WISCONSIN

BICYCLE/PEDESTRIAN

RAILROAD CROSSING SAFETY ACTION PLAN

October 2024

WISCONSIN DEPARTMENT OF TRANSPORTATION

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Introduction

Background

Railroad crossings represent critical interactions between rail and road transportation networks, where the convergence of trains, vehicles, and pedestrians, and bicyclists create inherent safety risks. Despite WisDOT's ongoing efforts to improve crossing safety, these critical locations continue to be vulnerable to accidents, including collisions, injuries, and fatalities. As traffic and pedestrian volumes increase in communities adjacent to railroad corridors in Wisconsin, the need for proactive safety measures becomes even more pressing.

The purpose of the **Bicycle/Pedestrian Railroad Crossing Safety Action Plan** (or "Bike/Ped SAP", for short) is to collect critical data and conduct a thorough analysis of Wisconsin's at-grade railroad crossings to present a framework for continued analysis and evaluation of the safety of active transportation users at Wisconsin's public at-grade rail crossings through ongoing and active discussion, collaboration, and the development of local partnerships.

This plan aims to provide the Wisconsin Department of Transportation (WisDOT) with a comprehensive, data-driven evaluation of railroad crossings specifically focused on the safety of active transportation users, including pedestrians, bicyclists, and wheelchair users, with the ultimate goal of identifying priority locations for investment and improvement. By using available data tools, this study systematically assesses at-grade railroad crossing risks exposure levels and operational conditions for these vulnerable populations at more than 3,800 at-grade crossings in the state.

The data-driven approach adopted for the Bike/Ped SAP utilizes innovative data collection and aggregation methods to leverage multiple data sets including historical incident data, multimodal traffic volumes, infrastructure inventory records, geometric designs, and local demographics to form a detailed safety profile for each crossing and cluster of crossings. An estimated risk score was calculated for each crossing after using these datasets to characterize the geometric and operational factors of each crossing that increase the hazard to non-motorized road users, approximate the number of interactions between non-motorized road users and trains at each crossing, and identify vulnerable populations near the crossings. The highest-risk crossings were then identified and grouped into high-priority corridors.

This methodology ensures that safety assessments are quantitative and evidence-based while still being sensitive to the populations and land uses in the study area. In addition to the quantitative data approach, this study also incorporates qualitative data through engagement of residents during statewide and targeted community engagement in communities identified with having elevated risk corridors operating within them. This

combined approach allows WisDOT to prioritize investments in the locations that will yield the greatest safety benefits while incorporating priorities of community members.

The outcomes and recommendations included in this safety action plan will support WisDOT's mission of enhancing public safety, reducing transportation-related risks, and ensuring the efficient movement of goods and people. By identifying high-priority corridors where there are clusters of high-risk crossings for further engineering study and funding consideration, this action plan will inform future capital investment decisions, foster collaboration with local communities in need of investment, and align with federal safety guidelines and processes.

In the following sections, the action plan outlines the methodology used to evaluate bicycle and pedestrian crossing safety, the process for screening and prioritizing high-risk crossings and corridors, and the recommendations for a suite of implementable safety improvements. This comprehensive evaluation will provide WisDOT with actionable insights, ensuring that future investments are strategically directed to mitigate the highest risks and achieve the greatest impact.

For this Bike/Ped SAP, railroad crossings are defined as locations where vehicles, pedestrians, and bicyclists are legally allowed to cross railroads. Crossings can be either grade separated or at grade. Grade separated crossings have roadways and pathways crossing railroads at different levels by using tunnels or bridges. These types of crossings are safer because different transportation modal users do not interact with each other. At-grade railroad crossings are locations where trains, pedestrians, bicyclists, and vehicles cross at the same level which can sometimes lead to hazardous interactions and dangerous consequences when incidents occur. This study focuses on improvements that can be made to public at grade crossings.

Connection to WisDOT's Vision

The vision of Wisconsin's transportation system is of an integrated multimodal transportation system that maximizes the safe and efficient movement of people and goods throughout the state, enhancing economic productivity and the quality of Wisconsin's communities while minimizing impacts to the natural environment. This plan places additional emphasis on equity and environmental justice of populations adjacent to railroad corridors. Railroads have been an integral part of Wisconsin's transportation system since 1847 (a year before Wisconsin had even become a state), when the state's first rail service was introduced. Wisconsin has a long history of involvement in rail transportation, from planning and policy development to financial support.

In 2022, WisDOT finalized its statewide long-range transportation plan (LRTP), known as Connect 2050. One of the eight goals of the plan is "maximize Transportation Safety" and four of the related safety objectives were related to rail crossing safety:

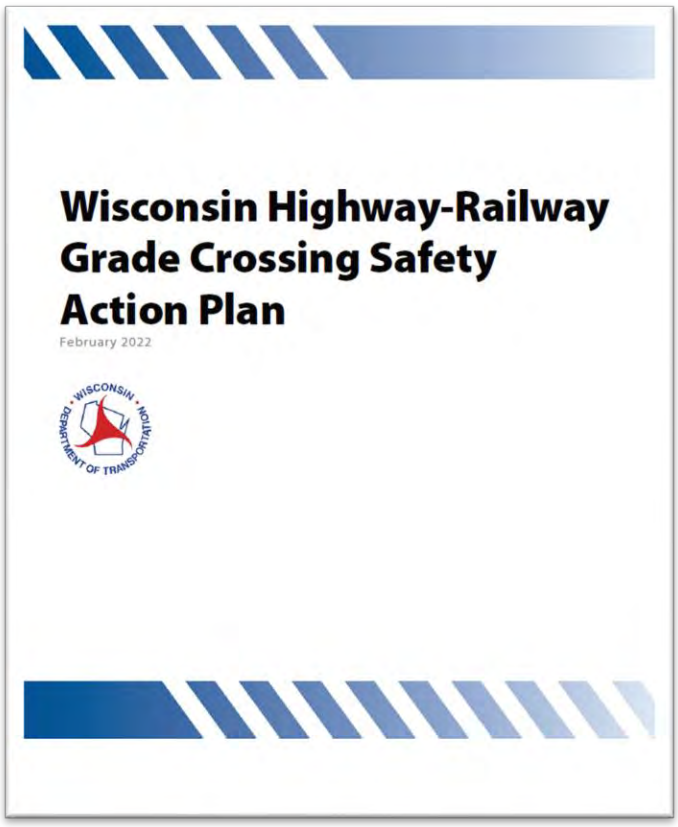
- Develop and maintain a system that is safe and secure
- Strategically align resources to make progress toward the goal of zero fatalities in Wisconsin
- Leverage data and technology to improve safety

1. This active transportation plan is Wisconsin's first ever bicycle/pedestrian railroad crossing safety action plan and builds on the state's highway-railroad crossing safety action plan completed and submitted to the Federal Railroad Administration (FRA) in 2022.

2. This plan reviews available data and uses data modeling tools to understand travel patterns of active transportation users near railroad crossings.

3. The plan analyzes at-grade highway-railroad, pathway, and trail crossings in Wisconsin to identify those that are exhibiting a high-risk for incidents, suicides, and trespassing.

4. The plan examines high-risk corridors and collaborates with local partners to understand safety issues.



5. The plan summarizes DOT strategies and potential improvements to reduce grade crossing risks for active transportation users.

Research and implement innovative safety solutions that involve education, engineering, enforcement, emergency management, and everyone. Improving safety at highway-rail grade crossings continues to be a major public safety concern, and liability, for both railroads and public agencies. Due to increasing highway and rail volumes, as well as increasing train speeds and lengths, highway-railroad grade crossing safety for all modal users will continue to be a priority for WisDOT.

Wisconsin Railroad Crossing Safety Program

WisDOT Railroad Crossing Safety Rules/Statutes

Highway-rail and pathway at-grade crossing safety requires continuous, comprehensive, and cooperative planning and evaluation as an important component of the state's multimodal transportation system. State statutes, plans, and funding programs work in concert to provide realistic strategies, measures, and processes to improve safety across Wisconsin. This section provides a summary of current statutes, programs, and funding sources available for improving bicycle and pedestrian crossing safety in Wisconsin.

While the implementation of this plan is primarily WisDOT responsibility, there are other partners that are necessary for the successful implementation of this plan and for the improvement of rail crossing safety. Those integral partners include the Office of Commissioner of Railroads (OCR), Federal Railroad Administration (FRA), railroad operators and owners, local units of government, first responders, Operation Lifesaver representatives, and law enforcement officials.

The Wisconsin statutory references that relate to Wisconsin railways and highway-rail and pathway grade crossings include:

- Chapter 84.05: Railroad crossing improvements.
- Chapter 85: Rail program rules, railroad projects and competitive bidding, and acquisition of abandoned rail property.
- Chapter 86: Miscellaneous highway provisions including highway/railroad grade crossings (86.11, 86.12, 86.13, 86.135)
- Chapter 189: Office of the Commissioner of Railroads, powers, and duties
- Chapter 190: Railroads, organization and management including powers of railroads and railroad consolidation; sale or lease of property.
- Chapter 191: Railroads, construction, including railroad extensions.
- Chapter 192: Railroads, regulations and liabilities including railroad train crews, and trespassing on railroads.
- Chapter 195: Railroad regulation, including protecting grade crossings, advance warning signs, rail crossing warning devices (195.28), and new and altered rail crossings (195.29)
- Chapter 349.085: Authority to install stop signs at railroad grade crossings.

WisDOT Transportation Plans and Guiding Programs

WisDOT Transportation Plans

Wisconsin State Rail Plan

In July 2023, WisDOT adopted the Wisconsin Rail Plan 2050. The Wisconsin Rail Plan 2050 includes policies for railroad crossings, freight rail, Wisconsin's state-owned rail system, long distance passenger rail, intercity rail, and commuter rail. The plan specifically discusses rail data trends, existing and future service levels, rail system conditions, commodity freight movements, and includes a list of future rail-related improvements. This SAP is consistent with the policies in the Wisconsin Rail Plan. The plan's website is www.wisdotplans.gov/plan/wrp2050.

Guiding Programs

Section 130 Program

The Section 130 Highway-Rail Crossing Safety Program is an FHWA program that provides funds to states for the elimination of hazards at highway-rail and pathway crossings including crossings at roadways, trails, and pathways. In Wisconsin, this program is a partnership between OCR, WisDOT, railroad companies, and sometimes local communities. WisDOT and OCR participate in regularly scheduled meetings and ongoing coordination regarding the selection and delivery of projects in the OCR safety program. FRA staff also participate in bi-monthly meetings to review projects and current issues.

Office of the Commissioner of Railroads (OCR)

The OCR Crossing Safety Program is a 4-year program that has annual program limits of $2.7 million of Section 130 federal funding with a $1.7 million state match. The $1.7 million of state funds can be used only on warning devices. A focus of the program is to improve crossing safety by upgrading both antiquated crossing warning devices and upgrading passive warning devices to active. Candidate crossings are selected using a statewide benefit/cost analysis and ultimately, approximately 12 - 15 crossings are improved each year.

WisDOT's Safety Program

The WisDOT Crossing Safety Program is a 4-year program utilizing $592,000 of Section 130 federal funds. Improvements fall under two categories – warning device improvements and elimination of hazards.

1. Replacing obsolete equipment as identified by the railroad. Funding is a 50/50 split between federal and railroad dollars.

2. Elimination of hazards as identified by WisDOT, OCR, and/or local municipalities. Funding is a 90/10 split between federal and railroad or local dollars. Geometric improvements, elimination of hazards, installation of warning devices at passive crossings, and standalone preemption upgrades may be considered.

3. Crossing consolidation incentive payments are also funded with elimination of hazard funds. WisDOT can match railroad incentive funds with up to $30,000 federal Section 130 funds. These are 100% federal funds, and no state match is required.

In fall of 2020 and again in August 2021, WisDOT solicited all the partner railroad companies for lists of projects eligible for the 50/50 program. The programming team has programmed projects through fiscal year 2024 and plans to send another solicitation to rail partners to fill out the program to 2026.

WisDOT Railroad Related Programs

Statewide Transportation Improvement Program

The Statewide Transportation Improvement Program (STIP) required by 23 CFR 450.216 is a four-year prioritized listing of highway and transit projects for the state of Wisconsin. The STIP includes both capital and non-capital projects that are federally funded or considered regionally significant in both urban and rural areas. The STIP incorporates the Transportation Improvement Programs (TIPs) prepared by the state's 14 Metropolitan Planning Organizations (MPOs) by reference. Approval of the STIP is done jointly by the Federal Highway Administration and the Federal Transit Administration and constitutes formal approval of the incorporated MPO TIPs.

As discussed in the funding programs section of this SAP, many highway projects include a rail crossing component. WisDOT routinely includes improvements to crossing surfaces and warning devices when highway projects involve grade crossings. WisDOT Railroads and Harbors Section is involved in all highway projects with federal funding to coordinate crossing surface and warning device upgrades. OCR makes the final determination on cost apportionment for these improvements and warning device adequacy. Standalone warning device and crossing surface projects are included in the STIP.

Signal Maintenance

Railroads are solely responsible for maintaining and operating all warning devices at crossings. To help offset these costs, Wisconsin has a state program that reimburses railroads for up to 50% of their signal maintenance expenses. The amount of reimbursement is determined by the number of signal units at each crossing. While the state allocates funds for this program, in recent years, these funds have fallen short of covering 50% of the total costs. As a result, reimbursements are often prorated based on the available funds. OCR administers this program. For more detailed information, please refer to the Railroads & Harbors Section's Railroad Coordination Handbook.

Crossing Surface Repair Program

The Crossing Surface Repair Program is programmed at $467,300 of state funds per year with an 85/15 funding split between the State and railroad. Only crossing surfaces on state highways, not within Connecting Highway limits, are eligible for this program. Due to the fast nature of crossing surface degradation, the program is typically programed two years in advance.

Generally, crossing surfaces are replaced or improved within the highway improvement program. This program covers the replacement of railroad crossings on the state highway system that are in poor condition and do not have programmed improvement projects. The Rails and Harbors Section of WisDOT has developed a ranking system to rate the crossings on a scale from very good to poor, providing a standardized methodology for the prioritization of eligible crossings for the programming process. This effort was designed to be based on an every-other-year field review and subsequent statewide ranking. In 2019, the statewide data was gathered on all crossings eligible for this program. Another statewide field review was completed in 2024.

Ongoing Railroad Safety Education and Awareness Efforts

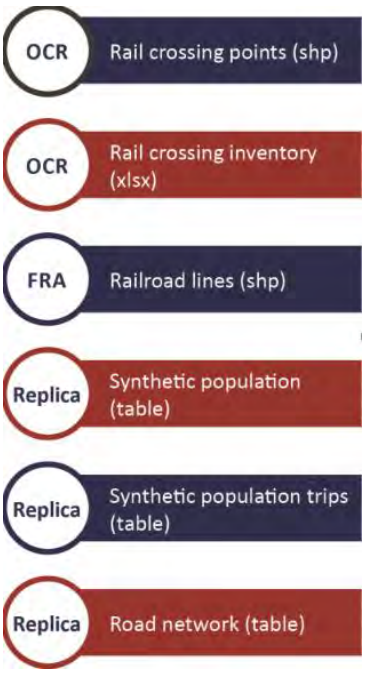
Operation Lifesaver

Wisconsin Operation Lifesaver (OLI) is a non-profit safety education and awareness program dedicated to reducing incidents, fatalities, and injuries at highway-rail grade crossings and on railroad rights of way in the State of Wisconsin. Wisconsin Operation Lifesaver offers free presentations to all age groups and targeted audiences that include bus drivers, professional truck drivers, law enforcement, first responders, and school children. Operation Lifesaver educates the public on making safe decisions on or near railroad property. Wisconsin Operation Lifesaver is supported by railroads operating in Wisconsin, private citizens, corporations, and an energetic team of volunteers and members. (source: https://oli.org/)

Data Collection and Analysis

Wisconsin Railroad Crossing Information

Several data sources were used for this study. Data from the FRA was used to understand the physical conditions at each crossing. FRA collects and manages a variety of data points about every crossing in the country ranging from the number of tracks at each crossing and skew of those tracks, to the speed and number of trains that use the crossing each day. This data was collected, and an analysis of high-risk corridors was performed using attributes determined to increase the chances of a crash taking place at the crossings.



Demographic data was also compiled and analyzed to understand the people who would be using the crossings. Not every person is equally likely to be involved in a crash with a train as a bicyclist or pedestrian. For example, people who do not have access to a personal motor vehicle are more likely to travel by walking or riding a bike, increasing the likelihood they would be using a crossing outside of a vehicle. Certain groups of people are also vulnerable including children, elderly, Black, Indigenous, and People of Color (BIPOC), and people with low incomes. Places in the state that had a higher proportion of the populations more likely to be involved in train crashes were prioritized in the analysis.

Another important data point to the study is the number of trips crossing a given railroad crossing. Because it is impractical to count the number of people crossing at every railroad crossing in the state, the study instead used data from Replica to estimate the number of crossings. Replica is a “big data” company that collects and analyzes data trends on transportation and economic topics and can estimate the number of trips taken along roadways with fairly reliable accuracy. Replica’s data was used to estimate the number of bicycle and pedestrian trips at railroad crossings so the crossings with the most pedestrian and bicycles trips could be prioritized over crossings with few trips over the crossing.

Wisconsin Bicycle and Pedestrian Railroad Crossings

While historical crash data can provide insights into potential hazards on railroad corridors, relying solely on these numbers can be misleading. Due to the low frequency of major rail accidents compared to other modes of transportation, the sample size of past incidents is often small. This limited data can lead to skewed statistical analysis, making it difficult to accurately predict future crash likelihoods. Factors such as changes in infrastructure, equipment, operating procedures, and external conditions can significantly influence the risk of accidents, making historical data less reliable for forecasting future trends.

With the understanding that past crashes are not reliable predictors of where future crashes could take place, recognizing these crashes and the impact they have had on real people and families is important. These crashes can occur at railroad crossings, along tracks, or on bridges. Accidents at railroad crossings typically involve unintentional collisions between trains and vehicles or pedestrians. These can be caused by many factors.

Trespassing incidents occur when individuals intentionally enter restricted areas of railroad property, such as tracks or bridges. Most trespassing goes unreported without an accident. Railroad companies report to the FRA when a crash happens. They also report when they witness. Due to lack of reporting of trespasser activity on the part of the railroads the Wisconsin DOT frequently utilizes the FRA trespasser dashboard webpage and fatality map web page to help assess trespasser hotspots and direct trespasser prevention efforts. Suicide by train involves individuals intentionally ending their lives by placing themselves in the path of a moving train. This is a complex issue with various contributing factors, including mental health conditions and personal crises and because of the intentional nature of those crashes, those crash locations were not included in the study.

Since 2013, there have been 104 crashes on railroads involving pedestrians or bicyclists statewide. Sixty-six of the crashes occurred within a city or village, while the remaining 38 took place in rural areas of the state. Figure 1 illustrates where those crashes took place. Table 1 shows the track milage and number of pedestrian and bicycle crashes of each of the 16 rail companies that own track in Wisconsin between 2013 and 2022.

Previous Crashes

Figure 1: Bike-Ped Crashes (2013 - 2022)

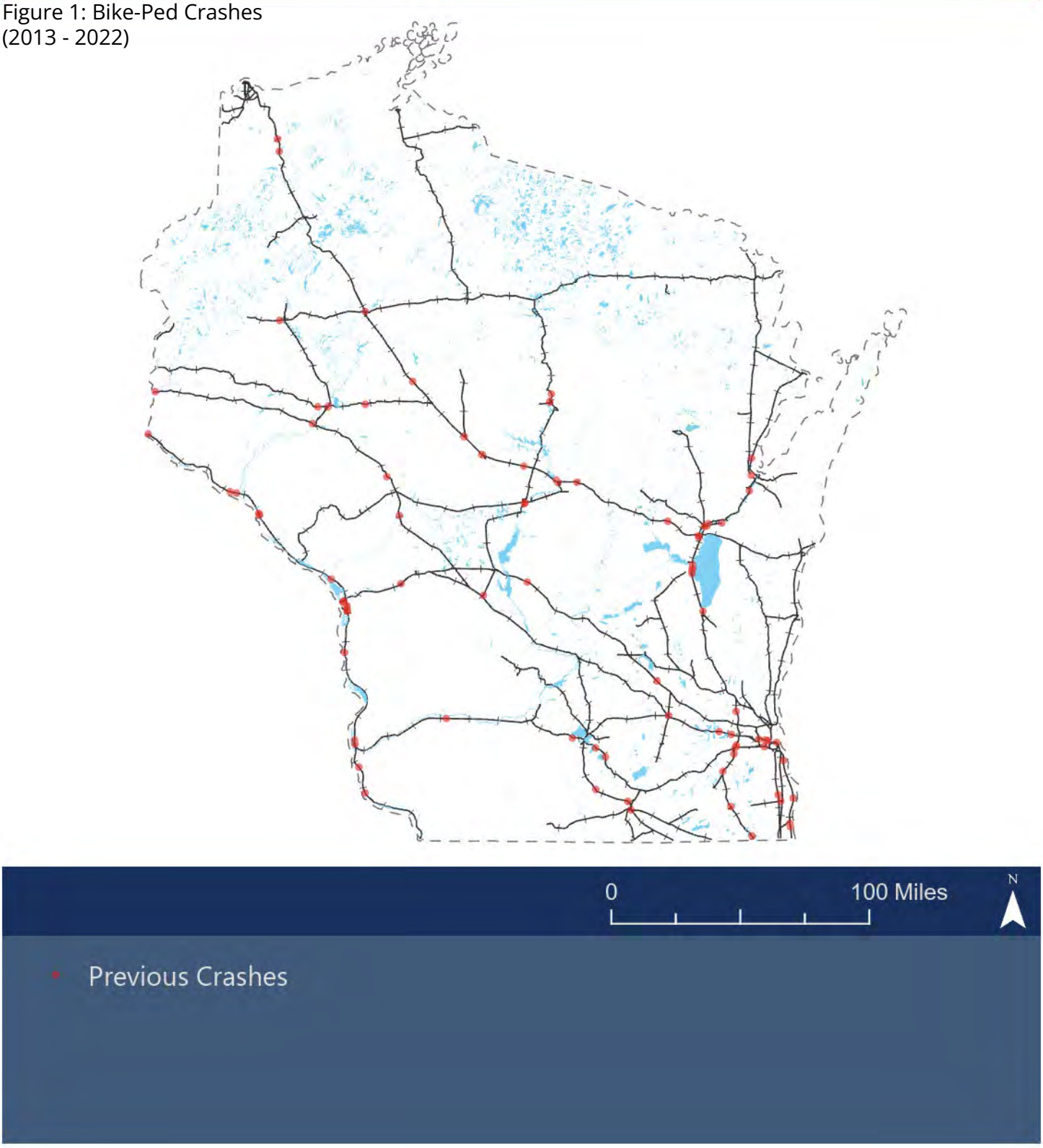


TABLE 1: FREIGHT RAILROAD CROSSINGS IN WISCONSIN

Railroad	Track Miles	# of At-Grade Crossings	Number of Bike/Ped Incidents (2013 – 2022)
BNSF	293	177	16
CN	60	63	6
CPRS	369	269	15
ELS	120	138	0
MCRY	4	4	0
METWR	7	14	0
MTR	<1	0	0
PGR	39	45	0
POMZ	4	18	0
TR	6	10	0
UP	630	631	4
USAT	7	1	0
WC	1,619	1,670	47
WGN	26	21	0
WIRR	2	4	0
WSOR	606	813	5

Bicycle/Pedestrian Crossing Risk Analysis

Railroad crossings inherently pose significant risks to pedestrians and bicyclists. To take the first steps toward mitigating these risks and ensuring public safety, the study team performed a comprehensive risk assessment analysis to identify the crossings with the highest risk potential. This analysis involves a systematic evaluation of various factors. An equation was created that incorporated hazards, exposure, and vulnerability to determine overall risk.

Risk is a complex interplay of three primary factors: hazards, exposure, and vulnerability. In the plan's analysis, risk refers to physical elements of the crossing including the skew of a crossing, whether the crossing is part of a quiet zone, and what kind of warning device is used at the crossing to alert pedestrians and bicyclists of the potential of oncoming trains or the threat of actual trains approaching.

Hazards: hazards include the physical infrastructure at the crossing that impact the likelihood of a person being harmed by a train. This plan analysis included warning device type, the skew of the tracks, and whether the crossing was in a quiet zone to calculate hazard level.

Exposure: this is the degree to which people at the crossing could be affected or exposed to trains at the crossing. For this study these included the number of trains moving through a crossing each day, the number of tracks at the crossing, type and speed of train, and the estimated number of pedestrians and bicyclists using the crossing.

Vulnerability: this is the susceptibility of a community or system to be adversely affected by a hazard. It included factors like socioeconomic conditions, and surrounding land use conditions.

To calculate risk, point values attributed to hazards and exposure were added together and then multiplied by the vulnerability score. This risk score was used to compare crossings throughout the state to understand where in Wisconsin had the highest risk for collisions between trains and pedestrians and bicyclists. By quantifying the associated risks, WisDOT and local agencies can prioritize safety improvements, implement effective countermeasures, and reduce the likelihood of accidents at railroad crossings. Figure 2 shows which attributes were used and how they were included in risk evaluation. A summary of the data and detailed maps showing the locations of crossings that have hazard, exposure, and vulnerability can be found in the appendix.

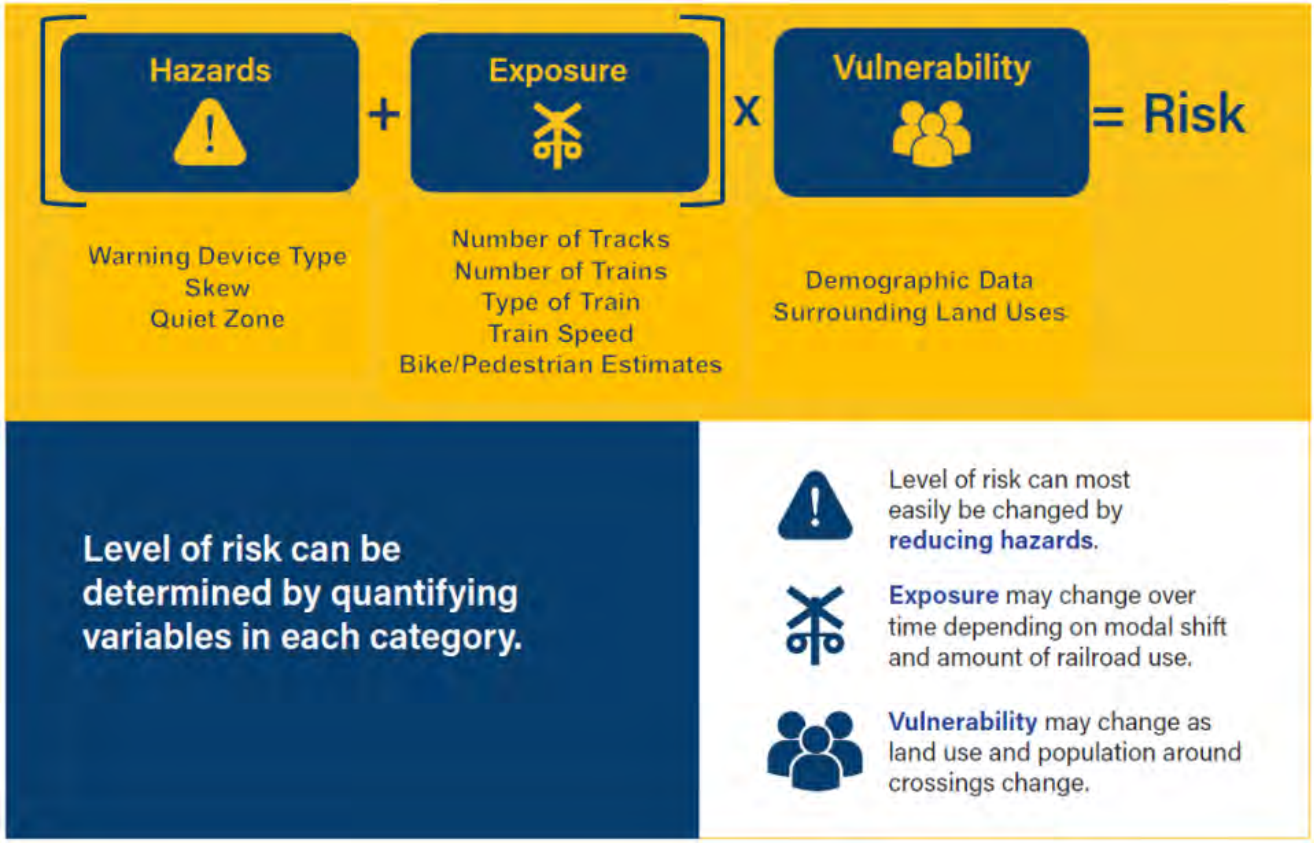


FIGURE 2: BICYCLE/PEDESTRIAN RISK ANALYSIS METHODOLOGY

High-Risk Corridor Examination

High-Risk Corridor Examination

Wisconsin's vast network of railroads intersects with many roadways, creating potential hazards for pedestrians and bicyclists. To proactively address these risks and enhance safety, the plan reviewed and identified high-risk rail corridors throughout the state. This process was to systematically identify and prioritize railroad crossings that pose the greatest danger, enabling targeted improvements and interventions to mitigate the potential for accidents and fatalities.

By evaluating individual crossing inventories, attributes, and scoring methods, individual crossings were able to be evaluated and ranked based on a scoring calculation. With high-risk crossings identified, the team identified high-risk corridors made up of consecutive crossings or clusters of crossings on a single rail line that consistently shared some of the highest risk scores. For this study, each corridor analyzed is within a single municipality. There were several corridors throughout the state that had elevated risk based on the scoring criteria. The appendix contains a map of the locations of the 26 elevated risk corridors throughout the state.

After further analyzing the 26 elevated-risk corridors, the study team selected corridors in La Crosse, Oshkosh, and West Allis as the three corridors that will be the focus of detailed study in this report. These corridors all had several high-risk crossings creating corridors that were valuable to understand crossings more widely throughout the state. By reviewing these corridors in various parts of the state, WisDOT can make improvements to crossings through the state over time.

Why These Three Corridors?

There were many corridors identified in the study that had combination of risk factors that showed the elevated risk for pedestrians and bicyclists of having conflicts with trains. The team selected these corridors to best represent an even statewide distribution between different corridor characteristics, railroad company involvement, and geographical distribution. The corridors identified in La Crosse, Oshkosh, and West Allis all exhibited much higher risk scores for the potential of conflicts between pedestrians and bicyclists and trains when compared to all Wisconsin grade crossings, but for distinct reasons. The team selected these corridors because of their elevated risk and because they are spaced throughout the state and can provide insight to other crossings in those regions of the state.

A corridor is made up of individual crossings. No one crossing is alike. Many in the corridor have similar characteristics like the number of trains that move through, but land uses and the people who live around each crossing are different and some of the geometric layouts are unique to individual crossings that may make one crossing have more risk than another in the same corridor.

La Crosse

The BNSF Aurora Sub in La Crosse had the 19th highest average crossing score over the 7 crossings on the corridor. Figure 3 shows the location of the corridor in La Crosse. The corridor is 8.4 miles long and has 32 trains pass through each day. The corridor has had 3 reported conflicts between trains and pedestrians and bicyclists since 2013. The total pedestrian and bicyclist estimates across the crossings were 822 crossings. There are several factors that made La Crosse an elevated risk corridor. These factors include the fact that:

- All but the northern most crossing in the corridor is in a quiet zone, where trains are not routinely sounding their horns as they pass through each crossing area
- The corridor has two parallel tracks the length of the corridor
- There are many passenger and freight trains that travel across crossings every day
- The trains crossing travel at a high speed
- Many pedestrians and bicyclists cross the crossings
- Several of crossings where near parks and many were near schools
- There is a high proportion of racial and ethnic minorities on North side of La Crosse

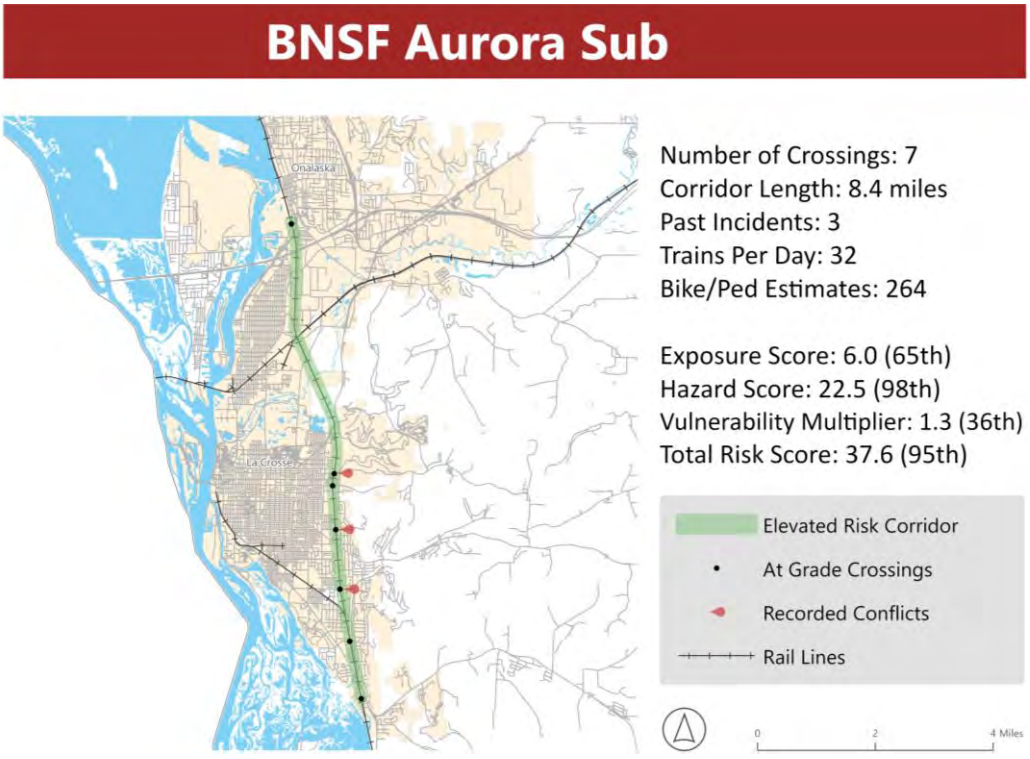


FIGURE 3: BNSF AURORA SUB

Through engagement with community members in La Crosse, the team learned that these are crossings that people were concerned about, and there are other crossings that residents were also concerned about outside of the identified corridor. The two crossings

near the Amtrak station at Avon Street/ Hagar Street and St Cloud Street/ Liberty Street were higher priority crossings for many people in the meeting because of the high train volumes which are often blocked by trains for extended periods of time.

Oshkosh

Oshkosh had the 7th highest average crossing score across the 18 crossings in the corridor on the WC Neenah Sub. The map below shows the location of the elevated risk corridor. The corridor is 6.5 miles long and has had 4 recorded conflicts all in the southern half of the corridor near the Fox River. Oshkosh has many factors making it a high-risk corridor including:

- Many of the crossings in the corridor are part of a quiet zone, where trains are not routinely sounding their horns as they pass through each crossing area
- High number of trains
- Trains traveling fast through the crossings
- Many pedestrians and bicyclists cross the tracks each day
- All but the crossing at sterling Ave and Indian Point Road had high bike ped counts.
- There are high proportions of racial and ethnic minorities who live near the crossings
- Many people with low incomes and limited vehicle access
- Higher rates of people without college degrees
- Many of the crossings near the Fox River are near a library and schools

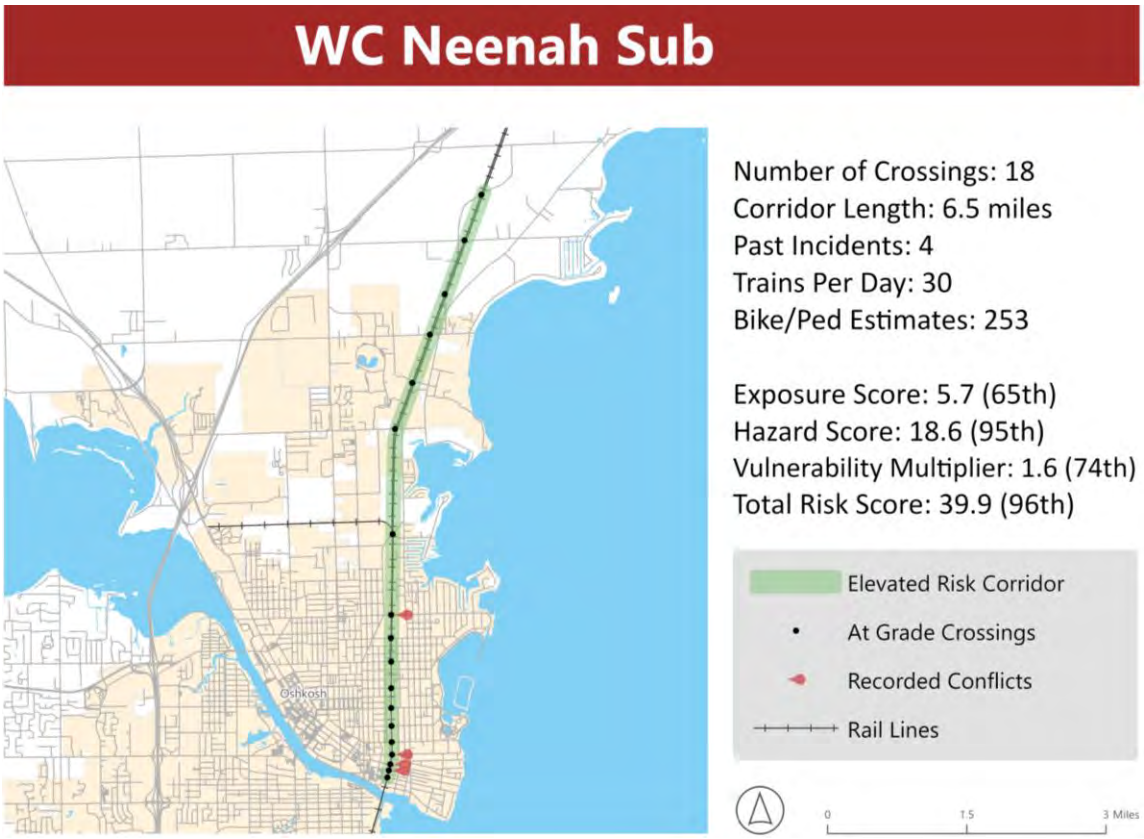


FIGURE 4: WC NEENAH SUB

Many people in the community engagement meetings believed that this corridor was high risk and mentioned some of the strange layouts of the crossings where Broad Street is parallel to the train tracks on both sides making for difficult crossings for pedestrians.

West Allis

The West Allis corridor is along the UP Milwaukee Sub and had the 4th highest average crossing score across the 11 crossings in the corridor. There have been two reported conflicts with trains along the 2.1-mile corridor shown in the map below. Other factors making this corridor elevated risk include:

- The corridor is double tracked
- The corridor is part of a quiet zone
- There are many trains moving through at high speeds each day
- Many pedestrians and bicyclist use each crossing
- Every crossing was within a half mile of a park
- All but one crossing was within a half mile of a school
- Many crossings were near a library
- There are many children, racial and ethnic minorities, and people with low incomes who live in the area

When talking with stakeholders about this corridor, people believed several of the crossings were dangerous, but also mentioned crossings to the west of the identified corridor because of concerns about trespassing.

Every one of the crossings in the three corridors was assessed in person to better understand the physical layout of each crossing to better understand how each crossing could be hazardous to people crossing. That information was shared during stakeholder engagement to hear thoughts and concerns about each crossing from community members.

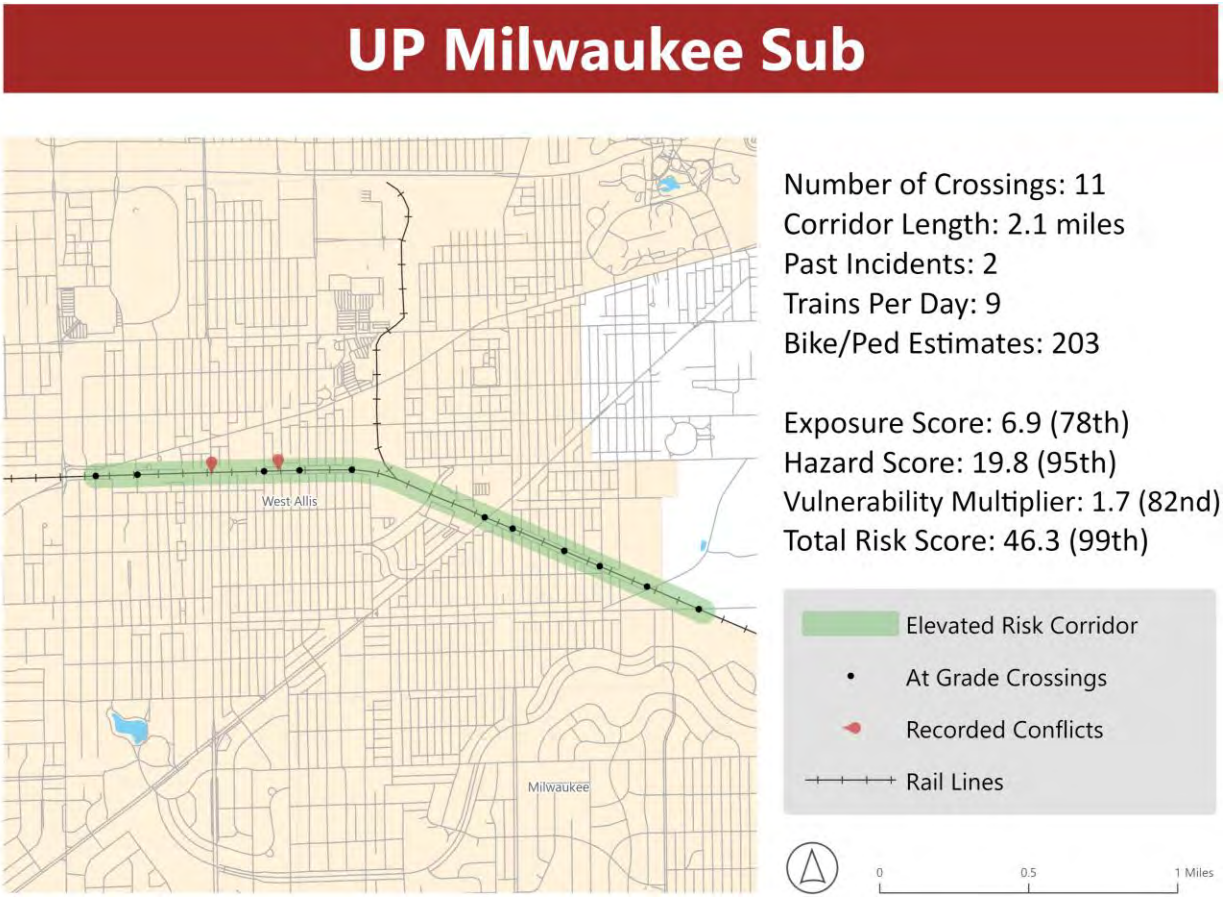


FIGURE 5: UP MILWAUKEE SUB

Stakeholder Engagement

Stakeholder Engagement

Wisconsin Department of Transportation (WisDOT) engaged residents broadly across the state and hosted targeted discussions with stakeholders to inform the planning effort to improve safety at railroad crossings for people walking, biking, or rolling. In 2021, WisDOT completed a Safety Action Plan (SAP) for highway grade crossings to improve safety for vehicles crossing railroads. This plan expands on the work of the highway crossing SAP by focusing on improving safety for people outside of personal vehicles.

As part of the Bicycle/Pedestrian Railroad Crossing Safety Action Plan, WisDOT identified factors that make certain railroad crossings potentially more dangerous than others. The study team reviewed the history of railroad injuries and deaths in the state at railroad locations with at grade crossings to understand common themes and identified three communities with a high degree of concern and opportunities for improvements. These communities include La Crosse, West Allis, and Oshkosh.

During the planning process, the study team hosted focus group discussions with transportation advocates from these communities to learn from those who interact with grade crossings daily. The discussions included representatives from for railroad companies, county government, local governments, educational institutions, multimodal advocates, business owners and interested residents. In addition to facilitating targeted conversations with key stakeholders in the communities of La Crosse, West Allis, and Oshkosh, WisDOT engaged residents broadly across the state via social media and news releases to encourage participation in an online comment map.

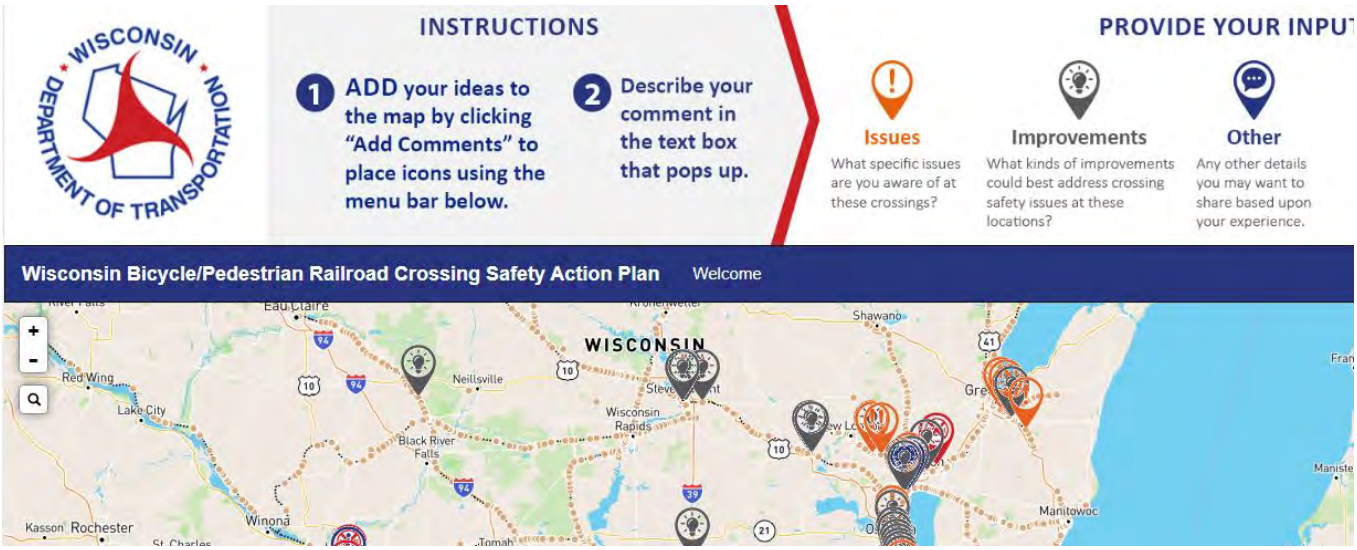
The purpose of community and stakeholder engagement was to share the identified areas for improvements, potential safety enhancements, and the study process being conducted for the WisDOT Bike/Ped Railroad Safety Action Plan. The effort broadly engaged residents statewide to inform the public about the study and ask for input on the interactive comment map. WisDOT also hosted virtual focus group meetings with targeted local communities to gain a better contextual understanding of specific railroad crossing locations. A summary of engagement strategies and key themes from focus group discussions is provided below.

Website: The Safety Action Plan provided plain language updates to the WisDOT SAP website and a link to the interactive comment map where residents could provide location specific ideas and concerns.

Comment map: A statewide interactive comment map asked residents to provide comments regarding the highway and pathway rail crossings in Wisconsin, indicated by icons on the map. Participants could zoom in and out across the state to click where they wish to provide comments. The comment map asked participants to respond to the following prompts:

- What specific issues are you aware of at these crossings?
- What kinds of improvements could best address crossing safety issues?
- Where are people crossing tracks outside of designated crossings?
- Where are people walking along tracks?
- Any other details you may want to share based upon your experience.

The comment map received over 175 comments. An image of the map is shown below.



Statewide Outreach – News release and promotional outreach (social media and email notifications) were shared via WisDOT communications to encourage participation on interactive comment map and to raise awareness about the Bicycle-Pedestrian Railroad Crossing Safety Action Plan.

Focus Area Outreach: WisDOT hosted virtual meetings with key stakeholders in each focus area (i.e., La Crosse, West Allis, and Oshkosh) April 3rd – 5th. Focus group participants were strategically identified in each community to encourage representation from various parts of the community. Representatives from railroad companies, WisDOT, county government, local governments, educational institutions, multimodal advocates, business owners and interested residents attended the virtual meetings.

The meetings included a short presentation and facilitated discussion. In the meetings, participants discussed specific issues they have observed or have concerns about at each crossing within the corridor. This information was used to guide potential recommendations for the specific crossings in the corridor and railroad crossings throughout the state.

La Crosse Bicycle and Pedestrian Railroad Safety Focus Group Summary:

Policy Issues and Considerations:

- Need for better signage and striping
- Need for more education and outreach about bike/ped safety
- Need to consider community needs when planning for new rail crossings
- Need to address the issue of trains blocking crossings for extended periods of time
- Need to improve ADA and bike/ped accommodations at existing overpasses

Access & Equity Considerations:

- There are several areas in La Crosse where there are no at-grade rail crossings for bikes/pedestrians.
- This makes it difficult for people who live in these areas to get around, especially if they do not have access to a car.
- The lack of at-grade crossings can also be a safety concern, as people may be tempted to cross the tracks illegally.

Safety Issues & High-Risk Locations:

- There are several locations in La Crosse that are considered to be high risk for bike/ped accidents.
- These locations include:
    - The crossing at 2nd Ave. SW
    - The crossing at Main Street
    - The crossing at 33rd Street
    - The crossing at Cass Street
    - The crossing at Farnum Street
    - The crossing at Ward Ave
    - The crossing at Avon/Liberty
- Some of the factors that make these locations high risk include:
    - The presence of multiple tracks
    - The high volume of train traffic
    - The lack of adequate signage and striping
    - The presence of obstacles that can block pedestrians' view of the tracks

- The city is divided by rail tracks, especially on the north side, which creates a significant barrier for pedestrians and cyclists

Identifying Specific Locations and Issues:

1. **2nd Ave. SW:** This is a specific location mentioned in the notes. It's likely a crossing point that presents safety concerns for pedestrians and cyclists.
2. **Main Street:** Another location mentioned, indicating a potential crossing point with safety issues.
3. **33rd St:** This is a location with a mobile home park, which could have specific pedestrian and cyclist traffic patterns.
4. **Cass Street, Farnum Street, Ward Ave:** These streets may have crossings that need attention due to their proximity to rail tracks.
5. **Avon/Liberty:** These areas are mentioned as potential problem spots, especially Avon, which is a designated bike route.
6. **Conoco Rd:** While less traveled, this crossing is still a concern due to its proximity to a bike/ped trail.
7. **Amtrak Stations:** The areas around the Amtrak stations at Avon/Hagar, Liberty, and St. Cloud St may have specific safety issues, especially related to pedestrian and cyclist access.

Key Issues and Considerations:

- **Railroad Track Barriers:** The division of the city by rail tracks creates significant challenges for pedestrian and cyclist movement.
- **Safety at Crossings:** The notes highlight the need for improved safety at various crossings, including signage, geometric improvements, and pedestrian gates.
- **Community Needs:** The community's specific needs, particularly on the north side, should be considered when addressing these issues.
- **Train Blockages:** The frequent blocking of crossings by trains is a major concern, as it can encourage unsafe behaviors.
- **Accessibility:** The notes mention the need for improved ADA and bike/pedestrian accommodations at existing overpasses.

West Allis Bicycle and Pedestrian Railroad Safety Focus Group Summary:

The focus is on improving safety and accessibility for pedestrians and cyclists at railroad crossings in West Allis, WI. Here's a breakdown of the key themes:

Safety Concerns:

- High-risk locations with heavy bike/pedestrian traffic (S. 82nd St., etc.)

- Challenges for people with disabilities, particularly motorized wheelchairs (dual tracks, lack of signage)
- Poor visibility across tracks (S. 57th St.)
- Lack of sidewalks at many crossings

Accessibility Considerations:

- Need for improved signage and geometric design (channelization, fencing) to guide pedestrians and cyclists safely.
- Collaboration with disability advocacy groups (Independence First) to ensure accessible crossing solutions.
- Detectable pavement treatments for visually impaired pedestrians.

Policy and Equity:

- Safe Routes to School considerations - children walking/biking to school need safe crossings.
- Municipal responsibility for sidewalk access at crossings.
- Targeting outreach to ensure equitable access for all user groups.

Collaboration and Funding:

- Coordination with Union Pacific Railroad for crossing improvements and potential grant funding (FRA Grade Crossing Elimination funds).
- Alignment with the city's long-term transportation plan (2045 Comprehensive Plan).

Additional Considerations:

- Fire department access needs at crossings (S. 60th St.)
- Addressing homeless encampment concerns at S. 57th St.
- Traffic calming measures on W. Lincoln Ave.
- Emergency access improvements at specific locations (76th St.)
- Prioritizing bike/pedestrian movement on the Greenway project.

Overall, the discussion highlighted the need for a comprehensive approach to improve safety and accessibility for pedestrians and cyclists at railroad crossings in West Allis. This includes infrastructure improvements, policy considerations, and collaboration with various stakeholders.

Oshkosh Bicycle and Pedestrian Railroad Safety Focus Group Summary:

Safety Issues & High-Risk Locations:

- **Track Design:** Gaps between rails causing safety hazards for pedestrians, cyclists, and people using mobility aids (e.g., Ceape Ave., No fill with Flangeways).
- **Visibility and Signage:** Lack of clear markings or warnings for pedestrians on one-way roads (e.g., Waugoo Ave.).
- **Crossing Angles:** Skewed crossings creating safety concerns (e.g., Harrison St.).
- **Surface Conditions:** Poor quality crossing surfaces posing a tripping hazard (e.g., Parkway Ave.).
- **High Pedestrian Traffic:** Increased pedestrian presence due to aging population, schools, events, and transit stops (e.g., Merritt Ave., Washington Ave., Murdock Ave.).

Policy Issues & Considerations:

- **Accessibility:** Ensuring crossings comply with ADA (Americans with Disabilities Act) standards (e.g., No fill with Flangeways).
- **Collaboration:** Opportunities to partner with UWO Senior Seminar and potentially CN railways on safety initiatives.
- **Education:** Importance of public education programs like Operation Lifesaver to promote safe railroad crossing behavior.
- **Safe Routes to School:** Incorporating railroad crossing safety into Safe Routes to School planning.

Access & Equity Considerations:

- **One-way roads:** Ensuring pedestrian safety on one-way roads with unclear markings (e.g., Waugoo Ave.).
- **Aging Population:** Addressing safety needs for an increasing number of older pedestrians north of the river (e.g., Merritt Ave.).
- **Transit Integration:** Considering railroad crossings near bus stops and public facilities (e.g., Murdock Ave.).

Additional Notes:

- Recent crossing reconstruction projects incorporating pedestrian safety improvements (e.g., Washington Ave.).
- Public interest in road diets (potentially impacting crossings) on certain streets (e.g., Parkway Ave.).
- City resource: CIP Interactive Dashboard for tracking infrastructure projects (https://www.arcgis.com/apps/dashboards/96d48f9afef34024a0e95f3790855463).

The discussion included several specific locations in Oshkosh, WI regarding bicycle and pedestrian safety at railroad crossings. Here's a list:

- **Ceape Ave.** - Steep grade crossing.
- **Otter Ave.** - Details not specified.
- **Waugoo Ave.** - One-way road with lack of markings/warnings for pedestrians walking against traffic.
- **Harrison St.** - Skewed crossing and need to relocate a no parking sign.
- **Merritt Ave.** - High pedestrian presence due to aging population north of the river. (CIP scheduled for 2029)
- **Irving Ave.** - Mentioned but details not specified.
- **Washington Ave.** - Recently reconstructed crossing with pedestrian improvements.
- **Murdock Ave.** - Increased pedestrian traffic due to nearby transit stop/public facilities.
- **Sterling Ave.** - Pedestrian-only crossing with potential transit/bus stop location concerns.
- **Parkway Ave.** - Poor surface crossing condition. Residents interested in a road diet.
- **New York Ave.** - Mentioned but details not specified.
- **Nevada Ave.** - Mentioned but details not specified.

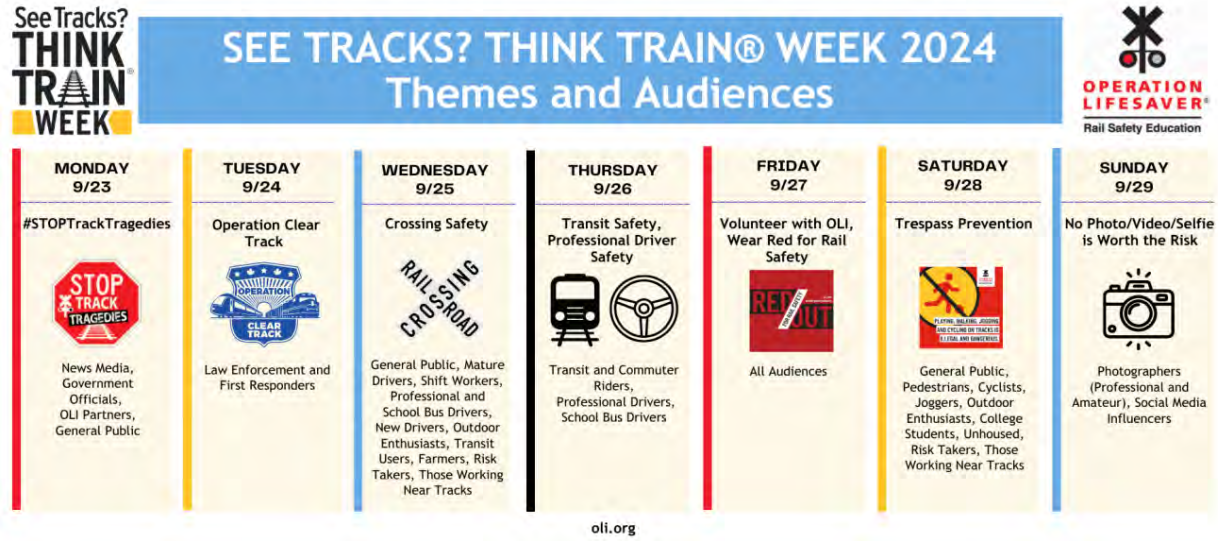
This summary highlights the main concerns regarding railroad crossing safety for pedestrians and cyclists in Oshkosh. It emphasizes the importance of crossing design, visibility, signage, accessibility, and education in creating a safer environment for all users.

Recommended Bicycle/Pedestrian Crossing Safety Strategies

Bike/Ped SAP Recommendations

The purpose of the Bicycle and Pedestrian Railroad Crossing Safety Action Plan is to collect critical new crossing data and conduct a thorough analysis of Wisconsin's at-grade railroad crossings to lay a framework for continued analysis and evaluation of the safety of active transportation users at the state's grade crossings through ongoing and active discussion, engagement, and collaboration.

Railroad crossings pose unique challenges for active transportation users, especially those who may have limited visibility of oncoming trains, reduced mobility, or may be unaware of the dangers posed by trains moving at high speeds. Furthermore, crossings that lack sufficient safety measures, such as pedestrian gates, adequate signage, or well-maintained surfaces, can become hazardous zones for walkers and cyclists. As more Wisconsin communities prioritize walking and cycling to reduce traffic congestion and improve public health, the risks associated with railroad crossings must be addressed to ensure the safety of all users.



There are a variety of opportunities to collaboratively improve conditions for people walking, jogging, or riding through railroad crossings in Wisconsin. While the immediately following section is focused on a suite of physical crossing improvements, it is important to also consider additional programmatic or policy improvements; like law enforcement training and public education campaigns to help people understand what to do when they encounter a railroad crossing.

This study effort has provided a means of providing estimates for bike and pedestrian volumes near at-grade rail crossings, which has enabled a rigorous analysis of prioritization of at-risk rail crossings from the perspective of bicyclists and pedestrians. The tools used in this study, and competing tools that offer similar data, are emerging in recent years. If WisDOT adopts a corporate approach to a predictive tool similar to that used in this study,

it would provide benefit in future analyses to determine the most at-risk locations, in turn enabling WisDOT to devote safety resources where they can have the most positive impact. There are several ways the department can improve data collection and storage of critical rail crossing characteristics data to consider bicycle and pedestrian impacts near sensitive community facilities and population groups in the future. One recommendation is to develop a rail crossing operations dashboard that could be used by key decision makers to ensure that active transportation user safety is being more critically considered as part of the WisDOT project scoping and construction processes.

The primary goal of the rail crossing operations dashboard would be to provide real-time and analytical insights into the rail safety risks associated with crossings statewide. The dashboard would focus on:

- Key Data Inputs (RCIS, crossing inventory forms, bike/ped infrastructure and incident data, traffic data, environmental factors, and community input),
- Key Performance Indicators identified for this study (including crossing risk, hazards, exposure, and quiet zone status),
- Filters for reporting and analysis (to understand geographic equity, user types, and mitigation status), and;
- Analytical Features (like predictive analysis, risk profiling, improvement scenario simulation, and real-time alerts).
- Representing Data through customizable visual reporting tools and geospatial displays of risk heat maps, incident timelines, or trend graphics.

The following physical crossing improvement strategies and at-grade crossing treatments could improve the safety of active transportation users. With the understanding that all sites are unique, consideration must be taken to address the specific characteristics and needs of each individual crossing separately. These crossing treatments could be implemented within the three corridors and the study locations, as well as future corridors or crossing locations where deemed necessary.

Bicycle-Pedestrian Strategies

A variety of crossing treatments were developed to provide a toolbox of options that can be reviewed for potential crossing improvement projects.

SIGNAGE		
34	Passive Signage	
	Active Signage	
GATES		
36	Swing Gates	Active Pedestrian Gates
	Horizontal Hanging Bars	
CROSSING SURFACE		
39	Stop Lines	Detectable Warnings
	Flangeway Filler	
IMPROVED GEOMETRICS		
42	Sight Distance	Skewed Approach
	Sidewalk Relocation	Closures
	Grade Separation	
CHANNELIZATION		
46	Pedestrian Fencing	Maze Fencing
	ROW Fencing	
OTHER TREATMENTS		
49	Illumination	
	Audible Crossings	

Since each location is unique and there is not a "one size fits all" solution, it is recommended to review the following treatments and utilize decision trees. Engineers rely on decision trees to determine the appropriate pedestrian and non-motorized control devices for a given situation. Although there are different types of decision trees, they all follow a similar structure. The process starts with a decision point that involves a condition, such as a crossing located within a school zone. From there, a set of considerations are judged, such as whether barrier channelization is required. Within these considerations, there are further rules to follow.

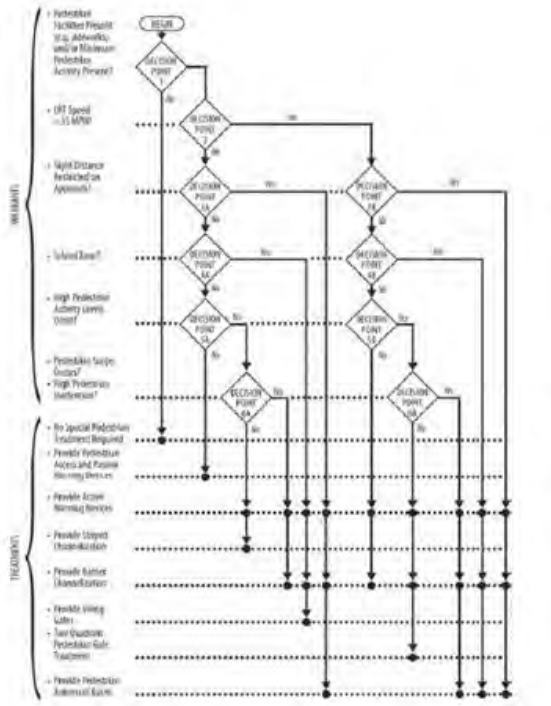


FIGURE 6: EXAMPLE DECISION TREE

Signage

Passive Signage

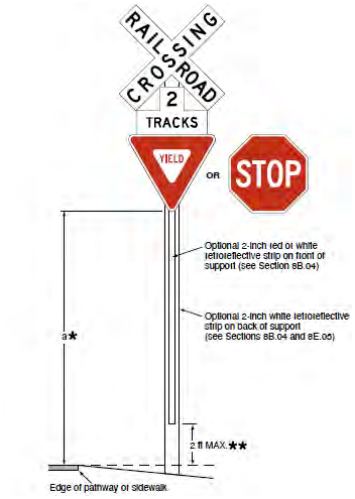


FIGURE 7

Passive signage, like passive control devices, is not triggered by trains. This allows non-motorized users to be aware of their surroundings and make the best decision before crossing the railway. The signage is required by law or is unique in its warning. For example, Yield or Stop signs are needed at passive crossings. Either sign can be assembled within the Crossbuck. They are installed below the railroad crossing warning sign, indicating the number of tracks ahead. This configuration must be along the sidewalk or pathway at each approach, with an offset dependent on the height of the Crossbuck Assembly. Passive signage may also be unique. This type of signage is usually tested before being implemented.

COST:	Between $25 per square foot and $35 per square foot for stop and yield signs. Unique signage cost varies
SOURCE:	https://nap.nationalacademies.org/read/22183/chapter/10#132

Active Signage

FIGURE 8

Blank-out signs at train crossings are activated by the presence of a train. These signs have changeable messages that include symbols or warnings about approaching trains and are not static, meaning the message is only displayed within a specific timeframe. They use LED lighting and display various messages, such as a picture of a train to indicate an approaching train, or a written warning stating "Another Train Coming Soon". The latter is used when pedestrians or cyclists may not realize that another train is approaching a crossing with multiple tracks. Additionally, the messages can contain instructions for an approaching train, reminding people to look in both directions as trains may be present on both tracks.

FIGURE 9

Furthermore, Active Signage can also include flashing lights which must alternate and operate for at least 20 seconds in anticipation of an approaching train. These flashing lights are located below the "Railroad Crossing" sign, pre-mounted to the mast, and synchronized with an audible device to warn visually impaired individuals. The lights should be four inches apart in diameter and have a height of eight inches.

COST:	$1,800-$6,000 per blank-out sign. $65,000+ for the installation of assembly of flashing light assembly with signage.
SOURCE:	https://railroads.dot.gov/sites/fra.dot.gov/files/fra_net/1370/small_Jan08_Ped_Devices_GX2.pdf\

Gates

Swing Gates

FIGURE 10

FIGURE 11

Swing gates are self-closing gates that return to the closed position when released. They are used for entry and exit purposes and as clear barriers between pedestrians and the railway, providing a precise warning mechanism. These gates also feature clear or unique signage, enabling pedestrians to determine whether crossing is safe. In an emergency, the swing gate provides a safe exit for pedestrians who need to reach safety along the track, opening away from the track and allowing users to push the gate open immediately. These gates can be placed beside automated controls, allowing pedestrians to exit the right-of-way in emergencies. Swing gates are a means of directing traffic flow. For example, swing gates serve as a guide within a sidewalk or pathway, directing non-motorized users toward an exit or entry.

Wisconsin's supplement to the Manual on Uniform Traffic Control Devices (MUTCD) discourages the use of pedestrian gates due to the likelihood of trapping issues that can be presented with these installations.

COST:	$49,000-$51,000 each
SOURCE:	https://railroads.dot.gov/sites/fra.dot.gov/files/fra_net/16553/Engineering_for_Ped_Safety_At_Crossings_final.pd

Automatic Pedestrian Gates and Automatic Gates

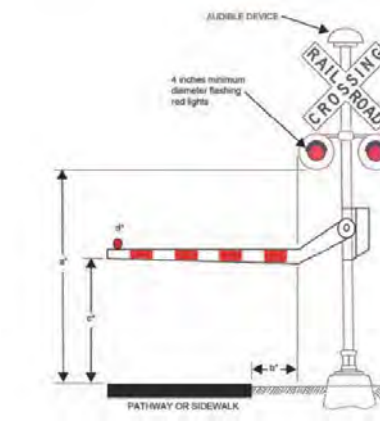


FIGURE 12

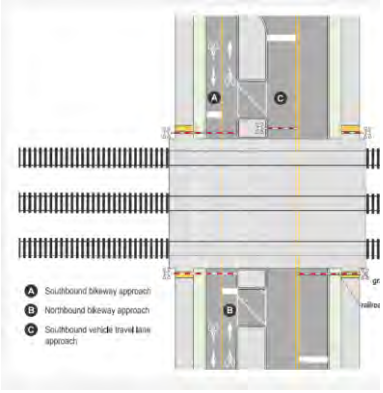


FIGURE 13

Automatic pedestrian gates fall under the category of active warning devices, which can include flashing lights, bells, or gates. These gates are installed in areas where flashing signals with Crossbuck signage and an audible warning system are present. They are particularly recommended when train speeds exceed 80 mph or when there is limited sight distance. However, other guidance recommends, when at public transit crossings, implementing pedestrian gates when trains exceed 40 mph. The MUTCD provides various ways to incorporate automatic pedestrian gates. One example is to have an automatic pedestrian gate separate from the vehicular gate with an offset from the sidewalk or pathway, and the vehicular gate between the sidewalk and curb. The mechanism of the pedestrian gate is separate from the vehicular gate and does not affect it. Further, the mast can have audible devices and/or flashing lights. Alternatively, the vehicular gate itself can function as a pedestrian gate offset from the sidewalk or pathway. Finally, automatic gates can be implemented within two-way bike facilities. Automatic gates would descend from the sidewalk, crossing both the sidewalk and bicycle facilities. Furthermore, a centerline raised median can be implemented to prevent cyclists from going around the gate.

Wisconsin's supplement to the MUTCD discourages the use of pedestrian gates due to the likelihood of trapping issues that can be presented with these installations.

COST:	$65,000+ for the installation of automatic pedestrian gates
SOURCE:	https://www.transportation.ohio.gov/working/engineering/roadway/manuals-standards/multimodal/11

Horizontal Hanging Bars

FIGURE 14

Horizontal hanging bars or gate skirts are secondary gates marked with identical striping to the primary gate arm. The skirt hangs one to two feet below the pedestrian gate and blocks additional area under the gate arm to make the gate (generally 3.5 to 4.5 feet above the sidewalk) more easily detectable by visually impaired users using a cane and by other users whose eye height is less than the height of the gate arm (especially children and wheelchair users). The gate skirt also discourages users from crossing underneath the gate. This is especially recommended when the gate is near children, such as school zones.

Both Connecticut and New Jersey have installed hinged pedestrian gate skirts to better block access to crossings, deterring pedestrian violations. (Source: Improving Ped Crossings with Ped Skirts, FHWA) An example is shown in Figure 14. (Source: FTA Standards Development Program: Rail Transit Roadway/Pedestrian Grade Crossing, Exploratory Report; FTA; page 53)

FIGURE 15

COST:	$15,000-$20,000
SOURCE:	Improving Ped Crossings with Ped Skirts, FHWA FTA Standards Development Program: Rail Transit Roadway/Pedestrian Grade Crossing, Exploratory Report; FTA; page 53 USDOT FRA, Effect of Gate Skirts on Pedestrian Behavior at a Highway-Rail Grade Crossing Final Report, 2013.

Crossing Surface

Stop Lines

FIGURE 16

Stop lines are painted markings placed along pathways or sidewalks. They are traversable lines covering the entire sidewalk or pathway width. A stop line indicates where non-motorized users should stop before entering the crossing area. It also delineates the refuge area providing a safe distance from the rail. Stop lines should be positioned two feet from gates or signals and 12 feet from the nearest rail. The stop line must also be located upstream from detectable warnings before the rail crossing. These physical markings may also have written warnings telling non-motorized users to stop before the crossing area, such as "wait here" or "stop here." Lastly, these markings must be durable enough to retain their visibility.

COST:	$2 to $4 per square foot
SOURCE:	https://railroads.dot.gov/sites/fra.dot.gov/files/fra_net/16553/Engineering_for_Ped_Safety_At_Crossings_final.pdf

Detectable Warnings

Detectable warnings are a safety feature that consists of a distinctive surface pattern with a series of truncated domes. These domes help visually impaired individuals detect a change in the surface and anticipate the approach of rails. According to the MUTCD, detectable warnings should be positioned 12 feet before a rail crossing and 2 feet before active or passive devices. They should span the entire width in front of non-motorized users, similar to stop lines.

FIGURE 17

COST:	$35 to $50 per square foot
SOURCE:	https://railroads.dot.gov/sites/fra.dot.gov/files/2022-04/FRA%20ADA%20Platform%20Guidance%204.11.2022_FINAL2_PDFa.pdf

Flangeway Filler

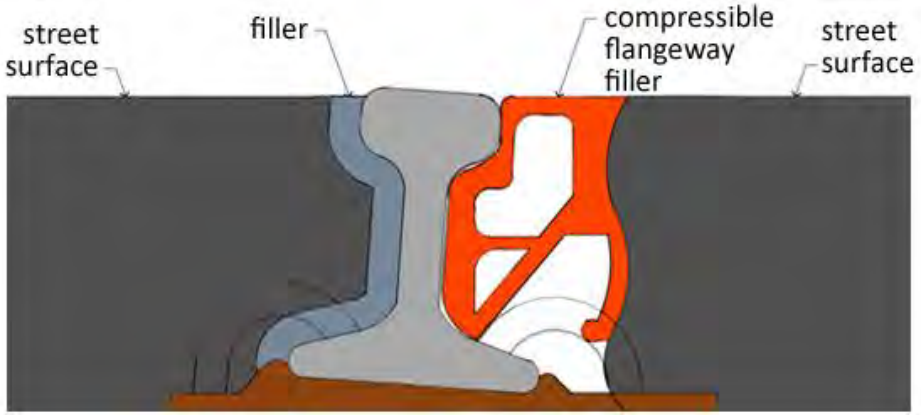


FIGURE 18

The flangeway is the area parallel to the rail and is located inside the edge of the rail and pavement, allowing the wheel to move along the rail. This gap varies in size and is required to be three inches for freight railways and a maximum of two and a half inches for other railways. However, while these gaps are important for reducing the likelihood of railcar wheel entrapment, they can be hazardous for wheelchair users, cyclists, and other micromobility users, potentially causing serious injury if a wheel is caught or unexpectedly redirected by the flangeway. This is especially true when users cross the flangeway gap at a diagonal angle. To address this issue, a flangeway filler made of rubber or other synthetic material, can be inserted between the gap in the rail and pavement to create a surface that is smooth and level enough to allow micromobility users to cross over it safely and compressible enough to avoid interfering with train wheels.

COST:	$60 to $120 per track foot
SOURCE:	https://railroads.dot.gov/sites/fra.dot.gov/files/fra_net/16553/Engineering_for_Ped_Safety_At_Crossings_final.pdf

Improved Geometrics

Sight Distance

Train Speed (MPH)	Pedestrian Clearing Sight Distance (feet) *
10	180
20	355
25	440
30	530
40	705
50	880
60	1060
70	1235
80	1410
90	1585

* walking 1.1 mps (3.5 fps) across 2 sets of tracks 15 feet apart, with a two second reaction time to reach a decision point 3 m (10 ft) before the center of the first track, and clearing 3 m (10 ft) beyond the center line of the second track. Two tracks may be more common in commuter station areas where pedestrians are found.

Note: 1 ft = 0.3048 meter.

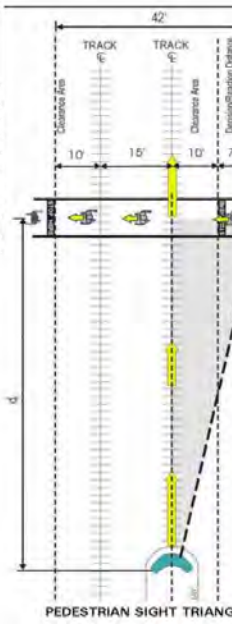


FIGURE 19

According to the California Public Utilities Commission, it is important for pedestrians and non-motorized users to have a clear view of the train track. This depends on factors such as train speed, crossing geometry, crossing width, and time to cross the track safely. This is known as the Pedestrian Sight Clearance distance. To help pedestrians and non-motorized users, active and passive devices warn them of approaching trains when there is not enough space for them to cross safely. The Sight Triangle encompasses the train's path, the unobstructed distance to the crossing, the path of the pedestrian, and the sight line of the approaching train. Figure 19 illustrates the decision reaction distance within the sight triangle, which is the distance needed for a person to see an approaching train. A passive device is placed between the clearance area and the decision reaction distance to provide a safe distance between the user and the tracks.

COST:	Can vary significantly
SOURCE:	https://docs.cpuc.ca.gov/PUBLISHED/GRAPHICS/83568.PDF

Skewed Approach Realignment

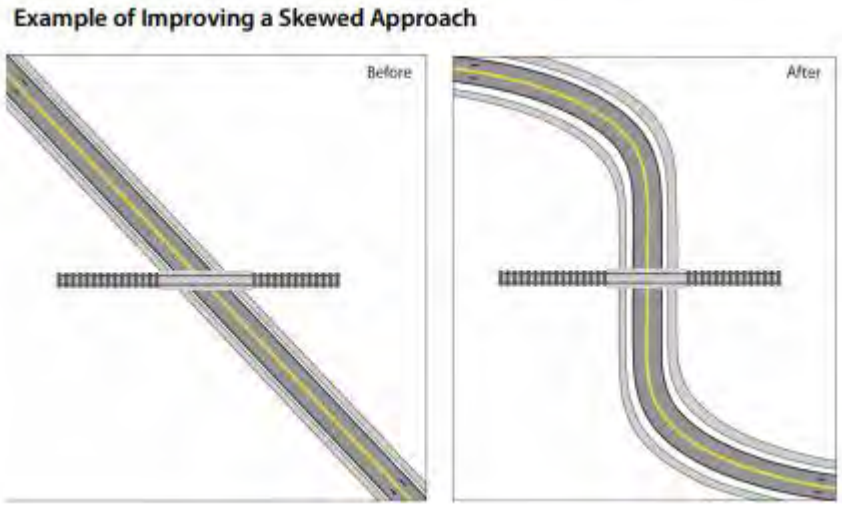


FIGURE 20

A skewed crossing is when a path or road intersects with a track at an angle that is either obtuse or acute. When crossing a street or path, a skewed crossing increases the time it takes pedestrians and cyclists to cross the tracks (thereby increasing their exposure to risk) and poses a risk of the wheels of bicycles, wheelchairs, and other micromobility devices getting stuck in the flangeway, even if is filled with a flangeway filler. Reconfiguring the roadway geometrics can improve crossing safety. This can include relocation of nearby roadway intersection or straightening a skewed approach to achieve a crossing as close to 90 degrees as possible. Improving the geometrics at a crossing can be costly depending on necessary roadway reconstruction and may require additional space.

COST:	Can vary significantly
SOURCE:	https://www.fhwa.dot.gov/publications/research/safety/20067/20067.pdf

Sidewalk Relocation

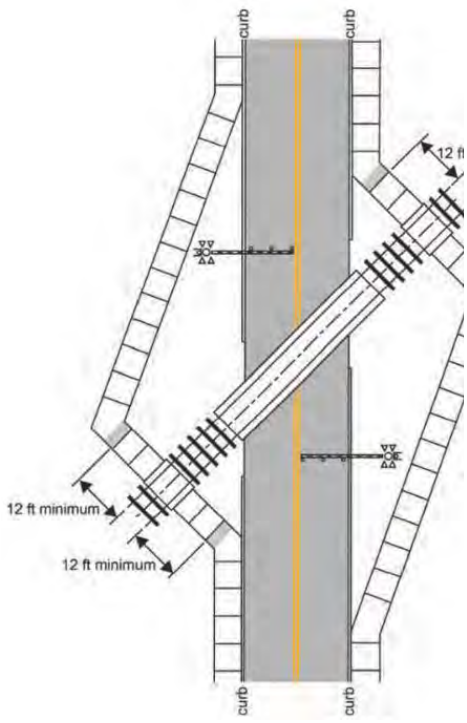


FIGURE 21

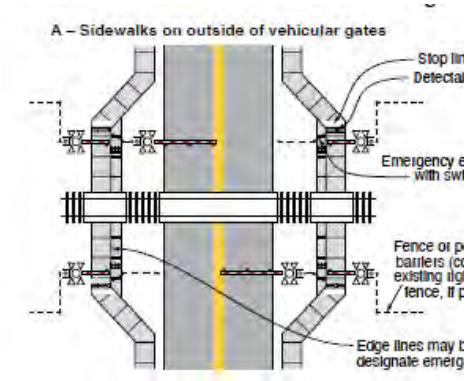


FIGURE 22

Sidewalk relocation is a process that allows for the addition of different pedestrian or cyclist treatments at a crossing location. The arm or counterweight of an active control device can get in the way of potential pedestrian or cyclist treatments. For example, when train speeds are 80 mph or higher, the MUTCD recommends the implementation of automatic pedestrian gates at the crossing location. Sidewalks are adjusted to work around the existing gate setup, including the necessary pedestrian gates, swing gates, and channelization treatments like fencing. Sidewalk realignment can also involve adjusting a sidewalk to be perpendicular to the track(s) at a 90-degree angle. This helps address longer distances that non-motorized users need to travel across track(s).

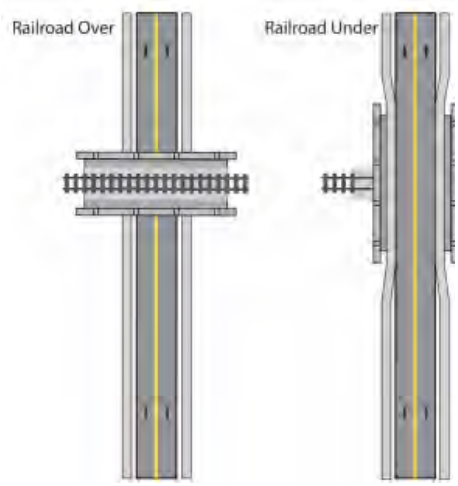
COST:	Can vary significantly
SOURCE:	https://nap.nationalacademies.org/read/22183/chapter/10#81

Crossing Closures

A highly effective way to improve crossing safety is consolidating crossings within a segment of road and improving remaining crossings that are to remain at grade. Consolidation of a crossing eliminates an at-grade crossing and should be considered when there are no significant impacts to traffic, safety, and access. Great care should be taken to avoid creating excessively large gaps between crossings for pedestrians and cyclists as this may increase the likelihood of trespassing if pedestrians or cyclists are forced to travel too far to the next available crossing. A benefit to the railroad is the cost savings by avoiding maintenance costs of surfaces and grade crossing warning devices.

COST:	Can vary significantly
SOURCE:	https://railroads.dot.gov/elibrary/highway-railroad-grade-crossings-guide-crossing-consolidation-and-closure

Grade Separation



A grade separated crossing improves safety by eliminating conflict points at an at-grade crossing. Grade separation makes it possible for trains to travel above or below a roadway or path allowing pedestrians, bicyclists, and motorists to not have interactions with crossing trains. Grade separation can be costly, complicated, and may require additional right of way to construct the necessary structures.

FIGURE 23

COST:	Can vary significantly
SOURCE:	https://policy.tti.tamu.edu/strategy/grade-separation/

Channelization

Pedestrian Fencing

Fencing is used as a barrier along the railway to reduce potential conflicts between pedestrians, cyclists, and others and the train. Pedestrian fencing is also designed to guide pedestrians and non-motorized traffic and promote safe pedestrian behavior when crossing the tracks. The fencing should run parallel to the tracks and direct people to the designated crossing areas. According to the Highway Crossing Handbook, at commuter rail or transit crossing locations, the fencing should be positioned 50 to 100 feet away from the crossing to guide pedestrians and must be three and a half feet high to ensure visibility is not obstructed.

COST:	$130 per linear foot
SOURCE:	https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-06/fhwasa18040v2.pdf

Maze Fencing

FIGURE 24

Maze fencing or barriers are a type of pathway that guides pedestrians or cyclists through a zig-zag pattern. This slows non-motorized users down and serves as a barrier between the users and the railway. It allows non-motorized users to face the direction of oncoming trains by making them turn 180 degrees through the pattern. While this technique does reduce conflict points between non-motorized users and trains, it should not be used in areas with restricted sight distance. There are various materials that can be used to create this type of pathway, including tubular barriers or fencing rails. According to the Guidebook on Pedestrian Crossings of Public Transit Rail Services, the barriers or fencing should not exceed a height of 36 inches at each approach near or at the crossing, and there should be enough room between the barriers and non-motorized users to accommodate wheelchair and cyclist users.

COST:	$130 per linear foot
SOURCE:	https://nap.nationalacademies.org/read/22183/chapter/10#85

Right of Way (ROW) Fencing

FIGURE 25

ROW fencing should be implemented in areas with a high potential for trespassing or individuals attempting vandalism. It should be installed in planned locations with documented cases of trespassing and near areas with high pedestrian traffic such as schools or commercial districts. ROW fencing serves as a clear barrier between the railway and potential trespassers. According to the US Department of Transportation, this physical barrier should redirect trespassers from the railway to designated railroad crossing locations. While there have been limited studies on this type of fencing, a single study showed a "94.6 percent reduction in the number of trespassers following the installation of fencing."

COST:	Varies between fencing types. For example, a standard chain link fence is relatively inexpensive, while welded wire is more expensive to implement. Maintenace considerations must be factored in as well, including the fencing being cut by trespassers.
SOURCE:	https://trespasstoolkit.fra.dot.gov/eLib/Details/L00033

Other Treatments

Illumination

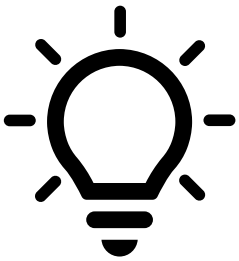


FIGURE 26

According to the MUTCD, Illumination should be implemented at rail crossings when:

Operations are performed at night,

Crossings are blocked for extended periods,

The crossing has a significant crash history.

COST:	Varies
SOURCE:	MUTCD: Pg 991

Audible Crossing Device

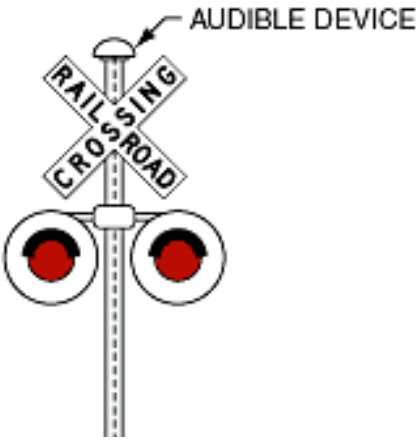


FIGURE 27

Audible crossings warn pedestrians and cyclists of approaching trains. These devices emit different sounds. Their sound must stand out from any other ambient noise in the area. The most effective sound for pedestrians and cyclists on a path or sidewalk is a crossing bell, which can be installed on top of a signal mast. According to the Highway-Rail Crossing Handbook, the bell's settings can be adjusted so that it rings for the duration of the train passing by, or in residential areas, it stops once the gate has fully descended. Additionally, the volume should range from 75 to 105 decibels (dB).

COST:	$300 to $500 each
SOURCE:	https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-06/fhwasa18040v2.pdf

Next Steps

Next Steps

Improving the safety of active transportation users at railroad crossings can save lives. A recent death of a pedestrian that occurred within one of the three high-risk corridors identified as part of this action plan highlights the immediate need to continue to making crossings safer to reduce preventable deaths.

This plan relied on an innovative and data-driven methodology to identify and prioritize several corridors for future investigation, engineering, and environmental assessment. Improving safety at these crossings may involve critical physical upgrades, such as installing signals, gates, and warning devices designed to be accessible for all users, including those with disabilities. Beyond investigating educational, enforcement, geometric, technological, or other safety improvements at those crossings identified in the three identified corridors, it is also important to categorize the next grouping of high-risk corridors that WisDOT can prioritize for future planning and engineering analysis.

Table 2 below illustrates the overall rankings of high-risk corridors in Wisconsin, based on the overall mean risk score. The high-risk corridors below confirm the project team's understanding of statewide bicycle and pedestrian risk and through this effort, or other ongoing planning or engineering efforts, many of the highest ranked corridors are already being addressed. Working down this list, the recommended corridors that should be considered for safety planning and local collaboration include the BNSF Aurora subdivision in Prairie Du Chien, the Wisconsin Central Neenah and Waukesha subdivisions in Fon du Lac, various segments of the Wisconsin Central Wausau Branch in Wausau, the Wisconsin Central Fox River and New London subdivisions in Green Bay, and the Wisconsin Central Waukesha subdivision in Burlington.

TABLE 2: RAILROAD CORRIDORS IN WISCONSIN EXHIBITING ELEVATED RISK (TOP 25)

Rail Corridor Name	Rail Ownership	Number of Crossings	Corridor Length
Downtown Milwaukee	CPKC + CM Sub	3	1.9
Waukesha South	WC + Waukesha Sub	15	2.7
Milwaukee Oak Creek	CPKC + CM Sub	2	5.8
West Allis	UP + Milwaukee Sub	11	2.1
Owen	WC + Superior Sub	5	5.9
Prairie du Chien	BNSF + Aurora Sub	11	5.5
Oshkosh	WC + Neenah Sub	18	6.4
Burlington	WC + Waukesha Sub	4	0.5
Neenah West	WC + Neenah Sub	3	0.8

Wauwatosa Brookfield	CPKC + Watertown Sub	11	7.4
Waukesha West	WSOR + Waukesha Sub	14	2.0
Green Bay West South bend	WC + Fox River and New London Sub	13	2.0
Green Bay West North bend	WC + Fox River and New London Sub	16	1.9
Fond du Lac	WC + Neenah and Waukesha Sub	11	6.1
Northside Milwaukee Short	WSOR + Milwaukee Sub	6	5.1
Watertown	CPKC + Watertown Sub	8	2.5
Northside Milwaukee Long	UP + Granville Branch	12	10.8
La Crosse	BNSF + Aurora Sub	7	8.4
Green Bay East	WC + Luxemburg Sub	7	1.0
Wausau SW	WC + Wausau Branch	8	0.4
Wausau SSW	WC + Wausau Branch	10	0.6
Neenah East	WC + Manitowoc Sub	18	2.6
Wausau East	WC + Valley Sub	16	2.7
Janesville	UP + Janesville Spur	6	1.0
Wausau Central	WC + Wausau Branch	4	0.8

This plan identified available data sources and methods to investigate bicycle and pedestrian safety and opportunities to streamline or include this data into WisDOT's decision-making process. This data and analysis would be best utilized by collaborating with software developers to build an interactive, scalable dashboard platform. Testing the platform to ensure functionality and engaging key stakeholders in high-risk communities and across the state to fine tune the design would be important. The platform could then be applied to help practitioners make more educated project scoping and construction decisions for projects near railroad crossings.

Another critical next step is to begin developing engineering enhancements to improve bicycle and pedestrian safety near high-risk railroad corridors in Wisconsin, which requires a strategic and systematic approach to ensure uniform and compliant crossing design, construction, and implementation. The first step in advancing engineering designs in high-risk corridors would incorporate a comprehensive safety diagnostic of existing crossing characteristics including an investigation of the adequacy of signage and pavement markings, visibility of approaching trains for pedestrians and cyclists, crossing surface conditions, and ADA compliance. Low-cost, high impact investments would first be identified, where enhancements to signs and signals could play a critical role in raising awareness and guiding pedestrians and cyclists' safety across tracks. Unique crossing

features will need to be considered to investigate innovative solutions like refuge islands, physical barriers, or medians to reduce the risk of accidents.

Another step WisDOT could take would be to provide further study into the three corridors that were investigated deeply in this study. Next steps could include specific design options, coordination with locals, and identifying ways to connect funding sources with the proposed remedial alternatives. This approach could be perpetuated in future years, similarly, studying the next three priority corridors to work toward enacting the identified solutions.

As part of a forward-looking approach, the state should also explore the integration of smart detection technologies at select crossings. Potential innovations may include real-time mobile alerts for pedestrians and cyclists approaching crossings when trains are detected. Smart sensors that detect the presence of pedestrians and cyclists on or near the tracks and trigger warnings for both the users and the approaching trains.

WISCONSIN

BICYCLE/PEDESTRIAN

RAILROAD CROSSING SAFETY ACTION PLAN

APPENDIX

Table of Contents

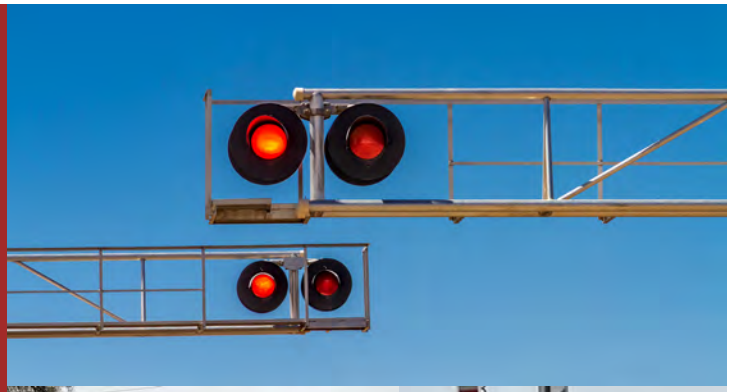
WARNING DEVICE TYPE

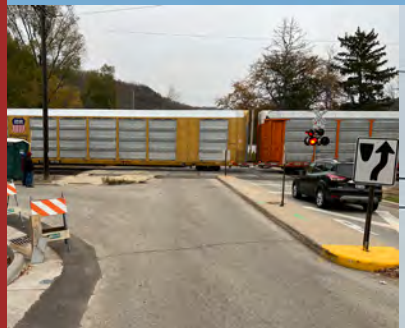
The level of protection at a railroad crossing significantly impacts safety. Crossings with passive warning devices like crossbucks or stop signs have a higher risk of accidents compared to those with active warning systems, such as flashing lights and gates. Active warning systems increase awareness of people crossing near an approaching train, reducing the likelihood of collisions. Additionally, gated crossings provide a physical barrier, preventing vehicles from entering the tracks while a train is approaching. While gates are often primarily informing vehicular traffic, they do provide added function of informing nearby pedestrians/bicyclists of the approaching train.

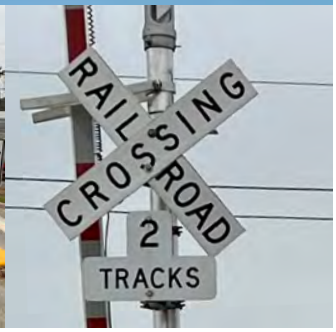
	TYPE	POINTS RECEIVED	WHY?
	**PASSIVE WARNING DEVICES** • Crossbucks • Crossbucks/Stop Signs	**5**	Limited impact on pedestrian safety
	**ACTIVE WARNING DEVICES** • Flashing Lights • Wigwag Bells • Highway Traffic Signals	**3**	Increased visibility or auditory impact

IN TOTAL,

1,897	***Crossings received 5 points***
696	***Crossings received 3 points***
1,220	***Crossings received 1 point (all other gates)***
8	***Crossings received 0 points (quad gates)***





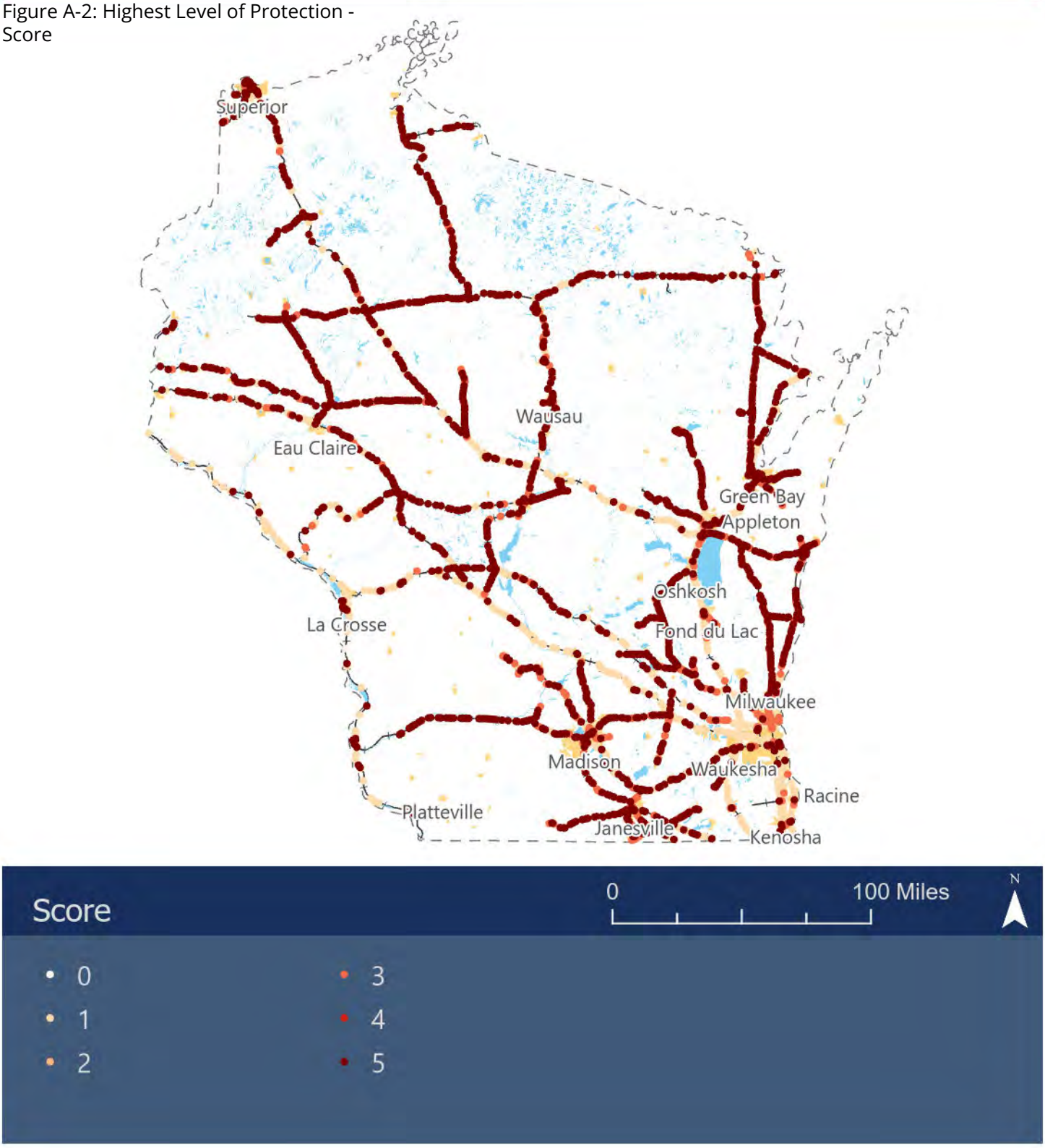


Highest Level of Protection

Figure A-1: Highest Level of Protection - Device Type

Highest Level of Protection

Figure A-2: Highest Level of Protection - Score



SKEWED CROSSINGS

Railroad crossing skew, the angle at which a road intersects a track, significantly impacts safety. A skewed crossing can obstruct a pedestrian and bicyclist's view of oncoming trains, especially when visibility is already limited by vegetation or buildings. This increased blind spot reduces reaction time, making it more difficult to avoid a collision. Additionally, the angled approach can affect leading to loss of control, especially for bicyclists where their tires can become stuck in the tracks.

	TYPE	POINTS RECEIVED	WHY?
	• Skewed crossings between 1 and 29 degrees	5	Negative impact on pedestrian safety
	• Skewed crossings between 30 and 59 degrees	2	Negative impact on pedestrian safety, but not as extreme

IN TOTAL,

81 ***Crossings received 5 points***

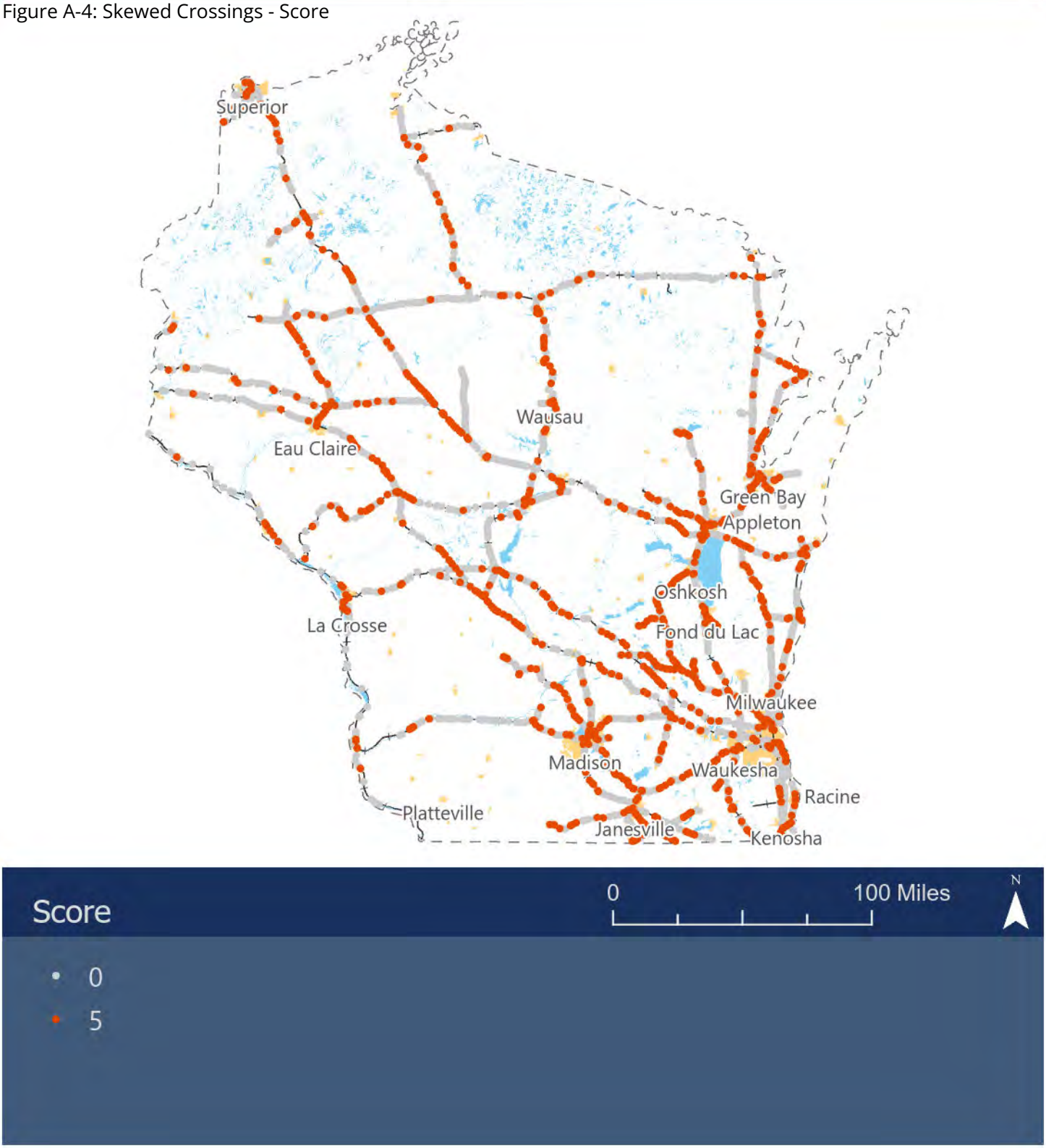
983 ***Crossings received 2 points***

Skew

Figure A-3: Skewed Crossings

Skew

Figure A-4: Skewed Crossings - Score



QUIET ZONES

While FRA quiet zones offer noise reduction benefits, they also present safety concerns. The absence of train horns, which serve as crucial auditory warnings, can increase the risk of accidents, especially for pedestrians and bicyclists and people who are visually impaired or distracted. Additionally, the effectiveness of other safety measures, such as crossing gates and lights, may be reduced in the absence of the auditory cue.

	TYPE	POINTS RECEIVED	WHY?
	• FRA Quiet Zones	5	Lack of auditory warnings increases potential accidents

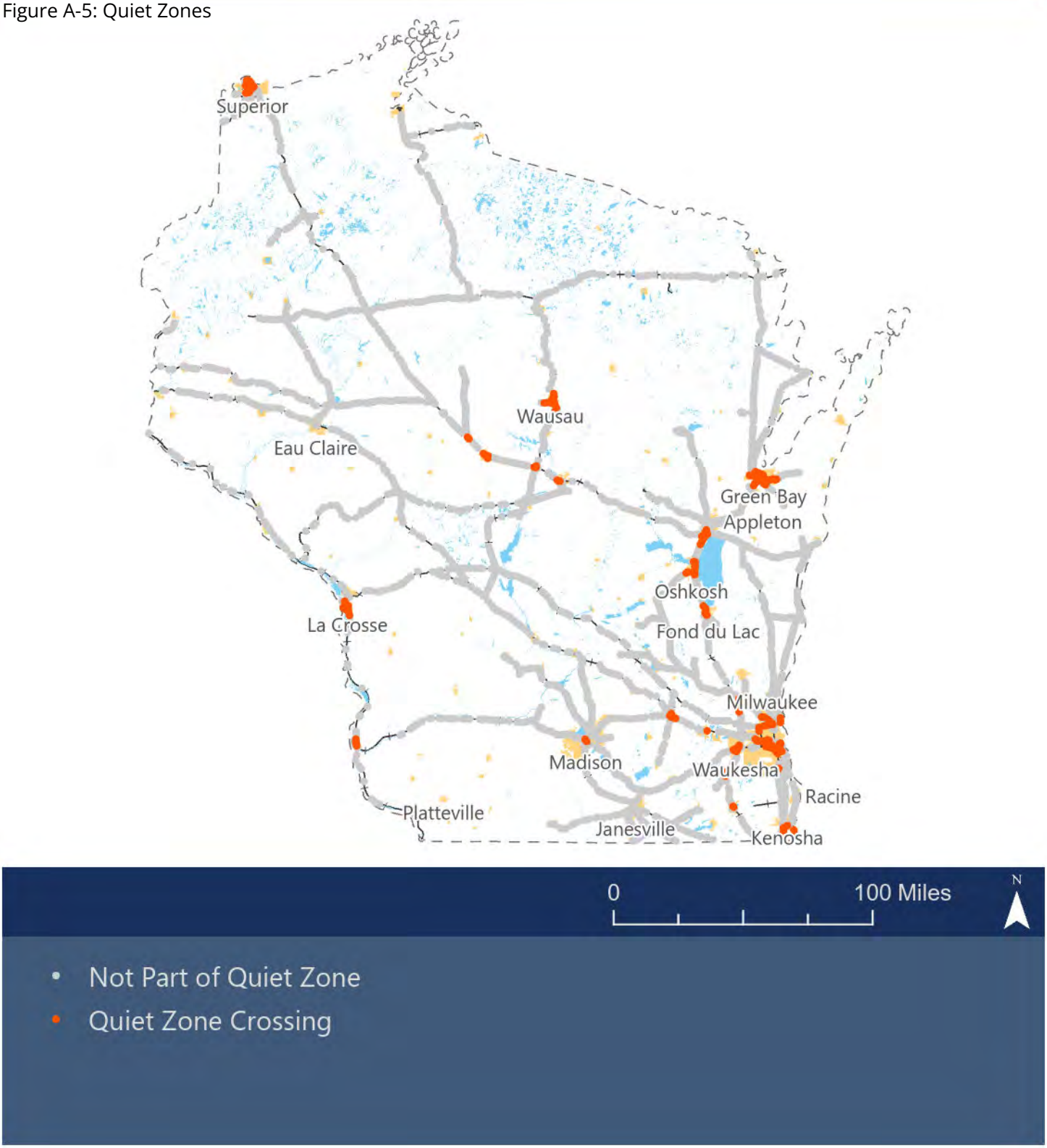
IN TOTAL,

427 ***Quiet Zone Crossings in Wisconsin***

427 ***Crossings received 5 points***

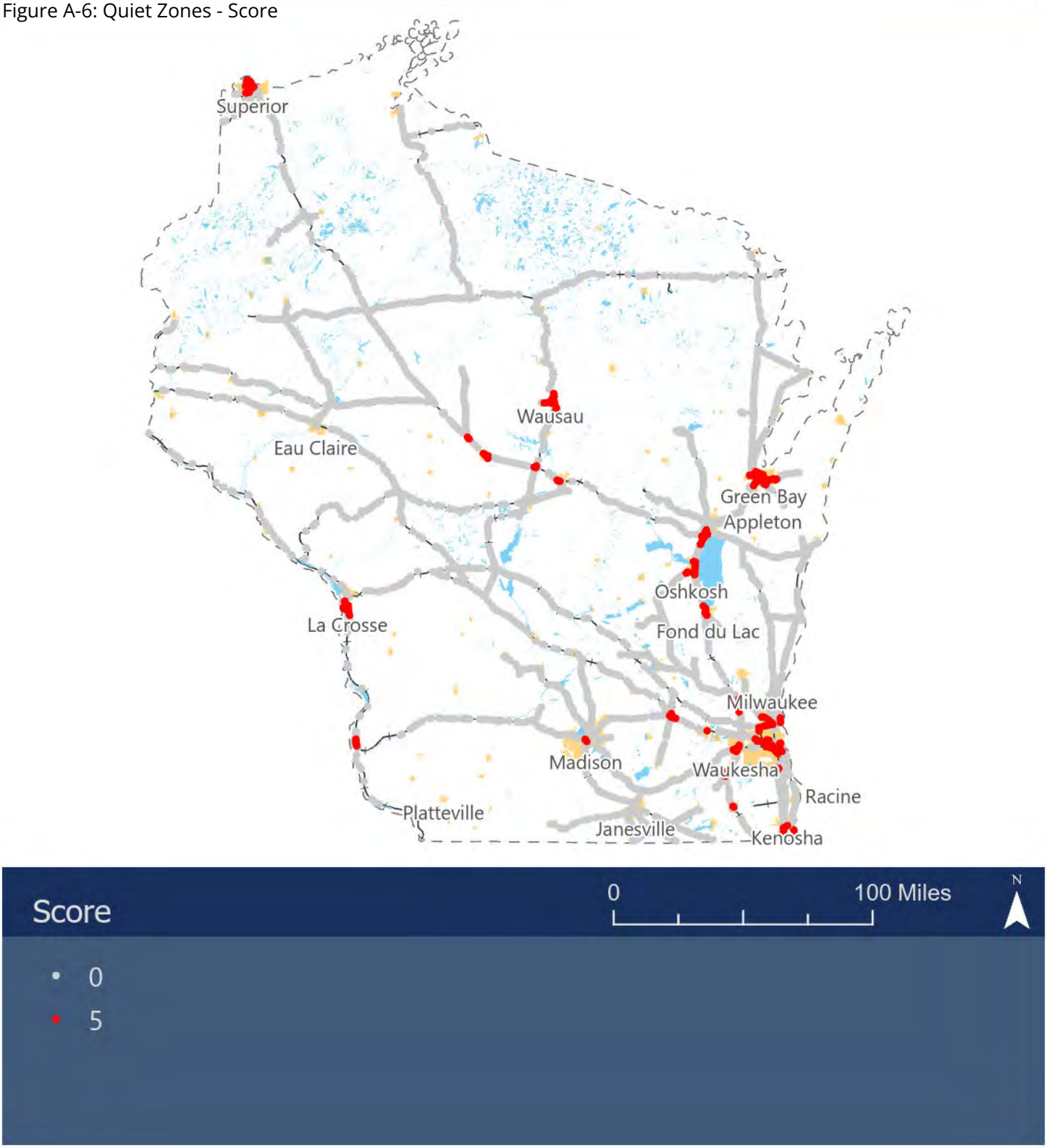
Quiet Zones

Figure A-5: Quiet Zones



Quiet Zones

Figure A-6: Quiet Zones - Score



MULTIPLE TRACK CROSSINGS

Multiple track crossings significantly increase the risk of crashes. With additional tracks, pedestrians and bicyclists have more blind spots to consider, making it harder to detect approaching trains. The time required to safely cross the tracks also increases, leaving less margin for error. Furthermore, the complexity of multiple tracks can lead to confusion about which tracks are currently in use, especially during switching operations. These factors contribute to a higher likelihood of collisions, making multiple track crossings particularly hazardous areas on the transportation network.

	TYPE	POINTS RECEIVED	WHY?
	• Crossings with multiple tracks	5	Pedestrians and bicyclists have additional blind spots and crossing distances increase

IN TOTAL,

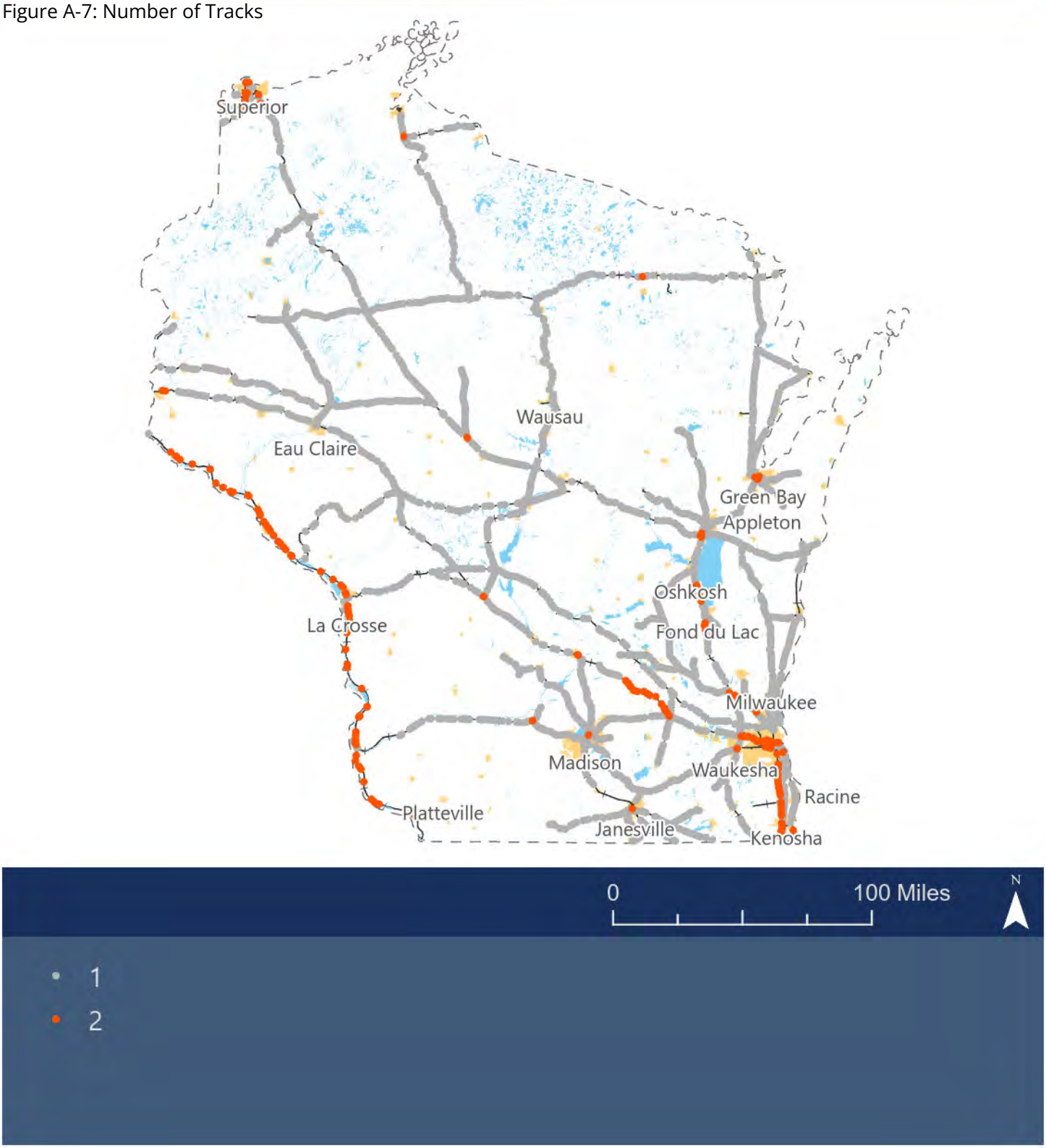
204 ***Crossings with multiple tracks***

204 ***Crossings received 5 points***

Many of the multiple track crossings in Western Wisconsin are on the BNSF Aurora Sub and BNSF St. Croix Sub. In and near Milwaukee the UP Milwaukee Sub and the CPRS CM Sub and CPRS Watertown Sub make up most of the double tracked lines. Those crossings received 5 points while single track crossings did not receive additional points.

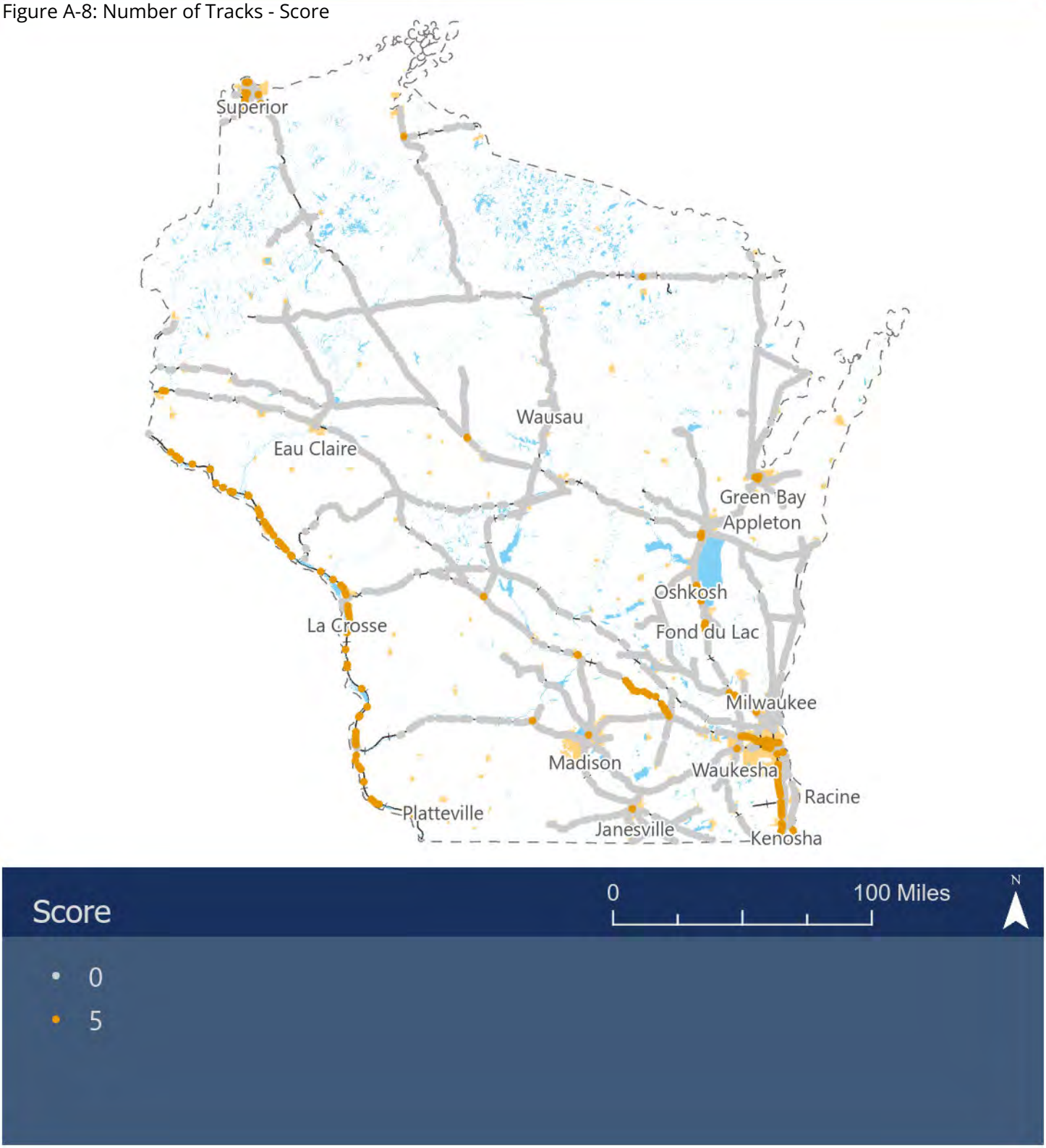
Number of Tracks

Figure A-7: Number of Tracks



Number of Tracks

Figure A-8: Number of Tracks - Score



TRAINS PER DAY

An increase in train traffic at a crossing significantly elevates safety risks. More frequent train passages reduce the time available for people to safely cross the tracks, increasing the likelihood of being caught on the tracks when a train approaches. Additionally, the heightened train activity can lead to driver fatigue and decreased attention, as they become accustomed to the regular train traffic. This reduced vigilance can result in misjudging train speeds or timings, contributing to accidents. The average number of trains per day at each crossing was 5.78, which was used to then assign points.

NUMBER		POINTS RECEIVED	WHY?
	• 16+ trains per day	5	High frequency of trains increase risk of accidents
	• Between 6 and 16 trains per day	2.5	Slightly high frequency of trains slightly increases risk of accidents

IN TOTAL,

47 ***Highest number of trains per day at a crossing***

477 ***Crossings received 5 points***

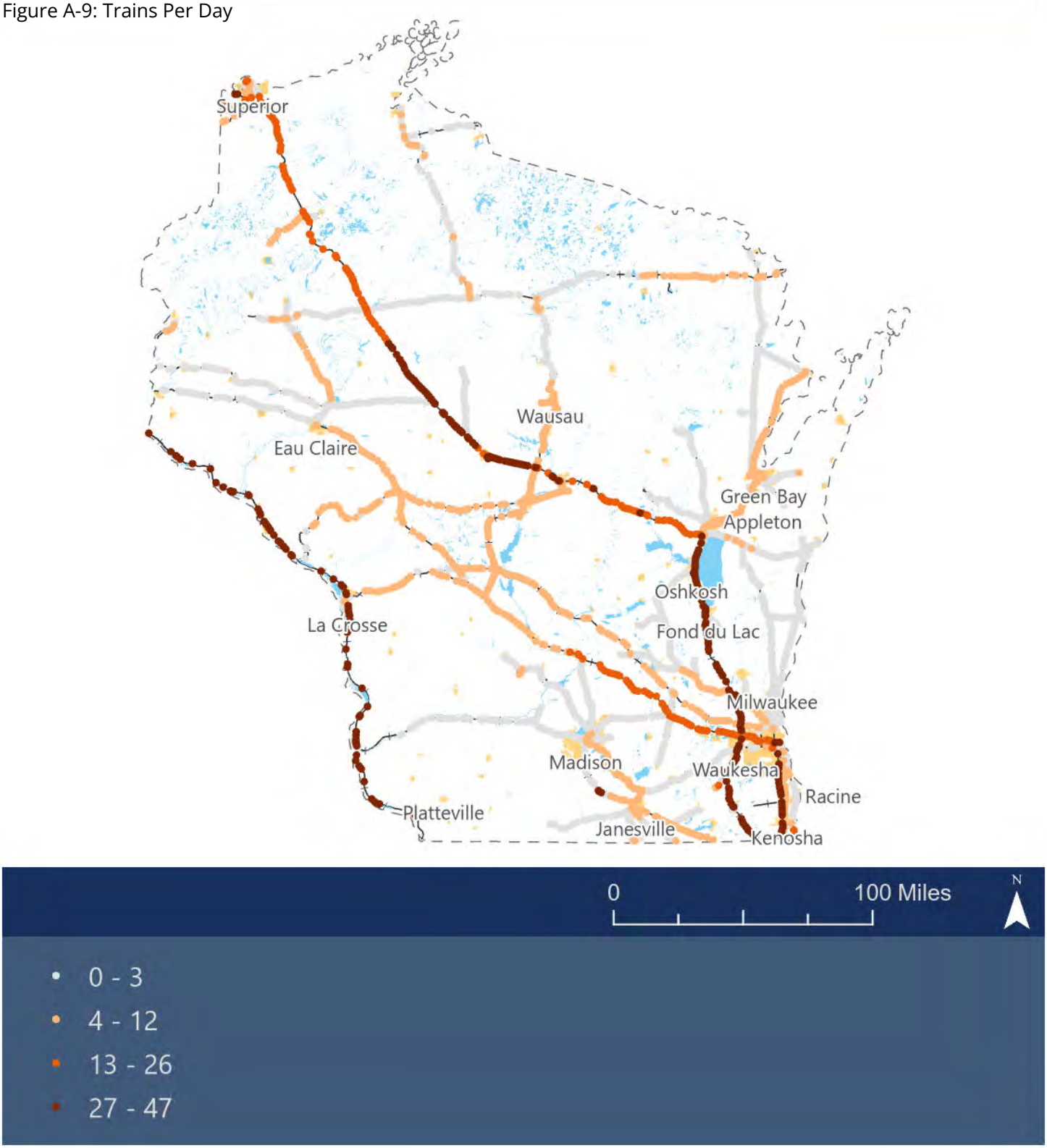
511 ***Crossings received 2.5 points***

330 crossings in Wisconsin have 30 or more trains per day. 97 of those crossings are on the WC Waukesha Sub that goes between Fond du Lac, through Waukesha and Burlington to the Illinois state line.

The La Crosse and Oshkosh corridors both have 30 or more trains per day.

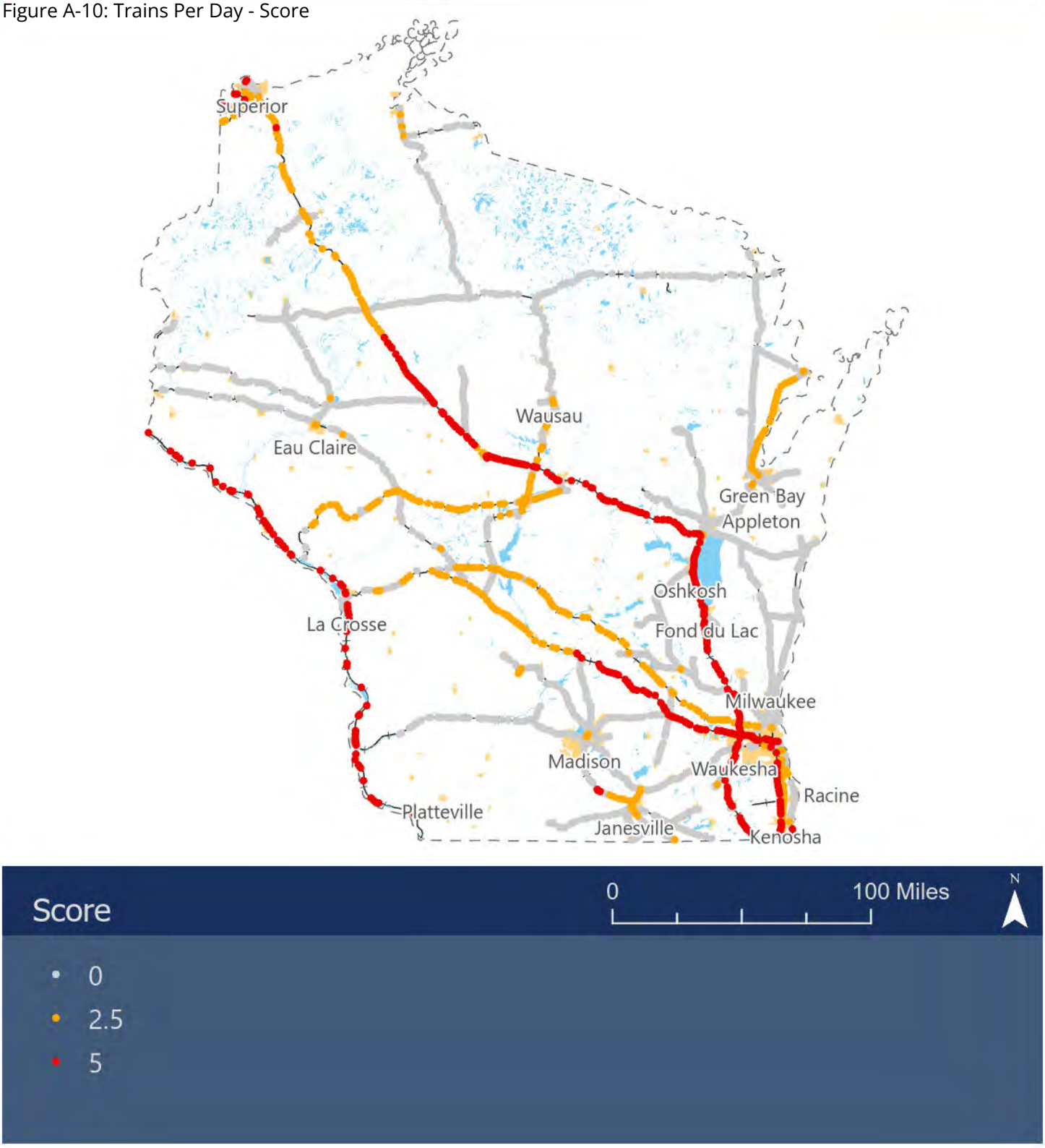
Number of Trains per Day

Figure A-9: Trains Per Day



Number of Trains per Day

Figure A-10: Trains Per Day - Score



PASSENGER / NIGHT TRAINS

The type of trains that use the tracks impact safety. Passenger trains and trains traveling at night impact the safety of crossings. Passenger trains pose unique safety challenges at crossings compared to freight trains due to their speed. Trains operating at night present increased safety challenges due to reduced visibility. People are more likely to be impacted by darkness. Poor lighting conditions can also hinder the effectiveness of warning devices, such as flashing lights and gates. These factors combine to create a higher risk of accidents at railroad crossings during nighttime hours or during the winter when the sun goes down earlier in the day.

	TYPE	POINTS RECEIVED	WHY?
	• Tracks that operate at night	5	Reduced visibility for bicyclists and pedestrians and less effective warning strategies
	• Tracks that operate passenger trains	5	Higher speed trains leave pedestrians and bicyclists less time to react due to increased stopping distances

IN TOTAL,

1 ***Passenger rail line***

2,429 ***Crossings with a passenger rail line or a track that operates at night***

Many crossings throughout the state have trains operating at night. These crossings received points for their impact on safety.

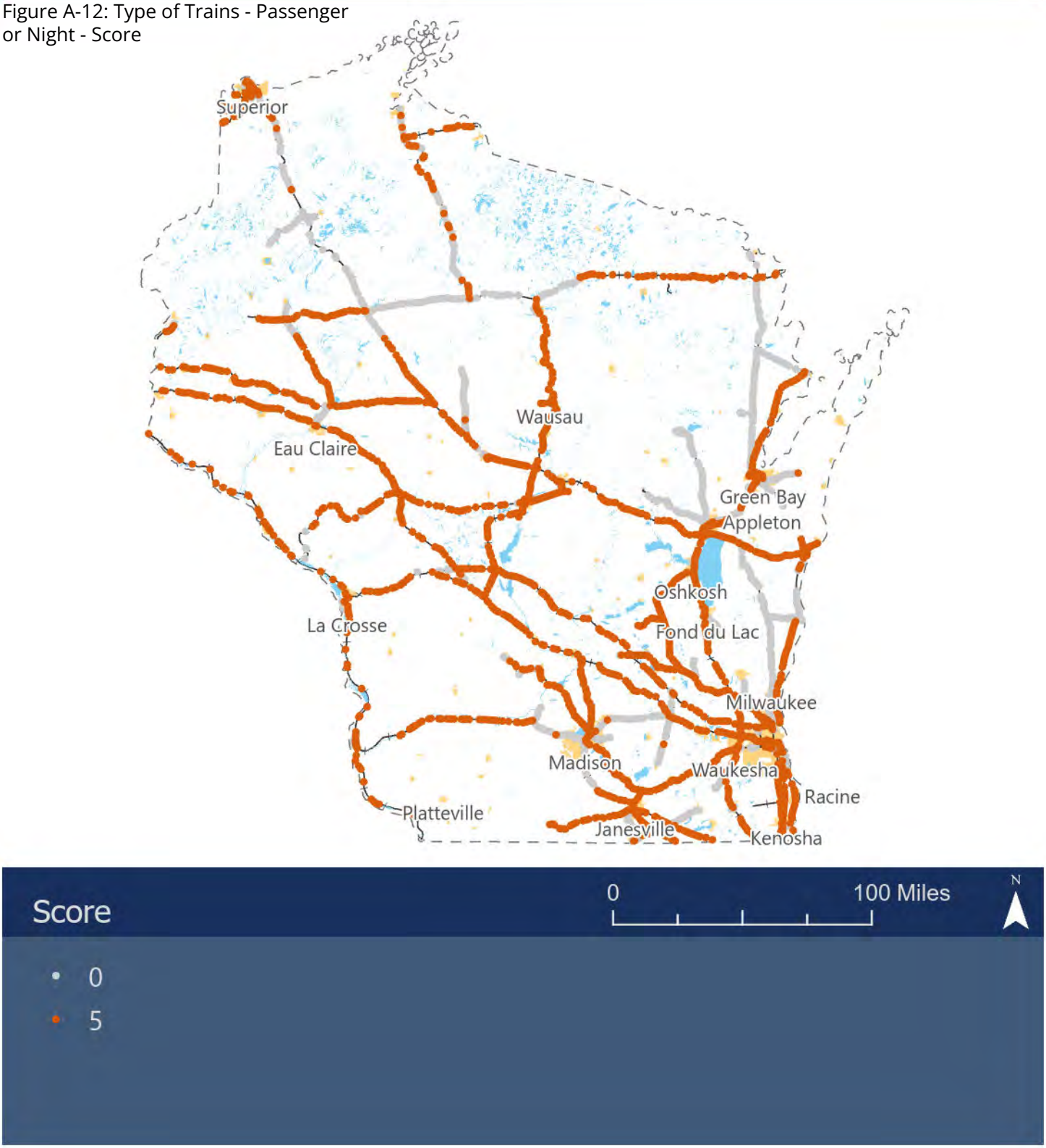
Source: Amtrak

Type of Trains

Figure A-11: Type of Train - Night or Passenger

Type of Trains

Figure A-12: Type of Trains - Passenger or Night - Score



MAX TRAIN SPEEDS

Faster trains, while offering reduced travel times, present significant safety challenges at crossings. Increased speeds dramatically decrease a train's stopping distance, leaving pedestrians and bicyclists with less time to react and clear the tracks. The heightened kinetic energy of a high-speed train also results in more severe consequences in the event of a collision. Furthermore, the increased speed can impact the effectiveness of traditional warning systems, as people may have less time to perceive and respond to approaching trains.

MAX SPEED		POINTS RECEIVED	WHY?
	• Over 50 MPH	5	High speed of trains increase risk of accidents
	• Between 35 and 50 MPH	2.5	Slightly high speed of trains slightly increases risk of accidents

IN TOTAL,

5 - 60 ***Range of train speeds (MPH)***

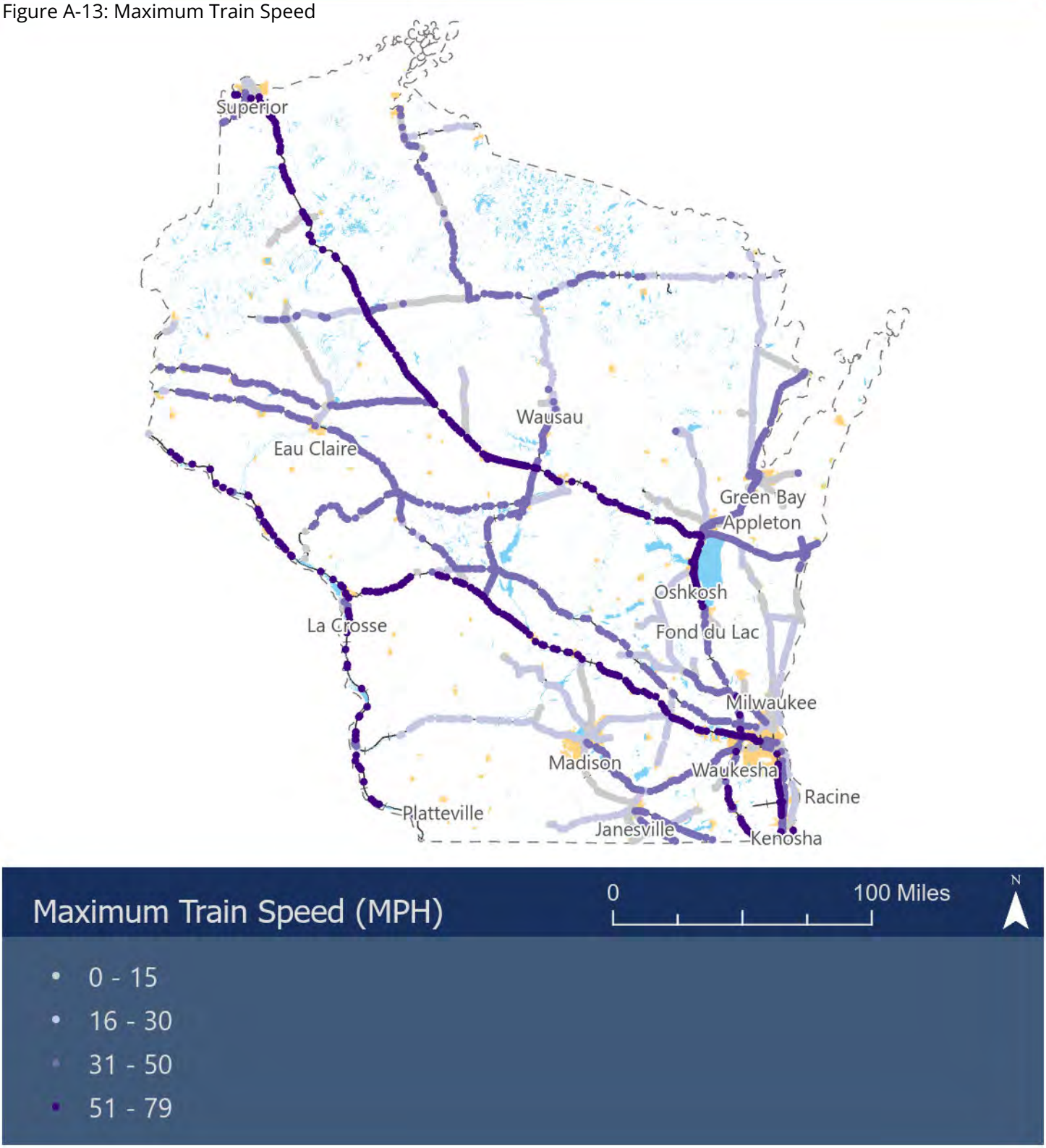
18 ***Crossings received 5 points***

2 ***Crossings received 2.5 points***

521 crossings on 19 lines in the state have maximum train speeds at or above 60 MPH. Crossings in the La Crosse and Oshkosh corridors are included in these crossings.

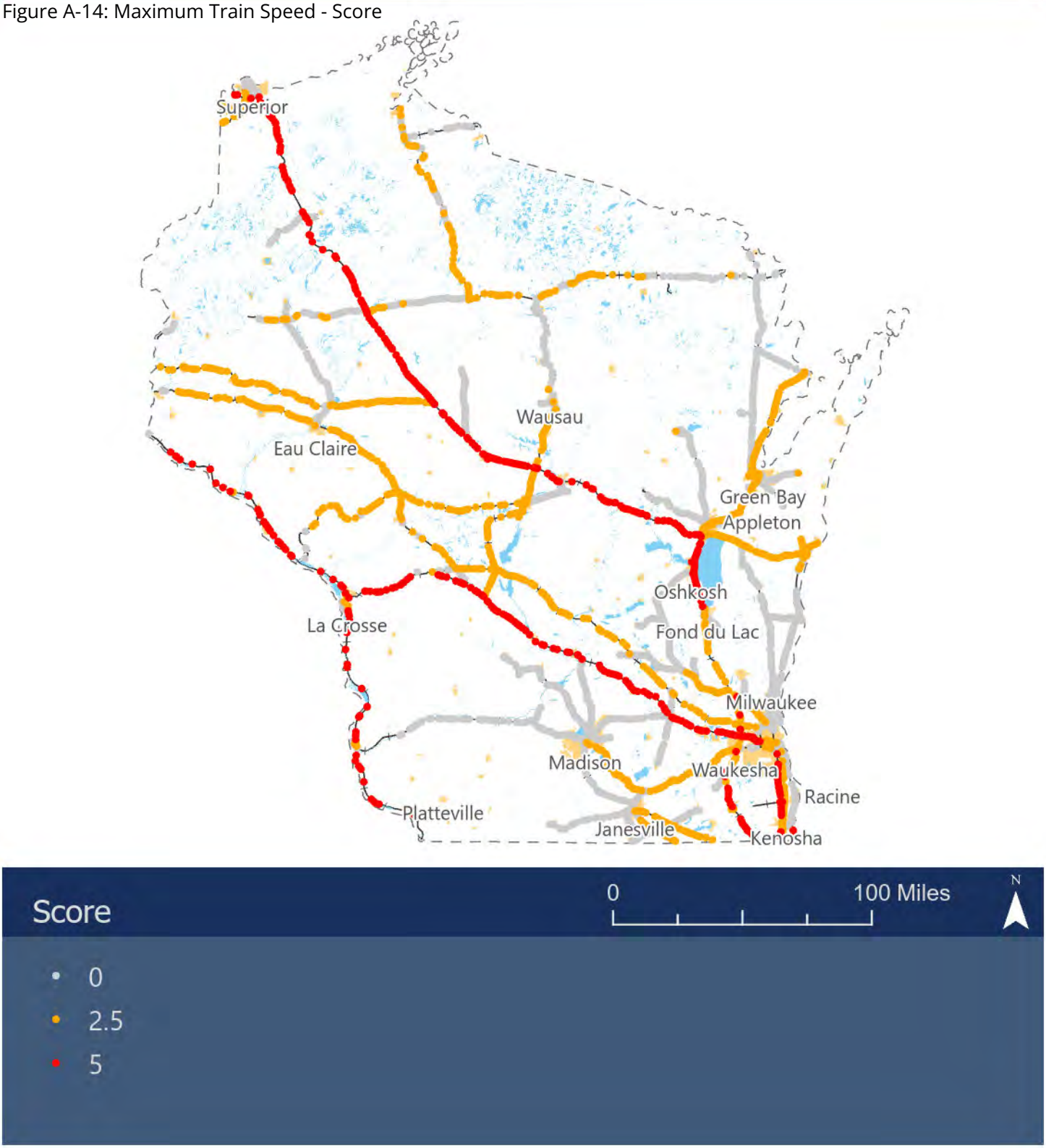
Train Speed

Figure A-13: Maximum Train Speed



Train Speed

Figure A-14: Maximum Train Speed - Score



BIKE-PED VOLUMES

A higher volume of bicyclists and pedestrians using a railroad crossing significantly increases safety risks. They are more susceptible to injuries in the event of a collision due to their lack of protective enclosures. Additionally, their smaller size and slower speeds can make them harder for train operators to see, especially in low-light conditions. Furthermore, pedestrians and cyclists may misjudge the speed or proximity of approaching trains, leading to accidents. It was not possible to perform counts at every crossing across the state, so the study used Replica estimates. Replica leverages a blend of data science and machine learning to predict traffic patterns and volumes.

VOLUMES		POINTS RECEIVED	WHY?
	• Over 430 bike-ped crossings per day	5	High volumes of bicycle-pedestrian activity
	• Between 24 and 430 bike-ped crossings per day	2.5	Medium volumes of bicycle-pedestrian activity

IN TOTAL,

52 ***Crossings received 5 points***

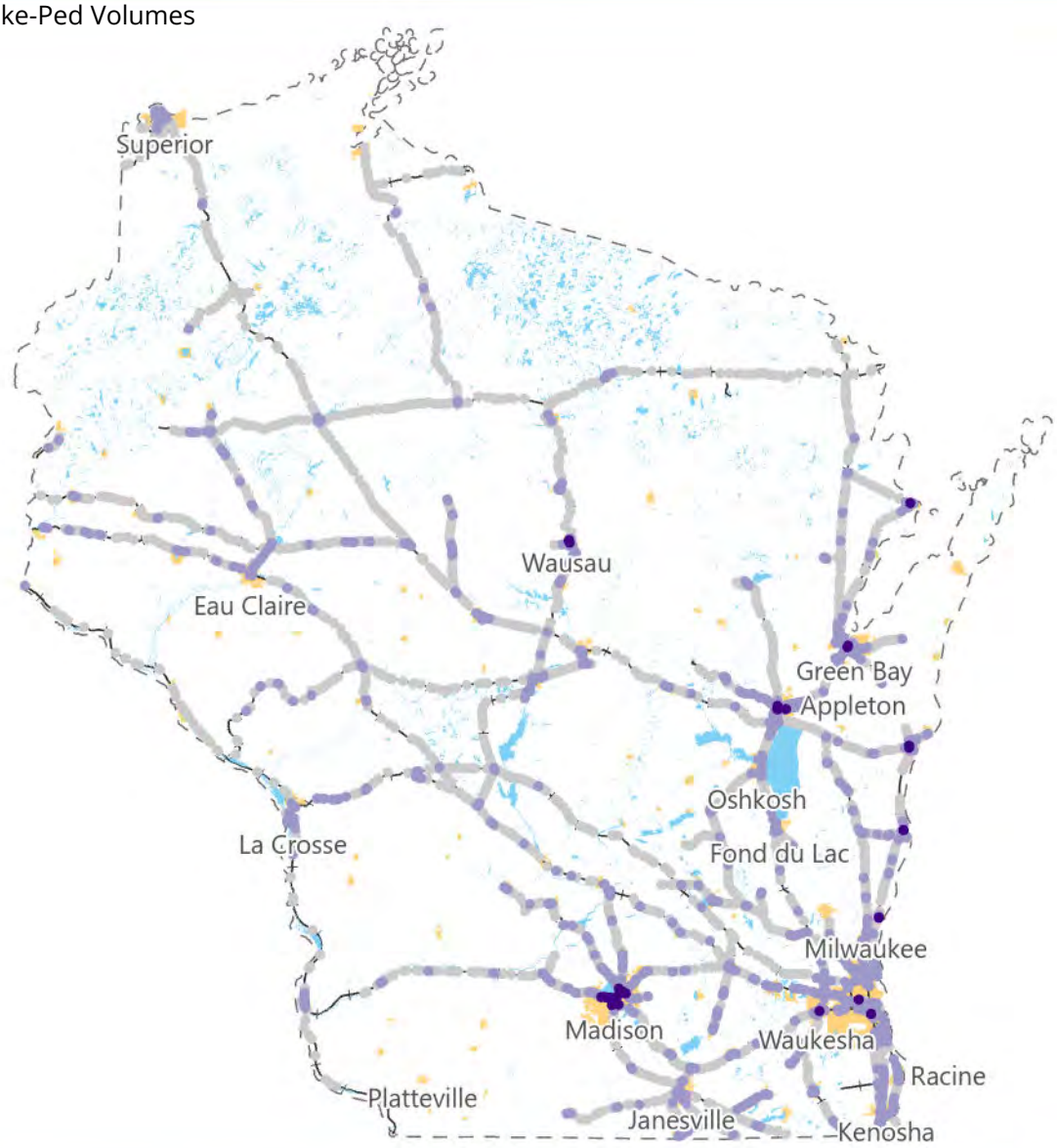
87 ***Crossings received 2.5 points***

9 of the top 10 crossings with the highest bike ped crossing estimates were within the City of Madison. Madison has several train lines that run on and near the Isthmus. The WSOR Prairie Sub runs through the UW - Madison Campus which sees many students walking/biking between class buildings.

Most crossings with high bicycle and pedestrian activity were in urban areas or the oldest sections of small cities.

Pedestrian and Bicyclist Estimates

Figure A-15: Bike-Ped Volumes



Number of People Crossing per Day

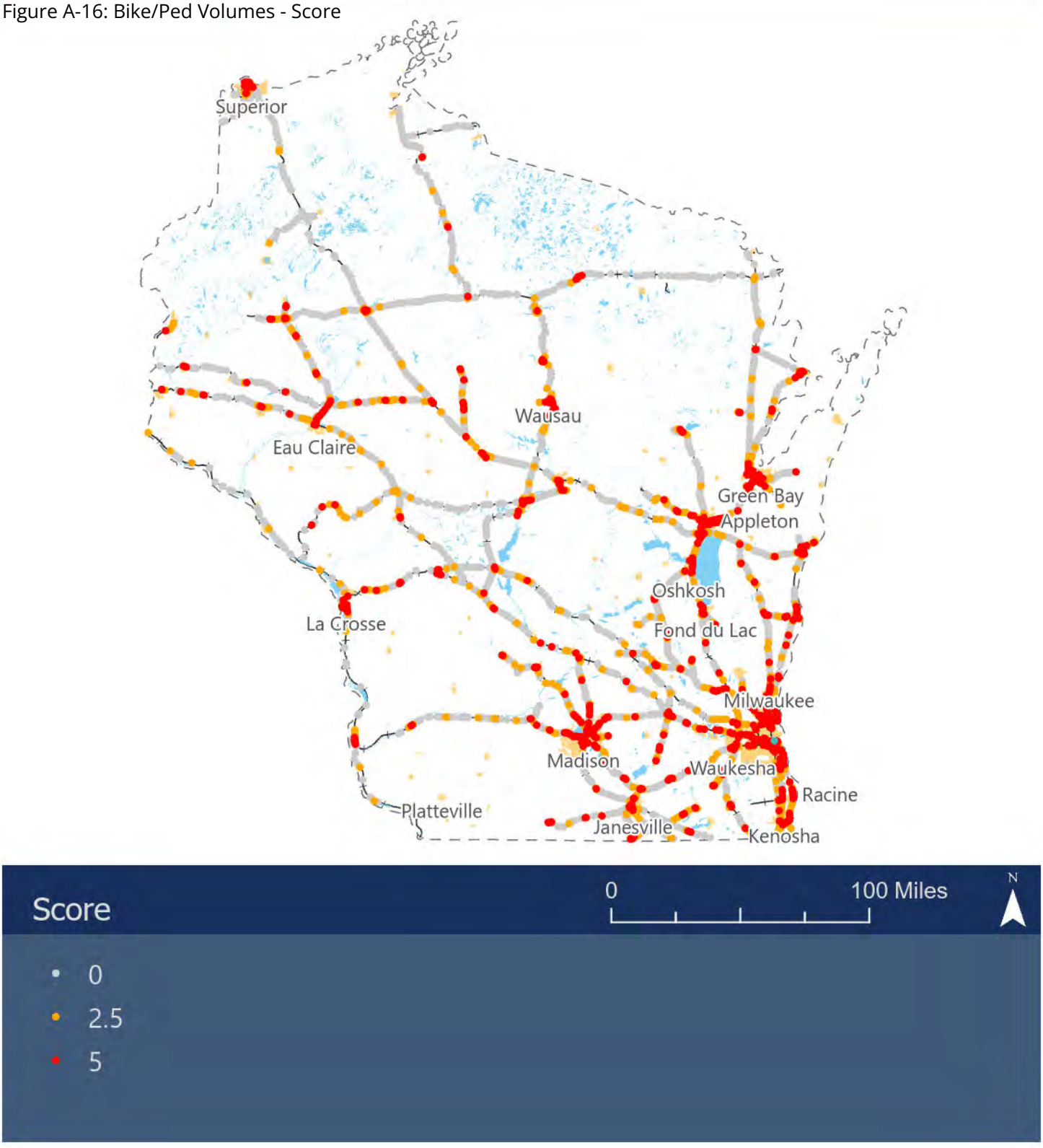
0 100 Miles

N

- 0 - 50
- 51 - 1000
- 1000+

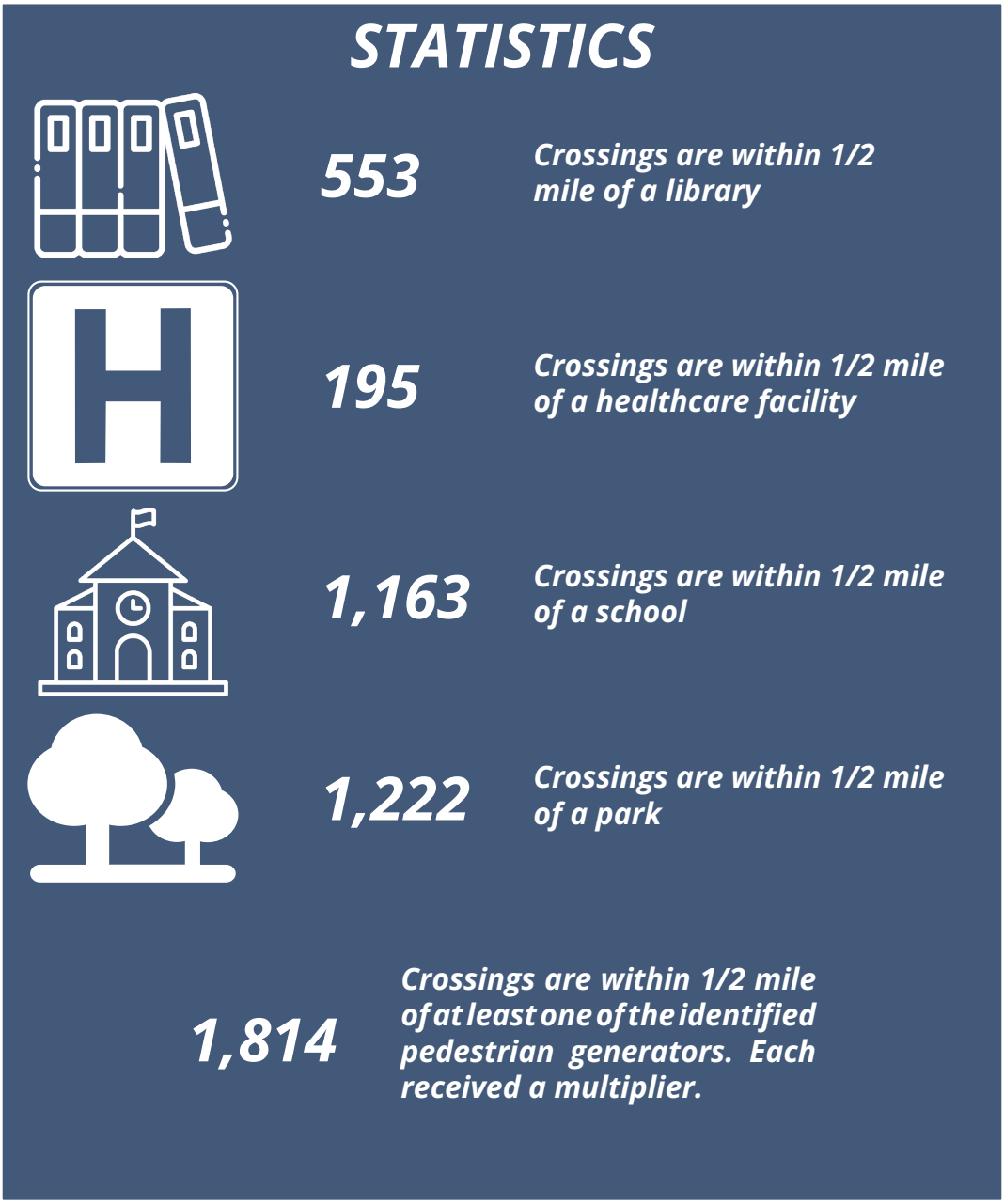
Pedestrian and Bicyclist Estimates

Figure A-16: Bike/Ped Volumes - Score



PEDESTRIAN GENERATORS

Pedestrian generators are locations that attract significant foot traffic. These areas serve as starting points or destinations for pedestrian journeys and can include a variety of land uses. A variety of pedestrian generators were used in this study to identify crossings that people are more likely to walk or bike to in their community. Libraries, Healthcare facilities, schools, and parks were identified as pedestrian generators for this study. Many crossings, especially in more urban areas had more of these pedestrian generators near them.



Pedestrian Generators: Libraries

Figure A-17: Pedestrian Generators - Libraries

Number of Libraries within 1/2 Mile

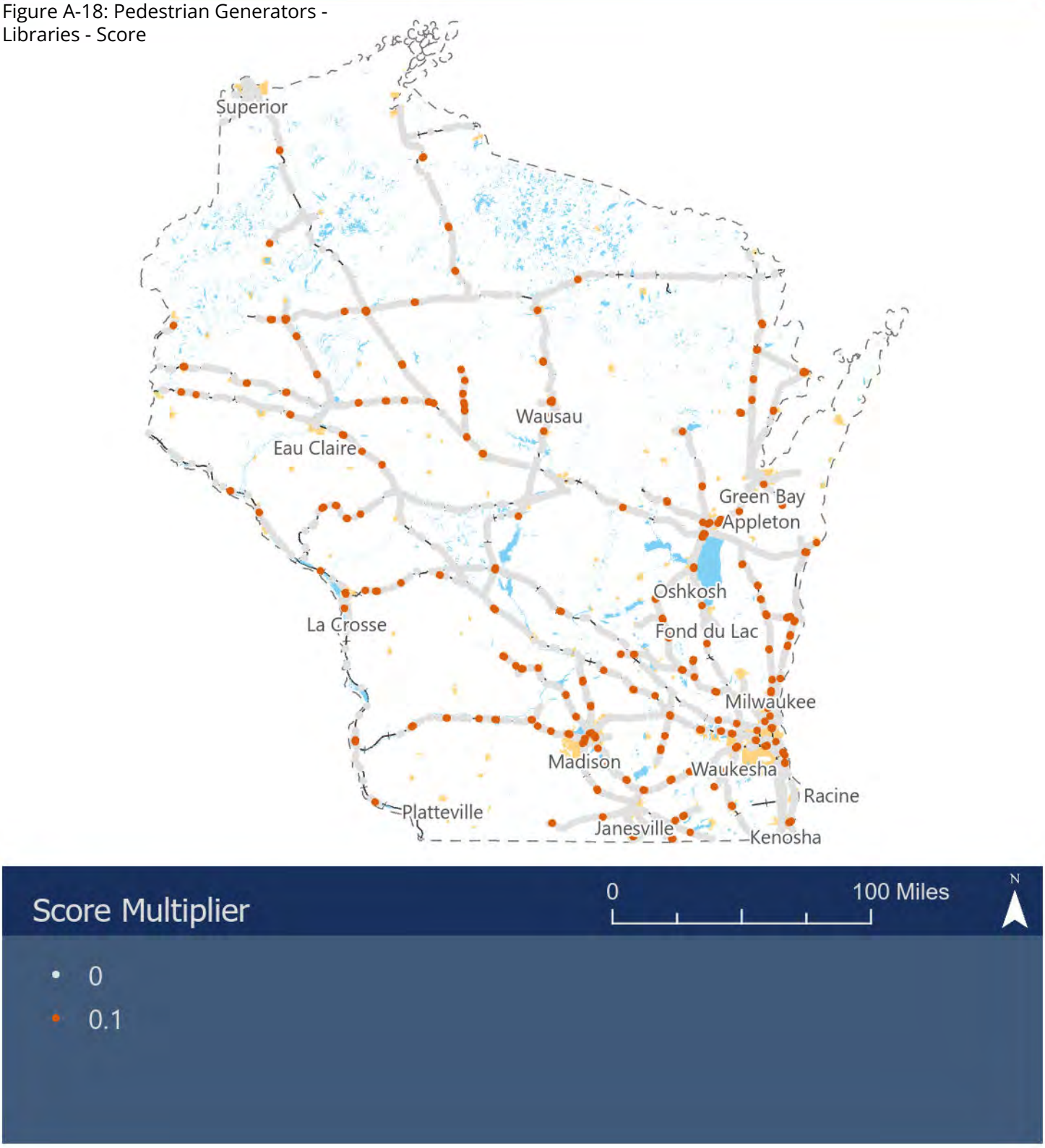
0 100 Miles

N

- 0
- 1
- 2
- 3

Pedestrian Generators: Libraries

Figure A-18: Pedestrian Generators - Libraries - Score



Pedestrian Generators: Healthcare Facilities

Figure A-19: Pedestrian Generators - Healthcare Facilities

Number of Healthcare Facilities within 1/2 Mile

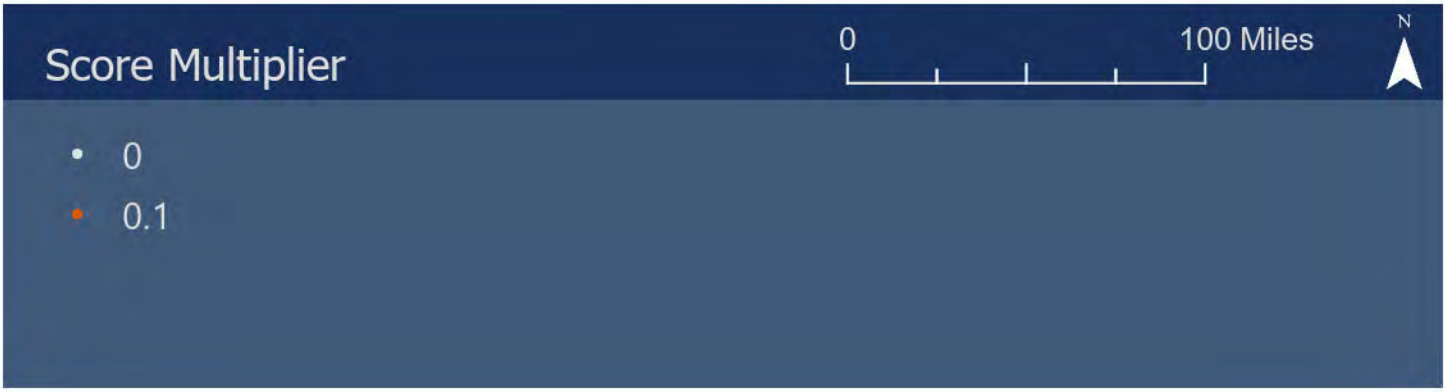
0 — 100 Miles

N

- 0
- 1 - 3
- 4 - 7

Pedestrian Generators: Healthcare Facilities

Figure A-20: Pedestrian Generators - Healthcare Facilities - Score



Pedestrian Generators: Schools

Figure A-21: Pedestrian Generators - Schools

Number of Schools within 1/2 Mile

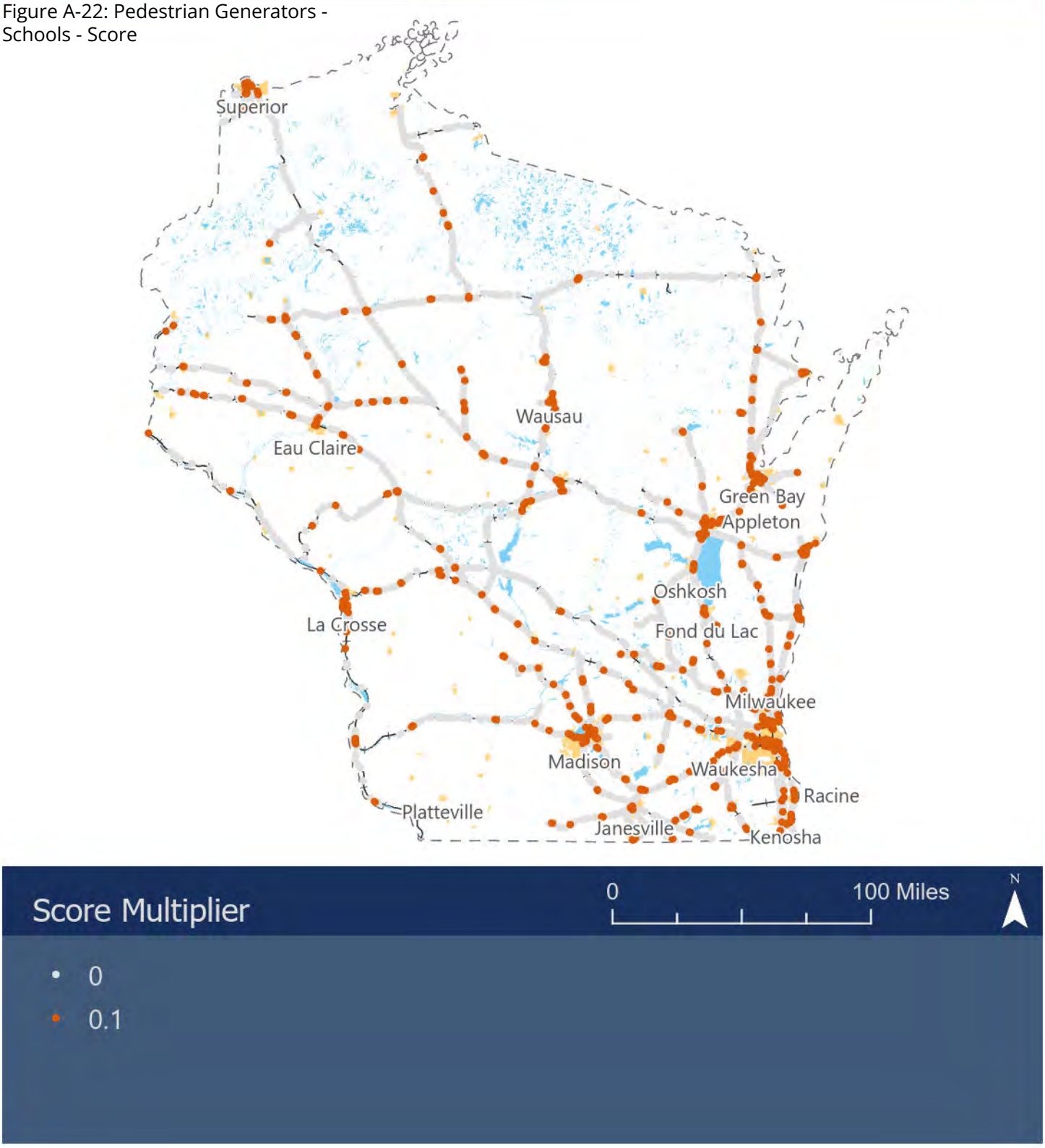
0 100 Miles

N

- 0
- 1 - 3
- 4 - 7

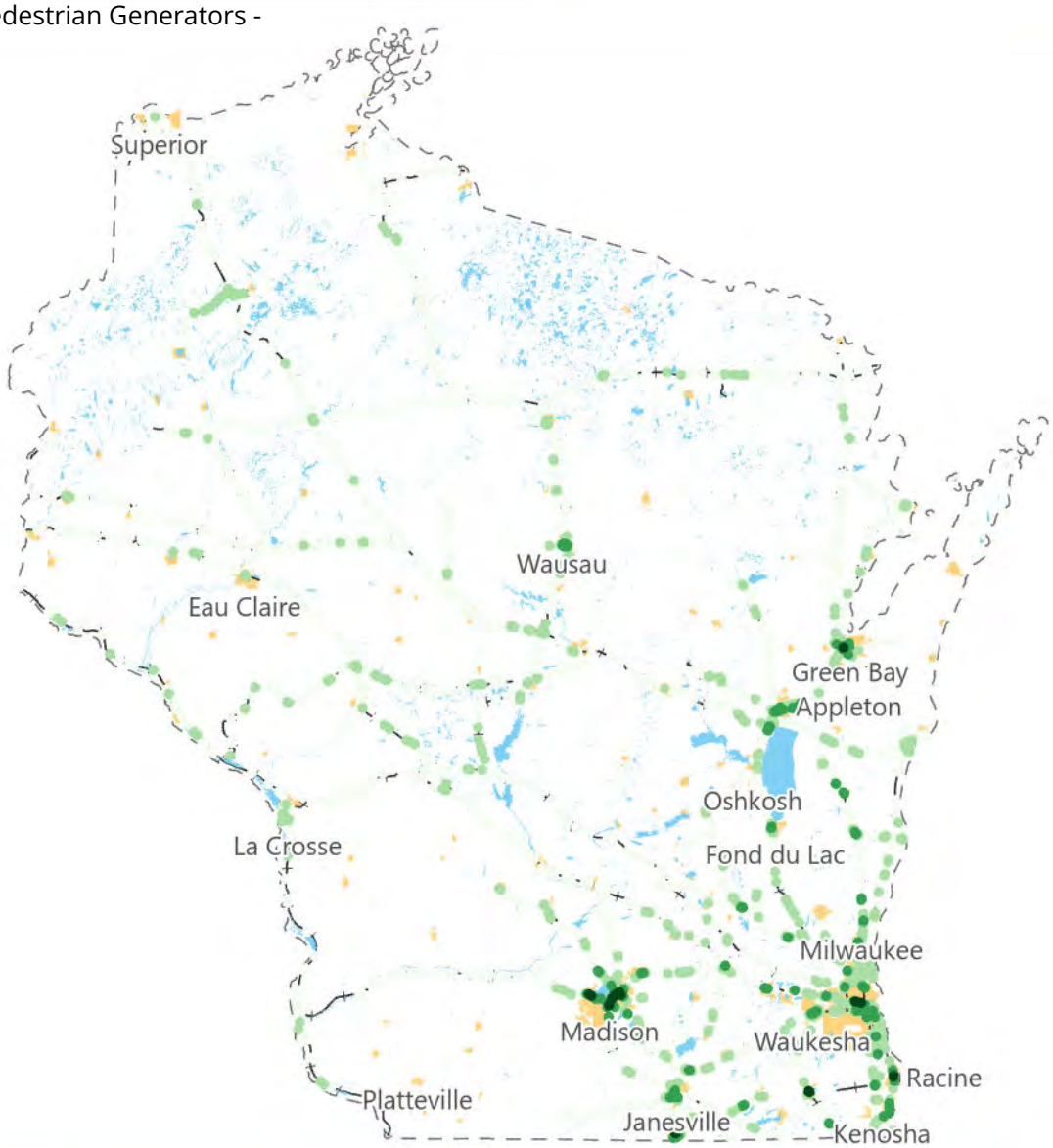
Pedestrian Generators: Schools

Figure A-22: Pedestrian Generators - Schools - Score



Pedestrian Generators: Parks

Figure A-23: Pedestrian Generators - Parks



Number of Parks within 1/2 Mile

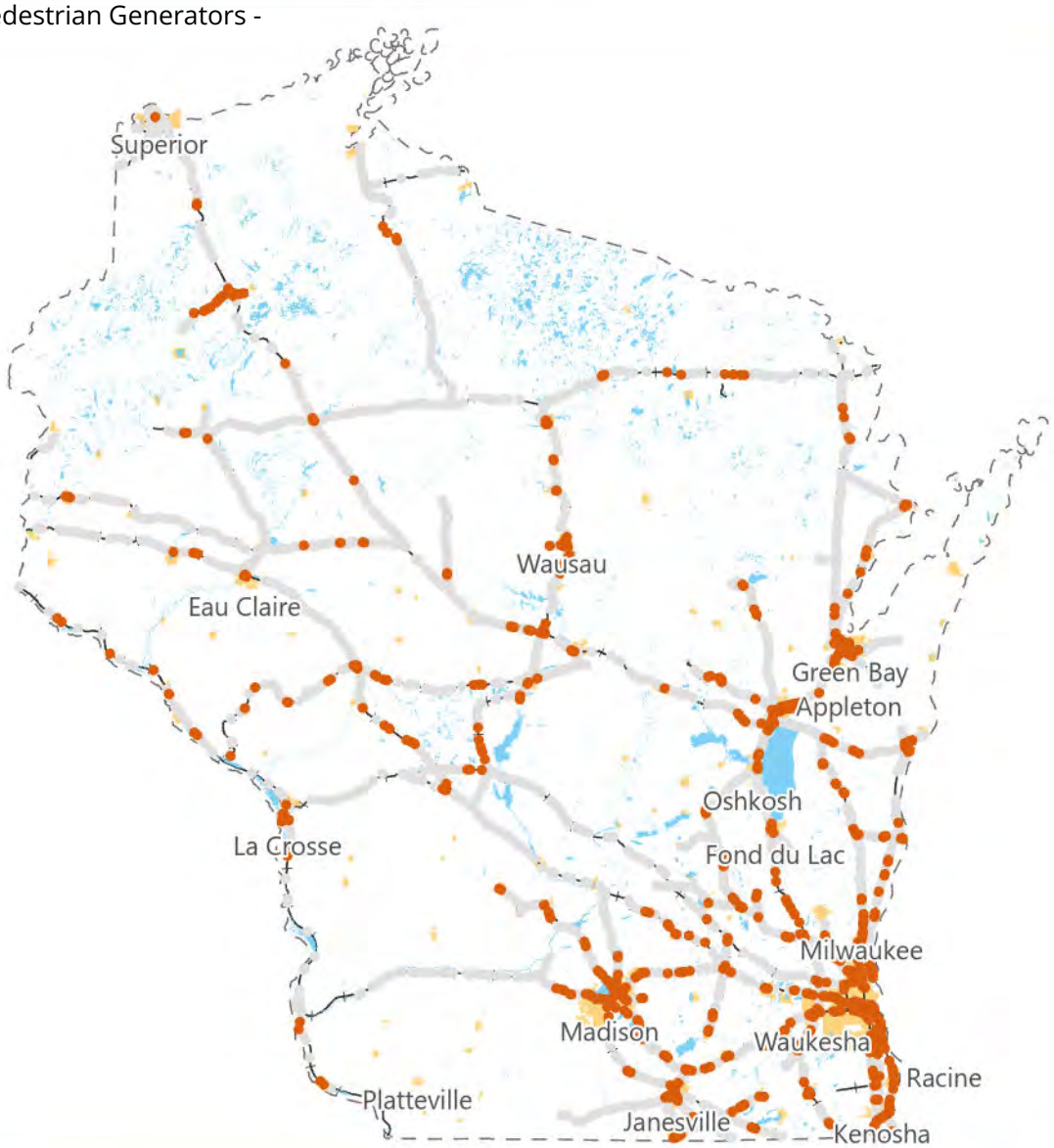
0 100 Miles

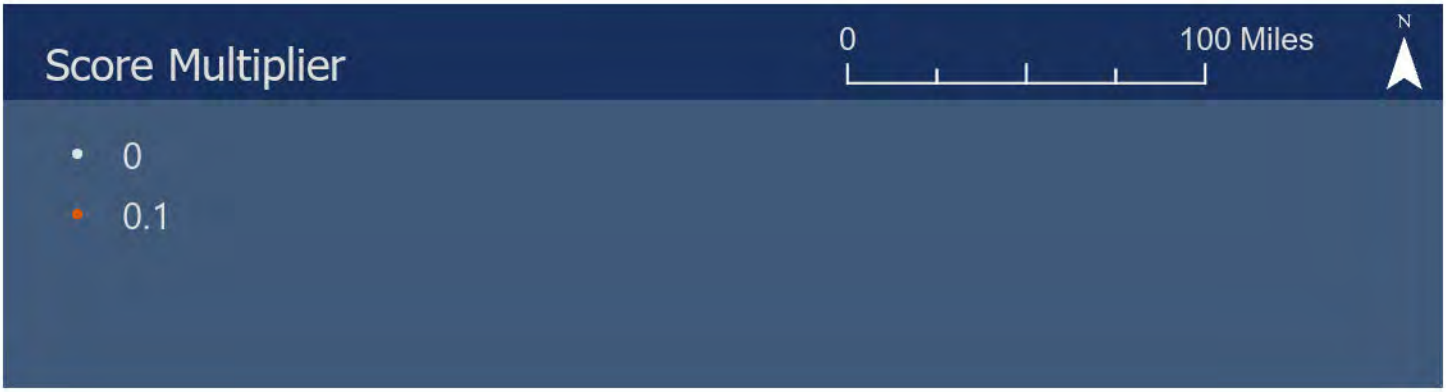
N

- 0
- 1 - 2
- 3 - 5
- 6 - 10

Pedestrian Generators: Parks

Figure A-24: Pedestrian Generators - Parks - Score



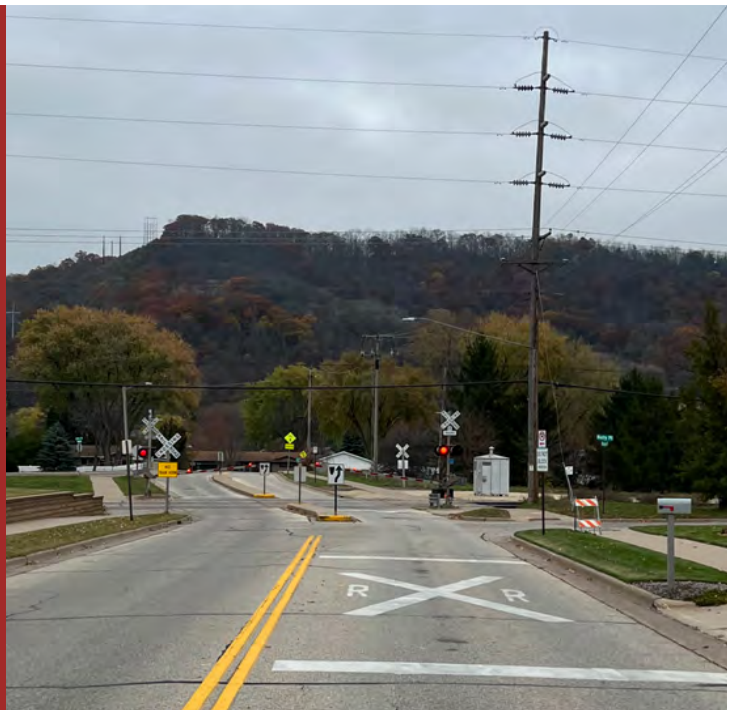


BUSINESS GENERATORS

Businesses can also be pedestrian generators. Replica was used to estimate the total number of trips taken to nearby businesses close to crossings. Some crossings had few trips to businesses while others had many. The crossings with the most trips taken were given points. Most crossings with high numbers of trips taken to nearby businesses were in more urban areas.

IN TOTAL,

174 ***Crossings received a .1 multiplier***



PERCENTAGE OF CHILDREN

An increased number of children residing near railroad crossings can significantly elevate safety risks. Children are naturally curious and may be drawn to the tracks, unaware of the immense dangers posed by trains. Their shorter stature and limited understanding of train speeds and stopping distances make them particularly vulnerable to accidents. Additionally, a larger population of children in the area can increase foot traffic near the crossing.

PERCENTAGE OF CHILDREN		MULTIPLIER ADDED
	• Over 27%	.2
	• Between 20 and 27%	.1

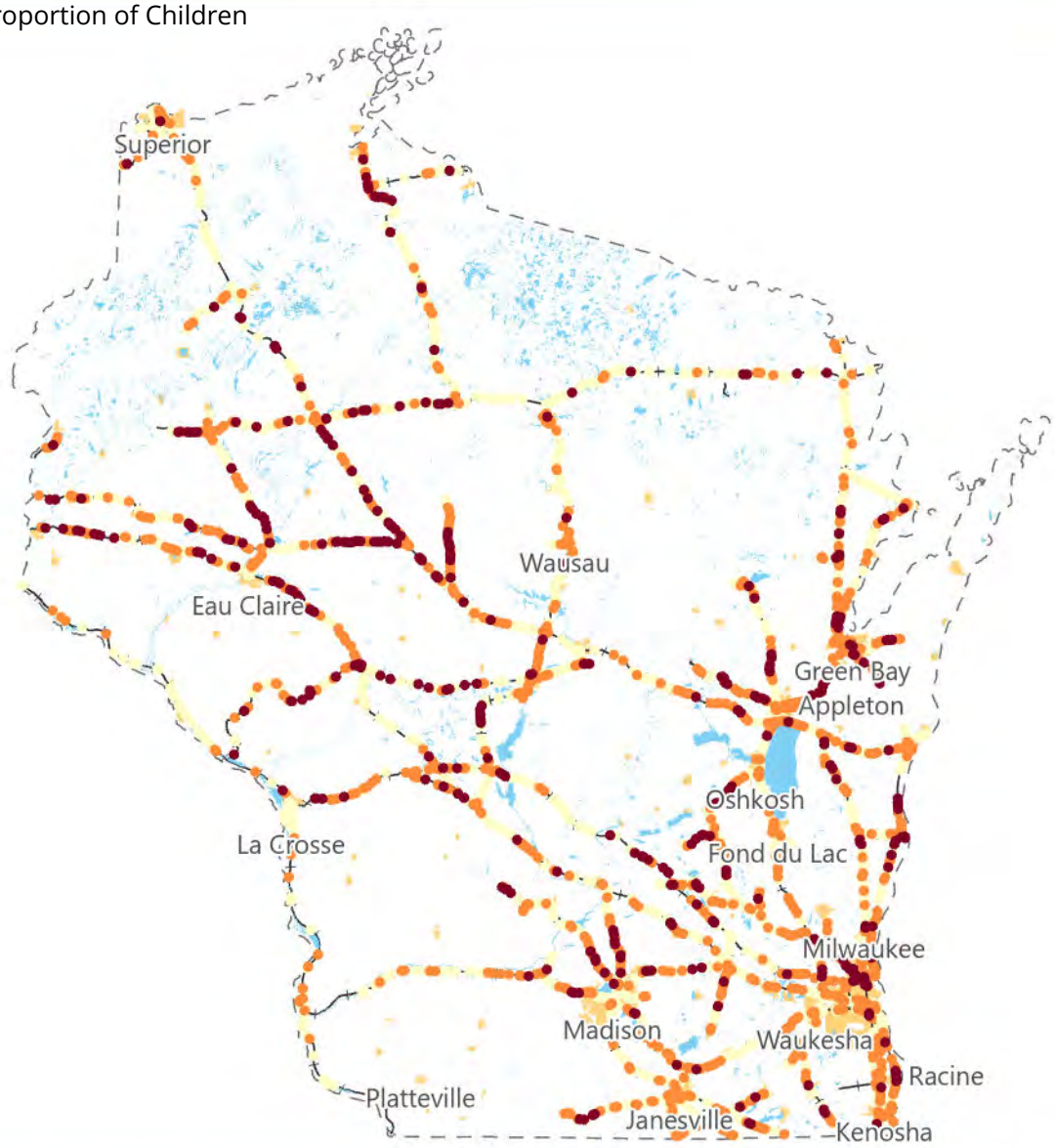
IN TOTAL,

1,580 ***Crossings received a .1 multiplier***

477 ***Crossings received a .2 multiplier***

Proportion of Children

Figure A-25: Proportion of Children



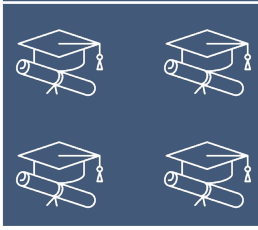
Score Multiplier / Proportion

0 100 Miles N

- 0.0 Low
- 0.1 Medium
- 0.2 High

PERCENTAGE OF PEOPLE WITHOUT A COLLEGE DEGREE

Individuals without college degrees often face economic challenges that may impact their housing choices, leading to residence in areas with higher industrial presence, including railroad crossings. These neighborhoods might have less robust safety infrastructure or community programs focused on railroad safety. Additionally, lower educational attainment can sometimes correlate with lower job stability or longer work hours, potentially leading to increased fatigue and reduced attention to surroundings when near railroad tracks.

PERCENTAGE OF PEOPLE WITHOUT A COLLEGE DEGREE		MULTIPLIER ADDED
	• Over 26%	.2
	• Between 14 and 26%	.1

IN TOTAL,

2,063 ***Crossings received a .1 multiplier***

329 ***Crossings received a .2 multiplier***

Proportion of Population without College Degrees

Figure A-26: Proportion of Population without College Degrees

Score Multiplier / Proportion

0 100 Miles N

- 0.0 Low
- 0.1 Medium
- 0.2 High

BLACK, INDIGENOUS, AND PEOPLE OF COLOR

Black, Indigenous, and People of Color communities living near railroad crossings face significant safety and health challenges. These neighborhoods, often low-income and working-class, are disproportionately exposed to environmental hazards associated with freight operations, such as toxic air pollution from diesel emissions and noise pollution from passing trains. Chronic exposure to these pollutants can lead to severe health issues, including respiratory diseases, cardiovascular problems, and increased cancer risk. Additionally, the presence of railroads can create physical barriers, impeding access to essential services and resources, and posing public safety risks due to frequent rail traffic and potential accidents. The systemic inequities in infrastructure and environmental policies exacerbate these risks, highlighting the urgent need for targeted interventions and regulatory measures to protect these vulnerable communities.

PERCENTAGE OF BIPOC RESIDENTS		MULTIPLIER ADDED
	• Over 26%	.2
	• Between 13 and 26%	.1

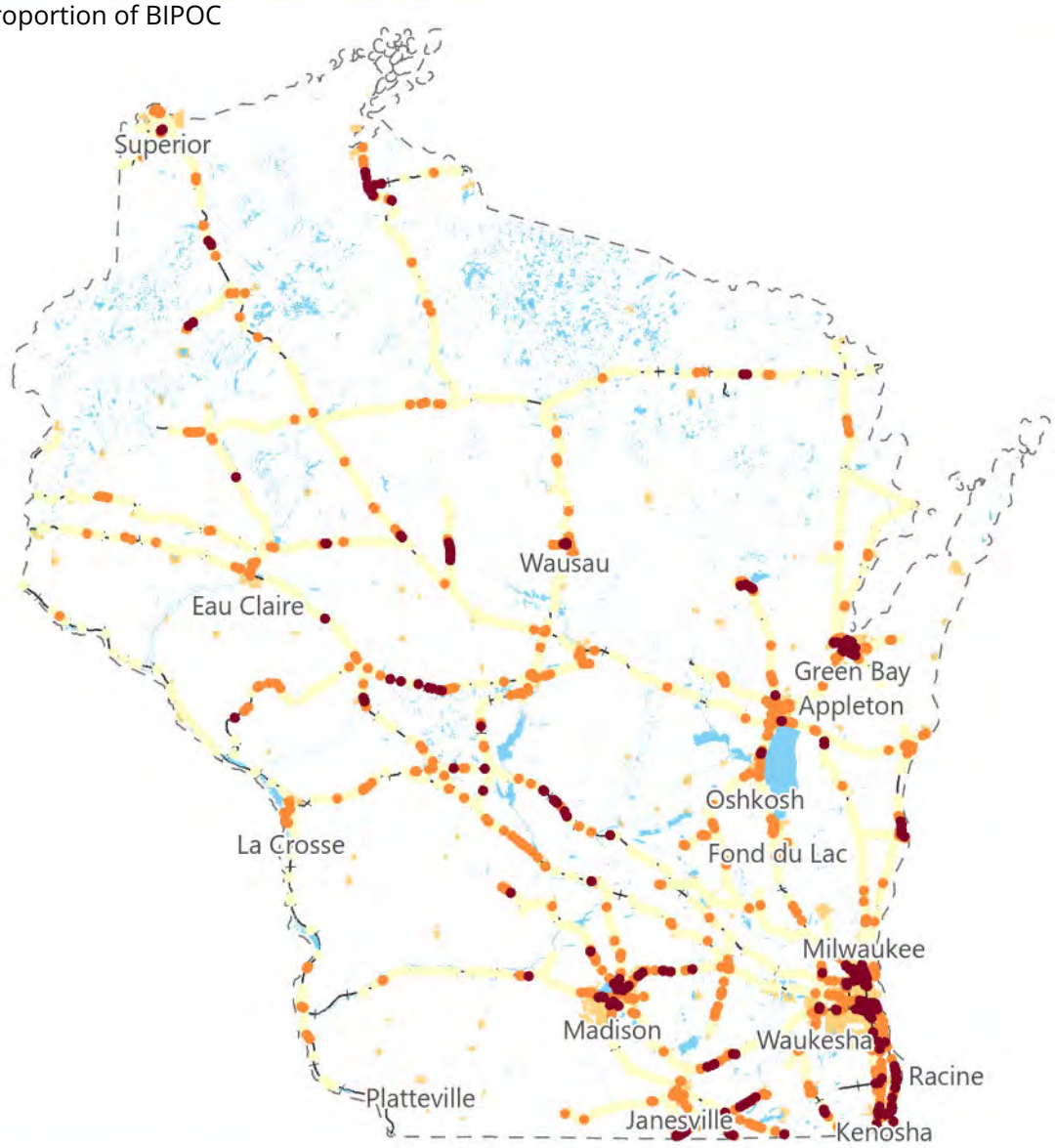
IN TOTAL,

976 ***Crossings received a .1 multiplier***

472 ***Crossings received a .2 multiplier***

Proportion of BIPOC

Figure A-27: Proportion of BIPOC



Score Multiplier / Proportion

0 100 Miles

N

- 0.0 Low
- 0.1 Medium
- 0.2 High

LOW INCOME

Low-income communities near railroad crossings often face heightened safety risks due to a combination of factors. These neighborhoods may have limited resources for infrastructure improvements, leading to inadequate safety measures at crossings. Residents might be more likely to take risks by crossing tracks illegally when trains are blocking intersections for extended periods, especially if they need to reach work, school, or access essential services.

PERCENTAGE OF PEOPLE UNDER THE 30TH PERCENTILE	MULTIPLIER ADDED
• Over 41%	.2
• Between 27 and 41%	.1

IN TOTAL,

1,322 ***Crossings received a .1 multiplier***

549 ***Crossings received a .2 multiplier***

Proportion of Population with Low Incomes

Figure A-28: Proportion of Population with Low Incomes

Score Multiplier / Proportion

0 100 Miles N

- 0.0 Low
- 0.1 Medium
- 0.2 High

NO VEHICLE ACCESS

Living near railroad crossings without a vehicle can significantly impact safety for pedestrians and cyclists. These individuals are more likely to frequently interact with railroad crossings on foot or bicycle, potentially increasing their exposure to risks associated with train traffic. Without the protection of a vehicle, they may be more vulnerable to accidents, especially if they misjudge train speeds or attempt to cross tracks when warning signals are active. Additionally, residents without vehicles may be more inclined to take shortcuts across tracks, leading to dangerous trespassing situations.

PERCENTAGE OF PEOPLE WHO DO NOT OWN A VEHICLE		MULTIPLIER ADDED
	• Over 14%	.2
	• Between 6 and 14%	.1

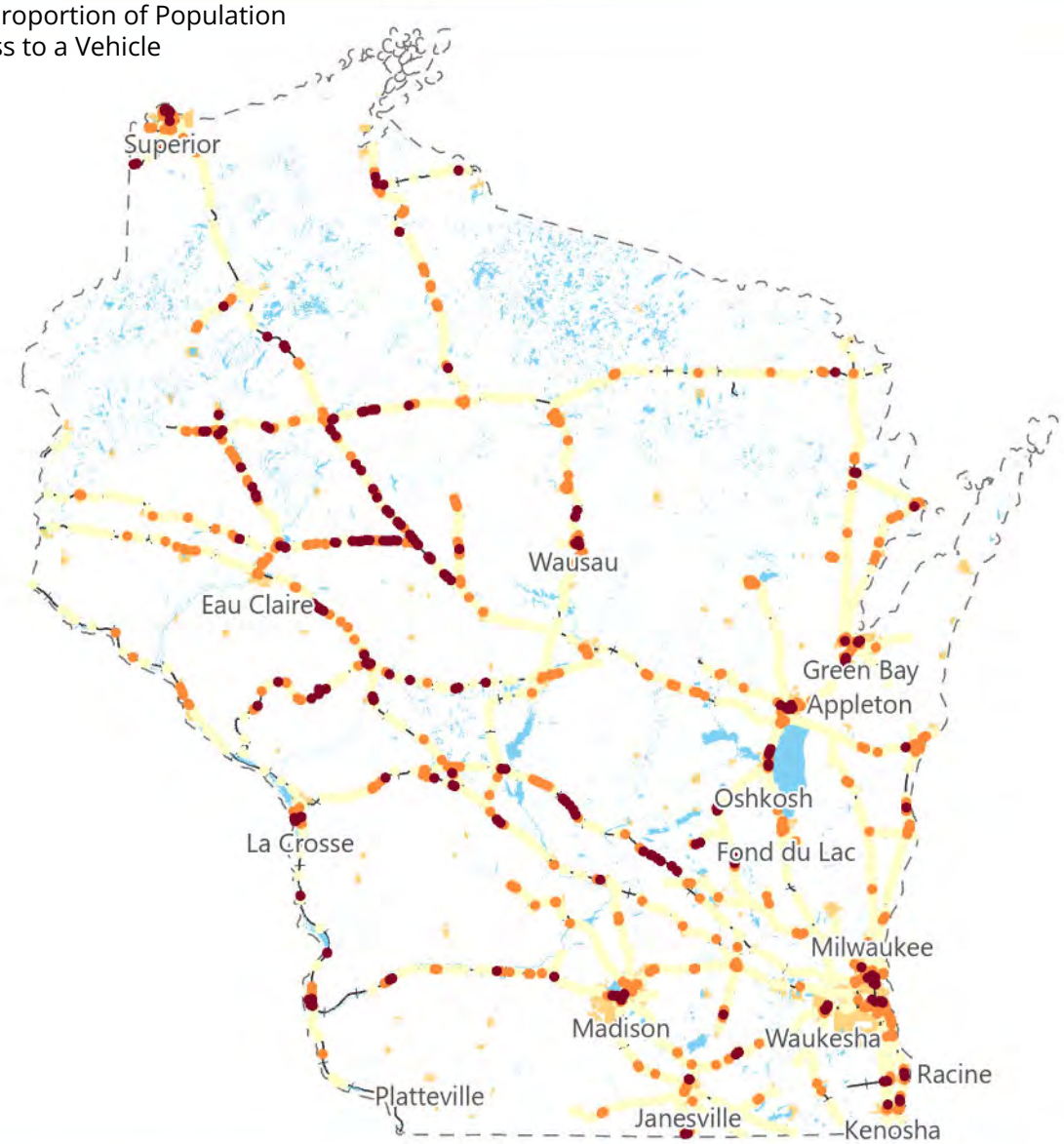
IN TOTAL,

980 ***Crossings received a .1 multiplier***

394 ***Crossings received a .2 multiplier***

Proportion of Population without Access to a Vehicle

Figure A-29: Proportion of Population without Access to a Vehicle



Score Multiplier / Proportion

0 100 Miles N

- 0.0 Low
- 0.1 Medium
- 0.2 High

HIGH RISK IDENTIFICATION

Using these factors and scores, individual crossings were able to be scored based on a scoring calculation. With high risk crossings identified, the team was able to identify high risk corridors made up of adjacent crossings. There were several corridors throughout the state that had elevated risk based on the scoring criteria. With that list, the team identified three corridors that were within a single municipality to learn more about their safety concerns with the railroad corridor.

HIGH RISK CORRIDOR LOCATIONS:

LA CROSSE, WI

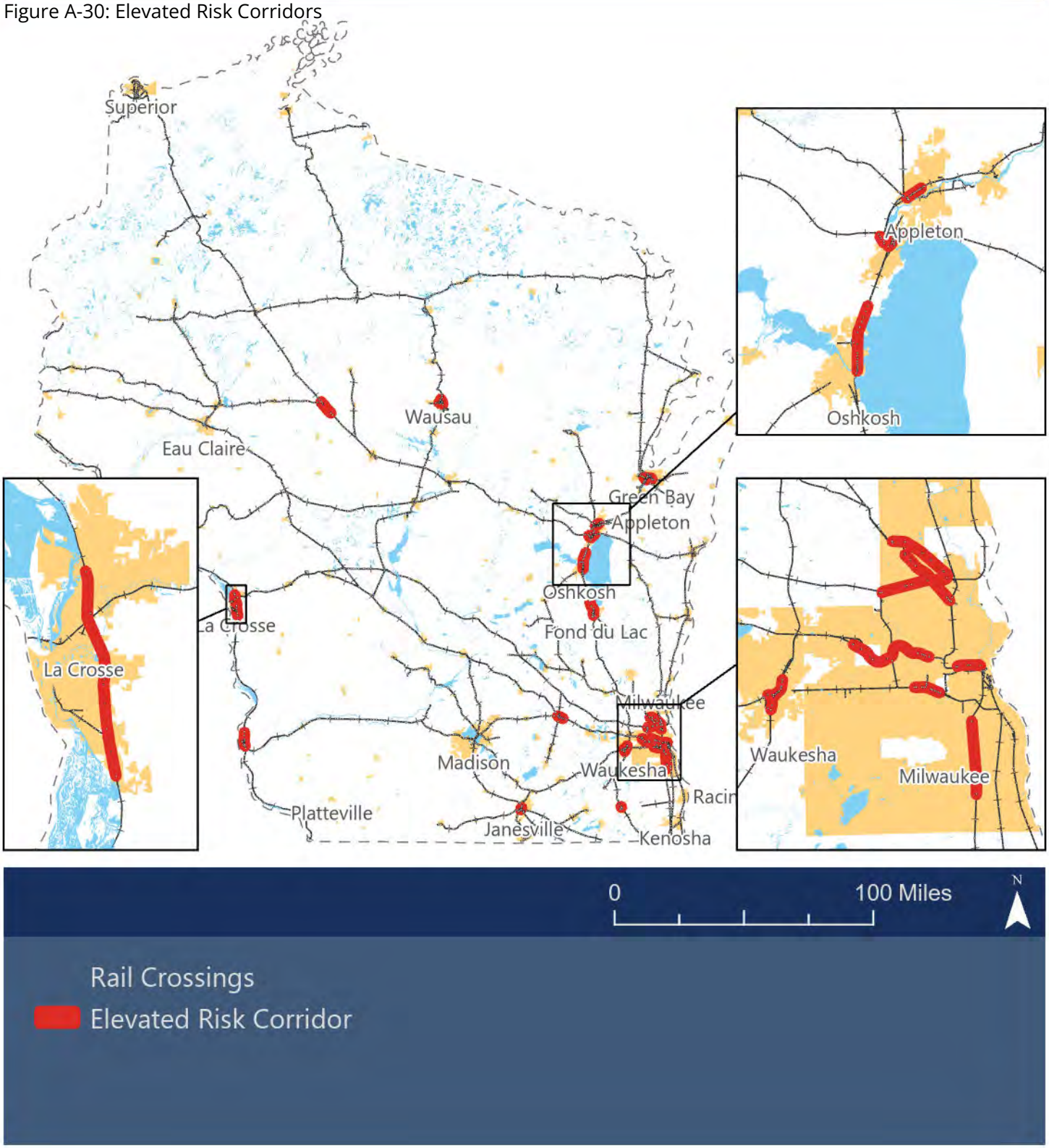
OSHKOSH, WI

WEST ALLIS, WI

La Crosse, Oshkosh, and West Allis all had several high risk crossings creating corridors that were valuable to understand crossings more widely throughout the state. By reviewing these three corridors in different parts of the state, WisDOT can make improvements to crossings through the state over time.

Elevated Risk Corridors

Figure A-30: Elevated Risk Corridors



Elevated Risk Corridors Ranking and Scores

Rail Corridor Name	Rail Ownership	Number of Crossings	Corridor Length	Risk Ranking	Mean Risk Score
Downtown Milwaukee	CPKC + CM Sub	3	1.9	1	48.5
Waukesha South	WC + Waukesha Sub	15	2.7	2	47.4
Milwaukee Oak Creek	CPKC + CM Sub	2	5.8	3	46.5
West Allis	UP + Milwaukee Sub	11	2.1	4	46.3
Owen	WC + Superior Sub	5	5.9	5	46.1
Prairie du Chien	BNSF + Aurora Sub	11	5.5	6	45.3
Oshkosh	WC + Neenah Sub	18	6.4	7	44.1
Burlington	WC + Waukesha Sub	4	0.5	8	43.6
Neenah West	WC + Neenah Sub	3	0.8	9	43.3
Wauwatosa Brookfield	CPKC + Watertown Sub	11	7.4	10	43
Waukesha West	WSOR + Waukesha Sub	14	2.0	11	42.2
Green Bay West South bend	WC + Fox River and New London Sub	13	2.0	12	40.3
Green Bay West North bend	WC + Fox River and New London Sub	16	1.9	13	38.5
Fond du Lac	WC + Neenah and Waukesha Sub	11	6.1	14	38.5
Northside Milwaukee Short	WSOR + Milwaukee Sub	6	5.1	15	38.1
Watertown	CPKC + Watertown Sub	8	2.5	16	38
Northside Milwaukee Long	UP + Granville Branch	12	10.8	17	37.9
La Crosse	BNSF + Aurora Sub	7	8.4	18	37.8
Green Bay East	WC + Luxemburg Sub	7	1.0	19	37.2
Wausau SW	WC + Wausau Branch	8	0.4	20	35.8
Wausau SSW	WC + Wausau Branch	10	0.6	21	35.7
Neenah East	WC + Manitowoc Sub	18	2.6	22	34.9
Wausau East	WC + Valley Sub	16	2.7	23	34.9
Janesville	UP + Janesville Spur	6	1.0	24	34.3
Wausau Central	WC + Wausau Branch	4	0.8	25	33.8