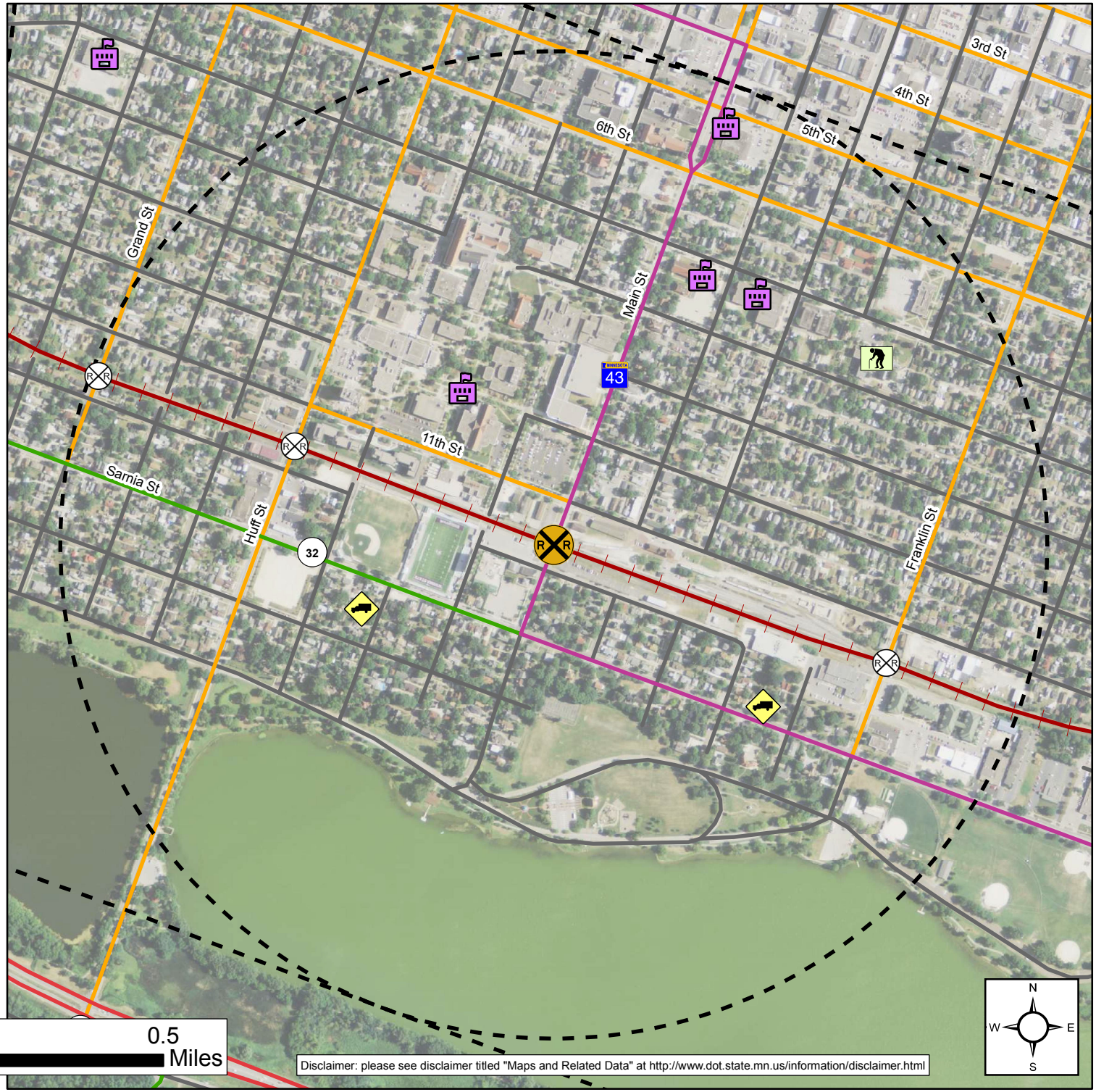
Canadian Pacific / SOO

Main Street (MN 43)
Winona, Winona County
USDOT# 391062A
Existing Warning Device(s):
Cants & Gates

- High Risk Crossing
- Other crossing
- Oil Train Route
- 1/2 Mile Buffer
- Police Station
- Fire Station
- EMS
- Hospital
- School
- Nursing Home
- Trucking Company
- Prison
- Interstate Highway
- U.S. Highway
- MN State Highway
- County Highway
- MSAS
- City Street

0 0.25 0.5 Miles

Winona



Corridor or Segment Map	Corridor Name	Segment Name
Corridor Map	BNSF1-Moorhead to Hastings	NA
Segment Map	BNSF1-Moorhead to Hastings	Moorhead to Detroit Lakes
Segment Map	BNSF1-Moorhead to Hastings	Detroit Lakes to Staples
Segment Map	BNSF1-Moorhead to Hastings	Staples to Sartell
Segment Map	BNSF1-Moorhead to Hastings	Sartell to Anoka
Segment Map	BNSF1-Moorhead to Hastings	Anoka to Minneapolis
Segment Map	BNSF1-Moorhead to Hastings	Minneapolis to Hastings
Corridor Map	BNSF2-Moorhead to IA Border	NA
Segment Map	BNSF2-Moorhead to IA Border	Moorhead to Breckenridge
Segment Map	BNSF2-Moorhead to IA Border	Breckenridge to Morris
Segment Map	BNSF2-Moorhead to IA Border	Morris to Willmar
Segment Map	BNSF2-Moorhead to IA Border	Willmar to Marshall
Segment Map	BNSF2-Moorhead to IA Border	Marshall to Pipestone
Segment Map	BNSF2-Moorhead to IA Border	Pipestone to IA Border
Corridor Map	CP/SOO-ND Border to La Crescent	NA
Segment Map	CP/SOO-ND Border to La Crescent	ND Border to Glenview
Segment Map	CP/SOO-ND Border to La Crescent	Glenview to Eden Valley
Segment Map	CP/SOO-ND Border to La Crescent	Eden Valley to Buffalo
Segment Map	CP/SOO-ND Border to La Crescent	Buffalo to Minneapolis
Segment Map	CP/SOO-ND Border to La Crescent	Hastings to Lake City
Segment Map	CP/SOO-ND Border to La Crescent	Lake City to Winona
Segment Map	CP/SOO-ND Border to La Crescent	Winona to La Crescent

Corridor	USDOT Number	City
BNSF1-Moorhead to Hastings	070798D, 062952D, 062949V	Moorhead
BNSF1-Moorhead to Hastings	070798D, 062952D, 062949V	Moorhead
BNSF1-Moorhead to Hastings	081018G	Detroit Lakes
BNSF1-Moorhead to Hastings	081018G	Detroit Lakes
BNSF1-Moorhead to Hastings	062847C	Frazee
BNSF1-Moorhead to Hastings	062847C	Frazee
BNSF1-Moorhead to Hastings	062826J, 062822G	Perham
BNSF1-Moorhead to Hastings	062826J, 062822G	Perham
BNSF1-Moorhead to Hastings	062779D, 062775B, 062773M	Wadena
BNSF1-Moorhead to Hastings	062779D, 062775B, 062773M	Wadena
BNSF1-Moorhead to Hastings	097617A	Staples
BNSF1-Moorhead to Hastings	097617A	Staples
BNSF1-Moorhead to Hastings	097668K	Little Falls
BNSF1-Moorhead to Hastings	097668K	Little Falls
BNSF1-Moorhead to Hastings	067248Y	St Cloud
BNSF1-Moorhead to Hastings	067248Y	St Cloud
BNSF1-Moorhead to Hastings	067245D	St Cloud
BNSF1-Moorhead to Hastings	067245D	St Cloud
BNSF1-Moorhead to Hastings	067230N	Clear Lake
BNSF1-Moorhead to Hastings	067230N	Clear Lake
BNSF1-Moorhead to Hastings	082517B	Becker Township
BNSF1-Moorhead to Hastings	082517B	Becker Township
BNSF1-Moorhead to Hastings	082946E, 082944R	Elk River
BNSF1-Moorhead to Hastings	082946E, 082944R	Elk River
BNSF1-Moorhead to Hastings	082926T	Anoka
BNSF1-Moorhead to Hastings	082926T	Anoka
BNSF1-Moorhead to Hastings	082811Y, 082810S	Coon Rapids
BNSF1-Moorhead to Hastings	082811Y, 082810S	Coon Rapids
BNSF1-Moorhead to Hastings	082978K	Minneapolis
BNSF1-Moorhead to Hastings	082978K	Minneapolis
BNSF1-Moorhead to Hastings	082992F	St Paul
BNSF1-Moorhead to Hastings	082992F	St Paul
BNSF1-Moorhead to Hastings	061138T	South St Paul
BNSF1-Moorhead to Hastings	061138T	South St Paul
BNSF2-Moorhead to IA Border	062936U, 062930D	Moorhead
BNSF2-Moorhead to IA Border	062936U, 062930D	Moorhead
BNSF2-Moorhead to IA Border	067931C, 067933R	Morris
BNSF2-Moorhead to IA Border	067931C, 067933R	Morris
BNSF2-Moorhead to IA Border	067927M	Benson
BNSF2-Moorhead to IA Border	067927M	Benson
BNSF2-Moorhead to IA Border	067834T, 067709F	Willmar
BNSF2-Moorhead to IA Border	067834T, 067709F	Willmar
BNSF2-Moorhead to IA Border	067282F	Marshall
BNSF2-Moorhead to IA Border	067282F	Marshall
BNSF2-Moorhead to IA Border	097910R	Pipestone
BNSF2-Moorhead to IA Border	097910R	Pipestone

CP/SOO-ND Border to La Crescent	689257R	Eden Valley
CP/SOO-ND Border to La Crescent	689257R	Eden Valley
CP/SOO-ND Border to La Crescent	689233C	Kimball
CP/SOO-ND Border to La Crescent	689233C	Kimball
CP/SOO-ND Border to La Crescent	689180F, 696288G	Buffalo
CP/SOO-ND Border to La Crescent	689180F, 696288G	Buffalo
CP/SOO-ND Border to La Crescent	688954Y	New Hope
CP/SOO-ND Border to La Crescent	688954Y	New Hope
CP/SOO-ND Border to La Crescent	391205V	Red Wing
CP/SOO-ND Border to La Crescent	391205V	Red Wing
CP/SOO-ND Border to La Crescent	391174Y	Lake City
CP/SOO-ND Border to La Crescent	391174Y	Lake City
CP/SOO-ND Border to La Crescent	391080X, 391079D	Winona
CP/SOO-ND Border to La Crescent	391080X, 391079D	Winona
CP/SOO-ND Border to La Crescent	391062A	Winona
CP/SOO-ND Border to La Crescent	391062A	Winona

Street Name	Extent of Map
5th St S, 8th St S (US 75), 11th St N	1/2 mile buffer of crossing(s)
5th St S, 8th St S (US 75), 11th St N	1-2 mile range of crossing(s)
Washington Ave	1/2 mile buffer of crossing(s)
Washington Ave	1-2 mile range of crossing(s)
Lake St N (MN 87)	1/2 mile buffer of crossing(s)
Lake St N (MN 87)	1-2 mile range of crossing(s)
NW 6th Ave, N 1st Ave	1/2 mile buffer of crossing(s)
NW 6th Ave, N 1st Ave	1-2 mile range of crossing(s)
2nd St SW, Jefferson St S (US 71), 1st St SW	1/2 mile buffer of crossing(s)
2nd St SW, Jefferson St S (US 71), 1st St SW	1-2 mile range of crossing(s)
6th St N (MN 210)	1/2 mile buffer of crossing(s)
6th St N (MN 210)	1-2 mile range of crossing(s)
Broadway W (MN 27)	1/2 mile buffer of crossing(s)
Broadway W (MN 27)	1-2 mile range of crossing(s)
E Saint Germain	1/2 mile buffer of crossing(s)
E Saint Germain	1-2 mile range of crossing(s)
15th Ave SE	1/2 mile buffer of crossing(s)
15th Ave SE	1-2 mile range of crossing(s)
Main Ave (MN 24)	1/2 mile buffer of crossing(s)
Main Ave (MN 24)	1-2 mile range of crossing(s)
165th Ave SE	1/2 mile buffer of crossing(s)
165th Ave SE	1-2 mile range of crossing(s)
Proctor Ave, Jackson St NW	1/2 mile buffer of crossing(s)
Proctor Ave, Jackson St NW	1-2 mile range of crossing(s)
Ferry St N (MN 47)	1/2 mile buffer of crossing(s)
Ferry St N (MN 47)	1-2 mile range of crossing(s)
Hanson Blvd, Egret Blvd	1/2 mile buffer of crossing(s)
Hanson Blvd, Egret Blvd	1-2 mile range of crossing(s)
Talmadge Ave SE	1/2 mile buffer of crossing(s)
Talmadge Ave SE	1-2 mile range of crossing(s)
Como Ave	1/2 mile buffer of crossing(s)
Como Ave	1-2 mile range of crossing(s)
Hastings Ave	1/2 mile buffer of crossing(s)
Hastings Ave	1-2 mile range of crossing(s)
8th St N, 11th St N	1/2 mile buffer of crossing(s)
8th St N, 11th St N	1-2 mile range of crossing(s)
W 7th St, W 5th St (MN 28)	1/2 mile buffer of crossing(s)
W 7th St, W 5th St (MN 28)	1-2 mile range of crossing(s)
14th St S (MN 29)	1/2 mile buffer of crossing(s)
14th St S (MN 29)	1-2 mile range of crossing(s)
7th St SW, Trott Ave SW	1/2 mile buffer of crossing(s)
7th St SW, Trott Ave SW	1-2 mile range of crossing(s)
W Main St (MN 68)	1/2 mile buffer of crossing(s)
W Main St (MN 68)	1-2 mile range of crossing(s)
E Main St	1/2 mile buffer of crossing(s)
E Main St	1-2 mile range of crossing(s)

State St (MN 22)	1/2 mile buffer of crossing(s)
State St (MN 22)	1-2 mile range of crossing(s)
Main St (MN 15)	1/2 mile buffer of crossing(s)
Main St (MN 15)	1-2 mile range of crossing(s)
Central Ave (MN 25), 5th St NE	1/2 mile buffer of crossing(s)
Central Ave (MN 25), 5th St NE	1-2 mile range of crossing(s)
Winnetka Ave	1/2 mile buffer of crossing(s)
Winnetka Ave	1-2 mile range of crossing(s)
Broad St	1/2 mile buffer of crossing(s)
Broad St	1-2 mile range of crossing(s)
W Lyon Ave (US 63)	1/2 mile buffer of crossing(s)
W Lyon Ave (US 63)	1-2 mile range of crossing(s)
5th St, 6th St	1/2 mile buffer of crossing(s)
5th St, 6th St	1-2 mile range of crossing(s)
Main St (MN 43)	1/2 mile buffer of crossing(s)
Main St (MN 43)	1-2 mile range of crossing(s)