SAFE TRAVEL FOR ALL

Lake County

Safety Action Plan

Chicago Metropolitan Agency for Planning

June 2025

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Lake County Forest Preserves
Lake County Health Department and Community Health Center
Lake County Major Crash Assistance Team
Lake County Regional Office of Education
Lake County Sheriff Crash Team
Lake County Transportation Alliance
Mano a Mano Family Resource Center
Metra
NAACP Lake County Chapter
Representatives from local municipal governments, including:

- City of Waukegan
- Village of Buffalo Grove
- Village of Fox Lake
- Village of Wauconda

PREPARED BY HDR

Disclaimers

The observations, findings, conclusions, and recommendations of this report are protected under 23 CFR 407, which states these shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in this report or documents associated with this review.

Disclaimer: Results of the analyses are based on data that was received from the Illinois Department of Transportation. Unless otherwise noted, crash data represents years 2018 to 2022 and was obtained from the state police and other enforcement agencies. The data was used "as is" for analysis purposes and should be interpreted accordingly.

Letter of Commitment

Division of Transportation

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May 23, 2025

On behalf of the Lake County Division of Transportation, I would like to reaffirm our strong commitment to prioritizing roadway safety, as reflected in the development of the Lake County Safety Action Plan. Ensuring the safety and welfare of the people of Lake County and the travelling public is our utmost priority. We firmly believe that no individual should suffer fatal or serious injury while travelling in Lake County.

This comprehensive plan incorporates valuable insights and is the result of thorough data analysis, stakeholder collaboration, and extensive community engagement. It reflects our shared vision of eliminating traffic-related fatalities and serious injuries across Lake County.

We recognize this Safety Action Plan is designed to benefit all road users, regardless of roadway jurisdiction. The Lake County Division of Transportation is dedicated and committed to advancing effective safety strategies along county highways and actively partnering with other transportation authorities to implement improvements throughout the region. Our collective objective is clear: to achieve zero traffic-related fatalities and serious injuries in Lake County by the year 2050.

As part of our commitment, we plan to:

- **Present a Vision Zero Policy to the Lake County Board for adoption** as a recognition that fatal and severe crashes are not inevitable, and death and severe injury are not an acceptable cost for using our public roadway system.
- **Collaborate with municipalities, townships, IDOT, and other transportation partners** to study site-specific safety concerns and help facilitate the implementation of appropriate countermeasures.
- **Support data-driven and community informed decision making**, while preserving flexibility for future project selection based on evolving conditions and stakeholder needs.
- **Track and publicly report progress** by Lake County and other agencies in implementing the goals and projects identified in the safety action plan.
- **Continue to provide technical support to local partners** in evaluating and developing policy recommendations, and, where appropriate, assist with coordination efforts involving state-level legislative proposals.

The Lake County Division of Transportation is committed to working alongside our local partners and implementing agencies to eliminate traffic related fatalities and serious injuries in Lake County by 2050.

Sincerely,

Shane E. Schneider, P.E.
Director of Transportation/County Engineer

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Glossary of Terms and Acronyms

AADT = Annual average daily traffic
ADA = Americans with Disabilities Act
APP = Area of Persistent Poverty
AWSC = All-way stop control
CMAP = Chicago Metropolitan Agency for Planning
CMF = Crash modification factor
CRF = Crash reduction factor
FHWA = Federal Highway Administration
HFST = High-friction surface treatment
HIN = High injury network
IDOT = Illinois Department of Transportation
KA = Fatality and serious injury
LCDOT = Lake County Department of Transportation
LPI = Leading pedestrian interval
LTRP = Long Range Transportation Plan
LTS = Level of traffic stress
NAACP = National Association for the Advancement of Colored People
NACTO = National Association of City Transportation Officials
NCHRP = National Cooperative Highway Research Program
PHB = Pedestrian hybrid beacon
RRFB = Rectangular rapid flashing beacon
SAP = Safety Action Plan
SHSP = Strategic Highway Safety Plan
SOV = Single occupancy vehicle
TWSC = Two-way stop control
USDOT = United States Department of Transportation
VRU = Vulnerable road user
VRUSA = Vulnerable Road User Safety Assessment

Introduction

PROJECT BACKGROUND AND PURPOSE

Safe Travel for All is a regionwide initiative to eliminate traffic fatalities and serious injuries in northeastern Illinois. The Chicago Metropolitan Agency for Planning (CMAP), the Illinois Department of Transportation (IDOT), and six counties in northeastern Illinois (Cook, DuPage, Kane, Lake, McHenry, and Will) were awarded nearly $3.9 million from the federal Safe Streets and Roads for All grant, with local and IDOT matches for a total investment of nearly $5 million, to develop a first-of-its-kind traffic safety framework for northeastern Illinois. As a part of Safe Travel for All, CMAP is working with six counties in the region, including Lake County, to develop a Safety Action Plan (SAP) specific to their communities, guided by a regional framework to coordinate future improvements.

Traffic fatalities in northeastern Illinois, particularly among the region's most vulnerable road users such as pedestrians and bicyclists, have been increasing since 2014. Between 2018 and 2022, Lake County recorded a total of 16,086 injury crashes, which account for 25 percent of the total crashes. Of those injury crashes, there were 248 fatalities and 2,083 serious injuries. It is critical that Lake County acts to address the risk on the roadway system and works toward the elimination of fatal and serious injury crashes.

By working together, the region can maximize the impact of local and systemwide traffic safety improvements. SAPs act as roadmaps to reduce and eliminate serious injury and fatal crashes impacting all roadway users in a community, including people in vehicles, walking, bicycling, rolling, and using transit. SAPs use data analysis and community input to identify what traffic safety problems are, how they occur, and what countermeasures a community can use to reduce safety risks.

SAFE SYSTEM APPROACH

The Safe System Approach to roadway safety, adopted by the U.S. Department of Transportation, examines five critical areas of safety to develop countermeasures and recommendations to improve safety performance. These areas are shown in **Figure 1** and include safer vehicles, safer speeds, safer roads, post-crash care, and safer people. Engineering countermeasures often address several of these categories, but do not always intersect with all; therefore, additional countermeasures will be examined as part of this SAP to address the safety issues more holistically in the Lake County study area.

Figure 1: Safe System Approach, U.S. Department of Transportation

Leadership Commitment and Goal Setting

ON TO 2050

CMAP's comprehensive regional plan, ON TO 2050, has set a goal to eliminate all traffic-related fatalities by 2050. Traffic deaths can be prevented, and Lake County is committed to using a full range of strategies, policies, and process changes to end traffic deaths in our communities. These strategies are intended to not only reduce and eliminate traffic-related deaths and injuries, but also to improve congestion and the reliability of Lake County's transportation network. Traffic safety impacts all community members, whether we drive, bike, walk, or use public transit. **Figure 2** illustrates past traffic fatalities in Lake County and the goal to reach zero fatalities and serious injuries by 2050.

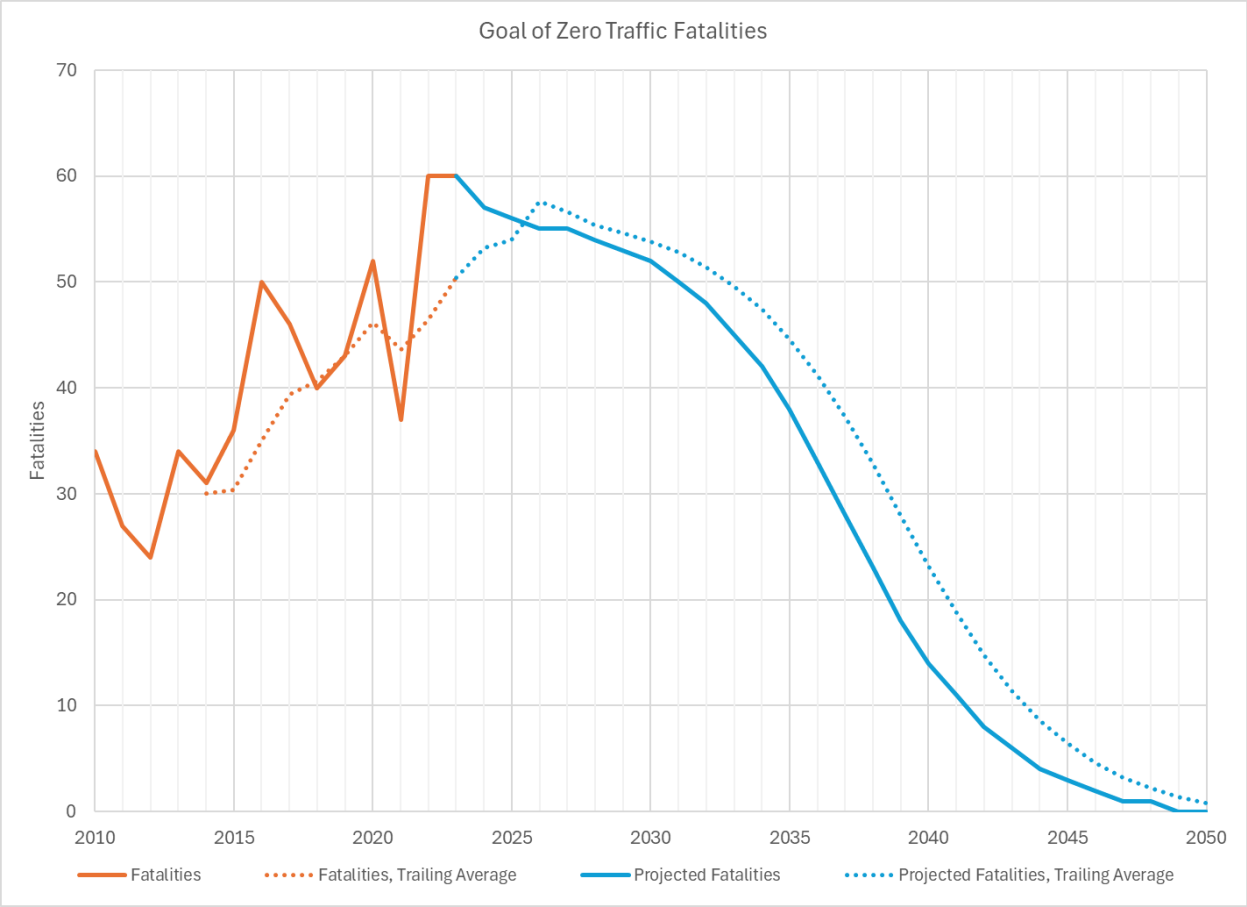


Figure 2: ON TO 2050 Goal to Eliminate Traffic Deaths, Lake County Fatalities

LAKE COUNTY RESOLUTION PAGE

Lake County intends to adopt a resolution committing to the goal of achieving zero fatalities and serious injuries by 2050. After the resolution is adopted (anticipated to occur during the summer of 2025), it will be included on this page.

Planning Structure

ROLES AND RESPONSIBILITIES

CMAP led the development of the SAP for Lake County in partnership with the Lake County Division of Transportation, the Illinois Department of Transportation (IDOT), and other regional partners. The core responsibilities and roles in the planning structure include:

- **CMAP**: Provided overall project management, technical assistance, data analysis, and best practice research to guide the SAP process. CMAP coordinated with county and municipal partners, ensuring that the plan aligns with regional safety goals and federal requirements and will coordinate long-term implementation and progress monitoring.
- **Lake County Division of Transportation**: Acted as the local lead, facilitating public engagement and coordinating with municipal stakeholders. Lake County Division of Transportation will implement plan recommendations at the county level.
- **IDOT**: Supplied crash data, technical support, and guidance to ensure that the SAP aligns with the state's Strategic Highway Safety Plan and meets federal funding eligibility requirements. IDOT will coordinate with CMAP, county and municipal leaders to improve regional safety outcomes through policy development and project implementation.
- **Community Stakeholders and Residents**: Residents, advocacy groups, and local organizations were encouraged to participate by providing input on safety concerns, attending in-person community events and open-houses, and engaging with interactive tools offered throughout the SAP process.
- **Municipal Governments**: Representatives were encouraged to identify local priorities and will play an important role in supporting the implementation of safety measures within their jurisdictions. The Council of Mayors sees that municipal priorities are reflected in regional safety planning.

STEERING COMMITTEE

The development of the Lake County SAP was guided by a Steering Committee designed to ensure broad representation and capture a wide range of perspectives. The committee's primary functions are to provide oversight, review data and recommendations, and ensure the plan reflects community needs and priorities. Committee members include:

- Bicycle Club of Lake County
- Clean Power Lake County
- Illinois Department of Transportation
- Lake County Center for Independent Living
- Lake County Forest Preserves
- Lake County Health Department and Community Health Center
- Lake County Major Crash Assistance Team
- Lake County Regional Office of Education
- Lake County Sheriff Crash Team

- Lake County Transportation Alliance
- Mano a Mano Family Resource Center
- Metra
- NAACP Lake County Chapter
- Representatives from local municipal governments, including:
    - City of Waukegan
    - Village of Buffalo Grove
    - Village of Fox Lake
    - Village of Wauconda

The Steering Committee met regularly to review progress, discuss key findings, and guide the direction of the SAP. This collaborative approach informed the plan through data-driven and responsive methods to meet the needs of all roadway users in Lake County. Lake County intends to invite the Steering Committee to participate in continuing traffic safety discussions in an advisory role through the SAP implementation and monitoring phase.

Study Area

Lake County, Illinois, has a population of 714,342 as of the 2020 census, making it the third-most populous county in Illinois. **Figure 3** shows the limits of the Lake County Safety Action Plan study area.

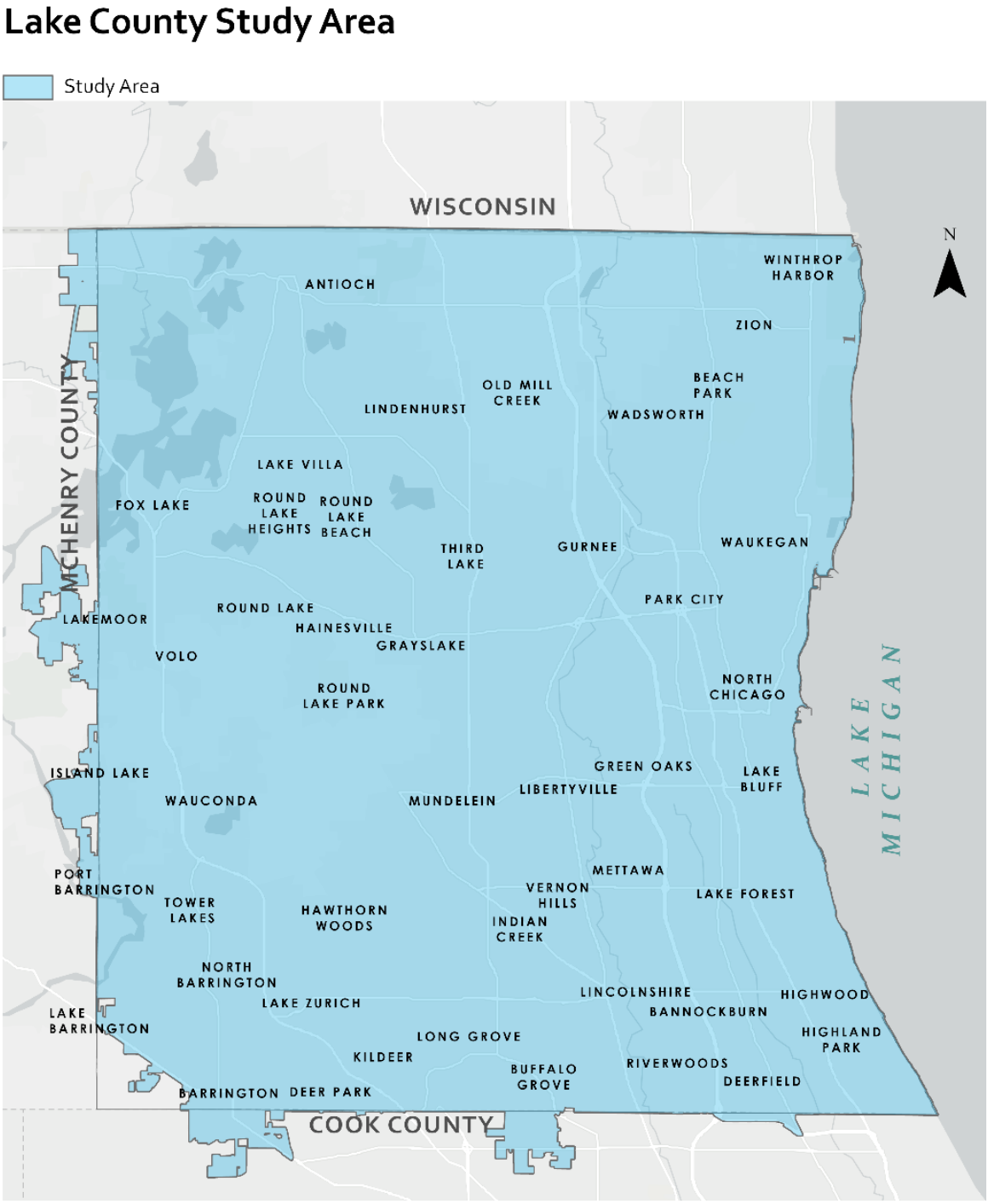


Figure 3. Map of Lake County Study Area

The study limits for the Lake County Safety Action Plan include all municipalities and unincorporated areas within Lake County, except for the villages of Barrington Hills, Fox River Grove, and Wheeling, which are included in other counties' Safety Action Plans. When a portion of a municipality falls within the Lake County study area, the entire municipal limits were included within the study area to maintain community cohesion. **Table 1** lists the municipalities included in the study area.

Table 1: List of Municipalities in Lake County Safety Action Plan Study Area

Antioch	Gurnee	Lake Forest	North Barrington	Third Lake
Bannockburn	Hainesville	Lake Villa	North Chicago	Tower Lakes
Barrington*	Hawthorn Woods	Lake Zurich	Old Mill Creek	Vernon Hills
Beach Park	Highland Park	Lakemoor*	Park City	Volo
Buffalo Grove*	Highwood	Libertyville	Port Barrington*	Wadsworth
Deer Park	Indian Creek	Lincolnshire	Riverwoods	Wauconda
Deerfield*	Island Lake*	Lindenhurst	Round Lake	Waukegan
Fox Lake*	Kildeer	Long Grove	Round Lake Beach	Winthrop Harbor
Grayslake	Lake Barrington	Mettawa	Round Lake Heights	Zion
Green Oaks	Lake Bluff	Mundelein	Round Lake Park	

**Municipality that falls partially within another county*

ROADWAY NETWORK

The Lake County roadway network includes interstates and federal highways, state highways, county roads, township roads, and local roads. The overall roadway network in the county includes 25 centerline miles of major interstates, 3 miles of access controlled non-interstate highways, 252 miles of principal arterials, 363 miles of minor arterials, 273 miles of major collectors, 52 miles of minor collectors, and 2,140 miles of local streets.

The Lake County Division of Transportation manages approximately 300 miles of these collector and arterial highways and more than 63 miles of shared use paths. Interstate 94 (Tri-State Tollway) is the major north-south interstate in the Lake County area, and there are four designated U.S. Highways: U.S. Route 12, U.S. Route 45, U.S. Route 41, and U.S. Route 14. The major marked routes in Lake County are shown in **Figure 4** and the functional classifications of major roads are displayed in **Figure 5**.

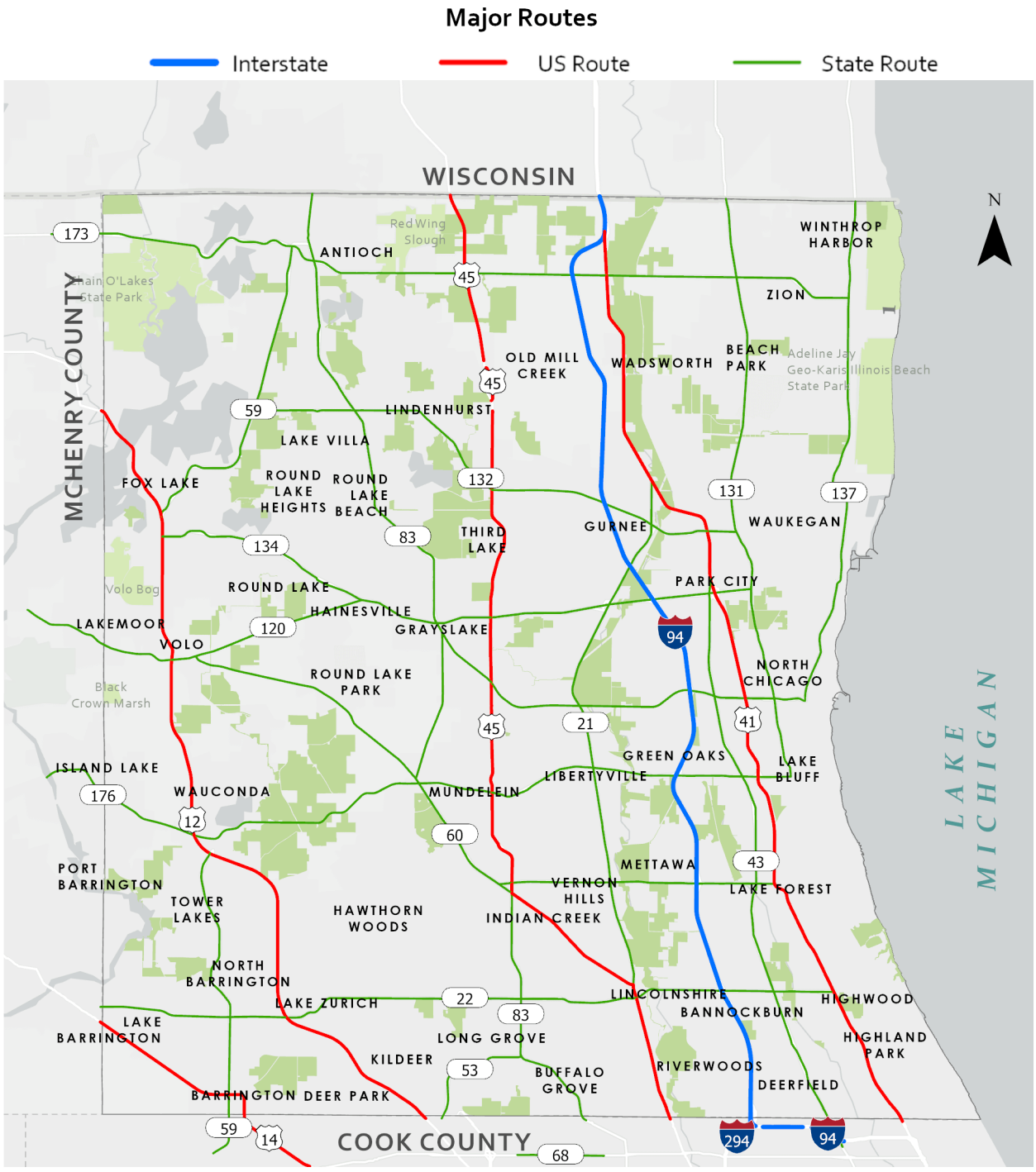


Figure 4: Map of Major Routes in Lake County, Illinois

Functional Classification

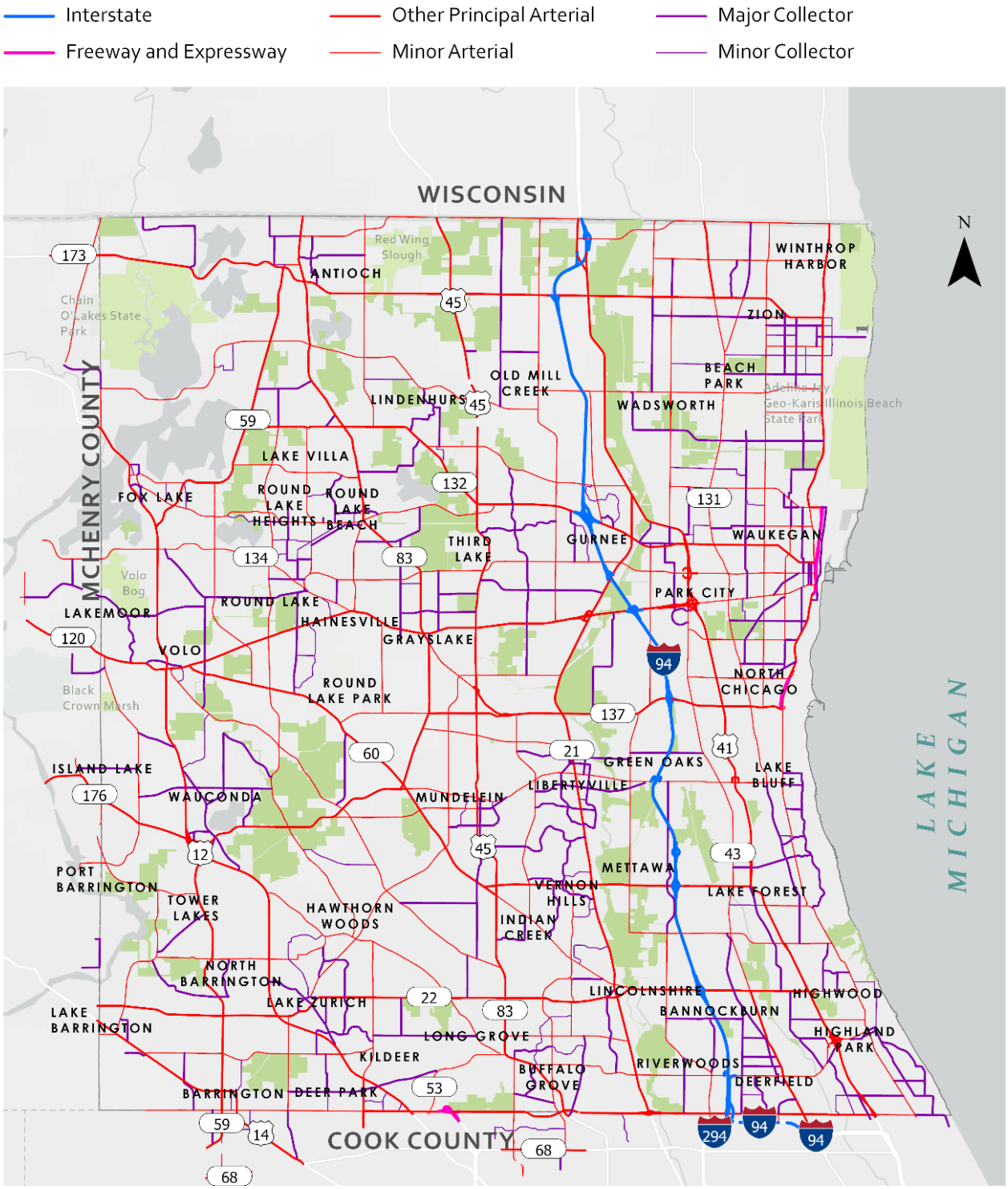


Figure 5: Map of Lake County Major Road Functional Classification

TRANSIT NETWORK

Lake County is served by three Metra commuter rail routes and the Pace Suburban Bus service within county limits. There is also a fourth Metra route and an Amtrak route that pass through, with no stops in the county. **Figure 6** shows the main transit network in Lake County, including four Metra routes (the Union Pacific Northwest, Union Pacific North, North Central Service, and Milwaukee District-North lines) and Pace Suburban Bus routes.

Pace Suburban Bus also operates the Ride Lake County on-demand paratransit service, which offers senior and disabled residents an affordable and flexible reservation-based dial-a-ride program. The Ride Lake County service area covers all of Lake County, including the full municipal boundaries of communities partially located within Lake County.

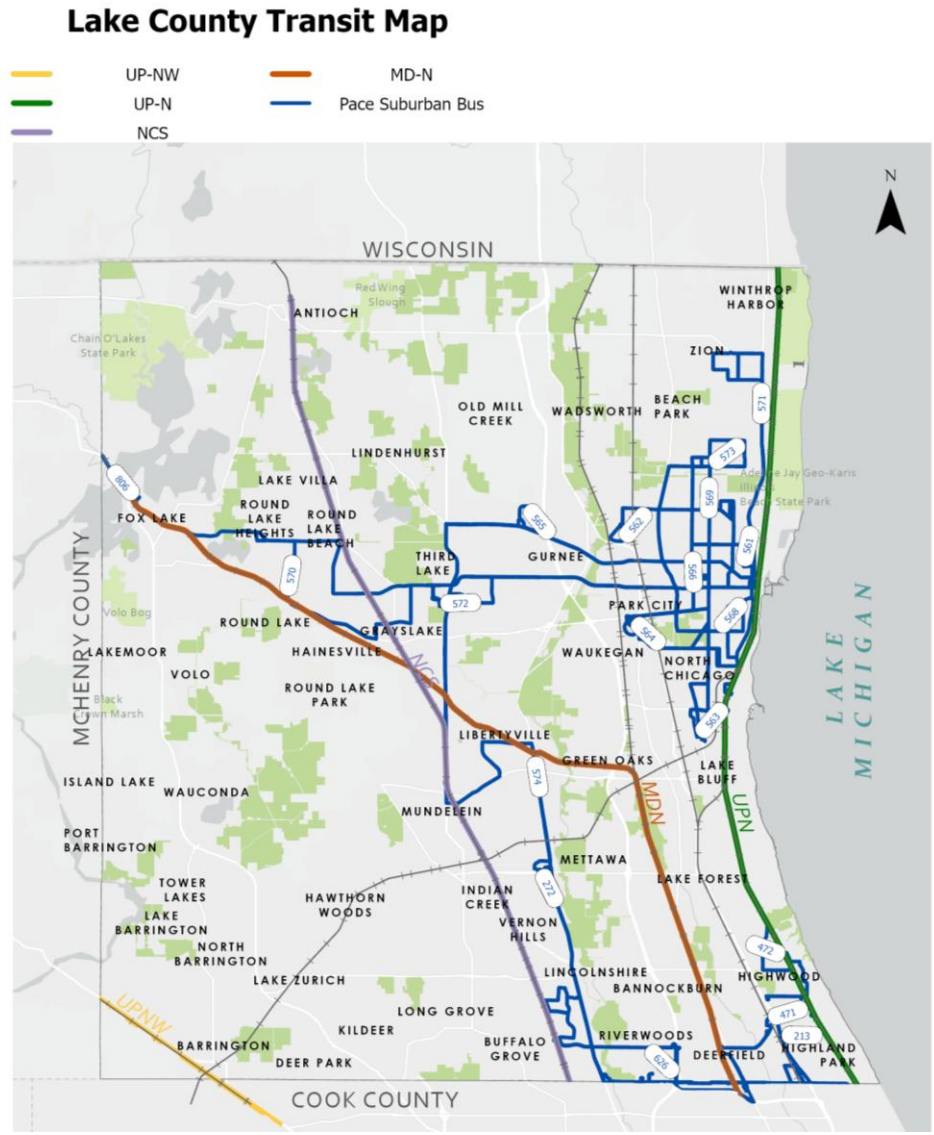


Figure 6: Map of Lake County Transit Network

PEDESTRIAN AND BIKE NETWORK

Lake County is also home to more than 550 miles of trails and bikeways connecting forest preserves and communities, including the Des Plaines River Trail and Greenway, Casey Trail, Skokie Valley Trail, North Shore Bike Path/McClory Trail, the Millenium Trail, and the Prairie Crossing Trail/Grayslake Bike Path. **Figure 7** shows the non-motorized transportation network in Lake County.

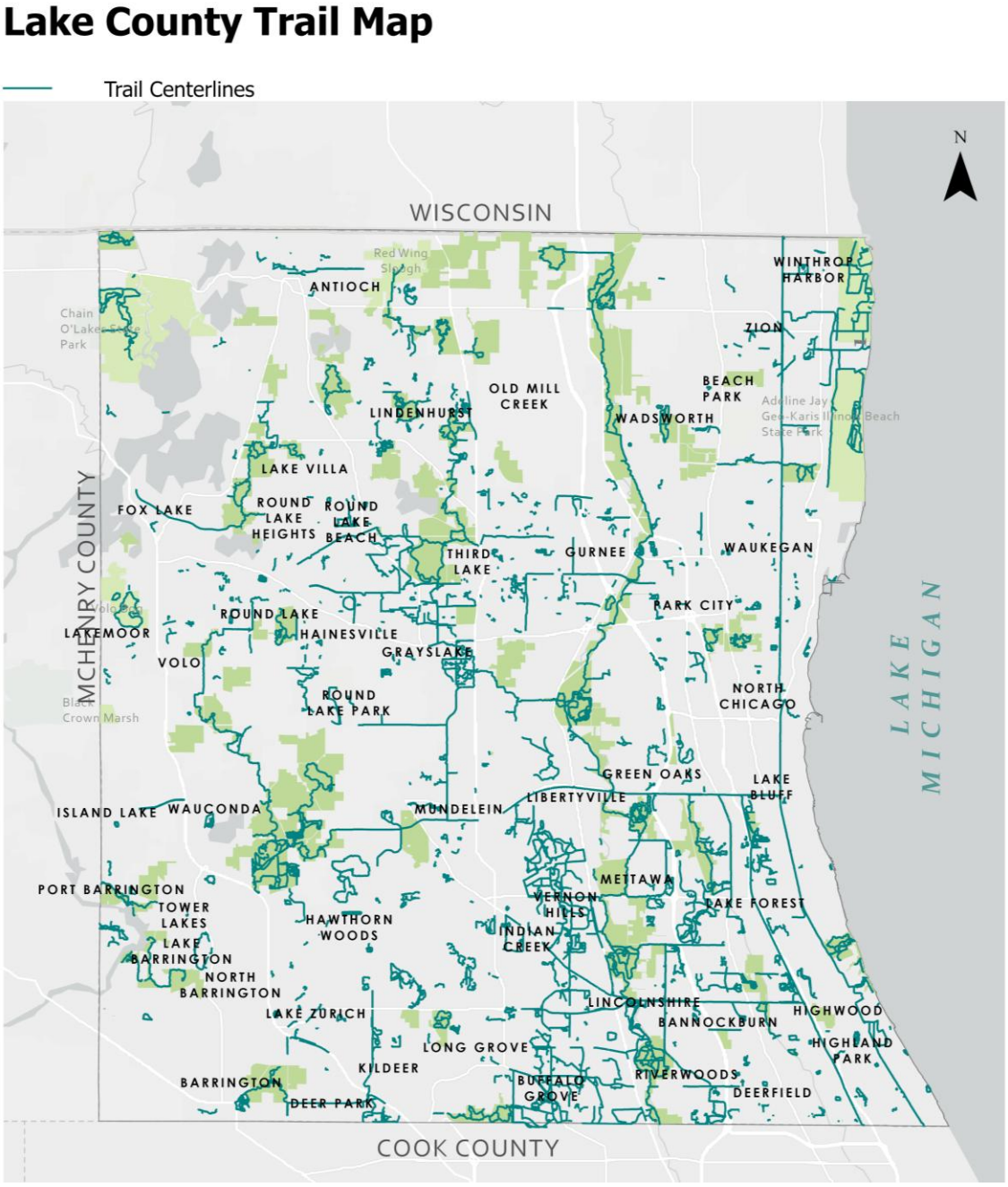


Figure 7. Map of Lake County Non-Motorized Transportation Network

Safety Analysis

EXISTING SAFETY CONDITIONS

The full Existing Conditions Memo, documenting all findings of the existing safety analysis, is provided in **Appendix A: Existing Safety Conditions Memo**. This section discusses some of the key findings identified in the existing safety analysis.

Crashes by Crash Severity

Within the Lake County study area, a total of 65,504 crashes and 16,086 total fatal and injury crashes were reported in a 5-year period from 2018 to 2022. The severity of injury crashes ranges from:

- **K – Fatality**: A motor vehicle crash (single or multiple) that results in the death of one or more people within 30 days of the crash.
- **A – Incapacitating or serious injury**: Any injury, other than a fatal injury, which prevents the injured person from walking, driving, or normally continuing the activities the person could perform before the injury occurred. Type A injuries commonly include severe lacerations, broken limbs, skull or chest injuries, and abdominal injuries.
- **B – Non-incapacitating injury**: Any injury, other than a fatal or incapacitating injury, which is evident to observers at the scene of the crash. Type B injuries might include a lump on the head, abrasions, bruises, and minor lacerations.
- **C – Possible injury**: Any injury reported or claimed that is not an incapacitating, non-incapacitating, or fatal injury. Type C injuries may include momentary unconsciousness, claims of injuries not evident, limping, complaints of pain, nausea, and hysteria.

Figure 8 summarizes Lake County crashes by severity, and **Figure 9** illustrates the location of all injury crashes in the Lake County study area from 2018 to 2022.

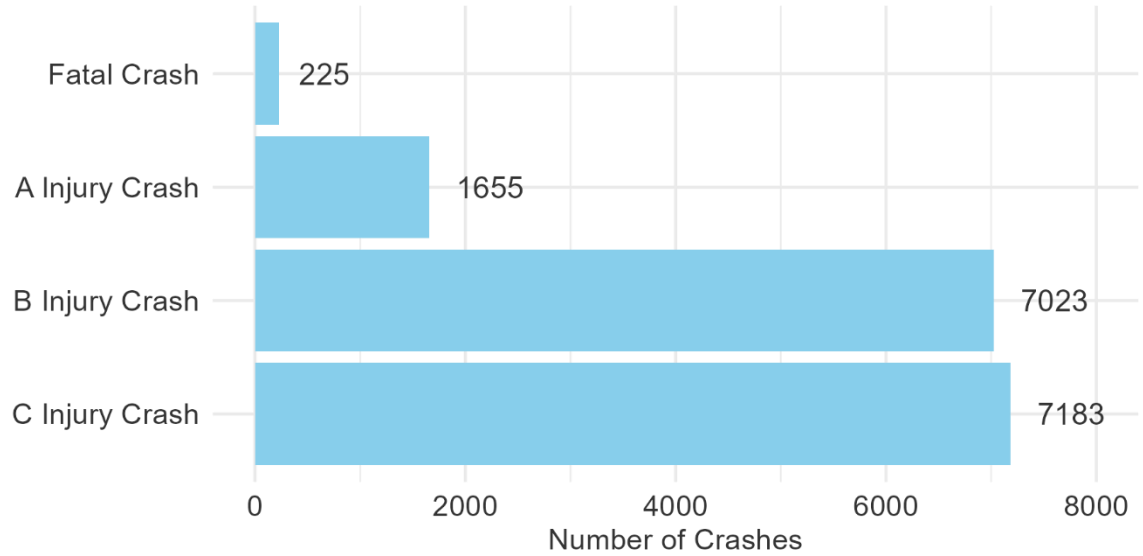


Figure 8. Lake County Fatal and Injury Crashes (2018-2022) by Injury Severity

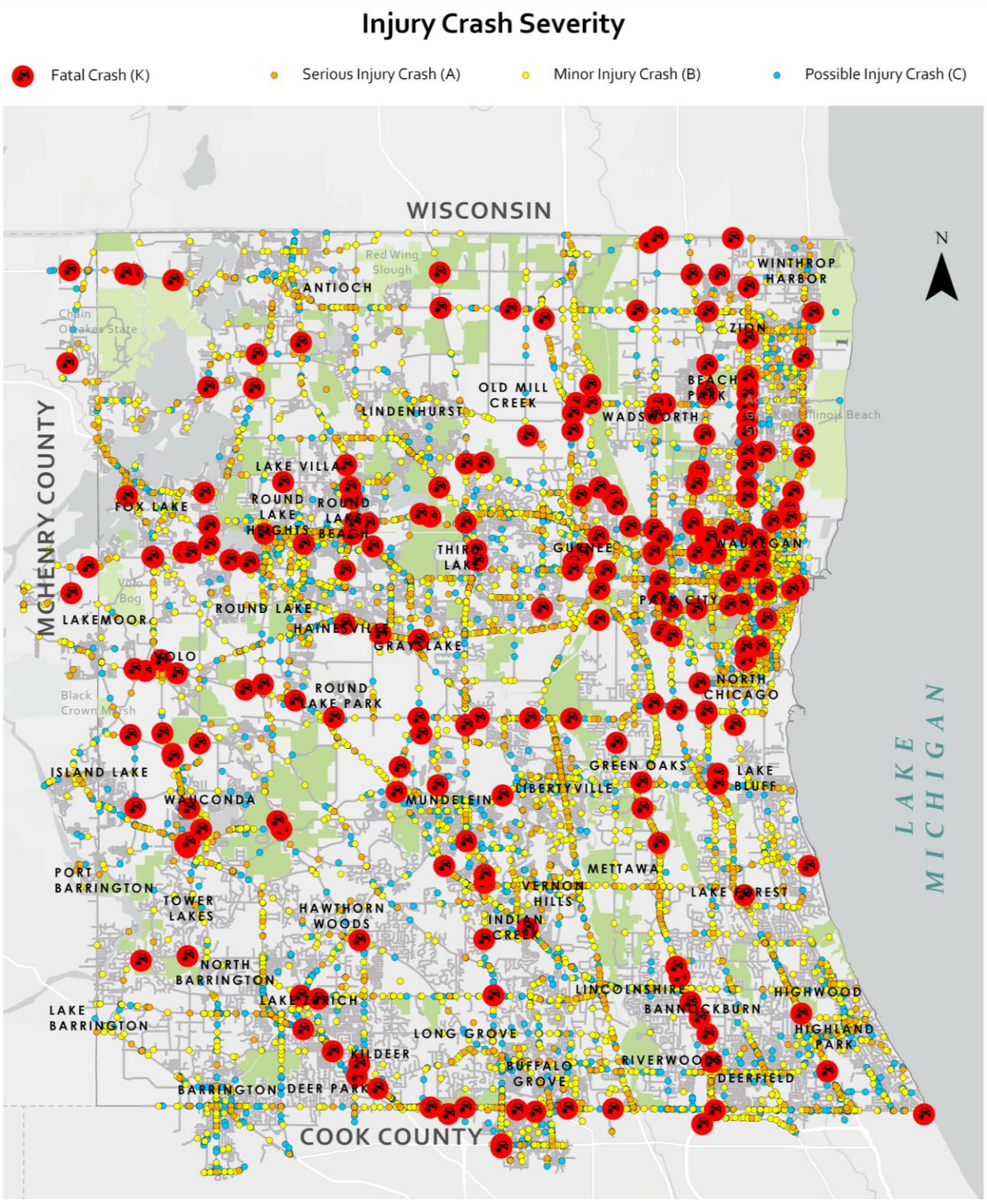


Figure 9: Map of Lake County Injury Crashes (2018-2022) by Injury Type

Crashes by Location

The analysis of Lake County crashes by type of road shows that intersections are the most common locations for crashes accounting 65 percent of total crashes and 61 percent of fatal/serious injury crashes. Segment crashes make up 35 percent of all crashes and 39 percent of fatal/serious injury crashes. Crashes were categorized as an intersection crash if the crashes occur within 200 ft of a signalized intersection, 100 ft of an all-way stop-controlled intersection, or 50 ft of any other intersection. **Figure 10** presents Lake County crashes by location (segment/intersection).

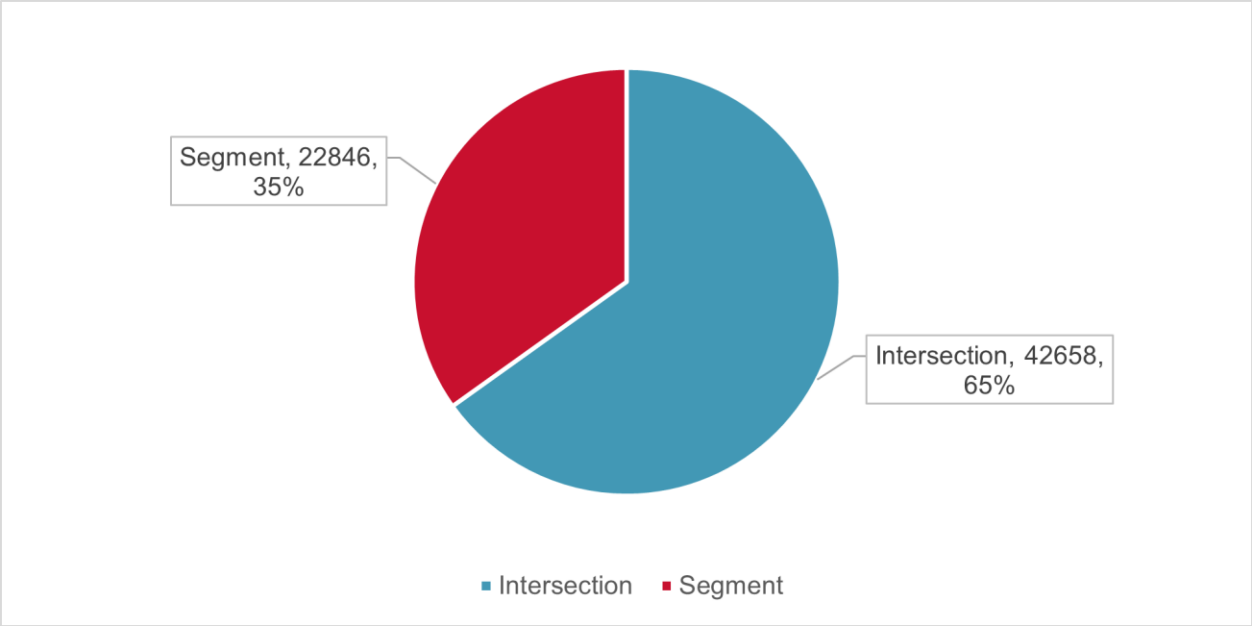


Figure 10: Lake County Crashes (2018-2022) by Segment/Intersection Location

The vast majority of crashes in Lake County occurred in urban areas. As shown in **Table 2**, urban areas accounted for over 94 percent of all crashes and over 92 percent of fatal and serious injury crashes.

Table 2: Lake County Crashes (2018-2022) by Urban/Rural Areas

	All Crashes	%	K/A Crashes	%
Urban	62,034	94.7%	1,742	92.7%
Rural	3,470	5.3%	138	7.3%
Total	**65,504**	**100%**	**1,880**	**100%**

Crashes by Collision Type

The analysis of injury crashes by collision type from 2018 to 2022 indicates front to rear (i.e., rear end) crashes are the most common type of injury crashes in Lake County. There were 5,484 front to rear injury crashes making up about 34 percent of injury crashes followed by 4,212 turning crashes accounting for 26 percent of injury crashes, 1,727 fixed object crashes accounting for 10.7

percent of injury crashes, and 1,699 angle crashes accounting for 10.5 percent of injury crashes. There were 541 sideswipes same direction crashes, which comprised about 3.3 percent of injury crashes. Likewise, there were 975 pedestrian/bicyclist crashes accounting for about 6 percent of injury crashes. All other collision types comprised the remaining 9.5 percent of crashes.

While front to rear crashes make up the largest percent of injury crashes (34 percent), that percentage drops by more than half when only considering the percentage of fatal and serious injury crashes**.** Fixed object, pedestrian, and front to front crashes account for a disproportionately high percentage of fatal and serious crashes when compared to their percentage of total injury crashes, indicating these crashes are more likely to result in severe injury. **Table 3** and **Figure 11** present Lake County injury crashes by collision type.

Table 3: Lake County Injury Crashes (2018-2022) by Collision Type

Collision Type	K Crashes	A Crashes	B Crashes	C Crashes	Total	%KA Crashes	%KABC Crashes
Fixed Object	55	272	889	511	1727	**17.4%**	**10.7%**
Pedestrian	39	131	242	122	534	**9.0%**	**3.3%**
Front to Front	30	87	160	93	370	**6.2%**	**2.3%**
Overturned	7	49	130	48	234	3.0%	1.5%
Bicyclist	8	65	263	105	441	3.9%	2.7%
Other Non-Collision	2	24	66	34	126	1.4%	0.8%
Sideswipe Opposite Direction	6	22	78	60	166	1.5%	1.0%
Parked Motor Vehicle	3	40	135	130	308	2.3%	1.9%
Train	3	1	0	3	7	0.2%	0.0%
Angle	16	185	779	719	1699	10.7%	10.6%
Other Object	0	21	96	61	178	1.1%	1.1%
Animal	0	7	28	24	59	0.4%	0.4%
Sideswipe Same Direction	9	41	220	271	541	2.7%	3.4%
Turning	31	412	1962	1807	4212	23.6%	26.2%
Front to Rear	16	298	1975	3195	5484	16.7%	34.1%
TOTAL	**225**	**1,655**	**7,023**	**7,183**	**16,086**	-	-

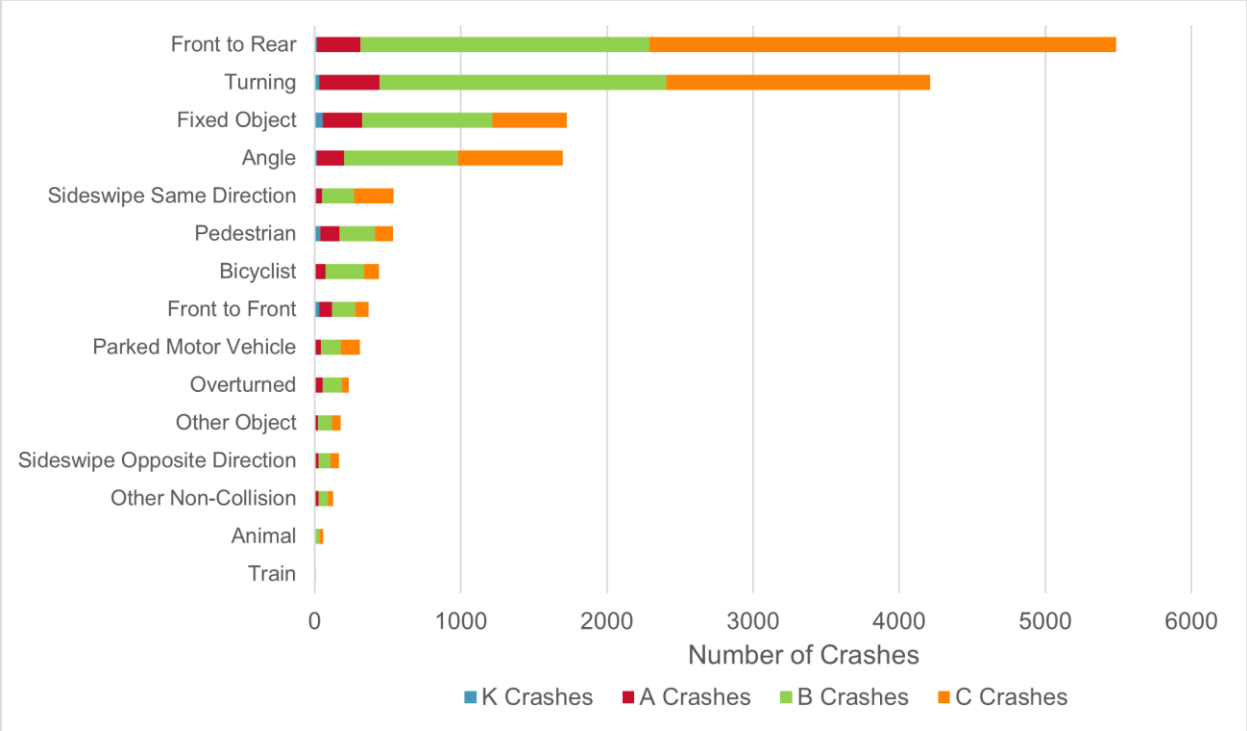


Figure 11: Lake County Injury Crashes (2018-2022) by Collision Type

Crashes by Mode Type

During the 5-year period from 2018 to 2022, Lake County recorded a total of 543 pedestrian crashes and 455 bicyclist crashes. The crashes resulted in 565 pedestrian injuries with 39 fatalities and a total of 448 bicyclist injuries with 8 fatalities. A map highlighting only the injury crashes involving non-motorized users (pedestrians and bicyclists) is provided below in **Figure 12**.

Analysis of Lake County crashes by vehicular mode indicates that pedestrian/bicyclist crashes account for 2 percent of total crashes (998), 6 percent of injury crashes (975) and 10 percent of fatal/serious injuries (243).

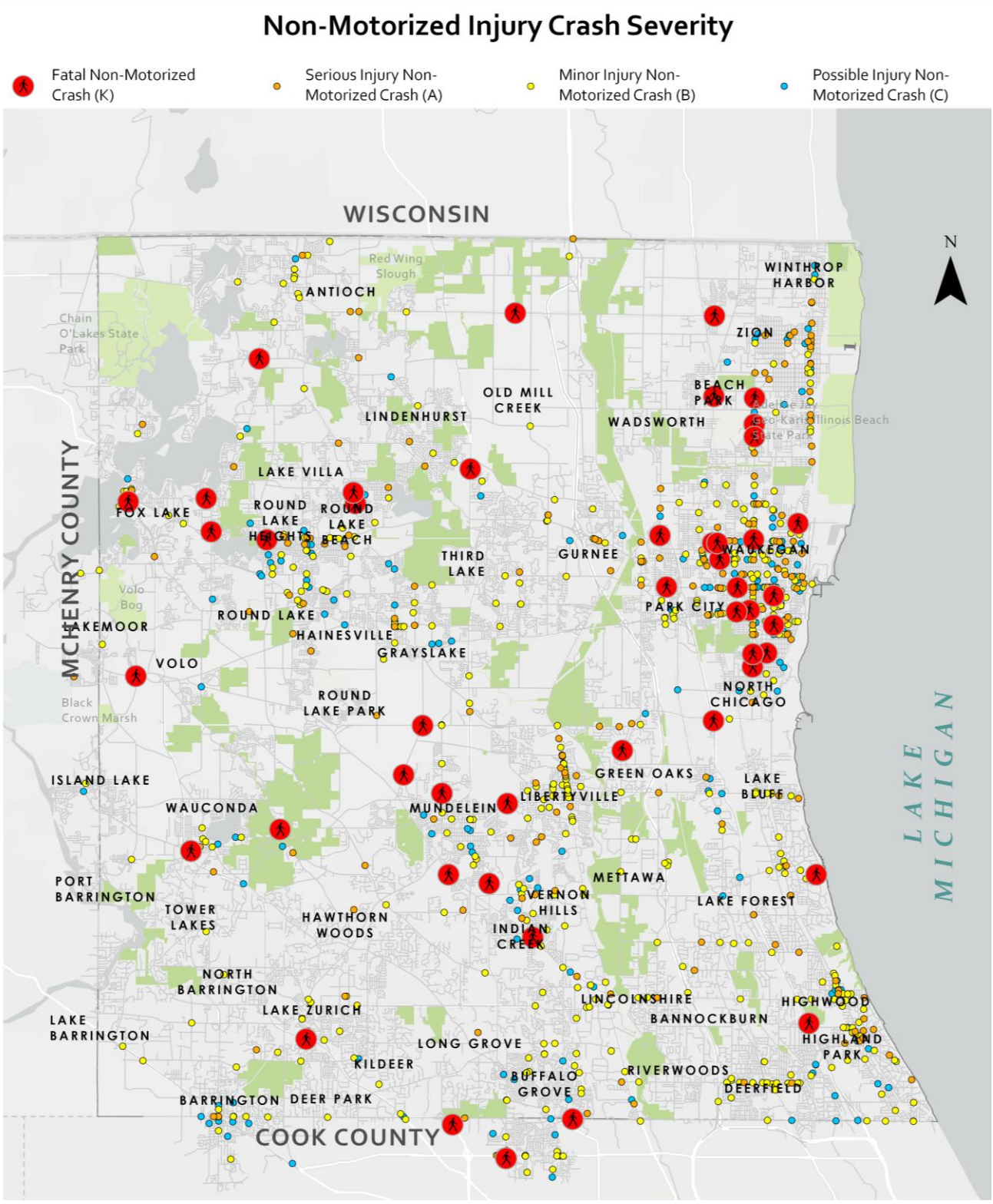


Figure 12: Map of Lake County Non-Motorized Road User Injury Crashes (2018-2022) by Injury Type

Further analysis of the pedestrian and bicyclist crashes indicates that 98 percent of pedestrian crashes and 97 percent of bicyclist crashes resulted in some form of injury while 31 percent of pedestrian crashes and 16 percent of bicyclist crashes resulted in fatal/serious injury, indicating higher injury risk for people walking and biking in Lake County. **Figure 13** and **Figure 14** summarize Lake County pedestrian and bicyclist crashes by crash injury severity.

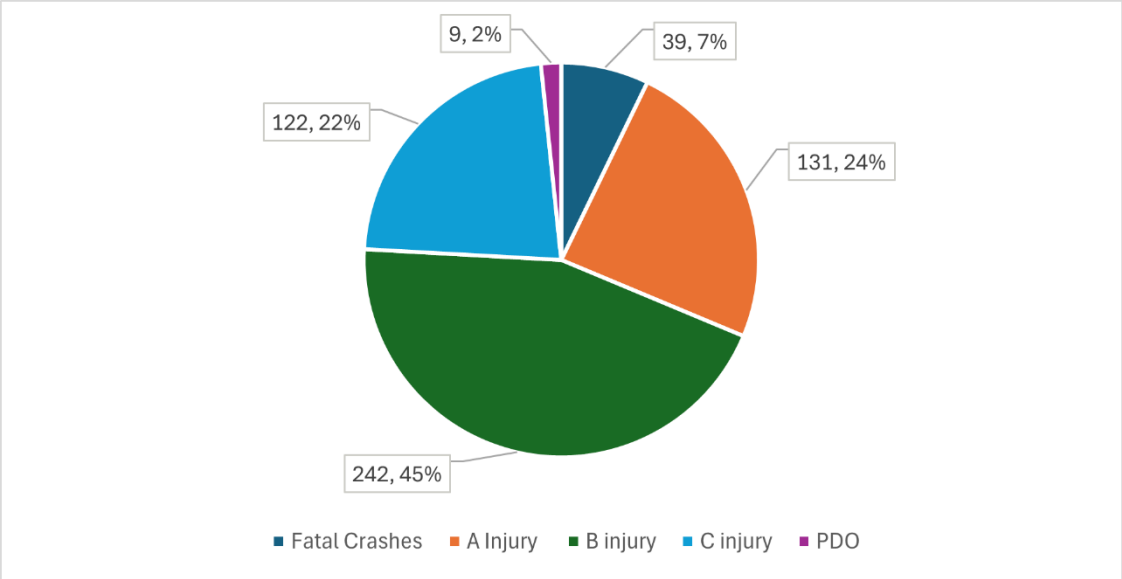


Figure 13: Lake County Pedestrian Crashes (2018-2022) by Crash Injury Severity

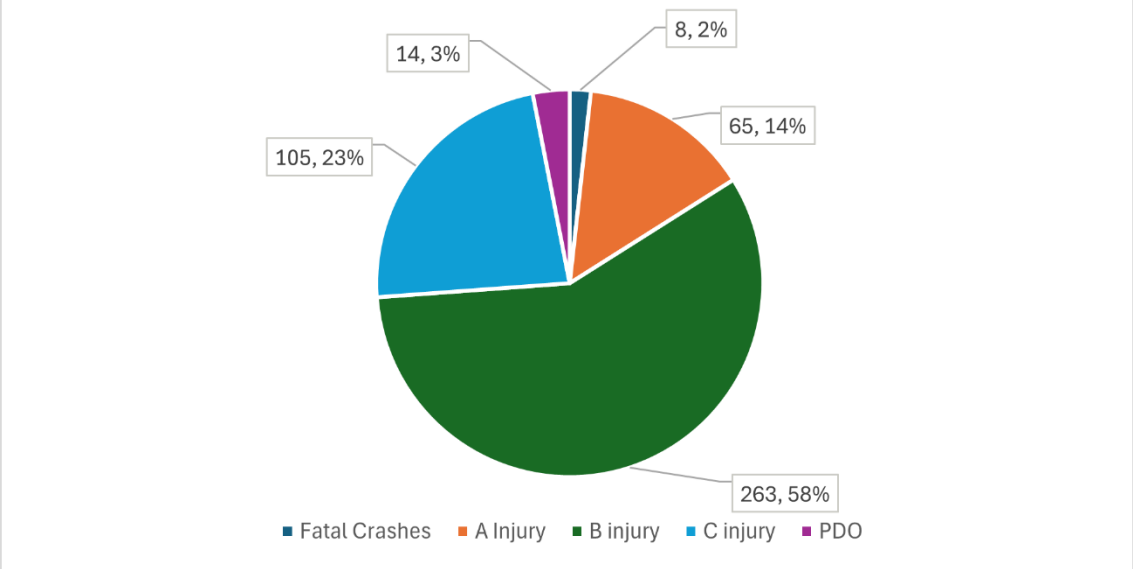


Figure 14: Lake County Bicyclist Crashes (2018-2022) by Crash Injury Severity

Of the pedestrian injury crashes, 67 percent of pedestrian crashes (377) occurred near intersections while 33 percent of pedestrian injury crashes (188) occurred on segments. Additionally, 78 percent of the bicyclist injury crashes (377) occurred at the intersections and 24 percent of the bicyclist injury crashes (108) occurred on segments.

HIGH INJURY NETWORK

A high-injury network (HIN) is a map of locations with the highest concentrations of traffic fatalities and serious injuries. The Lake County HIN was developed with two specific goals in mind:

1) To identify parts of the roadway network which exhibit the highest degree of injury (in terms of both frequency and severity of injuries) to prioritize intervention.
2) To allow municipal and local partners to identify priority locations for improvements within their boundaries.

The Lake County HIN has two tiers. The full HIN is made up of corridors with at least 2.5 fatal or serious injuries per mile from 2018-2022 and covers 66 percent of all fatal and serious injuries in the study area while consisting of just 7.5 percent of the total roadway miles in the county.

As a subset of the full HIN, a more exclusive tier (a very high injury network or V-HIN) is composed of those corridors with at least 6 fatal or serious injuries per mile. The V-HIN covers 35 percent of the total fatal and serious injuries on just 2.4 percent of the total roadway miles in the county.

A map of the Lake County high-injury network is shown in **Figure 15** along with a link to an interactive web version of the map which allows users to view the HIN in greater detail.

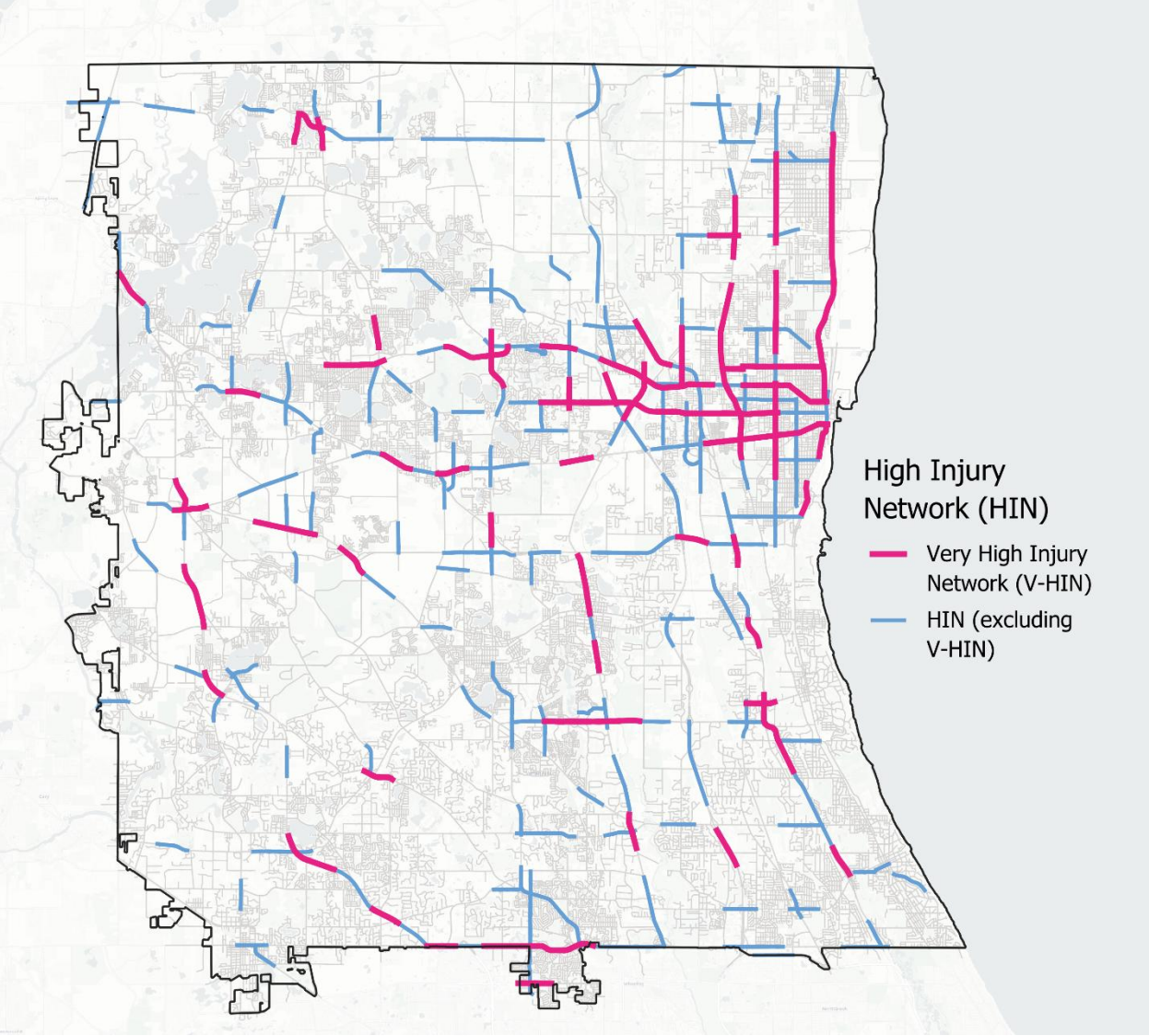


Figure 15: Map of Lake County High Injury Network (HIN) (Interactive Map Link to be added)

SYSTEMIC SAFETY CONDITIONS

A systemic analysis of safety conditions reviews severe crash history to identify high-risk roadway features that are highly associated with fatal and serious injuries. Analyzing roadway features, such as posted speed limit and number of lanes, in context of fatal and serious injury crashes can proactively identify roadway locations more prone to severe crash occurrences, regardless of crash history. **Figure 16** illustrates the steps involved in the systemic analysis process.

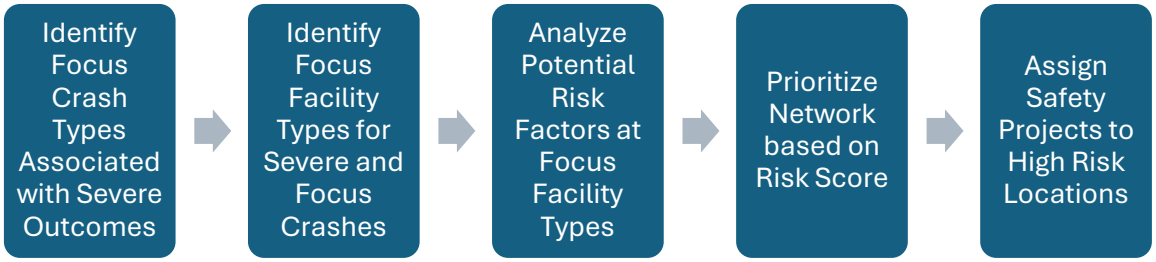


Figure 16. Systemic Analysis Process

Emphasis Areas and Crash Type Prioritization

Using the traffic safety emphasis areas identified in the CMAP regional safety action planning framework, a crash type analysis was performed to identify the number of fatal and serious injury crashes occurring within each emphasis area. Emphasis areas within the CMAP regional safety action planning framework include:

- Speeding and Aggressive Driving
- Impaired Driving
- Distracted Driving
- Unrestrained Occupants
- Pedestrian Safety
- Bicyclist Safety
- Motorcyclists
- Heavy Vehicles
- Older Drivers
- Younger Drivers
- Roadway Departures
- Intersections
- Railroad Crossings
- Work Zones
- Animal-Involved Crashes
- Wrong-Way Driving

Figure 17 details fatal and serious injury crashes by emphasis area for Lake County and the region. Emphasis areas with a higher variance between county and regional fatal and serious injury crashes indicate a larger portion of these crashes are occurring in Lake County than in the six-county region and should be prioritized for safety interventions.

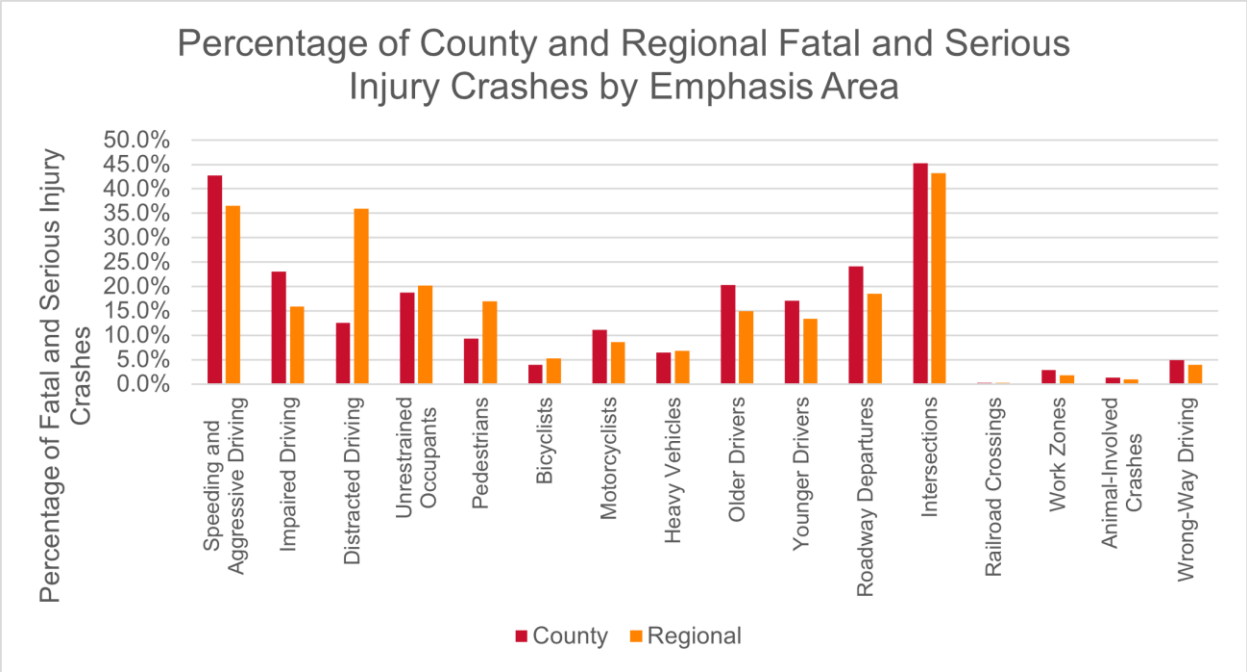


Figure 17. Percentage of County and Regional Fatal and Serious Injury Crashes by Emphasis Area

Emphasis areas that were present in many fatal and serious injury crashes, more often resulted in fatalities and serious injuries, and were more prevalent in Lake County than in the six-county area were considered higher priority. This analysis revealed that the priority emphasis areas for Lake County are:

- Intersections
- Speeding and Aggressive Driving
- Roadway Departures
- Impaired Driving

These four emphasis areas were selected because they were present in the highest percentage of fatal and serious injury crashes and had a higher variance between county and regional crashes compared to other emphasis areas. Though older drivers, younger drivers, and motorcyclists had a greater variance between county and regional crashes compared to intersections, intersections were involved in a much higher percentage of fatal and serious injury crashes. Similarly, though impaired driving made up a similar percentage of fatal and serious injury crashes compared to younger and older drivers, the variance between county and regional crash data was greater for impaired drivers.

For the four selected emphasis areas, the number of fatal and serious injury crashes that occurred were evaluated to determine which crash types are most frequently associated with the selected emphasis areas, and therefore considered as focus crash types. Identifying crash types allows a deeper analysis into potential crash causes and contributing factors.

The focus crash types most prevalent for the selected emphasis areas are:

- Fixed Object
- Turning
- Front to Rear
- Angle
- Front to Front
- Pedestrian/Pedalcyclist

The results are summarized in **Table 4**.

Table 4. Crash Type Prioritization

Crash Type	KA Crashes by Emphasis Area				
	Intersection	Speeding & Aggressive Driving	Roadway Departure	Impaired Driving	Total
Fixed Object	50	165	327	156	698
Turning	377	111	0	33	521
Front to Rear	129	266	0	66	461
Angle	160	71	0	32	263
Front to Front	13	34	117	49	213
Pedestrian or Pedalcyclist	89	47	0	27	163
Overturned	9	31	56	15	111
Sideswipe Opposite Direction	8	7	28	12	55
Parked Motor Vehicle	1	28	0	17	46
Sideswipe Same Direction	6	23	0	10	39
Other Non-Collision	4	11	0	7	22
Other Object	3	10	0	8	21
Train	1	0	0	1	2
Animal	0	0	0	0	0

Priority Focus Facility Types and Risk Factors

After identifying the focus crash types, site characteristics of urban or rural, segment or intersection, and number of lanes were analyzed to identify characteristics that could contribute to more focus crashes. This analysis was completed with the use of crash trees, which are included in **Appendix B: Crash Disaggregation Trees.**

The most frequent characteristics were used to identify facility characteristics for an appropriate focus facility. Facility refers to types of roadway infrastructure, such as whether a road is 2-lane or 4-lane, divided or undivided, or urban or rural. Urban and rural areas were defined using the U.S. Census Bureau's urban-rural classification.[1] The following facility types are locations with the highest frequency of fatal and serious injury crashes and focus crash types and were moved forward in the risk factor identification process:

- Urban 2-lane undivided segments
- Urban 4-lane divided segments
- Urban 4-lane undivided segments
- Urban 2-lane undivided intersections (signalized and stop control combined)
- Urban 4-lane intersections (divided and undivided combined)
- Rural 2-lane segments
- Rural 4-lane segments
- Rural 2-lane intersections (signalized and stop control combined)
- Rural 4-lane signalized intersections

Once the focus facilities were identified, risk factors were identified to determine which road characteristics are associated with the most fatal and serious injury crashes. The risk factor analysis was organized into six simplified facility type groups for this analysis, with each group getting its own set of risk factors.

- Urban segments (vehicle crashes)
- Urban segments (ped/bike crashes)
- Urban intersections (vehicle crashes)
- Urban intersections (ped/bike crashes)
- Rural segments
- Rural intersections

Road characteristics were considered a risk factor if the share of fatal and serious injury crashes was greater than the share of the network for locations with the road characteristic present. Pedestrian and bicycle risk factors were only analyzed for urban areas, as there was not sufficient pedestrian or bicycle crash data in the limited rural areas within Lake County to produce meaningful findings. While risk factors represent roads with a higher potential for fatal and serious injury crashes, they don't necessarily contribute as a direct cause for the crash. An example of this is that wider shoulders was identified as a risk factor. The wider shoulder itself is likely not the cause for the increased crash risk, but rather serves as a surrogate risk factor, as wider shoulders are often found on higher speed and higher volume roadways. Similarly, urban segments with no parking allowed is likely identified as a risk factor based on the data due to the fact that parked vehicles along a segment can often slow speeds along a corridor.

Each facility type group had between five and six risk factors identified. Risk factors are summarized in **Table 5**, **Table** 6, **Table 7**, and **Table 8**.

Table 5. Urban Segment Risk Factors

Urban Segment Characteristic	Vehicle Risk Factor	Ped/Bike Risk Factor
Volume	Greater than 2,500 vehicles per day	Greater than 2,500 vehicles per day
Speed Limit	45 mph or greater	30-40 mph
Outside Shoulder Width	4 ft or greater	-
Lane Width	12 ft	12 ft
Number of Lanes	4 or more lanes	4 lanes
Parking	No parking allowed	No parking allowed

Table 6. Urban Intersection Risk Factors

Urban Intersection Characteristic	Vehicle Risk Factor	Ped/Bike Risk Factor
Control Type	Signalized	Signalized
Number of Legs	4-Legged	4-Legged
Volume	Daily entering traffic of 7,500 vehicles per day or greater OR AADT cross product of 2,000,000 or greater	Daily entering traffic of 2,500 vehicles per day or greater OR AADT cross product of 400,000 or greater
Speed Limit	Major road speed limit of 40 mph or greater OR Minor road speed limit of 35 mph or greater	Major road speed limit of 30-35 mph OR Minor road speed limit of 30-35 mph
Parking Any Legs	No parking allowed on any leg	No parking allowed on any leg
Major Lanes Count	4 or more lanes	4 or more lanes

Table 7. Rural Segment Risk Factors

Rural Segment Characteristic	Vehicle Risk Factor
AADT	Greater than 10,000 vehicles per day
Speed Limit	50 mph or greater
Outside Shoulder Width	6 ft or greater
Lane Width	12 ft
Number of Lanes	4 or more lanes

Table 8. Rural Intersection Risk Factors

Rural Intersection Characteristic	Vehicle Risk Factor
Control Type	Signalized
Number of Legs	4 Legged
Volumes	Daily entering traffic of 7,500 vehicles per day or greater OR AADT cross product of 10,000,000 or greater
Speed Limit	Major road speed limit of 50 mph or greater OR Minor road speed limit of 50 mph or greater
Parking Any Legs	No parking allowed on any leg
Major Lanes Count	4 or more lanes

Risk scores for every segment and intersection were calculated based on the facility type and number of risk factors present. Each risk factor was weighted equally, adding one point to the total. **Figure 18**, **Figure 19**, **Figure 20**, **Figure 21**, **Figure 22**, and **Figure 23** show the risk scores for all segments and intersections within the Lake County network.

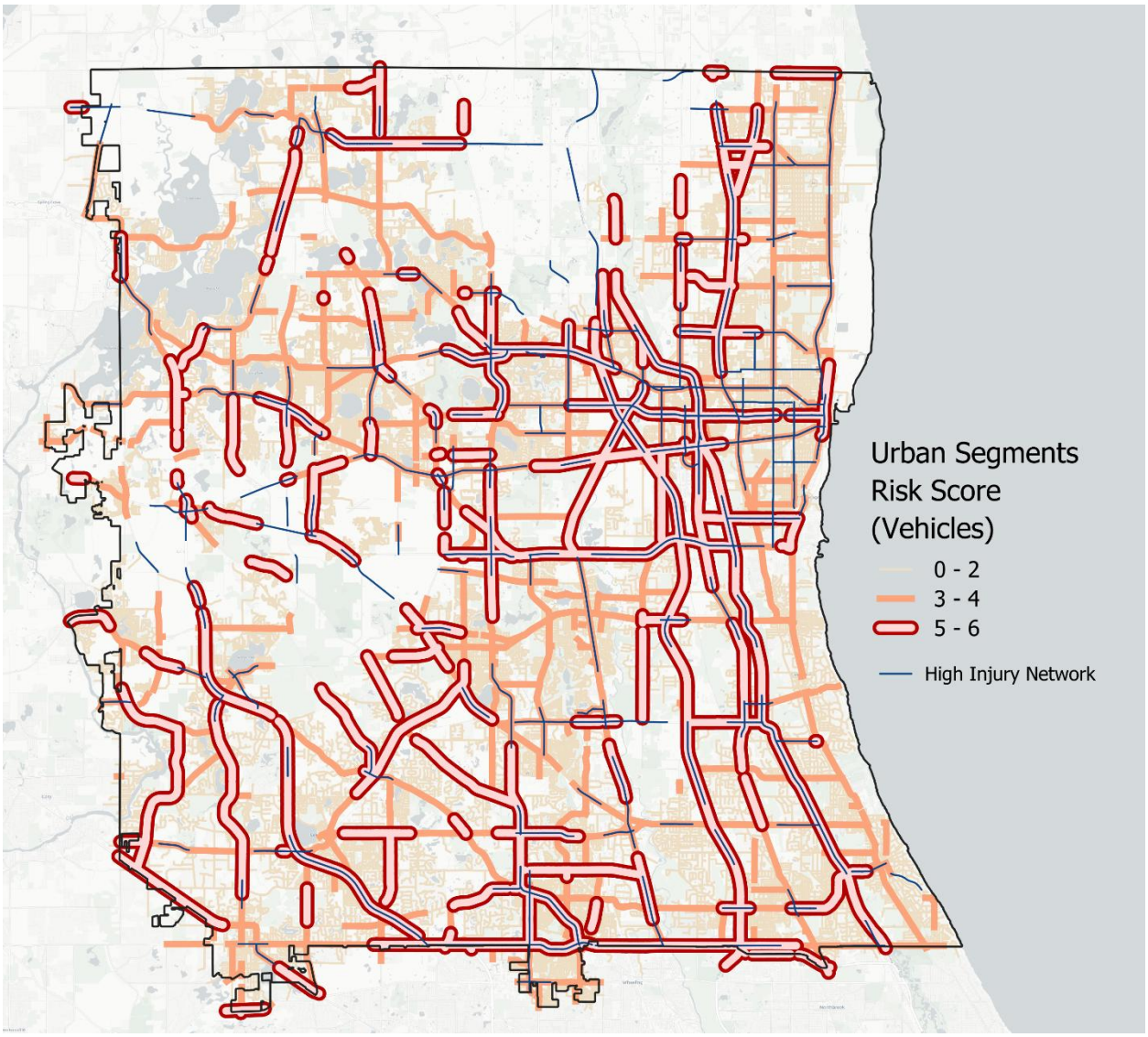


Figure 18. Urban Segment (Vehicles) Risk Scores Map

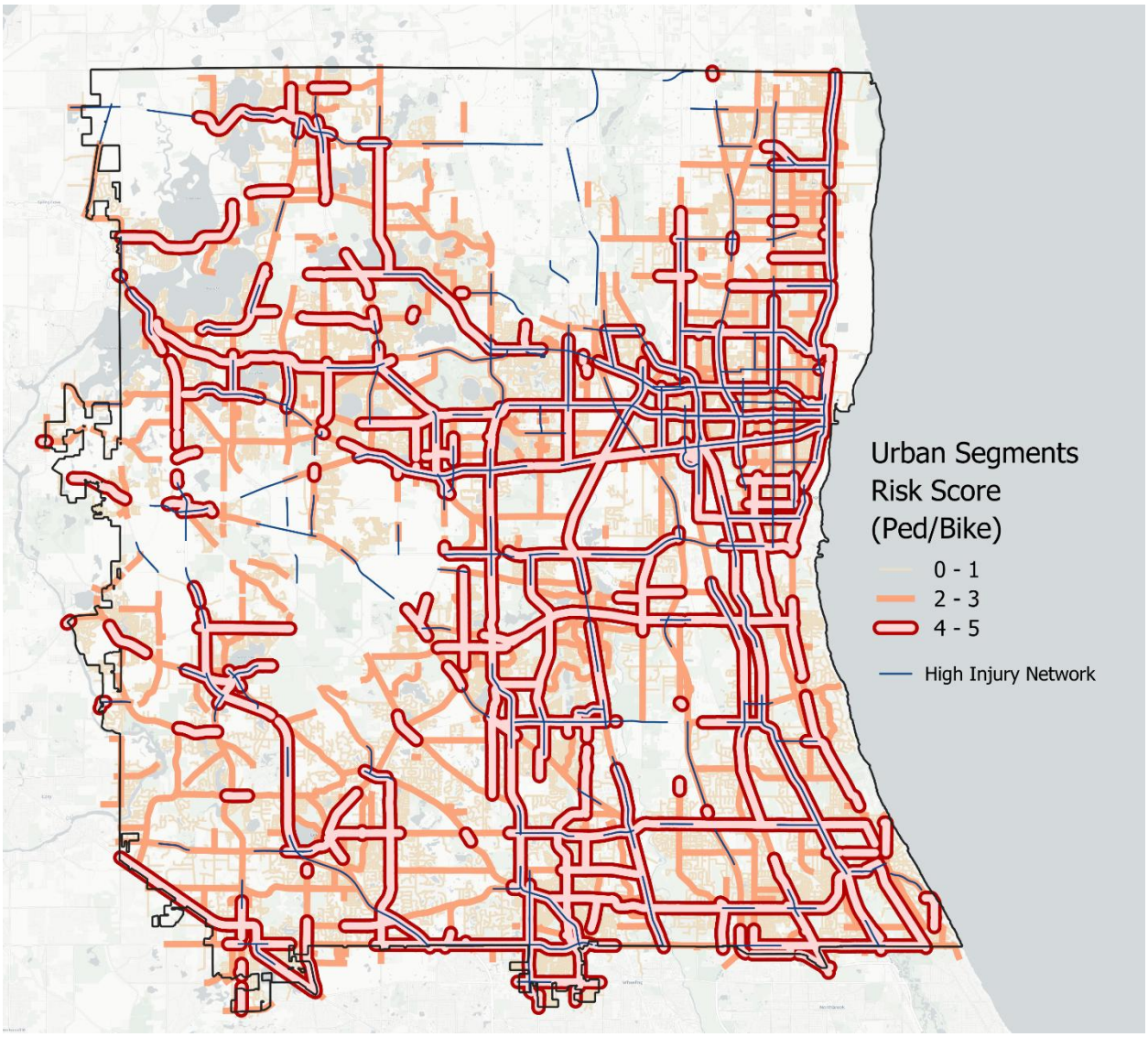


Figure 19. Urban Segment (Ped/Bike) Risk Scores Map

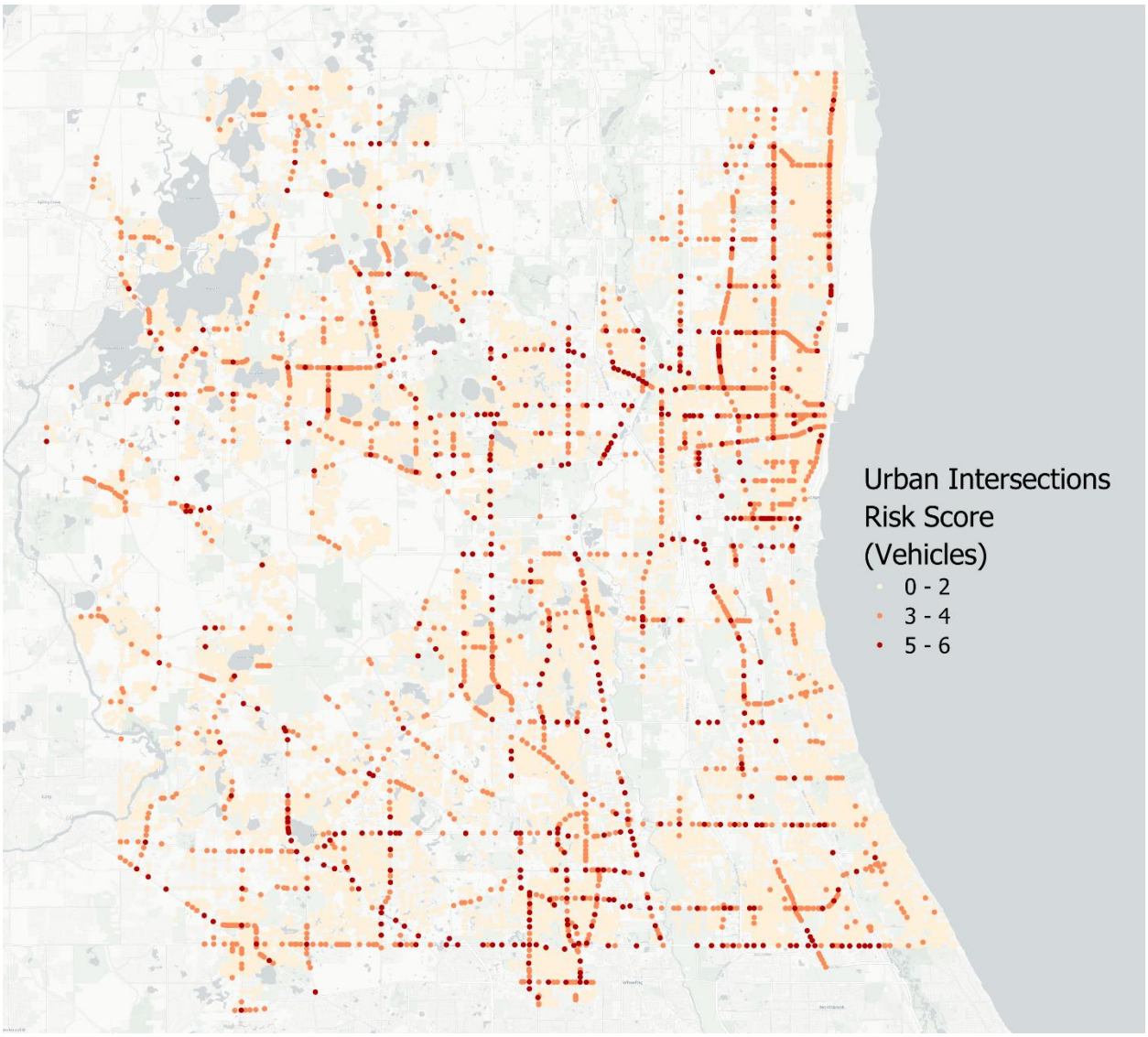


Figure 20. Urban Intersection (Vehicles) Risk Scores Map

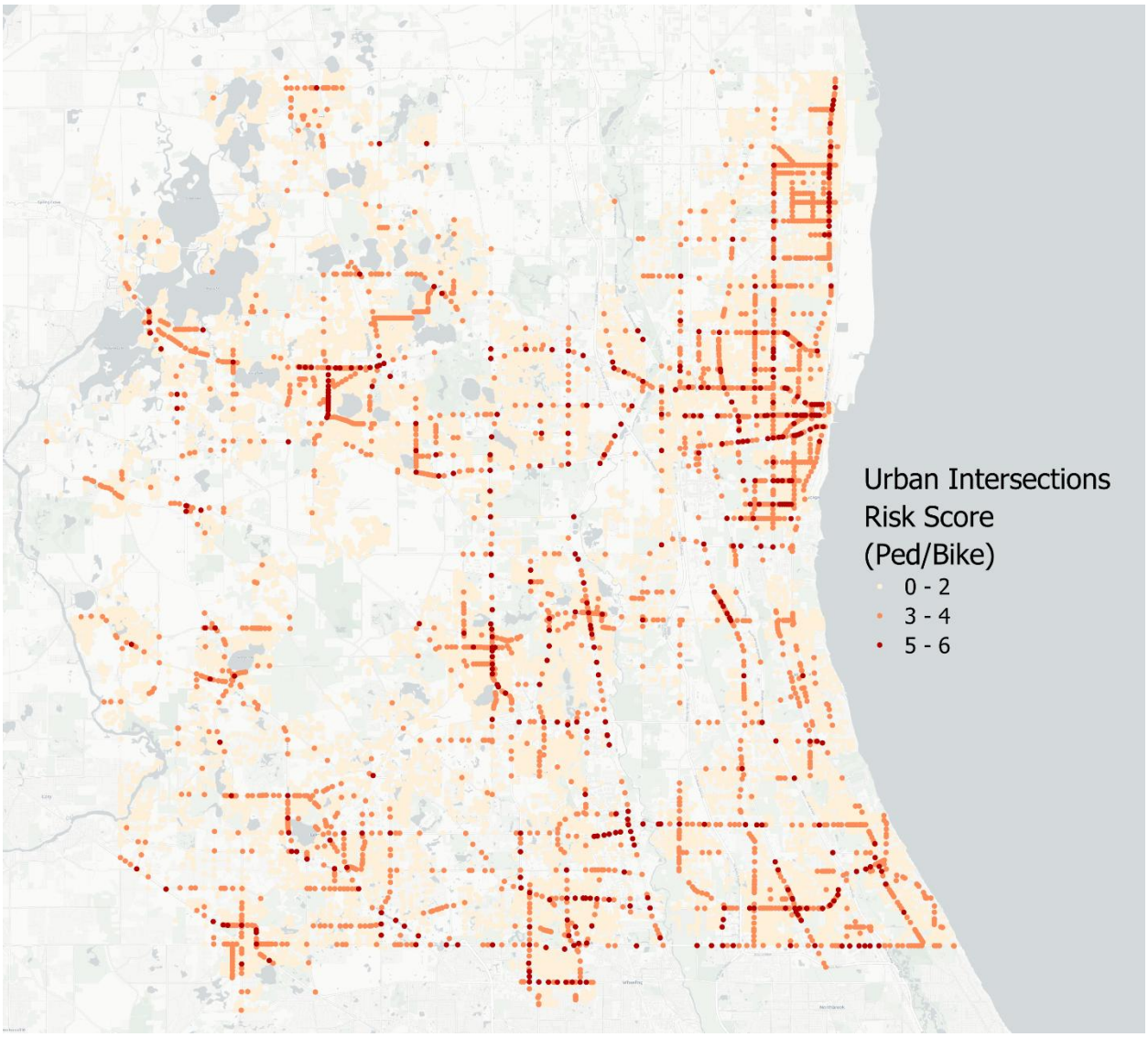


Figure 21. Urban Intersection (Ped/Bike) Risk Scores Map

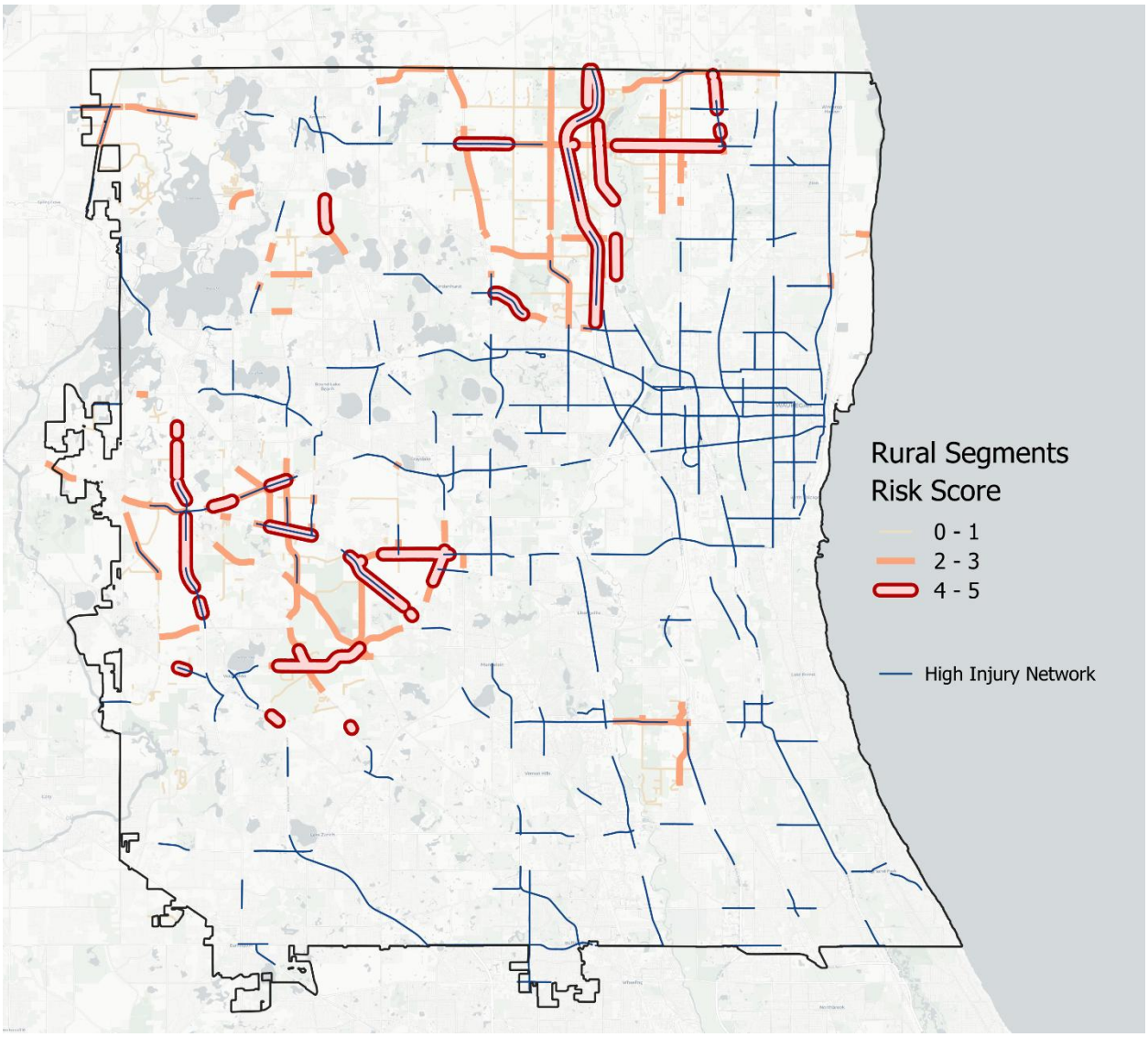


Figure 22. Rural Segment Risk Scores Map

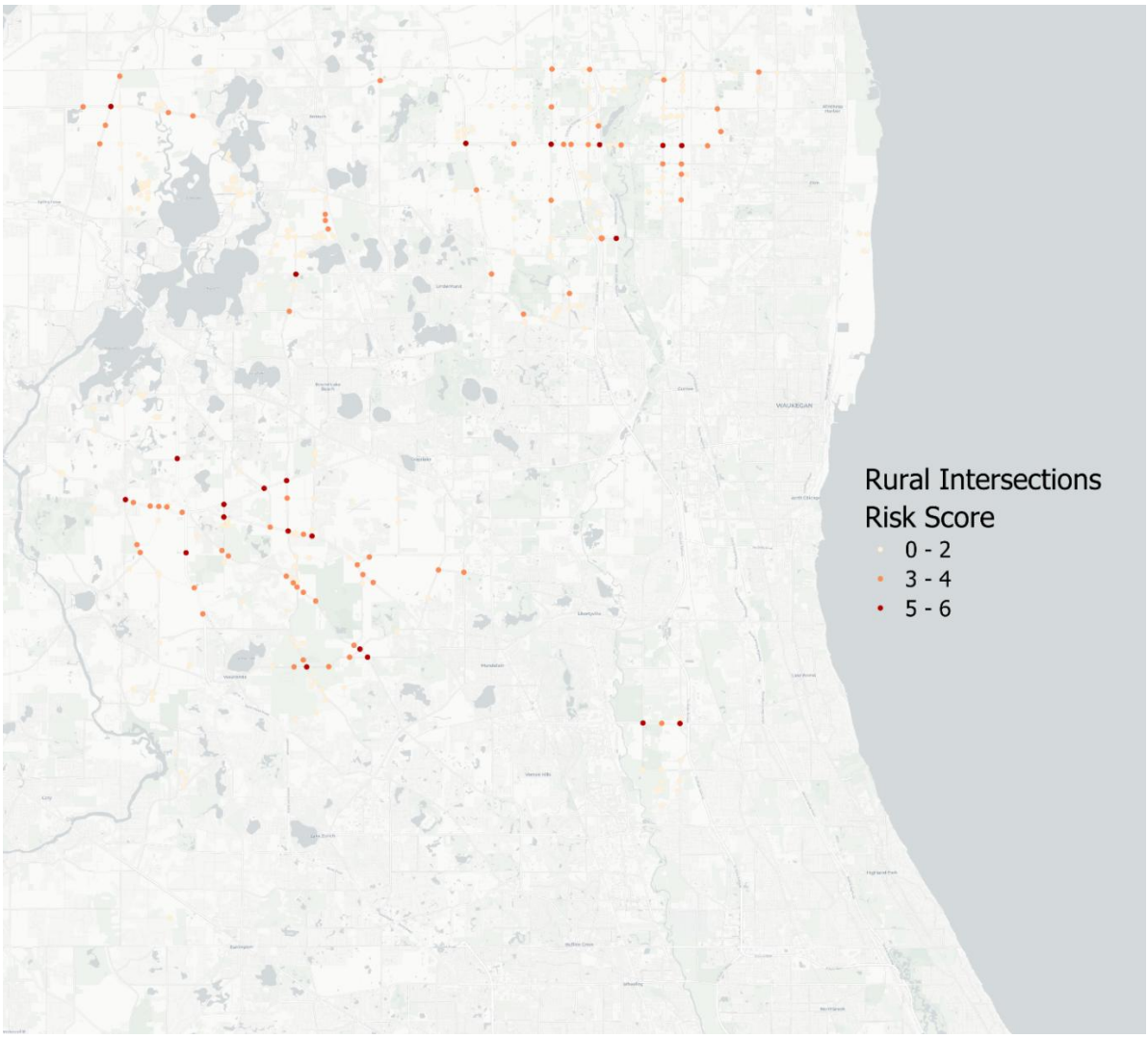


Figure 23. Rural Intersection Risk Scores Map

Locations with higher risk scores generally make up a small portion of the network but are associated with the highest frequencies of fatal and serious injury crashes, as shown in **Table 9**.

Table 9. Risk Score Network Summary

Facility Type	Share of Network with Risk Score of 4 or Greater	Share of Fatal + Serious Injury Crashes on Network with Risk Score of 4 or Greater
Urban Segment	13%	60%
Urban Segment Ped/Bike	10%	45%
Urban Intersection	7%	67%
Urban Intersection Ped/Bike	7%	57%
Rural Segment	19%	50%
Rural Intersection	12%	60%

RAILWAY SAFETY CONDITIONS

During the 10-year analysis period from 2012 and 2021, 92 railroad incidents were reported, resulting in 49 fatalities and 20 injuries. Of these 92 incidents, Metra trains were involved in 60 incidents (65 percent) and Amtrak was involved in three incidents. The remaining 29 incidents (32 percent) involved a freight train.

Figure 24 summarizes Lake County railroad safety incidents by the operating agency of the train involved in each railroad safety incident. All Lake County railroad safety incidents are displayed on the map in **Figure 26**.

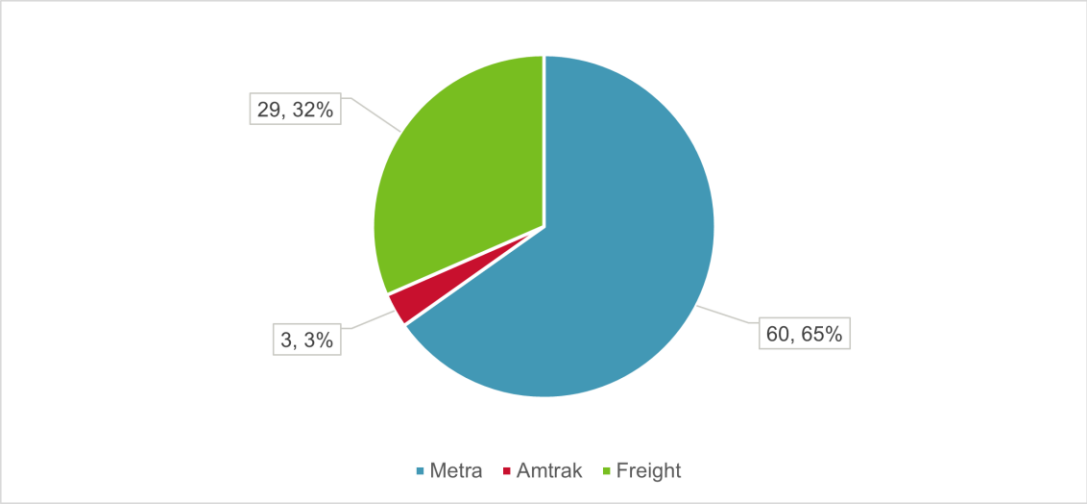


Figure 24. Lake County Railroad Safety Incidents by Operating Agency

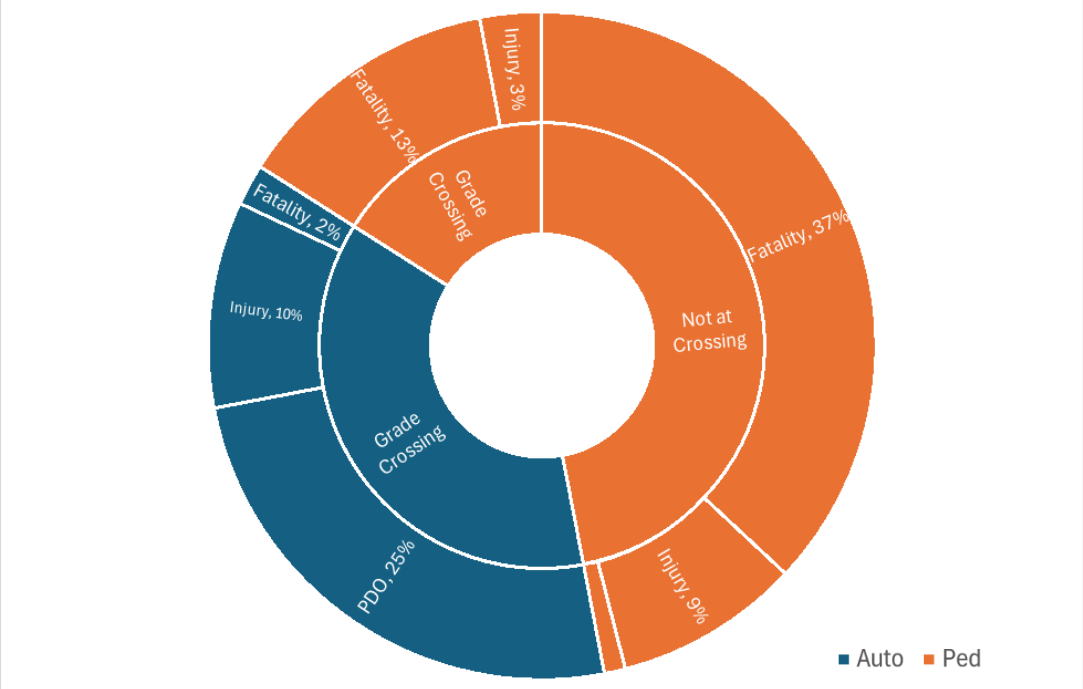


Figure 25. Lake County Railroad Safety Incidents by Vehicle Mode, Location, and Injury Severity

Railroad Safety Incidents (2012-2021)

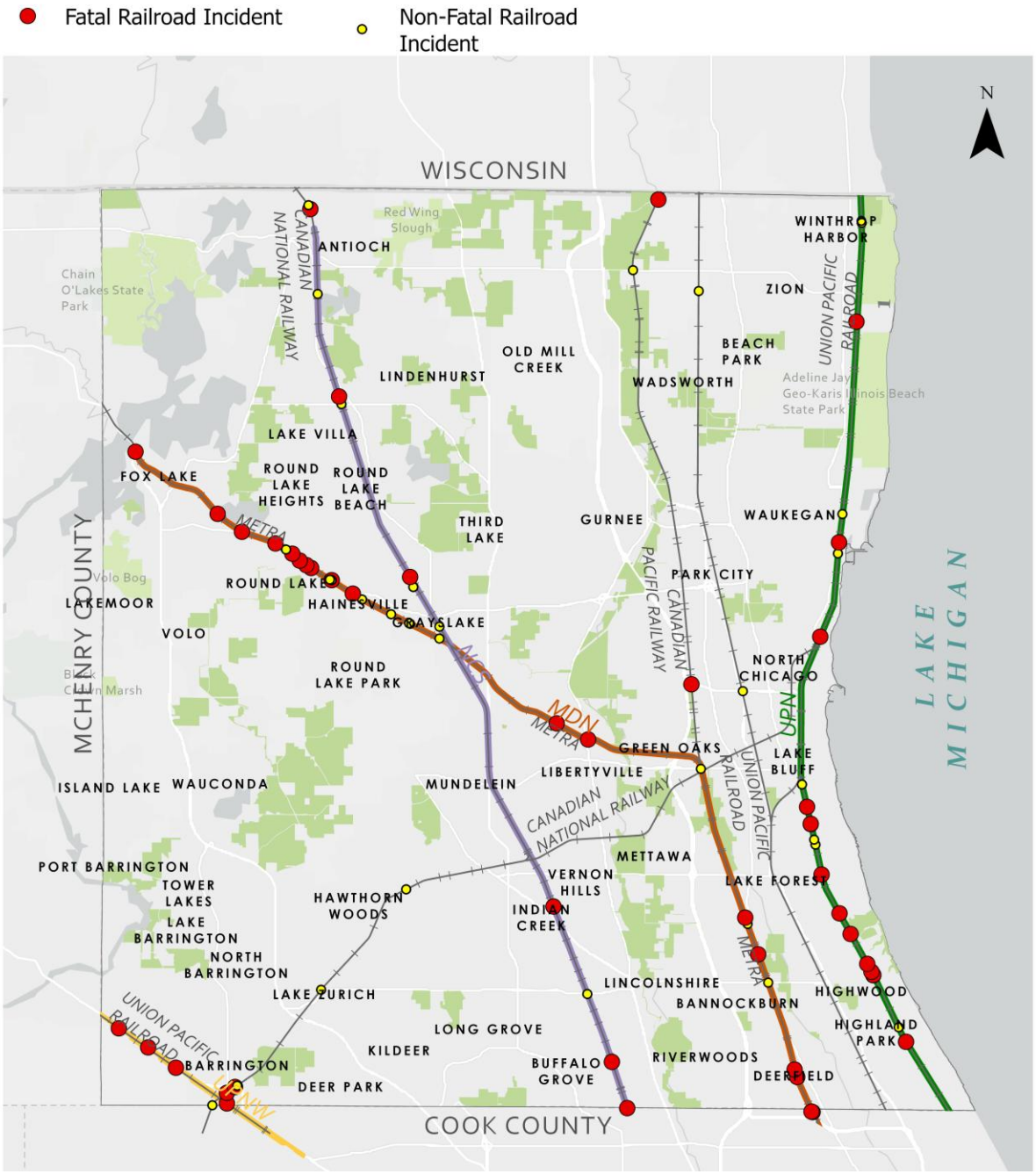


Figure 26. Map of Lake County Railroad Safety Incidents (2012-2021)

In the northeast Illinois region, Metra owns and operates four rail lines (Rock Island, Metra Electric, Milwaukee District North and Milwaukee District West). Three Metra lines, including one with stops in Lake County, are operated by Metra employees over tracks owned by freight railroads through trackage rights or lease agreements (Heritage Corridor, North Central Service and SouthWest Service). In May 2025, Metra assumed operation of three other Metra lines

previously operated through purchase-of-service agreements with the Union Pacific freight railroad (Union Pacific North, Union Pacific Northwest and Union Pacific West). One additional Metra line in the region is operated directly by the BNSF freight railroad through purchase-of-service agreements. Along the lines that are owned by other railroads, Metra works cooperatively to implement proposed safety improvement projects. **Figure 27** displays the same railroad incident data limited to crash incidents that involved or were reported by Metra.

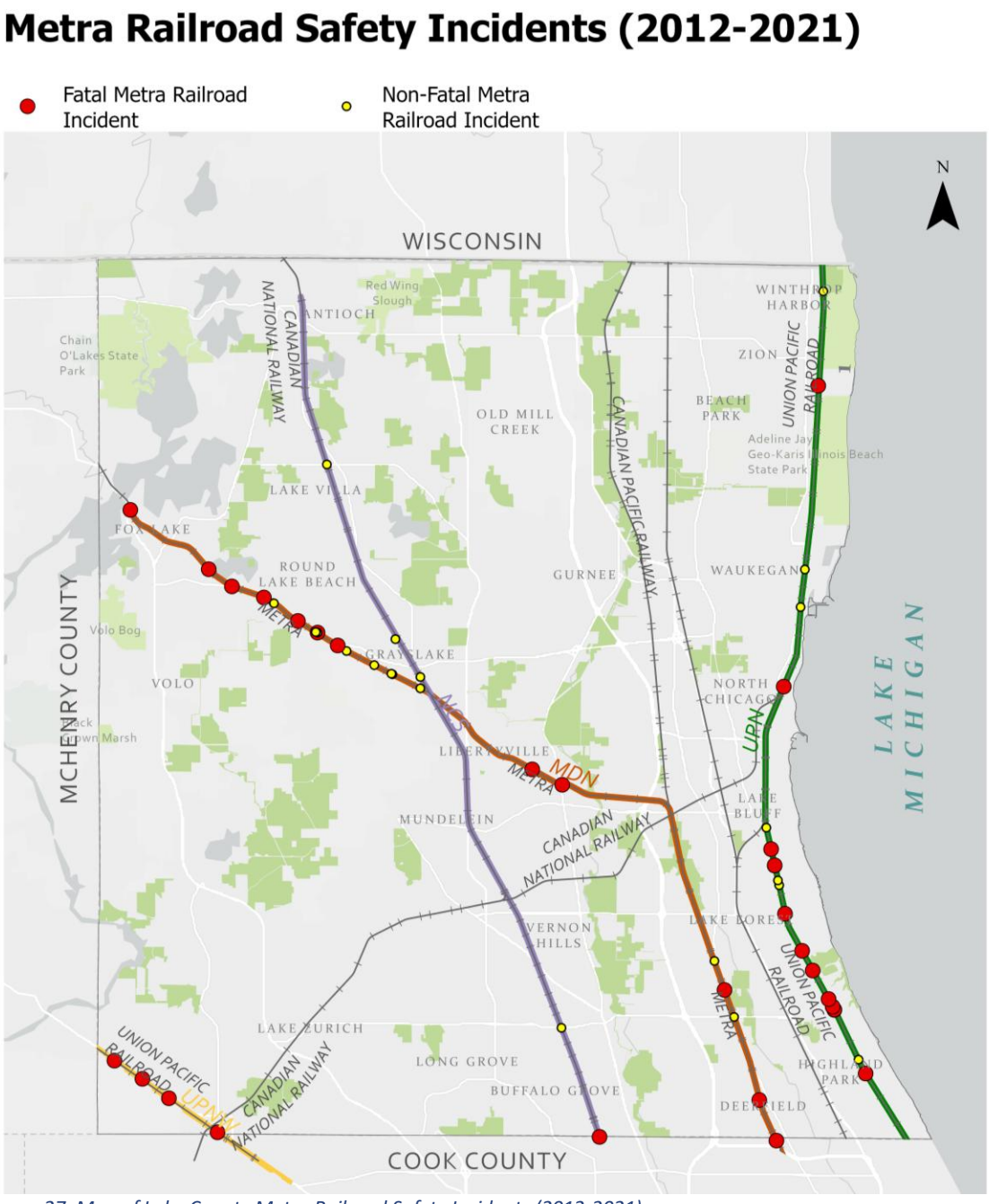


Figure 27. Map of Lake County Metra Railroad Safety Incidents (2012-2021)

To identify geographic focus areas for railroad safety incidents, all incidents were sorted by the municipality in which they occurred, as shown in **Table 10**. Municipalities which experienced five or more railroad safety incidents were selected for further safety analysis to identify railroad safety incident clusters.

Table 10. Lake County Railroad Safety Incident Count by Municipality

Municipality	Railroad Safety Incidents
Antioch	3
Bannockburn	1
Barrington	**8**
Barrington Hills	2
Buffalo Grove	1
Deerfield	3
Fox Lake	1
Grayslake	**11**
Green Oaks	1
Gurnee	1
Hainesville	2
Hawthorn Woods	1
Highland Park	3
Highwood	**5**
Ingleside	2
Lake Bluff	1
Lake Forest	**11**
Lake Villa	2
Lake Zurich	1
Libertyville	3
Long Lake	1
North Chicago	2
Northbrook	1
Prairie View	1
Round Lake	**8**
Round Lake Park	**7**
Vernon Hills	1
Wadsworth	2
Waukegan	3
Wheeling	1
Winthrop Harbor	1
Zion	1
TOTAL	**92**

Based on a review of the geographic incident data and the analysis above, the following geographic clusters were identified for rail safety incidents:

1. Barrington, near the intersection of the Canadian National Railway and Union Pacific Railroad, which also serves Metra's Union Pacific Northwest (UPNW) line. **Figure 28** shows the cluster of crashes at this location along with an aerial image of the area. **Table 11** summarizes the incidents that occurred at this cluster.

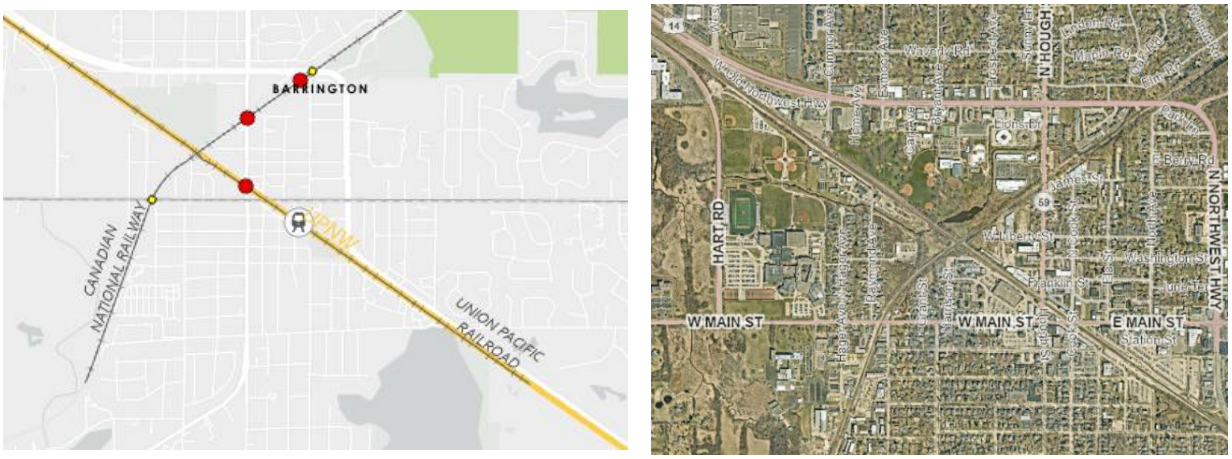


Figure 28. Rail Safety Incident Cluster #1 (Barrington)

Table 11. Summary of Cluster #1 Rail Safety Incidents

	Year	Highway	Rail Equipment	Incident Type	Vehicle Type	Safety Devices	Severity
1	2013	Hough St (IL 59)	Metra	Xing-Public	Ped	Gates	Injury
2	2013	Northwest Hwy (US 14)	Freight	Xing-Public	Truck-Trailer	Gates w/ Cants	Injury
3	2015	Hough St (IL 59)	Metra	Xing-Public	Ped	Gates w/ Cants	Fatality
4	2016	Main St	Freight	Xing-Public	Auto	Gates w/ Cants	Property Damage Only
5	2017	Hough St (IL 59)	Freight	Xing-Public	Truck-Trailer	Gates w/ Cants	Injury
6	2017	SW of Northwest Hwy (US 14)	Freight	Trespasser	Trespasser	Not A Crossing	Fatality
7	2020	Near Hough St (IL 59)	Freight	Trespasser	Trespasser	Not A Crossing	Fatality

Due to the intersection of the two major freight railroads in the vicinity of an urban area with multiple at grade crossings, Barrington experienced multiple fatal rail safety incidents during the 10-year study period.

2. Round Lake, in the vicinity of the Round Lake Metra station on the Milwaukee District North Metra line. **Figure 29** shows the cluster of crashes at this location along with an aerial image of the area. **Table 12** summarizes the incidents that occurred at this cluster.

Figure 29. Rail Safety Incident Cluster #2 (Round Lake)

Table 12. Summary of Cluster #2 (Round Lake/Round Lake Park) Rail Safety Incidents

	Year	Highway	Rail Equipment	Incident Location	Vehicle Type	Safety Devices	Severity
1	2012	Cedar Lake Rd / IL 134	Metra	Trespasser	Trespasser	Not A Xing	Fatality
2	2012	West End of Platform at Round Lake Depot	Freight	Trespasser	Trespasser	Not A Xing	Fatality
3	2012	Round Lake Depot / Railroad Ave	Freight	Trespasser	Trespasser	Not A Xing	Fatality
4	2013	Private Road at Mile 44.7	Metra	Xing-Private	Auto	Stop Sign	Property Damage Only
5	2013	Fairfield Rd	Metra	Xing-Public	Ped	Gates w/ Cants	Fatality
6	2014	Main St	Metra	Xing-Public	Auto	Gates	Injury
7	2014	Main St	Metra	Xing-Public	Auto	Gates	Property Damage Only
8	2014	Main St	Metra	Xing-Public	Auto	Gates w/ Cants	Fatality
9	2014	Main St (IL 134)	Metra	Xing-Public	Auto	Gates	Property Damage Only
10	2015	Near Main St	Metra	Trespasser	Trespasser	Not A Xing	Fatality

	Year	Highway	Rail Equipment	Incident Location	Vehicle Type	Safety Devices	Severity
11	2015	Main St	Metra	Xing-Public	Auto	Gates	Property Damage Only
12	2017	Near Long Lake Depot	Metra	Trespasser	Trespasser	Not A Xing	Fatality
13	2017	Main St (IL 134)	Metra	Xing-Public	Auto	Gates	Injury
14	2019	Hainesville Road	Metra	Xing-Private	Auto	Stop Sign	Property Damage Only
15	2019	Belvidere Rd (IL 120)	Metra	Xing-Public	Auto	Gates	Property Damage Only
16	2021	0.5 Mile North of Round Lake Depot	Freight	Trespasser	Trespasser	Not A Xing	Fatality
17	2021	200 ft West of Belvidere Rd	Metra	Trespasser	Trespasser	Not A Xing	Fatality

Multiple pedestrian and trespassing incidents were recorded in this area along IL 134 over the 10-year study period, often resulting in fatalities. The proximity of the Round Lake Metra station, coupled with a single track at-grade railroad cross section and the lack of extensive pedestrian accommodations may contribute to pedestrians crossing the railroad tracks at unprotected locations. To the southeast of the Round Lake Metra Station, IL 134 crosses the Metra (MDN) tracks at a nearly parallel skew, resulting in a long grade crossing. Pedestrians are directed further southeast to a pedestrian at-grade crossing that is perpendicular to the railroad tracks. A sidewalk and fences were installed at this location in 2012 to discourage crossing the railroad outside of this location which has reduced pedestrian incidents, though vehicle incidents at this crossing continue to be reported.

3. Lake Forest, near the Lake Forest Metra station along the Metra Union Pacific North (UPN) line. **Figure 30** shows the cluster of crashes at this location along with an aerial image of the area. **Table 13** summarizes the incidents that occurred at this cluster. The presence of nearby restaurants, schools, and a shared use path may promote pedestrian and bicyclist activity in this area.

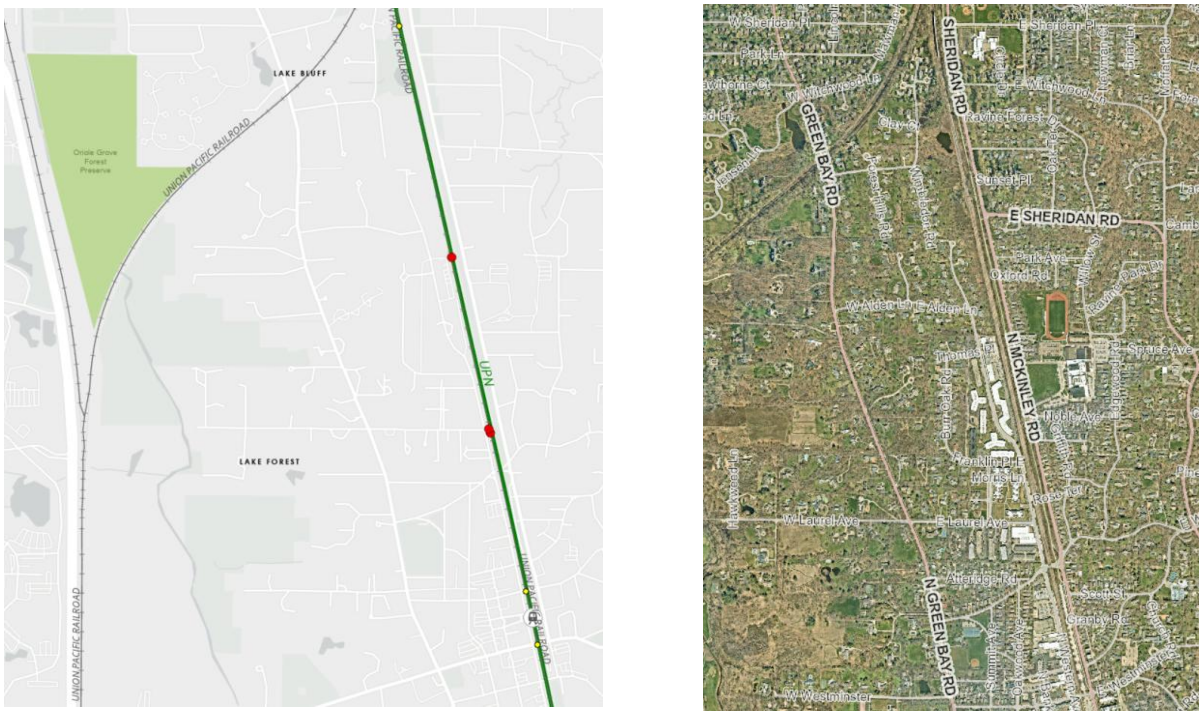


Figure 30. Rail Safety Incident Cluster #3 (Lake Forest)

Table 13. Summary of Cluster #3 (Lake Forest) Rail Safety Incidents

	Year	Highway	Rail Equipment	Incident Type	Vehicle Type	Safety Devices	Severity
1	2012	Ryan Place / Northwestern Ave	Metra	Xing-Public	Ped	Gates	Fatality
2	2012	North of Thomas Place Across from Lake Forest High School	Metra	Trespasser	Trespasser	Not A Xing	Fatality
3	2013	West of Witchwood Lane	Metra	Trespasser	Trespasser	Not A Xing	Injury
4	2019	Deerpath Road	Metra	Xing-Public	Auto	Gates	Injury
5	2019	Near Westminster Ave	Metra	Trespasser	Trespasser	Not A Xing	Property Damage Only
6	2020	1019 N Western Ave at Laurel Ave	Metra	Trespasser	Trespasser	Not A Xing	Fatality
7	2021	1000 N Western Ave at Laurel Ave	Metra	Trespasser	Trespasser	Not A Xing	Fatality

This stretch of railroad has experienced numerous rail incidents, including five incidents where a person trespassed on railroad right-of-way which resulted in four fatalities. Three teenage

students from the nearby high school were among the fatalities in the first three months of 2012. The railroad, which includes up to three tracks running parallel between Western Ave, the Robert McClory Bike Path, and N McKinley Rd, appears to be constructed near existing grade with long unfenced stretches and includes a nearly 1.5 mile stretch between Woodland Ave and Scranton Ave without a crossing.

4. Highwood, near the Highwood Metra Station along the Metra Union Pacific North (UPN) line south of Cluster #3. **Figure 31** shows the cluster of crashes at this location along with an aerial image of the area. **Table 14** summarizes the incidents that occurred at this cluster.

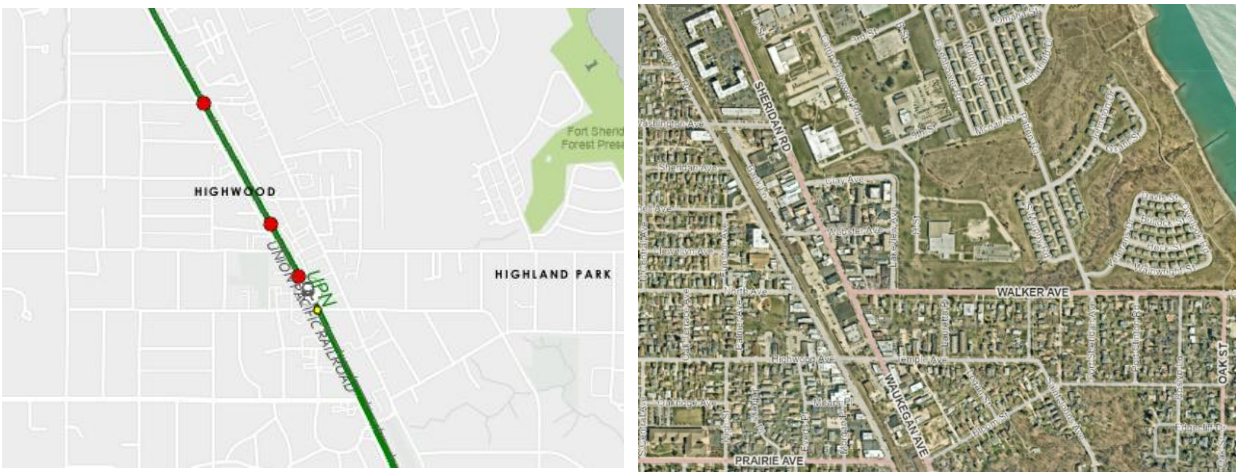


Figure 31. Rail Safety Incident Cluster #4 (Highwood)

Table 14. Summary of Cluster #4 (Highwood) Rail Safety Incidents

	Year	Highway	Rail Equipment	Incident Type	Vehicle Type	Safety Devices	Severity
1	2014	Highwood Ped Crossing	Metra	Xing-Ped	Ped	Ped AFLS	Fatality
2	2015	Highwood and Green Bay Rd	Metra	Xing-Public	Auto	Gates	Property Damage Only
3	2017	Highwood Depot	Metra	Trespasser	Trespasser	Not A Xing	Fatality
4	2019	Near Washington Ave	Metra	Trespasser	Trespasser	Not A Xing	Fatality
5	2021	Highwood Depot Crossing	Metra	Xing-Ped	Ped	Ped AFLS	Fatality

The Highwood Metra station is located in an urban area with a significant number of restaurants and bars. In addition to the at-grade sidewalk crossings over the railroad at Highwood Ave and Washington Ave, there is an additional mid-block platform that allows pedestrians to cross from one side to another at the Highwood Station.

5. Grayslake, between the NCS and Milwaukee District North lines. A skewed grade crossing at Ivanhoe Road was the site of five railroad incidents between vehicles and Metra trains. **Figure 32** shows the cluster of crashes at this location along with an aerial image of the area. **Table 15** summarizes the incidents that occurred at this cluster.

Figure 32. Rail Safety Incident Cluster #5 (Grayslake)

Table 15. Summary of Cluster #5 (Grayslake) Rail Safety Incidents

	Year	Highway	Rail Equipment	Incident Type	Vehicle Type	Safety Devices	Severity
1	2013	Ivanhoe Rd/ IL 83	Freight	Xing-Public	Auto	Gates	Injury
2	2014	Ivanhoe Rd/ IL 83	Metra	Xing-Public	Auto	Gates	Property Damage Only
3	2016	Ivanhoe Rd/ IL 83	Freight	Xing-Public	Auto	Gates	Property Damage Only
4	2016	Ivanhoe Rd/ IL 83	Metra	Xing-Public	Auto	Gates	Property Damage Only
5	2019	Ivanhoe Rd/ IL 83	Freight	Xing-Public	Auto	Gates	Property Damage Only

As part of an ongoing reconstruction project of IL 83, this grade crossing is being eliminated and replaced by a new crossing 1000 ft south at Atkison Road, which includes the elimination of the skew. This cluster should continue to be monitored to ensure adequate safety performance.

Engagement and Collaboration

Lake County's engagement strategy focused on the idea that traffic safety affects all roadway users. The Safety Action Plan was created to identify high-impact strategies and invest in the safety needs of all community members by incorporating evidence-based projects and strategies. By listening to all voices within Lake County, we ensure that those closest to the problem can contribute to the solution.

ENGAGEMENT EVENTS

Guided by the mission to "reach people where they are," the Safety Action Plan project team used a variety of tools to engage the community in a conversation about making roadways safe for all users, including:

- In-person community events
- A safety open house
- Project website
- Online survey
- Interactive safety hotspot comment map
- Social media
- Regular Steering Committee meetings

The project team brought awareness of engagement opportunities to the community through a combination of grassroots outreach through Steering Committee member organizations, community partners, social media advertisements, news releases, email blasts, and an online event calendar on the project website.

Open House

In November 2024, the project team hosted a Safety Action Plan-focused open house in partnership with the City of Waukegan featuring project information, existing traffic safety data and insights, and a question-and-answer session with the project team. Attendees participated in surveys and activities that merged engineering data with the lived experience of community members.

Community Events

In December 2024, the project team participated in the Village of Round Lake's Supper with Santa event and the Village of Buffalo Grove's holiday market. These community events served as valuable opportunities to bring the Safety Action Plan project to the community by leveraging established, well-known events in the area. The project team presented informational displays, provided educational outreach materials, and engaged attendees to provide feedback through surveys and identify traffic safety concerns and priority locations through interactive exercises.

Project Website

In addition to face-to-face outreach, a project website offered an online survey and comment form extending the project team's reach beyond that of grassroots, in-person events. This

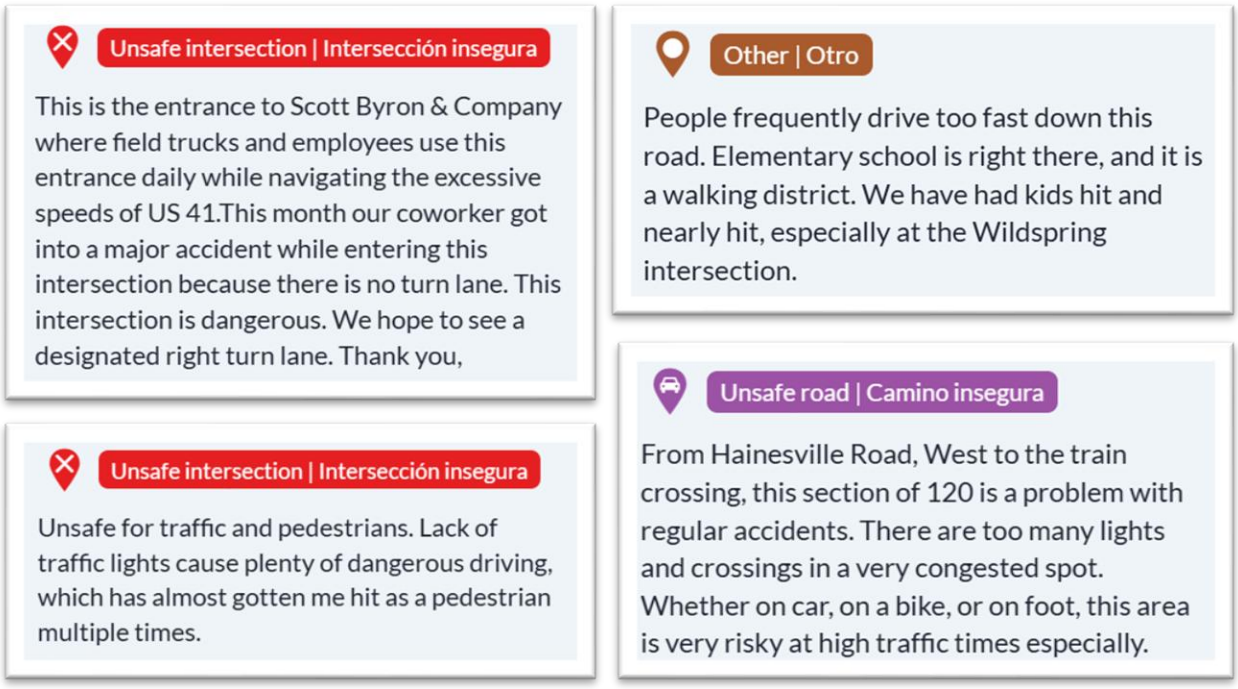
provided community members with the opportunity to provide feedback when it was most convenient for them.

The Safety Action Plan website also included an interactive map for online comment submissions. This new resource allowed the community to submit traffic safety concerns tied to a specific location in the county. These submissions were visible to all other website visitors, so they could see the concerns of others, comment, and upvote the concern. The interactive component of the website proved to be valuable during plan development. The online survey and comment map are provided in **Appendix C: Engagement Survey Questions and Results and Comment Map**.

Key Feedback

More than 1,000 users provided location-based comments to identify traffic concerns in Lake County, and **Figure 33** details some of these comments.

Figure 33: Project Website Online Comments



In one notable example, the project team identified a high volume of submissions for a specific location in the county. After engaging members of the Steering Committee, the project team learned that the principal of a local school had shared information about the project and encouraged students and their families to identify concerns in their community. This example highlights the impact of community feedback and led the project team to conduct focused outreach to other schools in Lake County.

IMPACT ON THE PLAN

Lake County has access to traffic and incident data, but the numbers only tell half the story. Community feedback provides the necessary human context not apparent in technical data and tells the story of how well our transportation network is meeting community needs. Community feedback also allows diverse voices to be heard and amplified, helping to address the traffic safety disparity. The feedback received from community members supported the development of this Plan's policy, process, and countermeasure recommendations. Key feedback themes included:

- Prioritizing enforcement of speed limits and distracted driving
- Desire for additional bicycle and pedestrian connectivity, specifically trails or other facilities separated from vehicle traffic
- Interest in increased transit availability
- Education and outreach for all roadway users
- Exploring countermeasures and policy options to reduce crashes

PLANS FOR FOLLOW-UP ENGAGEMENT

As Lake County begins development of its 2050 Long Range Transportation Plan (LRTP), additional engagement with communities will be a component of LRTP development. Conversations with community members on safety are expected to be a key part of this effort.

Community Impact Considerations

AREAS OF PERSISTENT POVERTY

Transportation safety and crash potential are a concern when addressing the needs of communities in Areas of Persistent Poverty (APPs). An APP is defined as:

- Any county that has consistently had greater than or equal to 20 percent of the population living in poverty during the 30-year period preceding November 15, 2021, as measured by the 1990 and 2000 decennial census and the most recent annual Small Area Income Poverty Estimates as estimated by the Bureau of the Census or census tract with a poverty rate of over 20 percent over a 30-year period.
- Any census tract with a poverty rate of at least 20 percent as measured by the 2014-2018 5-year data series available from the American Community Survey of the Bureau of the Census

As of April 2, 2025, the USDOT has updated the definition of "underserved community" to be consistent with the APP definition.[2] In accordance with this definition, APPs in Lake County are considered underserved communities and are prioritized for investment and support through USDOT programs.

The Lake County SAP uses a Safe System Approach, which aims to eliminate fatal and serious injury crashes by creating multiple layers of prevention and protection. This is especially important for people walking and biking, who do not benefit from the protection of a vehicle. This disparity is exacerbated in APP communities, where financial challenges often limit access to personal vehicles. Members of these communities may rely on walking and biking more than driving. As such, identified safety concerns have been analyzed to assess their impact within federally designated APPs in Lake County. Additionally, CMAP recommends directing safety countermeasures towards known communities of concern, a term used by CMAP to identify areas that experience disproportionate transportation-related burdens.

Projects and strategies identified within APP designated areas will receive additional consideration as a factor in the prioritization scoring process for the Lake County Safety Action Plan. The SAP will also establish performance metrics to track project and strategy completion, including a sub-metric focused on completions within APPs, with flexibility to account for changes in APP designations over time.

KEY INSIGHTS

In Lake County, census tracts designated as APPs are primarily located in or around the communities of North Chicago, Waukegan, Zion, and Round Lake. A total of 3,659 miles of roads are present in Lake County, including 275.13 miles within an APP, representing roughly 7.5 percent of the total street network. There are 273.91 miles of road in the Lake County HIN, including 38.27 miles in an APP or approximately 14 percent of the HIN. This finding shows that HIN segments are overrepresented in APPs compared to the overall street network.

When looking at high-risk roads (roads with risk scores of 5 or greater), there are 521.99 total miles in the county (14.3 percent of total network), including 42.54 miles (8.2 percent of high-risk roads) in APPs. The summary of mileage for Lake County by all segments is shown in **Table 16**.

There are several notable takeaways related to functional classifications in APPs on the HIN and on high-risk roads:

- 67.8 percent of the total APP miles fall on local roads or streets (186.36 of 275.13 APP miles)
- 59.2 percent of the minor arterial miles in APP fall on the HIN (19.38 of 32.76 APP miles)
- 53.6 percent of the other principal arterial miles fall on the HIN (11.41 miles of 21.28 APP miles)
- Of the total APP miles on high-risk roads, 45.0 percent are minor arterials and 36.6 percent are other principal arterials (19.18 and 15.61, respectively, of 42.65 total APP miles on high-risk roads).

Table 16: Lake County Mileage Summary for APP, HIN, and High-Risk Roads

Functional Class	Total Network Miles (% total network)	Total Miles in APP (% total network)	Total Miles on HIN (% total network)	APP Miles on HIN (% HIN)	Total Miles on High-Risk Roads (% total network)	APP Miles on High-Risk Roads (% high-risk roads)
Freeway and Expressway (including Interstate)	56.18 (1.5%)	6.91 (0.2%)	15.59 (0.4%)	1.8 (0.7%)	31.93 (0.9%)	3.99 (0.8%)
Local Road or Street	2,581.10 (70.5%)	186.36 (5.1%)	5.47 (0.1%)	1.62 (0.6%)	1.35 (0.04%)	0.80 (0.2%)
Major Collector	284.79 (7.8%)	22.98 (0.6%)	19.34 (0.5%)	4.05 (1.5%)	37.67 (1.0%)	3.09 (0.6%)
Minor Arterial	381.25 (10.4%)	32.76 (0.9%)	95.64 (2.6%)	19.38 (7.1%)	211.54 (5.8%)	19.18 (3.7%)
Minor Collector	57.27 (1.6%)	4.86 (0.1%)	0.76 (0.02%)	0.00 (0%)	1.59 (0.04%)	0.00 (0%)
Other Principal Arterial	298.75 (8.2%)	21.28 (0.6%)	137.13 (3.7%)	11.41 (4.2%)	237.92 (6.5%)	15.61 (3.0%)
Total	**3,659.34 (100%)**	**275.13 (7.5%)**	**273.92 (7.5%)**	**38.27 (14%)**	**521.99 (14.3%)**	**42.65 (8.2%)**

The summary of fatalities and serious injuries for Lake County by all roads, APP, HIN, and high-risk roads is shown in **Table 17**.

Table 17: Lake County Fatalities and Serious Injuries (KAs) within APP, HIN, and High-Risk Roads

Functional Class	Total KAs (% total KAs)	Total KAs in APP (% total KAs)	Total KAs on HIN (% total KAs)	APP KAs on HIN (% HIN KAs)	Total KAs on High-Risk Roads (% total KAs)	APP KAs on High-Risk Roads (% high-risk road KAs)
Freeway and Expressway (including Interstate)	110 (4.8%)	14 (0.6%)	70 (3.0%)	9 (0.6%)	92 (4.0%)	11 (0.7%)
Local Road or Street	220 (9.5%)	53 (2.3%)	17 (0.7%)	5 (0.3%)	4 (0.2%)	3 (0.2%)
Major Collector	190 (8.2%)	34 (1.5%)	76 (3.3%)	18 (1.2%)	43 (1.9%)	8 (0.5%)
Minor Arterial	816 (35.3%)	150 (6.5%)	590 (25.5%)	131 (8.5%)	568 (24.6%)	98 (6.3%)
Minor Collector	22 (1.0%)	3 (0.1%)	2 (0.1%)	0 (0%)	4 (0.2%)	0 (0%)
Other Principal Arterial	951 (41.2%)	70 (3.0%)	784 (33.9%)	65 (4.2%)	846 (36.6%)	64 (4.1%)
Total	**2,310 (100%)**	**325 (14.1%)**	**1,540 (66.7%)**	**229 (14.9%**	**1,557 (67.4%)**	**184 (11.8%)**

Total Fatalities and Serious Injuries

Minor arterials account for the largest share of total fatalities and serious injuries in Lake County APPs. A total of 2,310 fatalities and serious injuries occurred in the county between 2018–2022, of which 325 (14 percent total fatalities and serious injuries) took place in APPs. Minor arterials account for 816 total fatalities and serious injuries in the county and have the largest share of fatalities and serious injuries occurring in APPs with 150 crashes (46 percent total fatalities and serious injuries in APPs).

HIN Fatalities and Serious Injuries

Minor arterials and other principal arterials account for the largest shares of fatalities and serious injuries on the HIN in Lake County APPs. The Lake County HIN includes 1,540 fatalities and serious injuries, of which 229 (15 percent of total HIN fatalities and serious injuries) happened in APPs. Notably, minor arterials represent 590 of those HIN-related severe injuries with 131 occurring in APPs (57 percent total HIN fatalities and serious injuries in APPs). There were 784 fatalities and serious injuries on other principal arterial roads, and 65 of them were in APPs (28 percent total HIN fatalities and serious injuries in APPs).

High-Risk Road Fatalities and Serious Injuries

Minor arterials account for the largest share of fatalities and serious injuries on the high-risk roads in Lake County APPs. The Lake County high-risk roads includes 1,557 fatalities and serious injuries, of which 184 (12 percent) occurred in an APP. Minor arterials make up a substantial portion of this with 568 fatalities and serious injuries (36 percent) on high-risk segments and 98 within APPs (53 percent total high-risk road fatalities and serious injuries in APPs).

Policy and Process Changes

Significant safety progress can be achieved by simply updating county-wide practices and policies to include the latest best practices. New projects will benefit from the inclusion of these best practices and will provide an incremental safety benefit upon completion, contributing to an overall significant reduction in the severe crash total.

Policy and process recommendations are focused on ten functional areas:

1. **Complete Streets**
2. **Context-Sensitive Speed Limit Setting**
3. **Lane Repurposing and Road Diet Policy**
4. **Sidewalk Master Plan**
5. **Bicycle Master Plan**
6. **Transit Access and Last-Mile Connectivity**
7. **Mid-Block Crossing Policy**
8. **Trails Master Plan**
9. **Parking / Curb Management Approach**
10. **Safe Routes to School**

These ten functional areas were chosen based on their ability to contribute to a reduction in fatal and serious injury crashes in Lake County's four priority emphasis areas: intersections, speeding and aggressive driving, roadway departures, and impaired driving. These four emphasis areas account for more than 55 percent of all fatal and serious injury crashes in Lake County.

Functional areas include both short-term and long-term strategies. Short-term strategies allow for immediate safety impacts, while long-term strategies support consistent progress in areas of focus that may have higher barriers to execution but are still crucial to the ultimate goal of a Safe System. Several of the key policy and process strategies are also included and summarized in the Implementation Matrix (see **Table 21**), which identifies the applicable roadway typologies and crash emphasis areas discussed in the **Strategy and Project Selections section** of the plan.

It is noted that where municipalities are identified as an implementation lead, engagement with townships should also be considered.

Complete Streets

The goal of Complete Streets is to enable transportation investments in Lake County that support safe and convenient travel for all users regardless of age, ability, or mode of travel. Lake County's *Policy on Infrastructure Guidelines for Non-Motorized Travel Investments* supports complete streets by providing guidance on facilities for people traveling on foot, bicycles, and transit, as well as accommodating people with limited mobility and guidance on public input processes. Currently, three communities within Lake County have a Complete Streets Plan, while 46 communities do not. Street networks should be designed, operated, and maintained to accommodate pedestrians, bicyclists, public transit riders, and motorists safely and efficiently. Complete Streets principles apply to all transportation projects, including new construction, reconstruction, retrofits, and maintenance.

Outcomes

Complete Streets policies consider the mobility and safety of users across all modes of transportation and prioritize inclusive design. They can provide separation between users of diverse transportation modes and reduce the speed of conflicts between users. Some treatments that may be a result of Complete Streets policies have been shown to improve safety. For example, road diets have been found to reduce total crashes between 19 to 47 percent.[3]

Implementation Lead

- Local municipalities
- Lake County
- CMAP

Emphasis Areas and Risks Addressed

- Intersections
- Speeding and aggressive driving
- Turning crashes
- Angle crashes
- Pedestrian and pedalcyclist crashes

Strategies

- Adopt a Complete Streets Policy with references to implementation guidance.
- Apply design standards consistent to those used throughout the state and region.
- Require consideration of sidewalks, bike lanes, safe crossings, transit amenities, and ADA (American with Disabilities Act) compliance in all capital projects.
- Allow context-based flexibility to balance modal needs, available right-of-way, and safety outcomes.
- Include exceptions only under documented circumstances where accommodation is not feasible or appropriate.

Context-Sensitive Speed Limit Setting Policy

A context-sensitive speed limit setting policy would improve roadway safety by aligning speed limits with surrounding land use, multimodal activity, and crash risk, using nationally recognized best practices. Speed limits on local and county roads should be established based on a context-sensitive approach that prioritizes safety and the needs of all road users, especially vulnerable populations such as pedestrians, bicyclists, and transit riders. Traditional operating speed data may be used as a reference but should not solely dictate posted speeds.

Outcomes

Implementing appropriate and context sensitive speed limits will provide a more usable and safe system for all users. By providing appropriate speed limits based on anticipated roadway users, the City of Seattle saw a 26 percent decrease in traffic fatalities after implementing their city-wide speed management strategy and countermeasure program.[4]

Implementation Lead

- IDOT
- Lake County
- Local municipalities

Emphasis Areas and Risks Addressed

- Speeding and aggressive driving
- Roadway departures
- Pedestrian and pedalcyclist crashes

Strategies

- Apply methodologies described in FHWA's Methods and Practices for Setting Speed Limits, including NCHRP 966, the Speed Limit Setting Handbook, and USLIMITS2.
- Consider land use context, road function, crash history, presence of vulnerable road users, transit stops, and pedestrian activity in speed evaluations.
- Utilize tools such as injury minimization speed modeling, risk-based analysis, and context classification.
- Include public and stakeholder input for speed studies.
- Prioritize reduced speeds in school zones, downtown areas, transit corridors, and locations with a history of pedestrian or bike crashes or fatal/serious injury vehicle crashes.
- Utilize speed safety cameras and/or leverage enforcement resources on corridors with continued high occurrences of speeding after implementation of context-sensitive speed limits.

Lane Repurposing and Road Diet Policy

The goal of this policy is to promote safer and more efficient use of roadway space by repurposing excess travel lanes for bike lanes, parking, transit lanes, or pedestrian improvements. Lake County and municipalities should identify corridors, regardless of jurisdiction, where lane repurposing or road diets could reduce crash frequency and severity, improve multimodal travel, and enhance community livability.

Outcomes

Implementing a lane repurposing and road diet policy will provide roadways that are safer and more usable to all roadway users regardless of mode. Lane repurposing and road diets can provide more space for alternative modes, such as pedestrians and bicyclists. As mentioned previously, road diets have been found to reduce total crashes between 19 to 47 percent.[5]

Implementation Lead

- IDOT
- Lake County
- Local municipalities

Emphasis Areas and Risks Addressed

- Speeding and aggressive driving
- Angle
- Turning
- Pedestrian and pedalcyclist crashes

Strategies

- Use crash data and traffic analysis to screen corridors with excess capacity and safety concerns.
- Use daily traffic volumes to screen potential corridors for road diet and lane repurposing.
- Prioritize conversions of four-lane undivided roads to three-lane sections with center turn lanes.
- Coordinate with municipalities and stakeholders during concept development.
- Reference the IDOT District 1 Median Treatment Study and CMAP typologies for evaluation criteria.

Sidewalk Master Plan

The goal of a Sidewalk Master Plan is to eliminate sidewalk gaps, especially near priority destinations, and enable safe, accessible pedestrian infrastructure across Lake County. Over 5 percent of fatal and serious injury crashes in Lake County involved a pedestrian or pedalcyclist.

Outcomes

Implementing a sidewalk master plan provides connectivity across the network and separation of space between motorists and non-motorists. By installing sidewalks, crashes involving pedestrians can decrease between 65 to 89 percent. Even simply adding paved shoulders can reduce crashes involving pedestrians by 71 percent.[6]

Implementation Lead

- Lake County
- Local municipalities

Emphasis Areas and Risks Addressed

- Pedestrian and pedalcyclist crashes

Strategies

- Prioritize investments that connect underserved communities to schools, parks, transit, and employment centers.
- Use a gap analysis and safety framework to prioritize sidewalk infill projects.
- Set a minimum 5-foot clear width standard with buffers from vehicle traffic where feasible.
- Develop maintenance, lighting, and snow removal provisions.
- Coordinate sidewalk development with Safe Routes to School, Americans with Disabilities (ADA) Transition Plans, and Transit Access priorities.

Bicycle Master Plan

The goal of a Bicycle Master Plan is to implement a low stress, connected, and safe bicycle network across Lake County that supports everyday riding for people of all ages and abilities. 11 communities in Lake County currently have a bicycle master plan, while 38 communities do not. Bicycle master plans encourage safer and more active transportation.

Outcomes

Implementing a bicycle master plan provides connectivity across the network and separation of space between motorists and non-motorists. Bicycles are also an important part of the last—mile network. Many crashes involving bicyclists occur along segments, or non-intersections, and are heavily related to motorists overtaking bicyclists. Providing separated spaces can improve safety, and adding a bicycle lane alone can reduce crashes up to 49 percent while adding separated bike lanes can reduce crashes up to 53 percent.[7]

Implementation Lead

- Local municipalities
- Lake County
- CMAP

Emphasis Areas and Risks Addressed

- Pedestrian and pedalcyclist crashes

Strategies

- Prioritize investments that connect communities to schools, parks, transit, and employment centers.
- Use Level of Traffic Stress (LTS) analysis to guide bike facility selection.
- Require separated bikeways on arterials and high-speed roads.
- Integrate with trails and transit for multimodal connectivity.
- Expand bike parking and end-of-trip facilities at key destinations.

Transit Access and Last-Mile Connectivity

Transit access and last-mile connectivity enhance the transportation network for all users, especially those with no or low personal vehicle access. The goal is to enable safe access to public transportation by improving pedestrian and bicycle and other multi-modal connections to transit stops. Lake County and municipalities should implement infrastructure improvements and policy measures that enhance first- and last-mile connectivity, especially in disconnected areas.

Outcomes

Implementing a transit access and last-mile connectivity program will enhance multiple objectives, including safety, roadway congestion, travel time reliability, and vehicle emissions. Research by the American Public Transportation Association indicates that metro areas with 40 annual transit trips per capita have roughly half the traffic fatality rate of metro areas with 20 annual transit trips per capita.[8]

Implementation Lead

- Local municipalities
- CMAP
- Transit agencies, including Metra and Pace Suburban Bus

Emphasis Areas and Risks Addressed

- Pedestrian and pedalcyclist crashes

Strategies

- Implement sidewalk master plans (see previous recommendation) including last-mile considerations.
- Improve sidewalk lighting and ADA compliance near transit stops.
- Design and retrofit bus stops with adequate curb space, shelters, and crossings per Pace's Transit Supportive Guidelines.
- Implement a curb management policy that prioritizes safe passenger pick-up/drop-off.
- Use guidance from the Lake County SOV (Single Occupancy Vehicle) Reduction Study to shape investment priorities.

Mid-Block Crossing Policy

Mid-block crossing policy can enhance VRU (Vulnerable Road User) experiences within the transportation system. The goal is to support safe pedestrian access at logical and high-demand mid-block locations where intersection crossings are distant or insufficient. The criteria to identify and prioritize mid-block pedestrian crossings should be based on demonstrated need, network connectivity, crash history, roadway geometry, number of lanes, traffic volumes, and speeds. Mid-block crossings should be designed with current design guidance, such as the FHWA's Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations and the National Association of City Transportation Officials (NACTO) Urban Street Design Guide, to identify appropriate safety treatments and considerations in future designs.

Outcomes

Implementing a mid-block crossing policy can enhance the adoption of non-motorist travel modes, as well as the safety of those users. Mid-block crossings are typically placed in highly desired non-motorist crossing locations. By providing a separation of time and potentially space, these crossings can become safer. Certain mid-block crossing treatments such as Rectangular Rapid Flashing Beacons (RRFB) and pedestrian hybrid beacons can reduce pedestrian crashes by up to 47 percent and 55 percent, respectively. [9]

Implementation Lead

- IDOT
- Lake County
- Local municipalities

Emphasis Areas and Risks Addressed

- Pedestrian and pedalcyclist crashes

Strategies

- Install mid-block crossings near schools, transit stops, parks, trails, and major destinations.
- Design treatments may include high-visibility crosswalk markings, pedestrian refuge islands, Rectangular Rapid Flashing Beacons (RRFBs), pedestrian hybrid beacons, lighting enhancements, and curb extensions.
- Reference the Lake County Policy on Infrastructure Guidelines for Non-Motorized Travel Investments, Illinois VRU Safety Assessment, and IDOT TRA-23: Guidelines for Establishing Pedestrian Crossings for treatment selection.

Trails Master Plan

Providing safe and effective methods for alternative transportation promotes the use of alternative transportation modes. The goal is to improve connectivity, accessibility, and safety of the trail network in Lake County for recreation and transportation purposes. Trails should be planned and prioritized to close network gaps, connect underserved areas, and enable safe multimodal access.

Outcomes

Implementing a trails master plan will promote a wider network for both recreation and non-motorist connectivity. Providing more options for recreation and exercise can promote greater health and well-being within the community. Promoting alternative modes to vehicles can also improve congestion and emissions.

Implementation Lead

- CMAP
- Lake County (DOT & Forest Preserve District)

Emphasis Areas and Risks Addressed

- Pedestrian and pedalcyclist crashes

Strategies

- Prioritize trail investments that connect communities to schools, parks, transit, and employment centers.
- Include lighting, wayfinding, and maintenance planning in all trail development.
- Enable compliance with ADA standards and consider winter accessibility in maintenance policies.
- Use the Lake County Forest Preserves and regional trail master plans as references for alignment and coordination.

Parking / Curb Management Approaches

Curb management can impact pedestrian crossings, transit access, and safer road design in urban areas. The goal is to manage curb space in support of safety, multimodal access, and modern mobility needs.

Outcomes

Implementing a parking and curb management approach can balance the needs of all users, including pedestrians, businesses, motorists, and transit users. Benefits include improved transit reliability, additional revenue for local businesses, and a roadway network that meets the demands of all users.[10]

Implementation Lead

- Local municipalities

Emphasis Areas and Risk Addressed

- Angle, pedestrian, and pedalcyclist crashes

Strategies:

- Prioritize curb space for transit stops, ADA accessible parking, deliveries, micromobility, and short-term access over long-term vehicle storage.
- Implement curbside use policies that reduce conflicts and enhance safety for pedestrians and cyclists.
- Use data-informed strategies and dynamic pricing where appropriate.
- Coordinate curb management with transit agencies, businesses, and municipal partners.
- Ensure on-street parking is restricted far enough from intersections and crosswalks to maintain adequate sight lines.

Safe Routes to School

The goal is to enable safe, walkable, and bikeable conditions around schools to promote active transportation. To achieve this goal, coordination with local jurisdictions and school districts is needed to improve infrastructure and implement safety programs. These improvements will reduce barriers to walking and biking to school.

Outcomes

Implementing Safe Routes to School provides alternative transportation in a safe and effective manner. Locations that have implemented a Safe Routes to School program have seen an increase in walking and biking to school ranging from 37 to 43 percent, as well as a 44 to 75 percent decrease in school pedestrian injuries.[11] Additionally, by encouraging alternative transportation, Safe Routes to School has the potential to reduce vehicle congestion in school zones.

Implementation Lead

- School districts working with the applicable agencies with roadway jurisdiction (i.e., IDOT, LCDOT, and local municipalities)
- Lake County Regional Office of Education

Emphasis Areas and Risk Reduction

- Pedestrian and pedalcyclist crashes

Strategies

- Implement Safe Routes to School policies to codify and prioritize this policy. This can also provide guidance on how to improve active transportation.
- Support Safe Routes to School staffing.
- Conduct school travel audits and identify priority infrastructure needs near schools.
- Improve crossings, sidewalks, signage, and traffic calming in designated school zones.
- Partner with schools and law enforcement to support education and enforcement campaigns.
- Reference the Illinois SHSP and Illinois Highway Safety Plan to align with state strategies for child safety.

OPPORTUNITIES FOR SUCCESS

All focus areas share key opportunities for success. These key opportunities include:

- Leadership commitment and identifying functional area champions
- Development of an implementation plan
- Long-term follow-up engagement on the plan
- Ongoing updates to enhance the plan or policies as new data become available
- Collaboration with leading communities, both within and outside of Lake County, to share knowledge and project experiences

Strategy and Project Selections

SYSTEMIC APPROACH

A systemic analysis of safety conditions looks at overall crash history and network characteristics to identify high-risk roadway features. By analyzing roadway features, such as posted speed limits or number of lanes, relationships between roadway features and crashes that result in frequent or severe injuries can be identified. The process to identify risk factors throughout the network is described in the Safety Analysis section. Risk factors identified for each facility type are summarized in **Table 5**, **Table 6**, **Table 7**, and **Table 8**.

STRATEGIES AND COUNTERMEASURES

Locations considered for safety projects were those identified as high-injury and high-risk. Safety projects were identified for these locations based on guidance from the Safe System Approach, proven safety countermeasures, and existing road conditions and crash trends. Based on this guidance and findings from the systemic safety analysis, **Table 18** presents a selection of safety countermeasures identified as relevant to Lake County.

Location Type

The systemic analysis proposed countermeasures based on a corridor's characteristics, including:

- Average Daily Traffic (ADT) volume
- Crash history or risk factors
- Lane count
- Traffic control type
- Proximity to high-activity land uses (e.g., schools, bars)
- Location within an urban or rural context

These characteristics were used to match each location with appropriate safety strategies. A summary of the project selection criteria is provided in **Appendix D: Project Selection Criteria Summary**.

Crash Reduction Factor

A Crash Reduction Factor (CRF) represents the expected percent reduction in crashes associated with implementation of a specific treatment. These values are derived from empirical studies comparing crash outcomes before and after a countermeasure is deployed. For example, a CRF of 30 percent implies that if 100 crashes currently occur at a location, implementing the countermeasure could reduce that number to 70. CRFs cited in **Table 18** draw primarily from FHWA's *Proven Safety Countermeasures* initiative and the *Crash Modification Factors Clearinghouse*.

Quick Build Capable

Traditional infrastructure projects can take 7 to 10 years to deliver. Quick build treatments offer a faster, lower-cost alternative, using temporary or semi-permanent materials like signage, paint, or delineators that are often installed by local maintenance crews within a single construction season (~1 year). These treatments allow agencies to test safety improvements in the near term, sometimes in coordination with future capital projects.

Relative Cost

The relative cost of each countermeasure is denoted using dollar signs to indicate typical engineering and construction investment ranges on a per-mile or per-intersection basis. It is noted that these costs are average estimates that can vary and are dependent on the facility type:

- $ < $10,000
- $$ $10,000–$100,000
- $$$ $100,000–$1,000,000
- $$$$ > $1,000,000

Table 18. List of Road Safety Countermeasures for Consideration in Lake County

Description	Location Type	Applicable Crash Types	Crash Reduction Factor	Quick Build Capable	Relative Cost	Traffic and Other Considerations
Lane Departure Treatments (rumble strips, Safety Edge, clear zone, curve improvements)	Rural and urban segments with fixed object or single-vehicle crashes	Lane Departure, Fixed Object, Single Vehicle	20-40% (CMF ID 3394, 9230, 35, 36, 2439)	Yes	$ - $$	Systemic application; medium-term fix with strong rural impact
Stop-Control Upgrades (double/oversized stop signs, stop bars, all-way stop control)	High-risk stop-controlled intersections	Rear-End, Angle	68% (CMF ID 3127, 1692, 1661, 6051, 6602)	Yes	$ - $$	Quick-build capable
Signal Upgrades (retroreflective backplates, timing)	High-risk signalized intersections (urban)	Rear-End, Angle, Pedestrian	11-15% (CMF ID 586 & 1410)	Yes	$ - $$	Quick-build capable; improves visibility and reduces intersection conflicts
Lane Repurposing (4-to-3 lane conversion with turn lanes)	Urban 4-lane undivided segments with AADT <20,000	Rear-End, Angle, Speed	19-47% (CMF ID 5554 & 2841)	No	$$$$	Proven safety countermeasure; supports bike/ped facilities
Radius Tightening / Curb Hardening	High-risk intersections with ped/bike crash history or risk	Pedestrian, Bicycle, Speed	44% (CMF ID 8496)	Yes	$$	Option for low-cost temporary installation or medium-cost permanent installation
Lighting	High-risk locations with nighttime crash history	Nighttime	42% (CMF ID 11027)	Yes	$$ - $$$$	
Pedestrian Crossing Enhancements (RRFBs, PHBs, LPI, refuge islands, enhanced crosswalks, lighting)	Urban segments with pedestrian/bike crash history or long crossing gaps	Pedestrian, Bicycle	35-70% (CMF ID 11158, 10591, 1993, 2697, 11027)	Yes	$$	Proven countermeasures for pedestrian safety; applicable to mid-block and intersections

Description	Location Type	Applicable Crash Types	Crash Reduction Factor	Quick Build Capable	Relative Cost	Traffic and Other Considerations
Speed Calming Design (raised medians, curb/gutter, lane narrowing)	High-risk segments with low-medium speed limit and speed crash history	Speed, Rear-End	39-46% (CMF ID 21 & 8163)	No	$$ - $$$	Long-term investment
Access Management (medians, driveway reduction)	High-risk segments with turning or angle crash history	Angle, Turning, Left-Turn	Up to 50% (CMF ID 5185)	No	$$$	Medium-term solution; requires design and buy-in
Roundabout Installation	High-risk intersections with angle/turning or speed crash history	Angle, Turning, Speed	78-82% (CMF ID 211 & 226)	No	$$$$	Long-term investment; strong crash reduction benefits
Zero or positive offset turn lanes	High-risk intersections with angle/turning crash history	Angle, Turning	20-36% (CMF ID 276, 277, & 6096)	Yes	$$	Quick-build capable in some locations; improves visibility

CRASH EMPHASIS AREAS

Additional context was considered for countermeasures that would address focus crash types as identified in the Emphasis Areas and Crash Type Prioritization section. These focus areas are speeding and aggressive driving, impaired driving, roadway departures, and intersection crashes.

Speeding and Aggressive Driving Corridors

Crash Context:

Speeding and aggressive driving (e.g., weaving, tailgating) contribute significantly to high-severity crashes, particularly on multi-lane arterials and in transitional areas near schools or urban cores. These behaviors reduce available reaction time and increase the severity of impact.

Recommended Safe System Strategies:

- Apply context-sensitive roadway design to lower operating speeds.
- Incorporate multimodal corridor safety strategies that encourage safe travel behavior and shift excess lane capacity to safer uses.
- Deploy corridor speed strategies that reinforce speed limits through geometry and signage.
- Integrate enforcement tools where physical design does not suffice.
- Utilize speed safety cameras in school zones, work zones, and corridors with high occurrences of speeding.

FHWA Proven Safety Countermeasures:

- Road diets (lane reduction)
- Speed feedback signs
- Roundabouts
- Speed limit reduction and slow zones

Impaired Driving Corridors and Hotspots

Crash Context:

Severe and fatal crashes involving alcohol or drugs are concentrated during nighttime hours and on high-speed corridors or areas with a high density of alcohol-serving venues. Common crash types include single-vehicle roadway departures and high-speed multi-vehicle collisions.

Recommended Safe System Strategies:

- Install access control and traffic calming strategies to reduce high-speed turning movement conflict potential and improve driver predictability.
- Improve nighttime visibility for earlier hazard detection.
- Enhance pedestrian safety through mode separation and visibility enhancements.
- Utilize lane departure strategies, including rumble strips, SafetyEdge^{SM} treatments, clear zone maintenance, and median barriers.
- Leverage enforcement strategies such as publicized sobriety checkpoints or high-visibility saturation patrols.
- Implement public safety education campaigns and programs.

FHWA Proven Safety Countermeasures:

- Enhanced roadway lighting
- Medians and pedestrian refuge islands
- Access management
- High-visibility crosswalks and advance stop/yield lines
- Shoulder and centerline rumble strips
- Roadside design improvements (clear zone, slope flattening, adding/widening shoulders)

Roadway Departure Corridors

Crash Context:

Road departure is a common incident for fatal and serious injury crashes on rural and urban segments and can have contributing factors tied to speeding, impairment, and inattention. Vehicles that leave the roadway can collide with a fixed object, such as a tree or structure, or become overturned, in which the severity increases with higher speeds for either instance.

Recommended Safe System Strategies:

- Utilize lane departure strategies, including rumble strips, SafetyEdge^{SM} treatments, clear zone maintenance, and median barriers.
- Install features that absorb kinetic energy in the event of a lane departure crash such as cable median barrier and impact attenuators, where appropriate.
- Provide features that increase visibility and attentiveness/awareness such as lighting, enhanced pavement markings, and curve signing.

FHWA Proven Safety Countermeasures:

- Enhanced delineation at curves
- Roadside design improvements (clear zone, slope flattening, adding/widening shoulders)
- Shoulder and centerline rumble strips
- Median barriers
- SafetyEdge^{SM}
- Wider edge lines
- Pavement friction management

High-Crash Intersections: Turning and Rear-End Collisions

Crash Context:

Intersections remain critical points of conflict. Rear-end crashes often stem from signal delay and short following gaps, while turning crashes—especially left-turn collisions—are linked to poor visibility and misjudged gaps in oncoming traffic.

Recommended Safe System Strategies:

- Redesign intersections using intersection configuration strategies, including geometric changes like the addition of turn lanes and control modifications like signal upgrades.
- Implement maintenance and operations/quick build strategies such as pavement marking refreshes and backplate installations.
- Prioritize multimodal strategies to improve visibility and protection for people walking or biking, such as protected left-turn phases and leading pedestrian intervals (LPI).

FHWA Proven Safety Countermeasures:

- Turn Lanes Additions
- Protected Left-Turn Phases and Leading Pedestrian Intervals (LPI)
- Roundabouts
- Backplates with Retroreflective Borders
- Improved Signal Timing and Coordination
- All-Way Stop Control Conversion (from TWSC to AWSC)
- Reduced Left-Turn Conflict Intersections
- Systemic Traffic Signal Modifications
- Left-Turn Hardening
- Zero or Positive Offset Turn Lanes

Urban Four-Lane Undivided Road Segments

Existing Safety Conditions

Four-lane undivided roads in urban areas make up 1,118 miles of road in Lake County, or about 4 percent of the network. Speed limits on these roads typically range from 30 to 45 miles per hour. Urban four-lane undivided roads accounted for 1,374 total crashes and 64 fatal and serious injury crashes in Lake County between 2018 and 2022, representing 8 percent of all urban segment crashes and 11 percent of all urban segment fatal and serious injury crashes. The most common crash types involving fatal and serious injuries on these road segments include:

- Single vehicle (25%)
- Pedestrian/bicycle (19%)
- Angle (17%)
- Head-on/sideswipe opposing (14%)
- Rear end (11%)

Several characteristics of four-lane undivided roads in urban areas contribute to common crash patterns. First, the design and number of lanes can encourage higher travel speeds, especially during low-volume periods. These higher speeds increase the risk of loss of vehicle control and roadway departure crashes. Second, the wide cross-section and lack of median refuge make these streets more difficult to cross safely. Limited sight distance, particularly when vehicles stop near crosswalks or pass a bicyclist, can lead to multiple-threat crashes involving pedestrians. Third, high access point density and the lack of dedicated turn lanes make it difficult for drivers to find safe gaps in traffic, increasing the risk of angle crashes. Fourth, the absence of physical separation between opposing directions of travel contributes to the potential for head-on and sideswipe opposing crashes. Finally, abrupt slowing or stopping to turn or yield, especially in the absence of turn lanes, can lead to sudden speed changes and an increased likelihood of rear-end crashes.

The urban segment risk factors for total vehicle crashes and pedestrian/bicyclist crashes are shown in **Table 5**. Risk scores for every segment were calculated based on the facility type and number of risk factors present. Each risk factor was weighted equally, adding one point to the total. Urban four-lane undivided road segments on the high injury network (HIN) with a high systemic risk score will be considered for safety countermeasure recommendations.

Countermeasures

Where traffic volumes are less than 20,000 vehicles per day, lane repurposing should be considered to add left-turn lanes or two-way left-turn lanes. The addition of left-turn lanes removes the left-turn conflict point from within the through travel lane and allows for a redistribution of space, such as adding bike facilities or parking. Lane repurposing is associated with up to a 47 percent reduction in total crashes (CMF ID 2841) and a 37 percent reduction in angle crashes (CMF ID 879).

After lane repurposing is considered, access management strategies should be used to close driveways or limit turning movements from driveways and minor intersections on road segments with a risk-profile of angle and turning crashes based on systemic analysis. Access management reduces conflict points for turning vehicles going out and into driveways and minor roads and is associated with up to a 50 percent reduction in total crashes (CMF ID 5185). Roundabouts should be considered at key intersections as a proactive measure to control speed while also being highly effective at reducing angle crash potential.

Speed calming design countermeasures should be installed on low-speed and medium-speed roads and where an elevated risk of speed-related crashes may be present. Speed calming countermeasures include lane narrowing and adding high visibility crosswalks, and speed humps or speed tables. The narrower feel of the road with these treatments in place effectively slows drivers down. Installing roundabouts at key intersections to create a roundabout corridor will also be effective at slowing drivers at intersections with an elevated risk of speed-related crashes. Speed calming countermeasures are associated with a 39-46 percent reduction in speed/crashes (CMF ID 21 & CMF ID 8163).

Other speed countermeasures to be considered for four-lane undivided roads include variable speed limits on corridors with an elevated risk of speed-related crashes and rear-end crashes, speed safety cameras on corridors with an elevated risk of speed-related crashes, and speed studies to set appropriate speed limits systemically throughout the high-risk network.

For four-lane undivided corridors with a history of fixed object or single vehicle crashes, lane departure strategies like centerline and edgeline rumble strips or clear zone improvements should be considered.

Multimodal corridor safety countermeasures should be installed on segments with a high pedestrian/bicycle risk score. Sidewalks should be installed on high-risk segments with no existing sidewalks. Bicycle facilities should be installed on or parallel to high-risk corridors with no existing bike path and an elevated risk of bicycle-related crashes. Master plans for pedestrians, bicycles, and parking should be developed for all municipalities that don't already have them. Lighting enhancements are also recommended in areas with a history of nighttime crashes to improve visibility and safety for all users. Lighting improvements have a potential crash reduction of 42 percent for nighttime crashes (CMF ID 11027).

Urban Two-Lane Undivided Road Segments

Existing Safety Conditions

Urban two-lane undivided roads make up about 25,700 miles, or 86 percent, of Lake County's roadway network. Speed limits on these roads range from 25 to 50 miles per hour, depending on the context of the area. Urban two-lane undivided roads accounted for 7,082 total crashes and 223 fatal and serious injury crashes in Lake County between 2018 and 2022, representing 43 percent of all urban segment crashes and 40 percent of all urban segment fatal and serious injury crashes. The most common crash types involving fatal and serious injuries on these road segments include:

- Single vehicle crashes (38%)
- Pedestrian and bicyclist crashes (17%)
- Angle crashes (13%)
- Head-on/sideswipe opposing crashes (13%)
- Rear-end crashes (9%)

Several roadway characteristics contribute to these patterns. Urban two-lane undivided roads often lack dedicated left-turn lanes or separation between opposing traffic, which can increase the risk of turning conflicts and head-on or sideswipe opposing crashes. Limited space for pedestrians and cyclists, particularly on segments without sidewalks or bike facilities, raises the risk of vulnerable road user crashes. Roadway departure and fixed-object crashes are also prevalent, often tied to speeding, lack of lighting, or absence of recovery zones.

Urban segment risk factors for total vehicle crashes and pedestrian/bicyclist crashes are shown in **Table 5**. Urban two-lane undivided segments with a high systemic risk score and presence on the High Injury Network will be considered for safety countermeasure recommendations.

Countermeasures

Urban two-lane undivided road segments in Lake County are well-suited for targeted, lower-cost safety improvements. Their narrow cross-section and lack of physical separation contribute to speed-related crashes, turning conflicts, and risks for pedestrians and bicyclists.

Where roadway width allows, lane narrowing or restriping to provide dedicated left turn lanes or two-way left turn lanes can help calm traffic and create space for bike lanes or pedestrian refuge, reducing total crashes by up to 43 percent (CMF ID 8163). It's noted that road classification should be considered when identifying locations for lane narrowing. On corridors with frequent turning or angle crashes, access management—such as driveway consolidation or limiting left-turns—can reduce conflict points and improve flow, with potential crash reductions up to a 50 percent (CMF ID 5185).

In areas with speed-related risk, design changes like curb extensions, raised crosswalks, or median islands can promote safer speeds. These treatments may also be paired with visibility improvements and enhanced crossings to protect vulnerable users.

For two-lane undivided corridors with a history of fixed object or single vehicle crashes, lane departure strategies like centerline and edgeline rumble strips or clear zone improvements should be considered.

Segments with high pedestrian or bicycle crash risk should be prioritized for sidewalks, bike facilities, and improved crossings with lighting and refuge space. Lighting enhancements are also recommended in areas with a history of nighttime crashes to improve visibility and safety for all users. Lighting improvements have a potential crash reduction of 42 percent for nighttime crashes (CMF ID 11027).

Urban Four-Lane Divided Road Segments

Existing Safety Conditions

Four-lane divided roads in urban areas make up 1,412 miles of road in Lake County, or about 5 percent of the network. Speed limits on these roads typically range from 35 to 55 miles per hour. Urban four-lane divided roads accounted for 3,350 total crashes and 138 fatal and serious injury crashes in Lake County between 2018 and 2022, representing 21 percent of all urban segment crashes and 25 percent of all urban segment fatal and serious injury crashes. The most common fatal and serious injury crash types on this road type include:

- Single vehicle (28%)
- Rear-end (26%)
- Pedestrian and bicyclist (11%)
- Angle (11%)
- Head-on/sideswipe opposing (10%)

These roads typically carry higher volumes and speeds with wide cross-sections that can encourage aggressive driving behaviors. Frequent access points and turning movements without dedicated lanes contribute to conflict, while the divided design still lacks physical protection for vulnerable users in many locations.

Urban segment risk factors for total vehicle crashes and pedestrian/bicyclist crashes are shown in **Table 5**. Urban two-lane undivided segments with a high systemic risk score and presence on the High Injury Network will be considered for safety countermeasure recommendations.

Countermeasures

On urban four-lane divided roads with AADT below 20,000, lane repurposing can be used to introduce center turn lanes or bike facilities, helping reduce crash exposure while supporting multimodal access. To address turning conflicts, access management strategies such as driveway consolidation and the installation of medians with right-in/right-out configurations can improve overall traffic flow and safety. Access management strategies are associated with up to a 50 percent reduction in total crashes (CMF ID 5185).

At high-risk intersections along four-lane divided road segments, roundabouts may be appropriate to reduce angle and speed-related crashes, promote safer corridor operations, and can reduce fatal and injury crashes by 69 percent (CMF ID 10097). On corridors where speeding is a recurring issue, physical design elements like lane narrowing and enhanced visibility features can help regulate vehicle speeds. Additionally, segments with elevated pedestrian or bicyclist crash risk—especially those near schools, transit stops, or commercial destinations—should be prioritized for sidewalks, protected bike lanes, and enhanced crossings with lighting and refuge space. Sidewalks can reduce vehicle/pedestrian crashes by 40 percent (CMF ID 11246).

Urban Two-Lane Undivided Intersections

Existing Safety Conditions

There are 15,451 urban two-lane undivided intersections in Lake County, or about 88 percent of all intersections. Urban two-lane undivided intersections—both signalized and stop-controlled—accounted for a significant share of Lake County's intersection-related crashes between 2018 and 2022. Urban two-lane undivided intersections accounted for 16,733 total crashes and 452 fatal and serious injury crashes in Lake County between 2018 and 2022, representing 50 percent of all urban intersection crashes and 48 percent of all urban intersection fatal and serious injury crashes.

The most common crash types at these intersections include angle, turning, and rear-end crashes, along with a notable share of pedestrian and bicyclist injuries. Contributing factors include limited sight distance, lack of dedicated turn lanes, and frequent conflicts at uncontrolled or permissive turning locations. Additionally, the absence of pedestrian infrastructure, high exposure during crossings, and inconsistent lighting contribute to vulnerable road user crashes.

The urban intersection risk factors for total vehicle crashes and pedestrian/bicyclist crashes are shown in **Table 6**. Urban two-lane undivided intersections on the high injury network with a high systemic risk score will be considered for safety countermeasure recommendations.

Countermeasures

To improve safety at urban two-lane undivided intersections, lower-cost operational and geometric strategies should be prioritized. Stop-control upgrades—such as oversized signs, advanced warning signage, retroreflectivity improvements, flashing LED stop signs, and double-up stop signs—can improve compliance and visibility, especially at high-risk intersections.

For locations with recurring angle or left-turn crashes, signal timing improvements, retroreflective backplates, or all-way stop conversions may help simplify operations and reduce conflict. Retroreflective backplates on signal heads can reduce crashes by 15 percent (CMF ID 1410) and all-way stop conversions from two-way stop control can reduce crashes by 68 percent (CMF ID 3127). Additionally, where pedestrian and bicyclist risk is elevated, enhancements such

as high-visibility crosswalks, refuge islands, curb extensions, intersection lighting, and leading pedestrian intervals (LPI) can create safer crossings and increase driver awareness. High-visibility crosswalk markings can reduce vehicle/pedestrian crashes by 37 percent (CMF ID 2697).

On intersections with high crash severity or complex traffic movements, roundabouts, reduced conflict intersections, or radius tightening may be considered to reduce speed and conflict points while also considering overall intersection performance.

Urban Four-Lane Divided Intersections

Existing Safety Conditions

There are 551 urban four-lane divided intersections in Lake County, or about 4 percent of all intersections. Urban four-lane divided intersections—both signalized and stop-controlled—accounted for a significant share of Lake County's intersection-related crashes between 2018 and 2022. Urban four-lane divided intersections accounted for 5,159 total crashes and 142 fatal and serious injury crashes in Lake County between 2018 and 2022, representing 15 percent of all urban intersection crashes and 15 percent of all urban intersection fatal and serious injury crashes. The most common fatal and serious injury crash types include rear-end, angle, and turning crashes, along with a notable presence of pedestrian and bicyclist crashes.

Several factors contribute to crash patterns at these intersections. Wide cross-sections and multiple lanes of travel increase crossing distance and the number of conflict points for both vehicles and pedestrians. Limited protected turn phases and closely spaced access points can lead to turning conflicts and rear-end crashes. In areas with high pedestrian activity, long signal cycles and lack of refuge space make crossings more hazardous, particularly when visibility is low or drivers fail to yield.

The urban intersection risk factors for total vehicle crashes and pedestrian/bicyclist crashes are shown in **Table 6**. Urban four-lane divided intersections on the high injury network with a high systemic risk score will be considered for safety countermeasure recommendations.

Countermeasures

Improving safety at urban four-lane divided intersections should begin with operational upgrades. Signal enhancements—such as retroreflective backplates, improved timing, and advance warning signage—can reduce rear-end and angle crashes.

Where crash patterns show frequent turning conflicts, access management strategies and protected turn phases should be considered to reduce exposure and simplify decision-making. In high-volume or high-risk locations, roundabouts or reduced conflict intersections (RCIs) may offer long-term safety benefits by eliminating or managing left-turn movements.

To address pedestrian and bicyclist safety, intersections should be equipped with enhanced crosswalks, pedestrian refuge islands, and lighting. At locations with high foot traffic or school zones, leading pedestrian intervals (LPIs) and curb extensions can increase visibility and reduce crossing distance, lowering the risk of multiple-threat conflicts. LPIs can reduce vehicle/pedestrian crashes by 59 percent (CMF ID 1993).

Rural Road Segments

Existing Safety Conditions

Rural road segments in Lake County include both two-lane and four-lane configurations and account for a substantial portion of the roadway network outside urbanized areas, with 1,440 miles of road in Lake County, or about 5 percent of the total network. Speed limits on these segments typically range from 30 to 55 mph, and volumes can vary significantly based on corridor function and connectivity.

Rural segments accounted for 4,675 total crashes and 135 fatal and serious injury crashes in Lake County between 2018 and 2022, representing 47 percent of all rural crashes and 51 percent of all rural fatal and serious injury crashes. The most common crash types involving fatal and serious injuries include single vehicle crashes, lane departures, and head-on or sideswipe opposing crashes.

Key contributing factors to these crash patterns include higher travel speeds, limited lighting, minimal shoulder or clear zone space, and sharp curves without adequate warning or control. Run-off-road and fixed-object collisions are particularly common on narrow or unlit segments, especially in poor weather or low-visibility conditions.

The rural segment risk factors for total vehicle crashes are shown in **Table 7**. It is noted that the outside shoulder width of six feet or greater identified as a risk factor is likely a surrogate risk factor. This means that it likely is not the wider shoulders that are a risk, but rather the higher speed and volume roads that are often associated with wider shoulders. Rural segments on the high injury network with a high systemic risk score will be considered for safety countermeasure recommendations.

Countermeasures

Rural road segments in Lake County should be prioritized for proven, cost-effective treatments that address lane departures, intersection conflicts, and vulnerable road user safety.

Lane departure improvements such as rumble strips, median barriers, and clear zone maintenance are recommended on high-risk segments with a history of run-off-road crashes. Shoulder/edgeline rumble strips can reduce fatal and injury run-off road crashes on rural two-lane roads by 33 percent (CMF ID 3394), installation of median barriers can reduce fatal crashes by 43 percent (CMF ID 42), and clear zone maintenance can reduce total crashes by up to 42 percent (CMF ID 35 & 36). These strategies offer medium-term, moderate-cost solutions with

strong systemic safety benefits. On rural curves, curve-specific treatments—including chevrons, advance warning signage, and high-friction surface treatments (HFST)—can reduce crashes in the short- to medium-term and are relatively low in cost. Chevrons can reduce nighttime curve crashes by 25 percent (CMF ID 2439) and HFST can reduce all curve crashes by 62 percent (CMF ID 10349). At high-risk rural intersections, roundabouts or J-turns are effective at reducing fatal and serious injury crashes, though they are typically higher in cost and require long-term implementation.

Finally, segments or intersections with pedestrian or bicyclist crash history should be considered for sidewalks, crossings, or paved shoulders. These multimodal improvements carry medium-to-high costs and are best suited for medium- to long-term implementation in areas with known vulnerability.

Rural Intersections

Existing Safety Conditions

There are 311 rural intersections in Lake County, or about 12 percent of all intersections. Rural intersections, both signalized and stop-controlled, accounted for a notable share of Lake County's intersection-related crashes between 2018 and 2022. Rural intersections accounted for 5,217 total crashes and 128 fatal and serious injury crashes in Lake County between 2018 and 2022, representing 53 percent of all rural crashes and 49 percent of all rural fatal and serious injury crashes.

The most common crash types at these intersections include angle, turning, and rear-end crashes. Contributing factors include limited sight distance, lack of dedicated turn lanes, and frequent conflicts at uncontrolled or permissive turning locations.

The rural intersection risk factors for total vehicle crashes are shown in **Table 8**. Rural intersections on the high injury network with a high systemic risk score will be considered for safety countermeasure recommendations.

Countermeasures

To improve safety at rural intersections, lower-cost operational and geometric strategies should be prioritized. Stop-control upgrades—such as oversized signs, advanced warning signage, and double-up stop signs—can improve compliance and visibility, especially at high-risk intersections. Additionally, providing intersection lighting can enhance visibility and reduce angle crashes by 33 percent (CMF ID 2376).

For locations with recurring angle or left-turn crashes, signal timing improvements, retroreflective backplates, or all-way stop conversions may help simplify operations and reduce conflicts. Retroreflective backplates on signal heads can reduce crashes by 15 percent (CMF ID 1410) and all-way stop conversions can reduce crashes by 68 percent (CMF ID 3127).

On intersections with high crash severity or complex traffic movements, roundabouts, reduced conflict intersections, or radius tightening may be considered to reduce speed and conflict points while considering overall intersection performance.

PROJECT LIST

Road safety countermeasure recommendations were assigned to road segments and intersections that were on the high injury network and had a high risk score. The type of countermeasure was dependent on the location type as well as any road design characteristics or crash trends that fit with the intended treatment of the countermeasure.

Many countermeasures were assigned independently of other countermeasures, where multiple countermeasures could be recommended for the same location. Existing road data was used to help determine which countermeasures were assigned but may not always reflect all contexts or site conditions; road planners should consider the geometry and surrounding environment for each location prior to implementation.

The summary of segment project recommendations is shown in **Table 19**, and the summary of intersection project recommendations is shown in **Table 20**.

Table 19. Recommended Segment Countermeasure Projects Summary

Segment Countermeasure	Number of HIN Segment Locations	Sum of Segment Miles	Percent of HIN Segment Miles
Urban Lane Repurposing	34	29.85	10.9%
Urban Access Management	136	121.13	44.2%
Urban Roundabout Corridor	14	13.27	4.8%
Urban Speed Calming	97	85.65	31.3%
Urban Variable Speed Limits	83	77.11	28.1%
Urban Speed Safety Cameras	135	123.44	45.1%
Urban Sidewalk	212	187.24	68.3%
Urban Bike Facility or Parallel Bike Blvd	20	17.78	6.5%
Rural Lane Departure Improvements and Curve Improvements	12	11.57	4.2%
Rural Ped/Bike Improvements	3	3.02	1.1%
Mid-Block Crossing	72	64.06	23.4%
Road Safety Audit	29	25.44	9.3%

Table 20. Recommended Intersection Countermeasure Projects Summary

Intersection Countermeasure	# Intersections	% of HIN
Roundabout	113	8.1%
Reduced Conflict Intersection	339	24.3%
Radius Tightening	309	22.1%
Lighting	246	17.6%
Temporary Radius Tightening	623	44.6%
Stop-Control Intersection Upgrades	300	21.5%
Signalized Intersection Upgrades	323	23.1%
Pedestrian Improvements at Signalized Intersections	333	23.8%
Pedestrian Improvements at Non-Signalized Intersections	332	23.8%
Rural Intersection Improvements	33	2.4%
Rural Ped/Bike Intersection Improvements	0	0.0%

The project list was mapped, and projects were grouped into the following categories:

- Intersection Projects
  - Major Intersection Projects
  - Intersection Improvements/Upgrades
- Segment/Corridor Projects
  - Major Corridor Projects (access management, lane repurposing, roundabout corridor)
  - Speed Management Projects
  - Pedestrian/Bicycle Improvements
  - Rural Safety Improvements
  - Road Safety Audit

To illustrate where countermeasures are needed throughout Lake County, **Figure 34** provides an index of county divisions into eight sections. These eight sections and countermeasure recommendations are shown in greater detail in **Figure 35**, **Figure 36**, **Figure 37**, **Figure 38**, **Figure 39**, **Figure 40**, **Figure 41**, and **Figure 42**. The full list of safety project recommendations is provided in **Appendix E: Project Recommendations (Corridors)** and **Appendix F: Project Recommendations (Intersections)**.

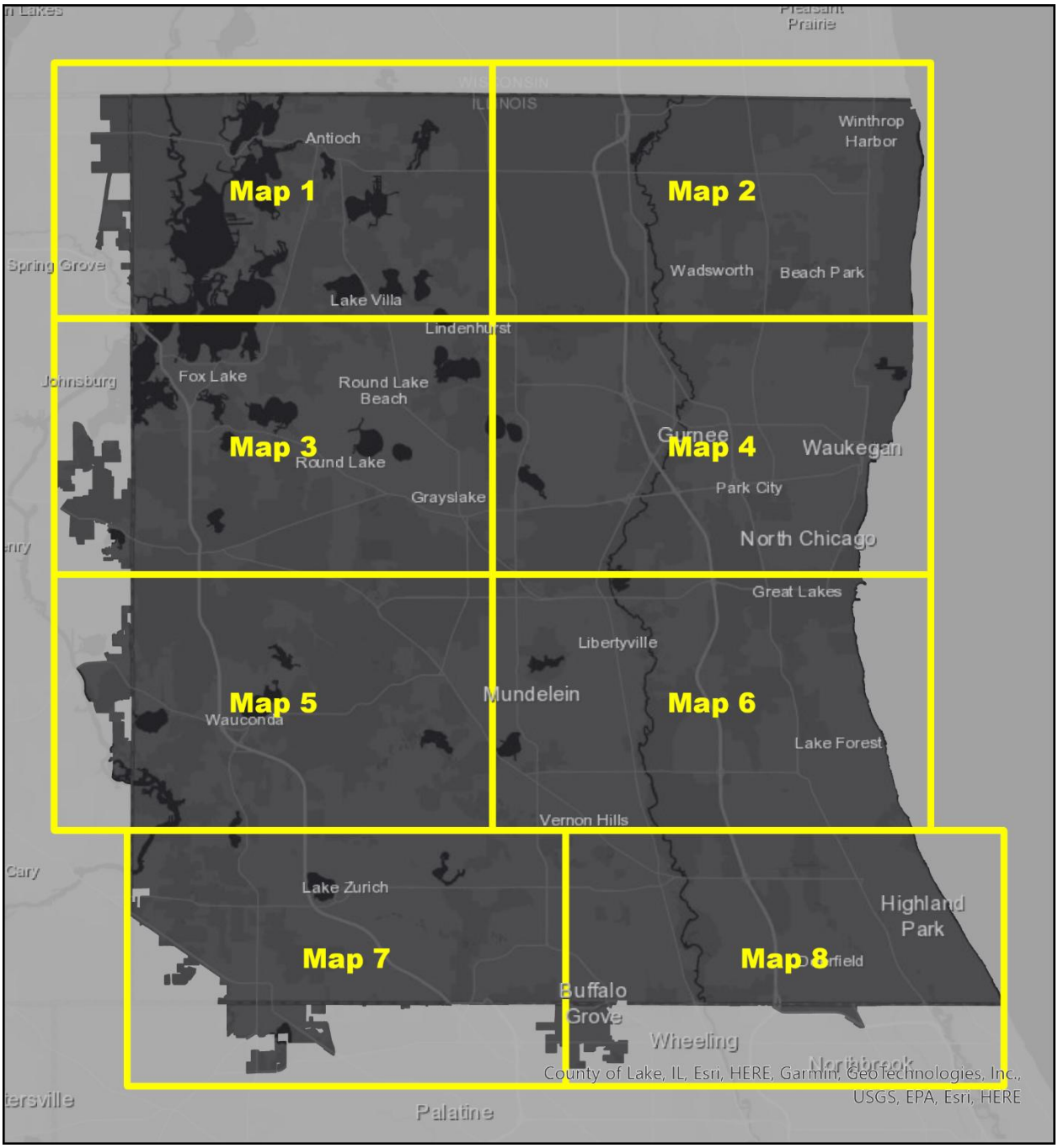


Figure 34: Countermeasure Map Index

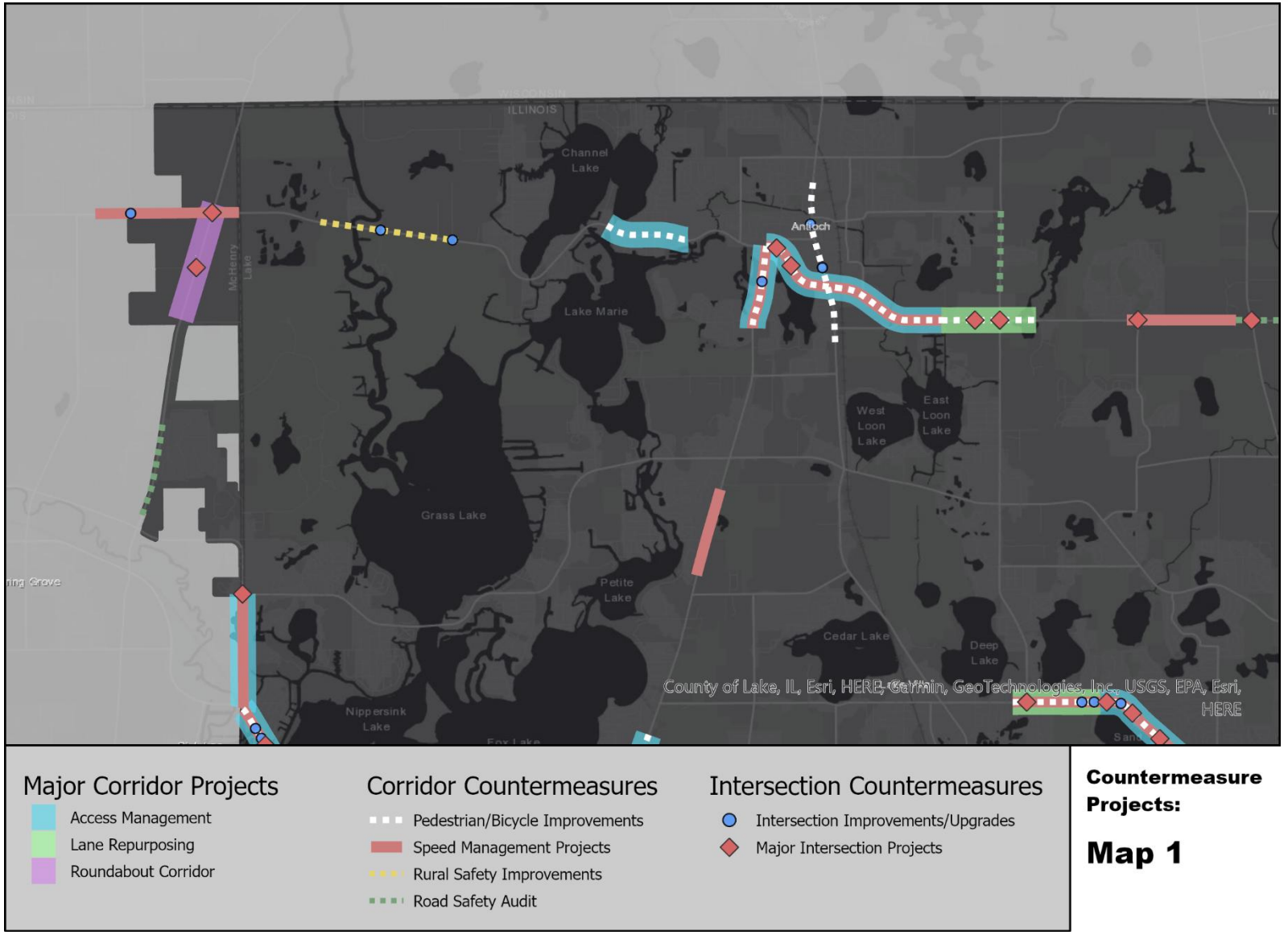


Figure 35: Countermeasure Map 1

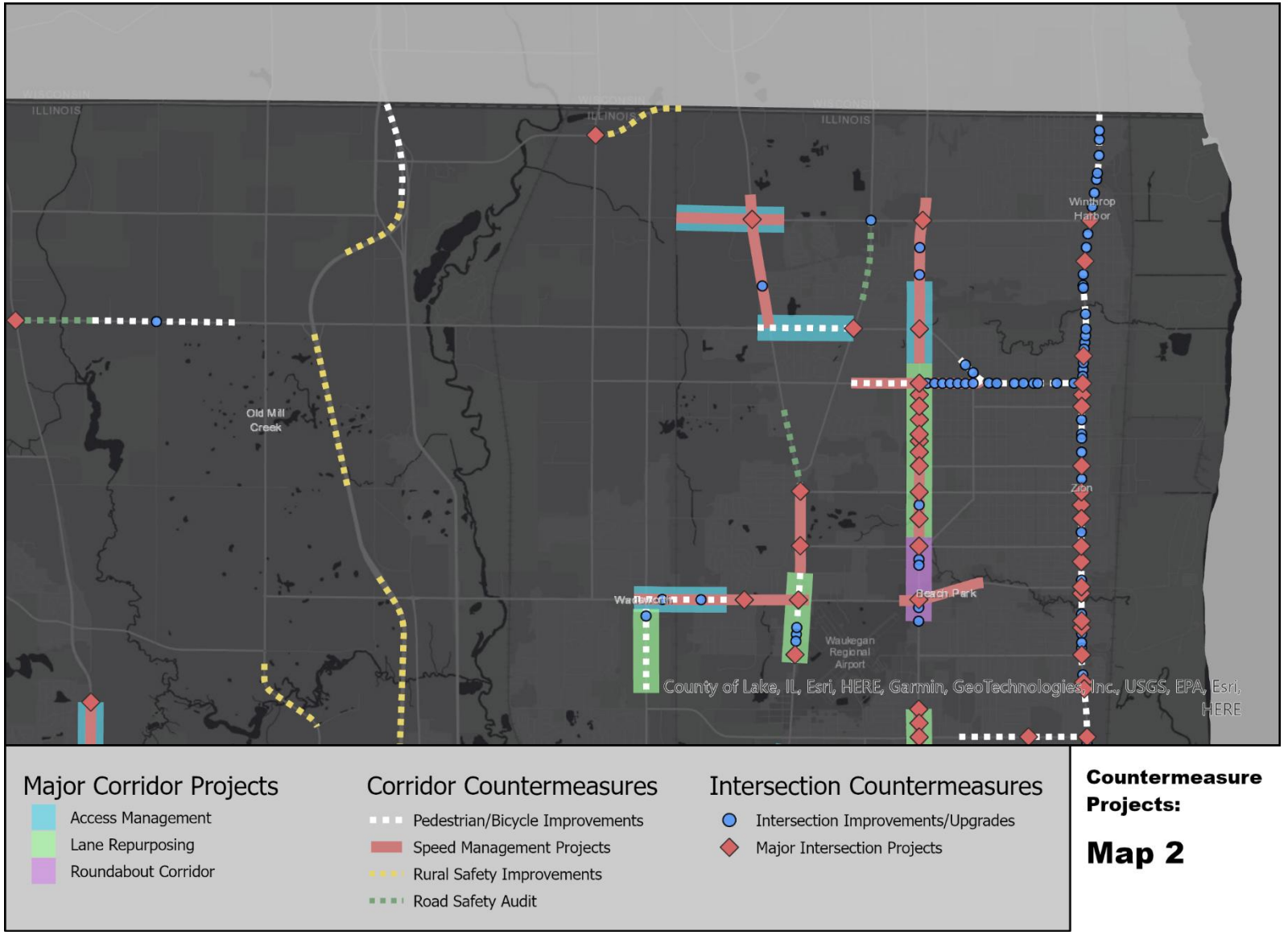


Figure 36: Countermeasure Map 2

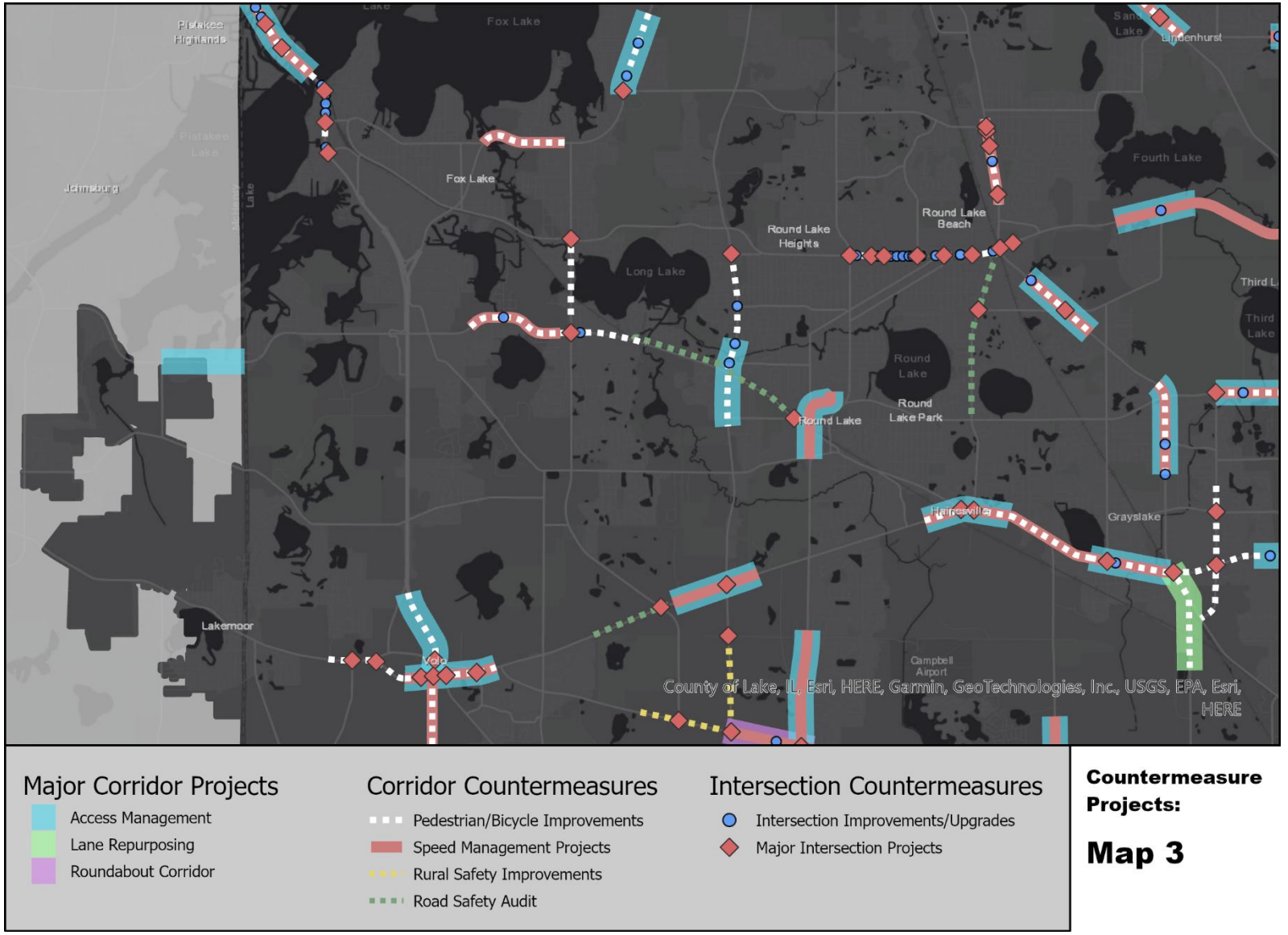


Figure 37: Countermeasure Map 3

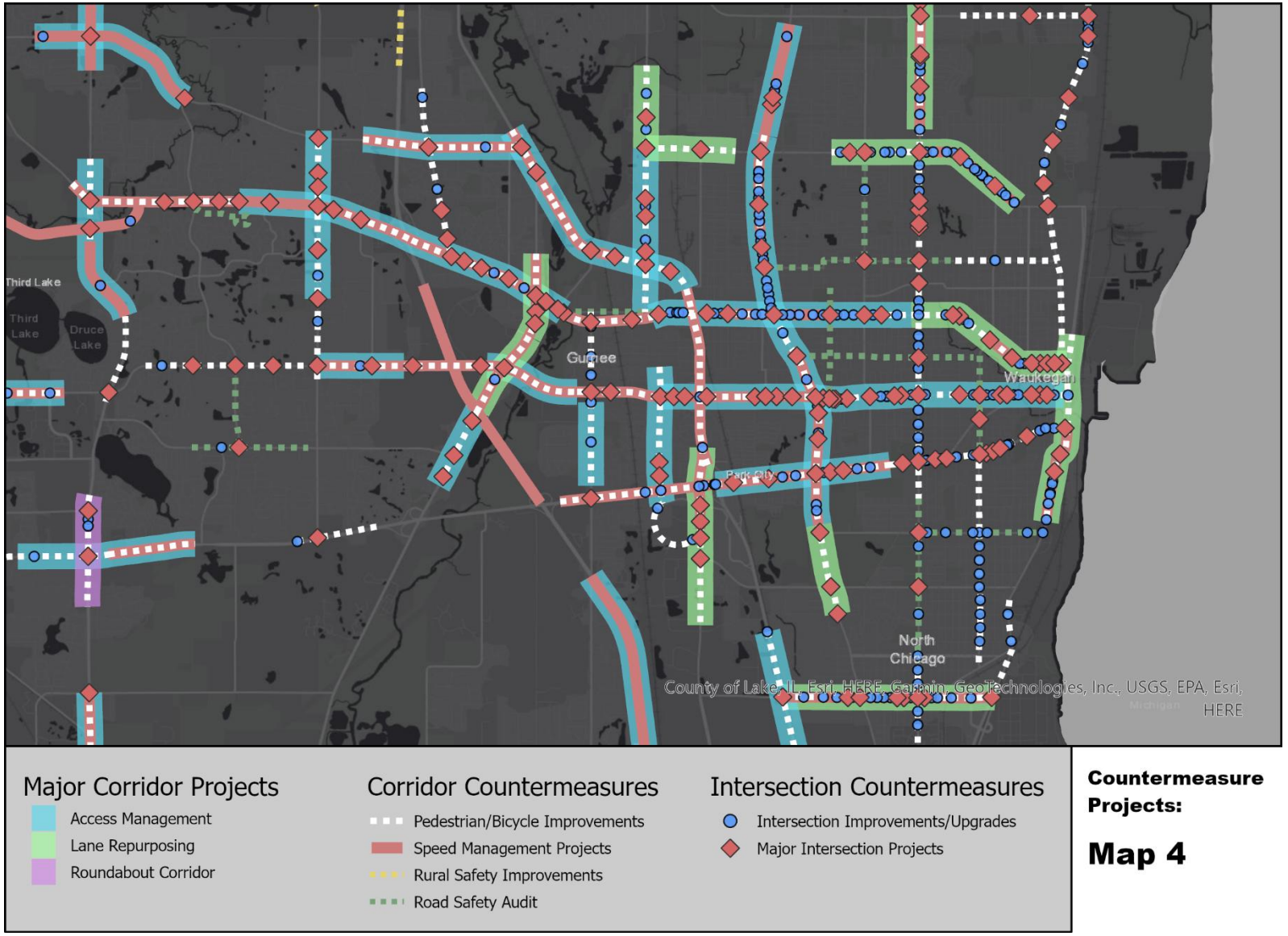


Figure 38: Countermeasure Map 4

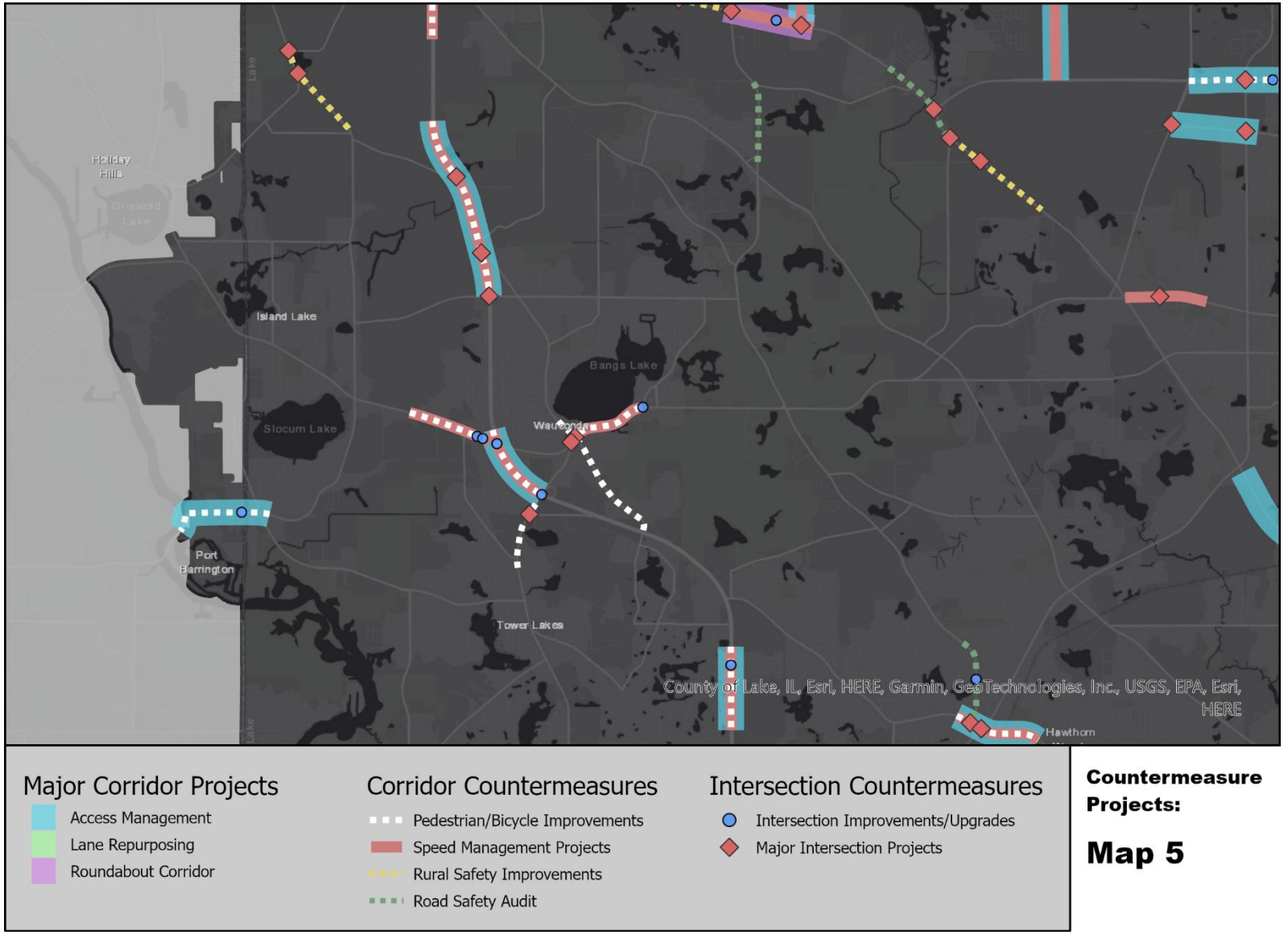


Figure 39: Countermeasure Map 5

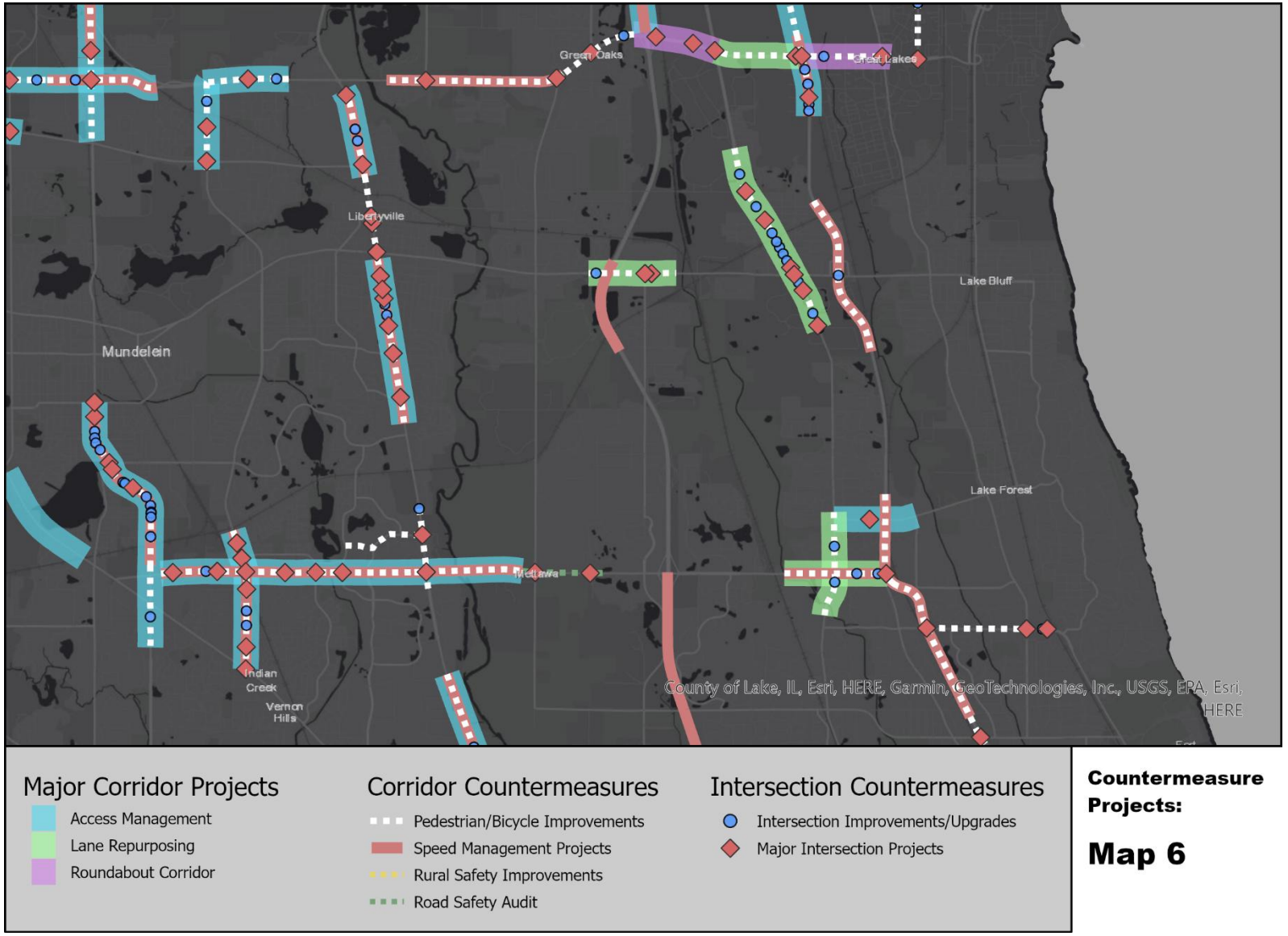


Figure 40: Countermeasure Map 6

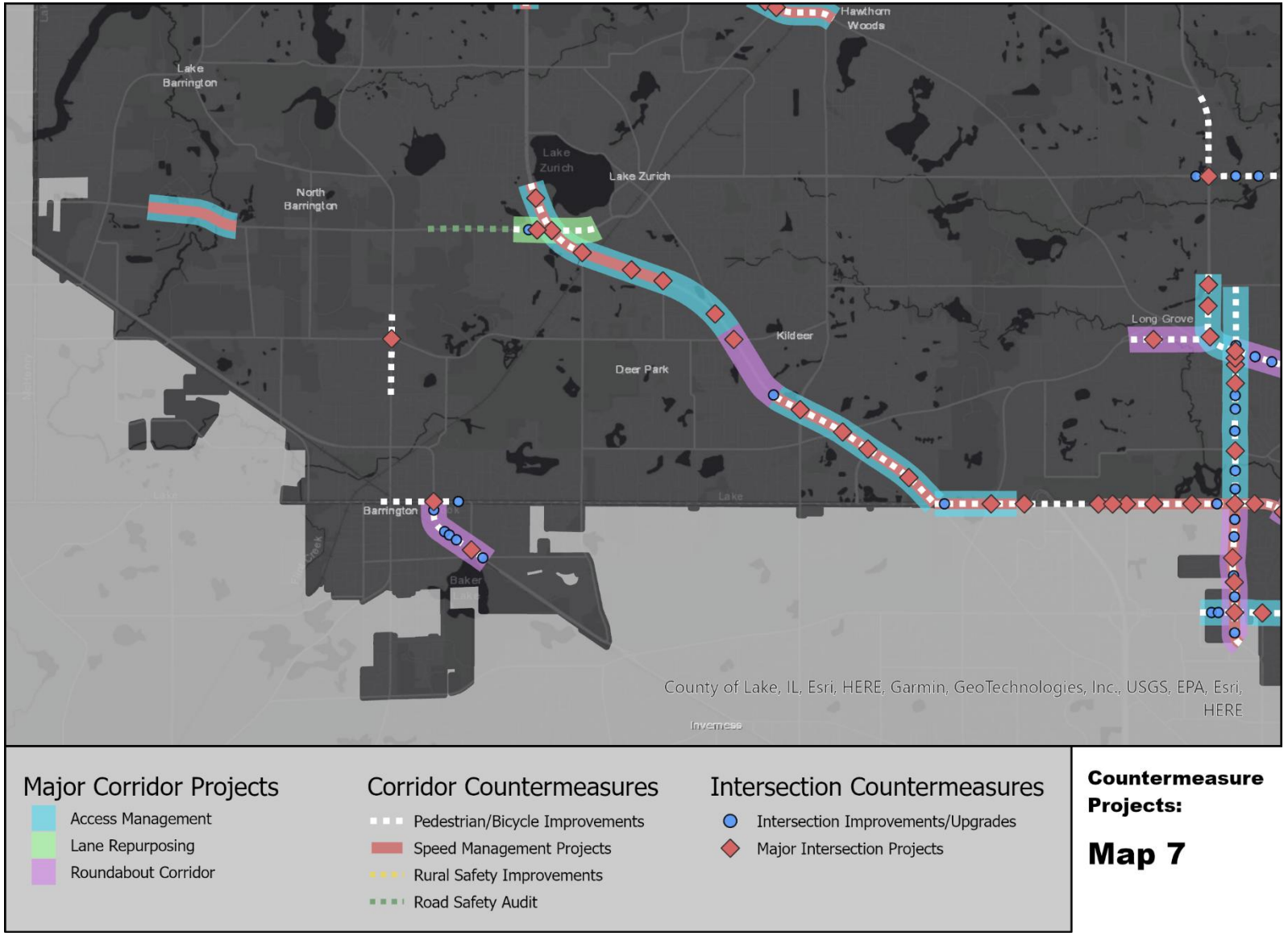


Figure 41: Countermeasure Map 7

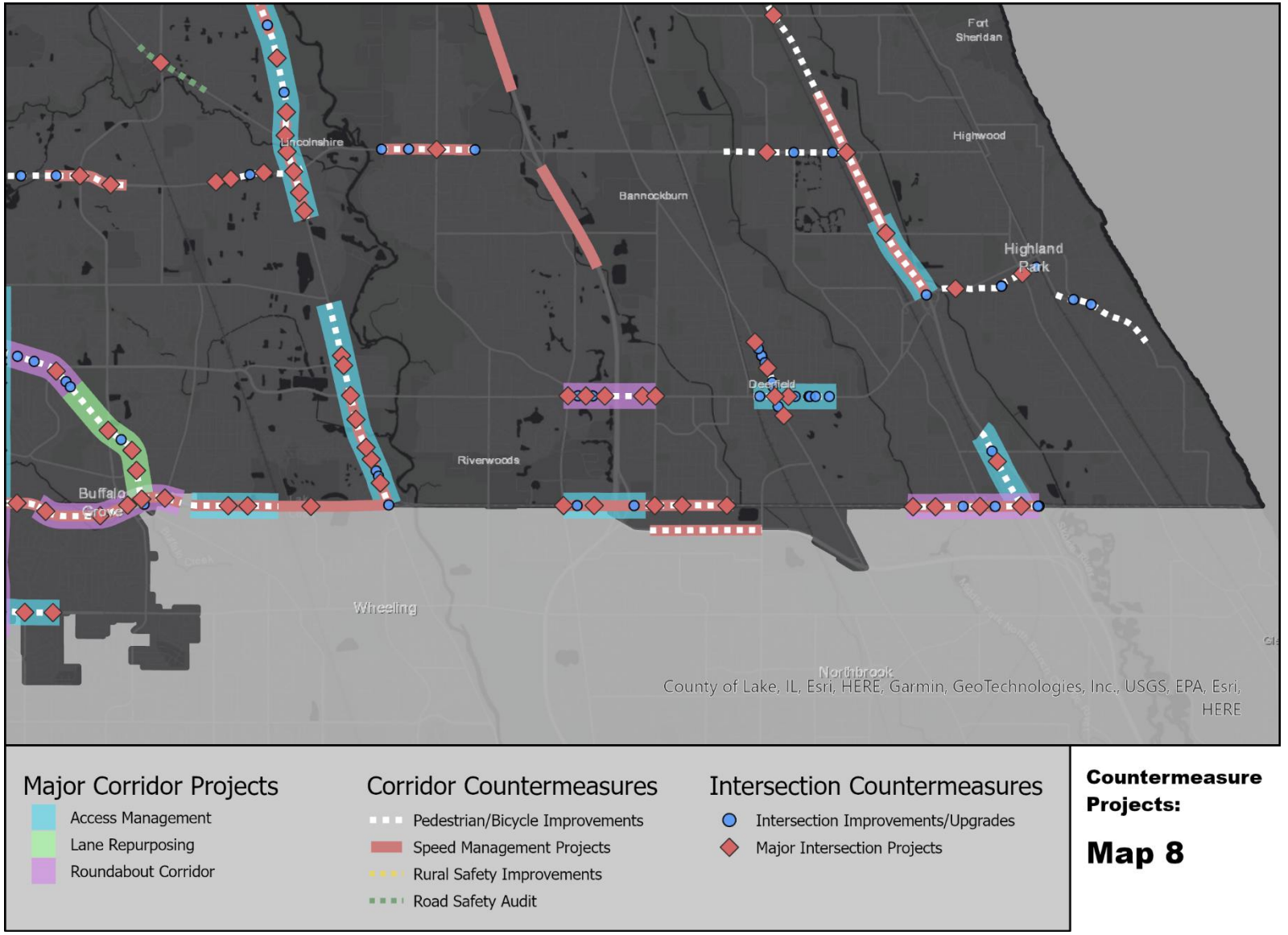


Figure 42: Countermeasure Map 8

IMPLEMENTATION MATRIX

In addition to the specific project location recommendations, an implementation matrix has been developed to use as a decision-making tool to support the advancement of proactive safety strategies throughout Lake County. Many of the strategies outlined in the matrix are infrastructure-focused, though there are also enforcement strategies included to address behavioral trends that may not be treated by infrastructure solutions alone. Additionally, there are policy and process change strategies included based on recommendations from the **Policy and Process Changes section**.

The implementation matrix includes information on the proposed strategies, the applicable typologies and crash emphasis areas, responsible party, and the recommended timeline for implementation. Implementation timeline is broken down into the following categories:

- Near-term (one to four years)
- Mid-term (five to nine years)
- Long-term (10 or more years)

Additionally, the expected impact and level of effort (LOE) for each strategy are identified based on the findings of IDOT's 2023 Vulnerable Road User Safety Assessment (VRUSA).[12] Where strategies are vehicle-oriented and not included in the VRUSA, impact and LOE identified are interpolated to align with the VRUSA ratings. The impact and LOE ratings include three tiers:

- Lower
- Moderate
- High

The implementation matrix is provided in **Table 21**.

Table 21: Implementation Summary Matrix

Strategy	TYPOLOGY							CRASH EMPHASIS AREAS				Timeline	Responsible Party	Expected Impact & Level of Effort (LOE)	
	Urban Four-Lane Undivided Segments	Urban Two-Lane Undivided Segments	Urban Four-Lane Divided Segments	Urban Two-Lane Undivided Intersections	Urban Four-Lane Divided Intersections	Rural Segments	Rural Intersections	Speeding & Aggressive Driving Crashes	Impaired Driving Crashes	Roadway Departure Crashes	Turning & Rear-End Intersection Crashes			Impact	LOE
INFRASTRUCTURE STRATEGIES															
Lane Departure Treatments (rumble strips, Safety Edge, clear zone, curve improvements)	X	X	X			X		X		X		Near-term	County & State	High	Lower to Moderate
Stop-Control Upgrades (double/oversized stop signs, stop bars, all-way stop control)				X	X		X				X	Near-term	State, County, & Municipalities	Moderate	Lower
Signal Upgrades (retroreflective backplates, timing)				X	X						X	Near-term	State, County, & Municipalities	Moderate to High	Lower
Lane Repurposing (4-to-3 lane conversion with turn lanes)	X							X			X	Near- to Mid-term	State, County, & Municipalities	High	Moderate to High
Radius Tightening / Curb Hardening				X	X		X	X			X	Near- to Mid-term	State, County, & Municipalities	High	Lower to Moderate
Lighting	X	X	X	X	X	X	X		X	X	X	Near- to Mid-term	State, County, & Municipalities	High	Moderate
Pedestrian Crossing Enhancements (RRFBs, PHBs, LPI, refuge islands, enhanced crosswalks, lighting)	X	X	X	X	X				X		X	Near- to Mid-term	State, County, & Municipalities	High	Moderate

Strategy	TYPOLOGY							CRASH EMPHASIS AREAS				Timeline	Responsible Party	Expected Impact & Level of Effort (LOE)	
	Urban Four-Lane Undivided Segments	Urban Two-Lane Undivided Segments	Urban Four-Lane Divided Segments	Urban Two-Lane Undivided Intersections	Urban Four-Lane Divided Intersections	Rural Segments	Rural Intersections	Speeding & Aggressive Driving Crashes	Impaired Driving Crashes	Roadway Departure Crashes	Turning & Rear-End Intersection Crashes			Impact	LOE
Speed Calming Design (raised medians, curb/gutter, lane narrowing)	X	X	X	X	X		X	X			X	Mid-term	State, County, & Municipalities	High	Moderate
Access Management (medians, driveway reduction)	X	X	X			X						Mid- to Long-term	State, County, & Municipalities	High	Moderate to High
Roundabout Installation				X			X	X			X	Mid- to Long-term	State, County, & Municipalities	High	High
BEHAVIORAL, POLICY & PROCESS STRATEGIES															
Develop and implement sidewalk master plan	X	X	X	X	X	X	X				X	Mid- to Long-term	County & Municipalities	High	Moderate
Develop and implement bicycle master plan	X	X	X	X	X	X	X				X	Mid- to Long-term	County & Municipalities	High	Moderate
Adopt a Complete Streets Policy	X	X	X	X	X			X			X	Near-term	CMAP & County	High	Lower
Require consideration of sidewalks, bike lanes, safe crossings, transit amenities, & ADA compliance in all capital projects	X	X	X	X	X	X	X	X	X		X	Mid-term	CMAP, County, & Municipalities	High	Moderate
Implement a curb management policy that prioritizes safe transit passenger pick-up/drop-off.	X	X	X	X	X			X			X	Mid-term	CMAP & Municipalities	Moderate	Moderate

Strategy	TYPOLOGY							CRASH EMPHASIS AREAS				Timeline	Responsible Party	Expected Impact & Level of Effort (LOE)	
	Urban Four-Lane Undivided Segments	Urban Two-Lane Undivided Segments	Urban Four-Lane Divided Segments	Urban Two-Lane Undivided Intersections	Urban Four-Lane Divided Intersections	Rural Segments	Rural Intersections	Speeding & Aggressive Driving Crashes	Impaired Driving Crashes	Roadway Departure Crashes	Turning & Rear-End Intersection Crashes			Impact	LOE
Implement Safe Routes to School policies to codify and prioritize this policy.	X	X	X	X	X	X	X	X			X	Near-term	Municipalities	High	Moderate
Conduct school travel audits and identify priority infrastructure needs near schools.	X	X	X	X	X	X	X	X			X	Mid-term	CMAP, County, & Municipalities	High	Moderate
Utilize speed safety cameras in school zones, work zones, and corridors with high occurrences of speeding.	X	X	X			X		X	X			Near- to Long-term (Ongoing)	State, County, & Municipalities	High	Lower
Implement publicized sobriety checkpoints or high-visibility saturation patrols.	X	X	X	X	X	X	X	X	X	X	X	Near- to Long-term (Ongoing)	Enforcement	Moderate	Moderate to High
Implement public safety education campaigns and programs.	X	X	X	X	X	X	X	X	X	X	X	Near- to Long-term (Ongoing)	CMAP & Enforcement	Lower	Lower
Implement rail crossing safety policy (upgrading crossing technology, cooperation with local jurisdiction for first-mile/last-mile improvements, etc.)	X	X	X	X	X	X	X					Mid-term	CMAP, County, Municipalities, Rail Owners	Lower	Moderate

Progress and Transparency

METHOD TO MEASURE PROGRESS

This Safety Action Plan recommends several courses of action to improve the safety of Lake County's transportation network. Measuring progress is key for the success of the plan and to achieve the goal of zero fatalities by 2050. To support consistent progress towards these goals, Lake County will track progress using five key measures adopted by the United States Department of Transportation (USDOT) to report on the overall progress of safety plans, as shown in **Table 22**.

Table 22: USDOT Safety Performance Measures, 2018– 2022 Baseline

Performance Measure	Description	Baseline[1]
Number of Fatalities	The total number of persons suffering fatal injuries in a motor vehicle crash during a calendar year.	46.4
Rate of Fatalities per 100 million VMT	The ratio of total number of fatalities to the number of vehicle miles traveled (VMT, in 100 Million VMT) in a calendar year.	0.818
Number of Serious Injuries	The total number of persons suffering at least one serious injury in a motor vehicle crash during a calendar year.	394.4
Rate of Serious Injuries per 100 million VMT	The ratio of total number of serious injuries to the number of VMT (in 100 Million VMT) in a calendar year.	6.957
Number of Non-motorized Fatalities and Non-motorized Serious Injuries	The combined total number of non-motorized fatalities and non-motorized serious injuries involving a motor vehicle during a calendar year.	47.4

In addition to the five key measures adopted by the USDOT, Lake County will also measure progress according to four additional county-specific measures, shown in **Table 23**.

Table 23: Lake County Additional Performance Measures, 2018– 2022 Baseline

Performance Measure	Description	Baseline[1]
Project Completion	The total number of location-based projects which include safety benefits completed during a calendar year.	N/A
Project Completion within APP	The total number of location-based projects which include safety benefits completed in an APP during a calendar year.	N/A
Number of Fatalities and Serious Injuries due to Impaired Driving	The total number of fatalities and serious injuries due to impaired driving during a calendar year.	111.4
Number of Fatalities and Serious Injuries due to Distracted Driving	The total number of fatalities and serious injuries due to distracted driving during a calendar year.	57.4

[1] Five-year rolling averages (2018-2022)

Annual Public and Accessible Reporting Process

Future efforts should include regular communication on progress and reductions in the safety performance measures detailed in **Table 22** and **Table 23**. Lake County can consider the following to provide regular updates to the public on safety progress:

- Online dashboard to track performance measure progress and project implementation status
- Annual report on progress
- Regular updates to this Safety Action Plan

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POLICY AND PROCESS CHANGES

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[12] Illinois Department of Transportation. *Illinois Vulnerable Road User Safety Assessment*. November 2023. https://idot.illinois.gov/content/dam/soi/en/web/idot/documents/transportation-system/manuals-guides-and-handbooks/safety/il-dot-vru-2023-11142023-final-spreads.pdf

SAFE TRAVEL FOR ALL

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