

RAMSEY COUNTY-WIDE

Pedestrian & Bicycle Plan

Gaps & Barriers in Ramsey County

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System Analysis Introduction and Overview

Budgets are not unlimited, needs are not equal and some places may see more net benefits than others in a given time period. The system analysis described below identifies those areas most deficient in walking and biking infrastructure as those areas of most potential for benefit.

A county-scale, data-driven approach was used to identify network gaps throughout Ramsey County. This analysis identified barriers to connectivity and put them in the context of community need and potential demand.

Analysis Approach

The report analyzes where people are, where they want to travel and what kind of system facilities they need. The analysis performed here is based on the principles of supply and demand.

The supply side represents the provision of pedestrian and bicycle facilities and the safety history of the streets in Ramsey County. Most often, this is a *lack* of supply of safe and comfortable facilities for walking and biking.

The demand side represents where people are located, where they want to travel and concentrations of historically disadvantaged populations that may have greater needs for transportation options and investment.

Balancing supply and demand can help guide investments, identify priorities and get the most community value for funding when upgrading or implementing facilities.

Mapping Street-by-Street

Each analysis area and data point is mapped and assigned to the individual street itself, even if these are not traditionally thought of as street characteristics. For example, population density data from the Census Bureau is translated from the census tract level geography and assigned to the streets within the area. This doesn't identify the individual block-by-block population density, but it does allow a block-by-block analysis using the general density in the vicinity of a particular street.

Outcomes

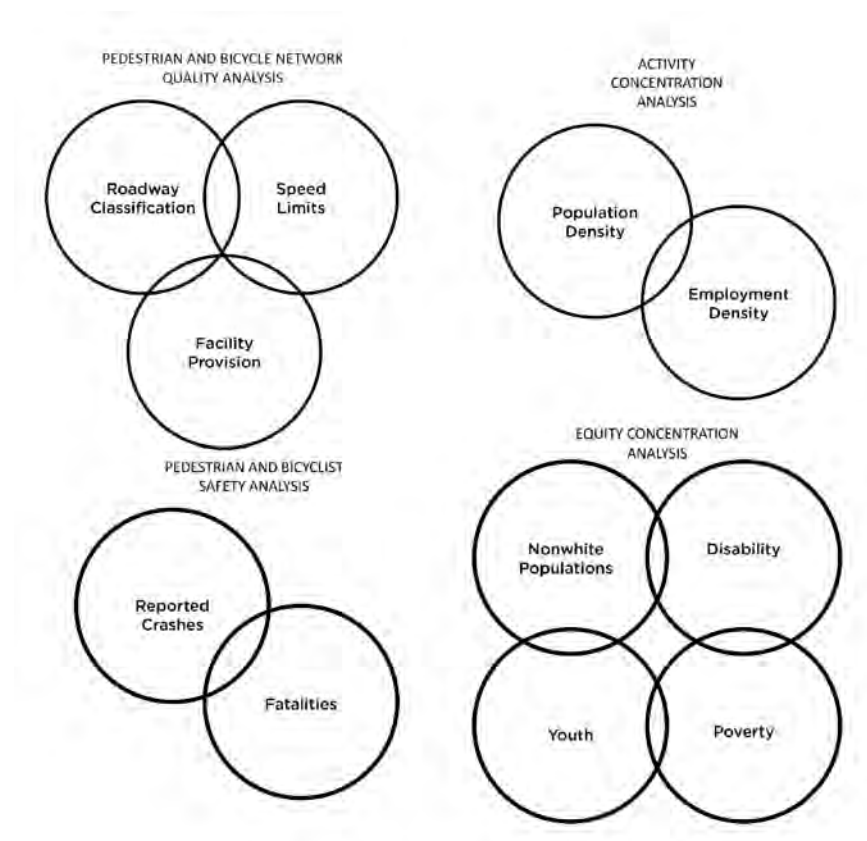
The analysis provides an overview of conditions for pedestrians and bicyclists on streets within the County. The result reflects the quality of streets and the experience for walking and cycling rather than a simple documentation of the existing facilities. Maps showing existing and planned facilities are available in the State of Walking and Biking Environment Report.

In addition, the system analysis provides additional information to inform future implementation of the Connected Ramsey Communities network. Evaluating network quality, barriers and key population concentrations supports both the route identification process and knowledge about needs for improvement or new facilities.

Four Analysis Areas

The technical analysis of the Ramsey County walking and biking network covers four areas. These analysis areas can be referenced independently to better understand the street-by-street conditions or can be combined to understand a comprehensive picture of street by street gaps, barriers and opportunities.

Each analysis area is composed of two or more factors. The Pedestrian and Bicyclist Safety Analysis, for example, is built upon datasets of reported crashes and locations of fatalities. Each analysis area is depicted below, identifying the primary inputs used in the analysis.



ACTIVITY CONCENTRATION

Constructing new facilities in locations where there will be higher levels of use helps make effective use of resources as the larger network is built out over time.

Trip making demand is tied to residential and employment population density, mix of land uses and trip length. Residential and employment population density is very important for walking and biking demand because as density increases, trip lengths tend to decrease.¹ The shorter the trip, the more likely it can be made by walking and biking.

High residential and employment population densities also result in more viable transit service and use.² Most people making a trip by transit start and end as a pedestrian, relying on sidewalks and crosswalks to get them to their final destination.

Employment is also a significant trip generator and attractor. The journey to work is one of the most consistent trips in a person's day. It is a standard measure tracked by the Census Bureau and is one of the most common ways to report and track the levels of walking and biking in local communities.

To represent trip demand in the analysis, the Population Density Index measures the composite density of population and employment, representing the general level of potential activity on a particular street.

Activity Concentration Analysis Results

While Saint Paul shows the highest level of activity concentration across the county, other communities have their own local areas of concentrated activity, such as Roseville Mall or employer campus areas. Not every community in Ramsey County has areas of high levels of activity. These locations are places where residents and employees are likely to make frequent short trips, ideal for increased walking and biking.

Activity Concentration Analysis Map Summary

The activity concentration analysis map displays a street-by-street assessment of surrounding residential and employment density. Color intensity indicates overall activity concentration on a relative scale of “Lower Activity” to “Higher Activity.” Absolute values for density factors are displayed and discussed in detail in the **State of Walking and Biking Report**.

Limited access highways are displayed in gray and are excluded from this analysis.

Findings and Notable Results

The major population center in Ramsey County is the City of Saint Paul. The downtown core is filled with dense employment activity. Other notable population activity areas include the 3M campus in Maplewood and along the Snelling Avenue corridor in Falcon Heights and Roseville.

Pockets of activity areas are also concentrated in the historic downtown White Bear Lake, the neighborhood around Berwood Park in Vadnais Heights and areas in St. Paul such as University Avenue, Energy Park Drive and the University of Minnesota St. Paul Campus.

Future development areas, such as Rice Creek Commons in Arden Hills, the New Brighton Exchange in New Brighton and the Ford Plant in St. Paul, are identified on the map. While these areas today are not yet developed to their future potential, these sites are planned for new residential and employment development. This will result higher activity levels than the surrounding areas.

Implications to the Future Vision

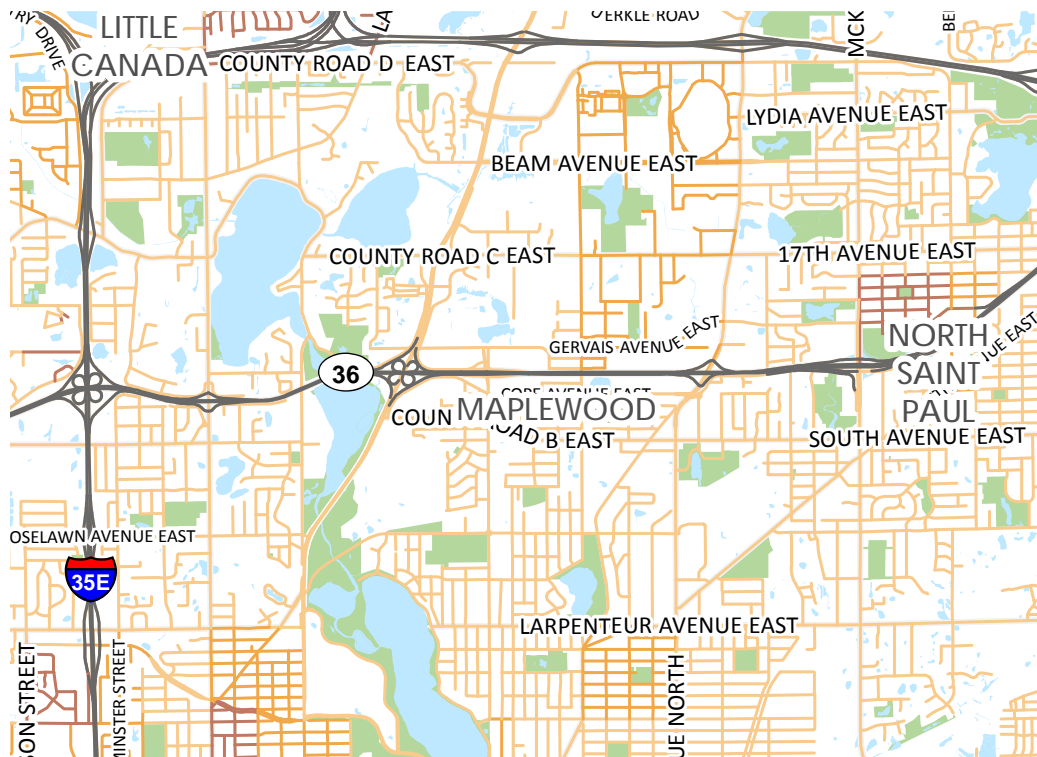
Areas with high levels of activity concentration are the backbone of the Connected Ramsey Community networks. These locations represent the most common origins and destinations for county-wide transportation trips and are most likely to have high demand for internal short-distance trips.

Not all areas with high activity concentration have the same needs for leveraging that activity. Downtown Saint Paul has the street grid, sidewalks and crossing opportunities to promote high levels of walking activity between destinations.

The high levels of activity around Roseville Mall lack the developed street grid and complete sidewalks of Saint Paul. Promoting walking and biking here should emphasize county-wide connections to the mall area, include high quality bike parking and provide comfortable walking corridors for trips between commercial developments.

Analysis Details and Data

The activity concentration analysis is based on 2013 Census five-year American Community Survey data of employment density and residential density. Both factors were assigned a one to five scale from least dense to most dense, and those scales were combined to identify areas of both high residential and employment density.



There are areas within Ramsey County that have high concentrations of activity, including in North St. Paul. For the full map, see page [2B-36](#).

PEDESTRIAN AND BICYCLE NETWORK DEFICIENCY

Not every street is safe or comfortable for walking and biking in its current form. Missing sidewalks and curb ramps or a lack of separated bike facilities on busy streets can easily prevent people from walking or biking.

Measures of pedestrian and bicycle deficiencies are analyzed by comparing the provision of walkways and bikeways with the roadway characteristics.

The Pedestrian Deficiency Index was measured by comparing the presence of a separated sidewalk or path to the type of roadway next to it. Busy streets without a separated walkway or with a walkway on only one side of the street are considered deficient.

Not all streets need a separated sidewalk to be comfortable for walking. On low-speed, low-volume local streets, the lack of a sidewalk may not be a barrier and is not considered deficient.

The Bicycle Deficiency Index measures streets in a similar way, by comparing the level of motorized traffic to the type of bikeway provided. In this analysis, street segments are classified into one of four levels of traffic stress based on the anticipated user comfort.

Pedestrian Network Deficiency Analysis Results

The analysis results illustrate a diverse Ramsey County street network formed by historic roadway standards. Facility quality varies widely across Ramsey County. Some local streets have complete sidewalks or paths on both sides while some large streets with significant levels of traffic are lacking any sort of pedestrian facilities.

Pedestrian Network Deficiency Analysis

Map Summary

The Pedestrian Network Deficiency Analysis map displays the analysis results of the pedestrian level of service calculation. Different colors indicate different levels of completeness. Streets considered most deficient are illustrated in red. These tend to be fast arterial streets with missing or incomplete sidewalks.

Light brown segments are the next level of deficiency in the analysis. These may be local streets with intermittent sidewalk coverage, or arterial streets with a sidewalk on only one side of the street.

Light green segments are those calculated to have minor deficiencies. These segments include moderate speed streets with a sidewalk on one side of the street, or local streets lacking sidewalks.

Dark green segments indicate the streets considered least deficient and least stressful. To qualify for this categorization, the street must have sidewalks on both sides of the street, and have traffic operating at low speeds.

Limited access highways are displayed in gray and are excluded from this analysis.

Findings and Notable Results

Streets with full sidewalk coverage are concentrated in the parts of Ramsey County with older development. This includes most of St Paul, the historic center of White Bear Lake and areas of Falcon Heights south of Larpenteur such as University Grove. These streets were built in an era when sidewalk provision was standard on all types of streets and the presence of sidewalks supports walking in these communities to this day.

Neighborhood development in areas outside of Saint Paul followed less consistent design standards and did not require sidewalks as a part of construction. This is particularly noticeable in lower density single family home neighborhoods. Most of these streets are considered deficient in the analysis because of the lack of sidewalks combined with a 30 mph default speed limit.

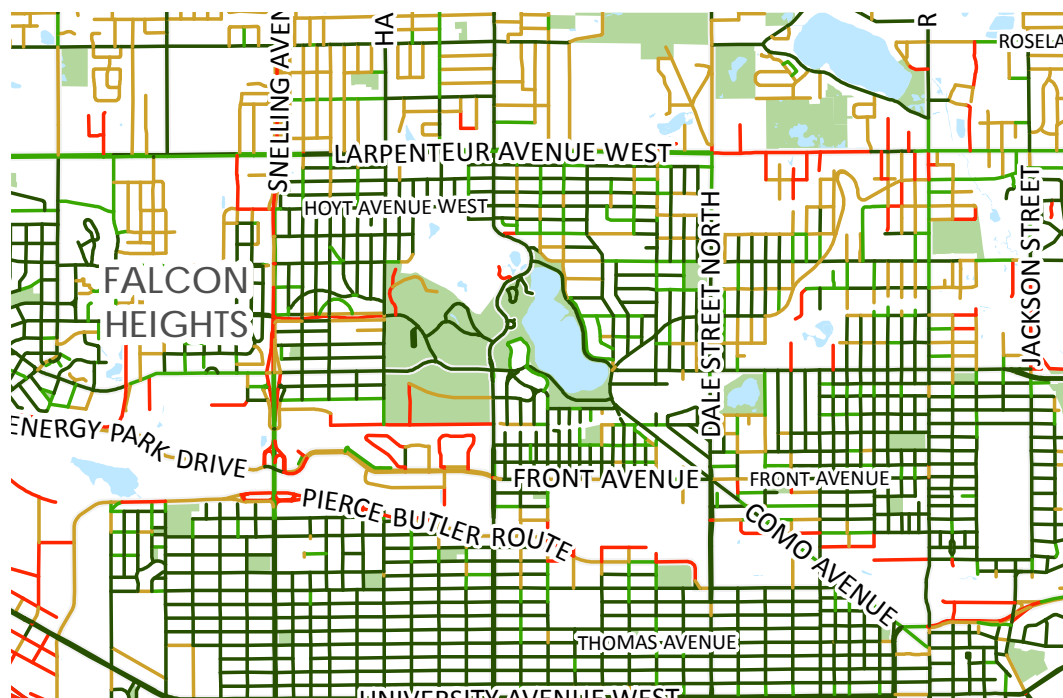
In outer suburban parts of Ramsey County, streets with paths are often the most complete street segments available for pedestrians because of their separated space for people to walk. While the analysis includes recreational paths in independent corridors less suitable for transportation purposes, this category also includes large streets with adjacent paths.

Implications to the Future Vision

The current design of a street has a dramatic influence over the potential for future investments to support pedestrian activity. To create safe and comfortable conditions high levels of traffic must be mitigated either with traffic calming or with increased separation between pedestrians and moving motor vehicles.

These investments in complete streets are most needed in the lower density suburban areas of Ramsey County.

However, unimproved streets that currently lack curbs, gutters and drainage may offer a future opportunity. Because these streets have little investment today, they offer a lower cost opportunity to construct to a high quality pedestrian facility than an existing complete street which would need to be reconstructed.



Sidewalk coverage varies across the county, with higher concentrations of sidewalks in areas like Falcon Heights. For the full map, see page [2B-37](#).

Analysis Details and Data

The pedestrian facility deficiency analysis is based on 2014 MnDOT street data describing speed limit, sidewalk data identifying the location and completeness of sidewalks, shoulder data indicating some form of walkable shoulder space and street classification for identifying local roadways.³

Shoulders are not considered a significant walking facility in this analysis. Providing a shoulder on these streets is considered a minor improvement over no shoulder, but is generally not enough to provide a high level of service for pedestrians.

The scoring matrix for the pedestrian level of service analysis is displayed below. Higher values are considered more deficient.

Table 2B-1: Scoring Matrix for Pedestrian Level of Service Analysis

Speed Limit	Pedestrian Facility Provision*			
	Complete sidewalk	Sidewalk on one side	Partial sidewalk	No sidewalk
25 mph or Less	0	3	4	5
30 mph	1	4	5	6
35-40 mph	2	5	6	7
45 mph or higher	3	6	7	8

* If the street is residential, the deficiency level decreases by 2 points and provision of a shoulder decreases the score by 1 point. Streets with paths are assigned a score of zero (not deficient).

Bicycle Network Deficiency Analysis Results

The bicycle network deficiency analysis shows that much of Ramsey County is traversable by skilled adult riders. Less skilled, more traffic averse riders, such as children or casual riders, are faced with network gaps, stressful situations and other barriers to bicycling.

Bicycle Network Deficiency Analysis Map Summary

The Bicycle Network Deficiency Analysis map identifies those streets that are most and least suitable for traveling by users of all ages and abilities as determined by the level of traffic stress analysis, described at the end of this section. A color scale of red to green reports the overall stress level.

Those streets classified as extreme stress are displayed in red. These are street segments that lack facilities or contain facilities inadequate for the intensity of traffic on the street. This classification is common on portions of state or county highways, and on portions of arterial streets with high levels of traffic.

Streets classified as high stress are displayed in orange. These street segments are arterial or collector roads with high speeds and volumes, often with a minimum width conventional bicycle lane.

Moderate stress streets are displayed in light green and include most local streets. The analysis considers most local streets to be stressful due to the default 30 mph speed limit. Because most bicyclist travel between 10 and 15 mph, the high speed limit indicates that motor vehicle speed differentials are too high for riders of all ages and abilities to be comfortable.

Low stress streets are displayed in dark green. These are considered to be functional for users of all ages and abilities. This includes recreational trails, streets with paths running adjacent to them, and some local streets with speed limits below 30 miles per hour.

Limited access highways are displayed in gray and are excluded from this analysis.

Findings and Notable Results

Most state or county highways are classified as extreme stress due to multiple lanes of fast moving traffic, with minimal separation from bicycle users. Arterial streets with high levels of traffic and no bicycle facilities are also classified as extreme stress, such as portions of Snelling Avenue and Larpeneur Ave.

Arterials streets with a separated shared use path running along them achieve a stress rating appropriate for users of all ages and abilities. Highway 96 is an example of an otherwise stressful street that achieves a low-stress rating due to the adjacent path.

Most streets in downtown Saint Paul are classified as high stress along with arterial streets such as portions of Como Avenue and University Ave W. These streets have too many lanes or traffic traveling too quickly to permit comfortable travel by bicycle, even if a bicycle lane is provided.

While local streets are often considered low stress, this analysis classifies most local segments in Ramsey County as moderate stress. Because the default speed limit is 30 mph, travel speeds are assumed to be too high for users of all ages and abilities to ride in mixed traffic.

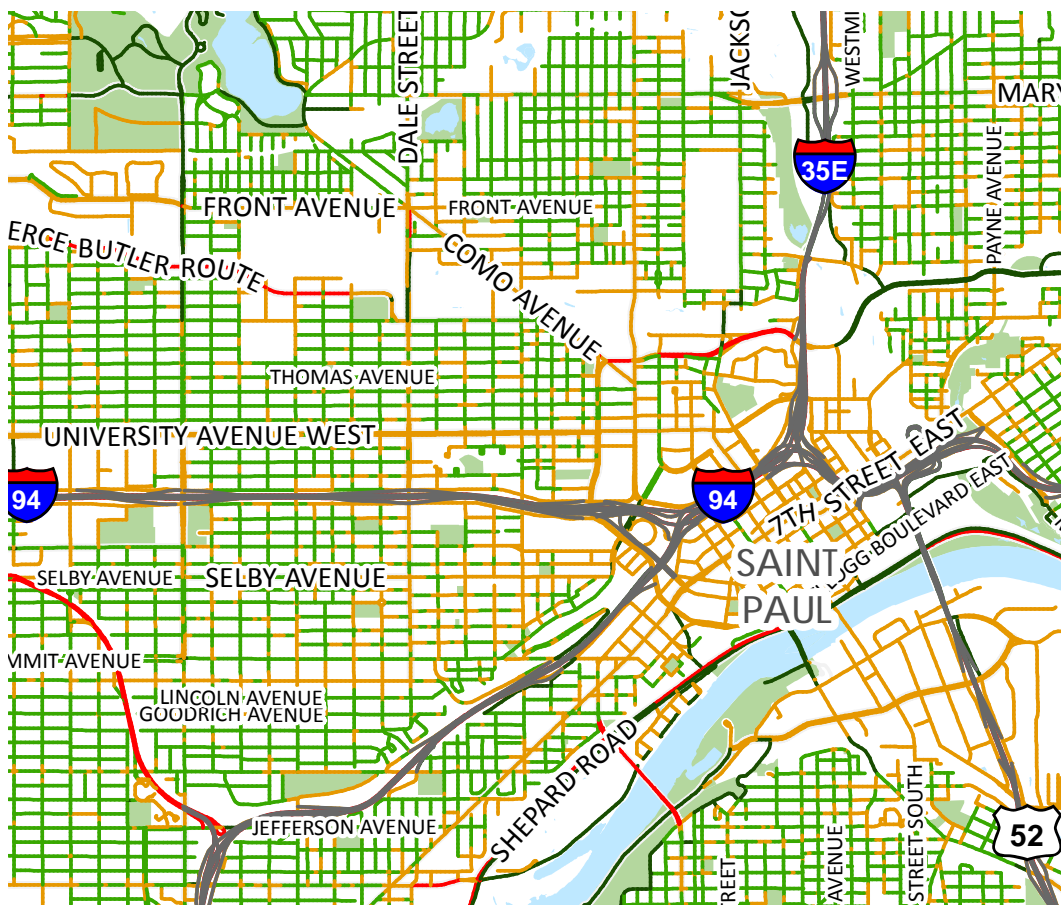
Residential street segments are occasionally classified as low stress when speed limits are below 30 mph. Collector streets such as Fairview Ave S through St. Catherine University are classified as low stress when a wide bicycle lane is present, traffic speeds are low and the roadway configuration includes only one lane in each direction.

Implications to the Future Vision

The results of the bicycle network deficiency analysis help identify gaps in the Connected Ramsey Communities network. If a county-wide network corridor is classified as extreme or high stress, it indicates a segment in need of improvement.

These network deficiency gaps may be present even if a street currently has a bicycle facility provided. Communities may need to upgrade existing facilities to something more comfortable if accessibility for users of all ages and abilities is desired.

In particular, county-wide network connections along local roadways may be considered candidates for speed management treatments and speed limit reductions. Achieving an average operating speed below 20 mph would reduce the difference in speed between bicyclists and motor vehicles and reduce exposure to passing cars. This modification would change the classification to low stress, which is considered suitable for bicyclists of all ages and abilities.



Levels of traffic stress vary from street to street throughout the County; many low volume and low speed streets are appropriate for most cyclists. For the full map, see page [2B-38](#).

Analysis Details and Data

The methods used for the Level of Traffic Stress Analysis were adapted from the 2012 Mineta Transportation Institute (MTI) Report 11-19: Low-Stress Bicycling and Network Connectivity.⁴ The approach outlined in the MTI report uses roadway network data including — posted speed limit, the number of travel lanes, and the presence and character of bicycle lanes — as a proxy for bicyclist comfort level. Road segments are classified into one of four levels of traffic stress based on these factors.

The lowest level of traffic stress 1 (LTS 1), is assigned to roads that would be tolerable for most children to ride and to multi-use paths that are separated from motorized traffic. Level of traffic stress 2 (LTS 2) roads are those that could be comfortably ridden by the mainstream adult population.

The higher levels of traffic stress 3 & 4 (LTS 3 and LTS 4) correspond to types of cyclists characterized by the Four Types of Cyclists framework.⁵ This categorization of cyclist types is accepted throughout the bicycling planning practice across the U.S. Level of traffic stress 3 (LTS 3) is the level assigned to roads that would be acceptable to current “enthused and confident” cyclists and level of traffic stress 4 is assigned to segments that are only acceptable to “strong and fearless” bicyclists, who will tolerate riding on roadways with higher motorized traffic volumes and speeds. The definitions for each level of traffic stress are shown below:

Table 2B-2: Bicycle Deficiency Analysis Scoring and Characteristics

Level of Traffic Stress (LTS)	Description	Suitability	Traffic Speed	Typical Locations
1	Little traffic stress and requires less attention	All cyclists (age 10 or higher)	Low	Residential local streets and separated bike paths/cycle tracks
2	Little traffic stress but requires more attention and skill	Adult cyclists with adequate bike handling skills	Low	Collector-level streets with bike lanes or a central business district
3	Moderate stress	Most observant adult cyclists	Moderate	Low-speed arterials with wide bike lanes or moderate speed roadways with one lane in each direction
4	High stress	Experienced and skilled cyclists	Moderate to high	High-speed or wide roadways with narrow or no bike lanes

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SAFETY

One of the top reasons people cite for not walking and biking more is concern about safety. The threat of collision is real, and 10 years of collision data shows that some places are safer than others. Intersections and streets that have a history of motor vehicle collisions act as barriers to walking and biking. The safety analysis identifies these locations to identify geographic patterns that might be overcome with targeted investments.

Pedestrian Safety Analysis Results

Ramsey County has the highest estimated pedestrian fatality rates in the State of Minnesota.⁶ Clusters of pedestrian involved crashes reveal key corridors with pedestrian safety concerns. These streets tend to combine a large amount of fast moving traffic with a high level of pedestrian activity and often have disastrous results.

Pedestrian Safety Analysis Map Summary

The pedestrian safety analysis identifies streets with a high concentration of crashes involving pedestrians. Segments with multiple crashes are highlighted with increasing intensity and the result shows clear corridors where pedestrian-involved collisions are a frequent occurrence.

Street segments in gray had no reported collisions. The locations of pedestrian fatalities are identified on the map. These locations indicate a potential problem area, although specific analysis of the crash details is necessary to understand the circumstances surrounding the particular incident.

Findings and Notable Results

When displayed visually, clear corridors appear with concerning levels of crashes. These tend to be streets with high volumes of cars and higher levels of pedestrian activity, such as:

- Downtown Saint Paul
- University Avenue W
- Snelling Avenue
- Summit Avenue
- Minnehaha Avenue E
- White Bear Avenue
- US 61 through White Bear Lake

Fatal or Serious Injury Crashes⁷

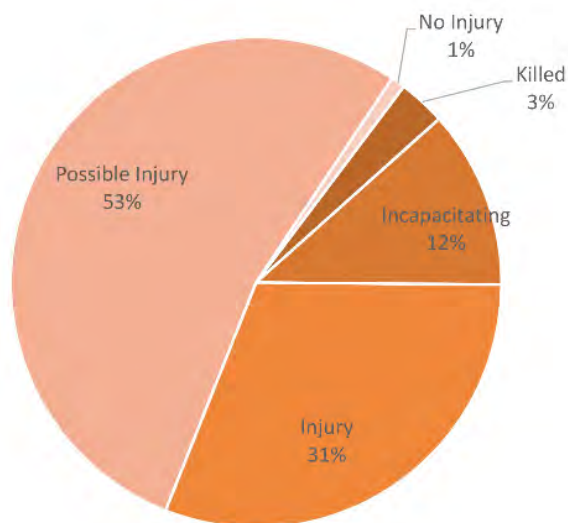
- Most pedestrian crashes resulting in an injury or fatality occurred in St Paul.
- Maplewood and White Bear Lake have the second highest number of pedestrian crashes resulting serious injury or fatality. In these communities, fatal and serious injury pedestrian crashes account for 29 and 26 percent of the community's pedestrian crashes, respectively.
- In Vadnais Heights, over two-thirds of all pedestrian crashes resulted in a fatal or serious injury.

Only **reported** crashes were used in this analysis. These crashes were severe enough to warrant reporting and data collection. Data concerning less severe crashes or near-miss events that may indicate a safety problem is not available and is not included on this map.

The likelihood of a pedestrian fatality is directly tied to the impact speed of a crash. This relationship is well documented nationally and is illustrated by the experiences within Ramsey County communities.

This can be seen based on an analysis of Ramsey County crash data.⁸ On streets with speed limits of 50 mph or below, the rate of fatal or serious injuries in crashes involving pedestrians is under 20%. On streets with speed limits of 55 mph or higher, this number jumps to 40%. It is important to note that the posted speed limit does not indicate the actual travel speed of the motor vehicle involved in the crash.

Injury Level of Pedestrian Involved Crashes in Ramsey County (2004-2014)



Implications to the Future Vision

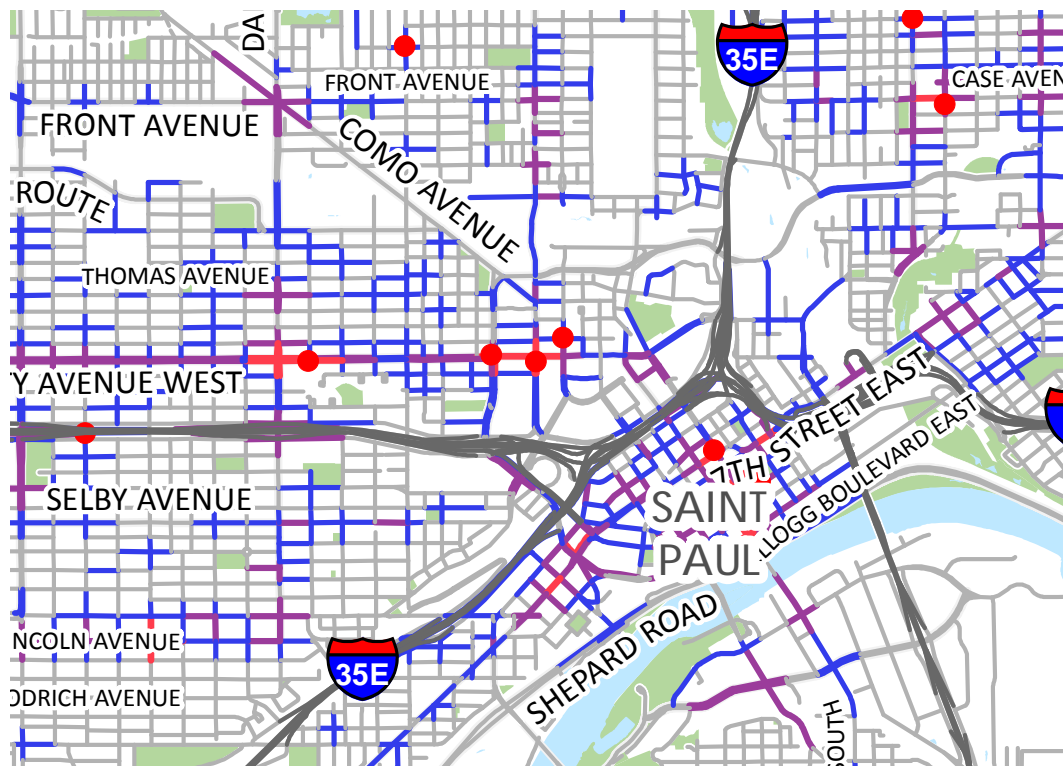
Concern over safety is one of the leading reasons people decide not to walk or bike. This analysis indicates that in some parts of Ramsey County the safety risk is real. Corridors with high levels of crash activity act as barriers to increased walking and local jurisdictions should explore investments to improve pedestrian conditions in these areas.

In some cases, such as University Avenue or Snelling Avenue, the high-crash corridor is a commercial corridor. These areas see high levels of pedestrian activity, and the traffic environment should be improved to reflect a pedestrian-priority. This may include lower design speeds, enhanced marked crossings and improved signal timing at intersections.

Analysis Details and Data

Crash data comes from MnDOT, including crashes from 2004-2014.

A detailed analysis of all pedestrian crashes in Ramsey County is available from MnDOT in the report *Pedestrian Safety: An Exploratory Analysis Minnesota and Ramsey County Preliminary Findings (2009 - 2014)*.⁹



Crashes involving pedestrians occur most frequently on streets with high volumes of cars and higher levels of pedestrian activity, such as in downtown St. Paul. For the full map, see page [2B-39](#).

Bicyclist Safety Analysis Results

It is estimated that Ramsey County has the second highest serious injury rate of bicyclists in the State of Minnesota.¹⁰ Overcoming these unsafe conditions will do much to remove a barrier to increase bicycling. The bicyclist safety analysis identifies those areas and streets where most bicycle involved crashes occur.

Bicyclist Safety Analysis Map Summary

The bicyclist safety analysis identifies streets with a high concentration of crashes involving bicyclists. Segments with multiple crashes are highlighted with increasing intensity, and the result clearly shows corridors where bicyclist-involved collisions are a frequent occurrence.

Street segments in gray had no reported collisions.

The locations of bicyclist fatalities are specifically identified on the map. These locations indicate a potential problem area, although specific analysis of the crash details is necessary to understand the circumstances surrounding the particular incident.

Findings and Notable Results

When the crash history data is displayed visually, clear corridors appear with concerning levels of crashes. Fewer high-crash corridors stand out than did on the pedestrian analysis, but those that do correlate with those identified in the pedestrian analysis:

- University Avenue W
- Snelling Avenue
- Rice Street
- Summit Avenue

Only *reported* crashes were used in this analysis. These crashes were severe enough to warrant reporting and data collection. Data concerning less severe crashes or near-miss events that may indicate a safety problem is not available and is not included on this map.

There were five bicyclist fatalities in Ramsey County within the ten year period examined in this analysis. This dataset is too small to get an accurate understanding of the causes or type of crash that resulted in a bicyclist fatality. To get better understanding, a national study was referred to that analyzed hundreds of bicyclist fatalities. This study identified “rear end” collisions as the major crash type resulting in bicyclist fatality. This information can be used to support facilities such as protected bike lanes, which can reduce rear-end collisions when compared to conventional on-street bike lanes.

Table 2B-3: Crash Type in Bicyclist Fatality Crashes in the United States¹¹

Crash Type	%
Rear End	40%
Cyclist Side/Car Front	11%
T-Hit	10%
Head On	8%
None	7%
Right Hook	6%
Driver Failure to Yield	6%
Other	5%
Sideswipe	4%
Cyclist Failure to Yield	2%

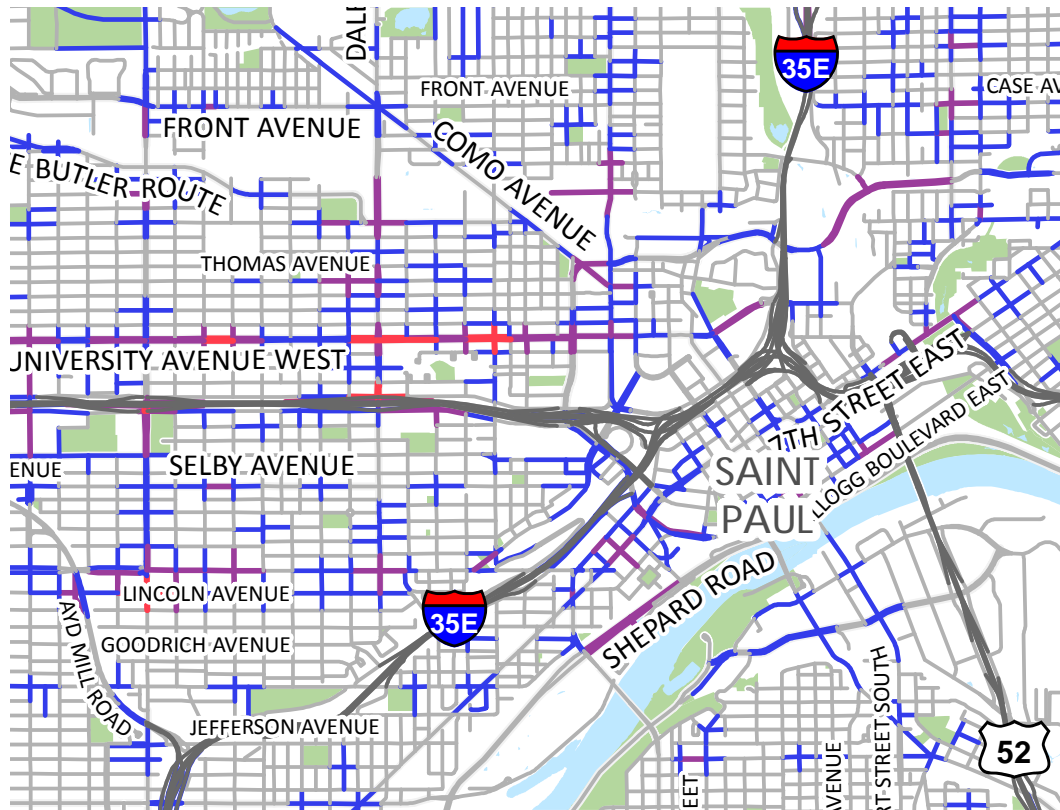
Implications to the Future Vision

The Connected Ramsey Communities Network has an opportunity to overcome the barriers of high-crash corridors. The network alignments can act as a bridge across these high crash areas, or if they run along them, can transform the safety of an entire corridor.

Even if a high-crash corridor is not a part of the county-wide network, local communities will see benefits from removing risks and improving safety for the most vulnerable users of these roads.

Analysis Details and Data

Crash data comes from MnDOT, including crashes from 2004-2014.¹²



Crashes involving cyclists occur most frequently on streets with high volumes of cars and higher levels of bicycle activity, such as in downtown St. Paul. For the full map, see page [2B-40](#).

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EQUITY

Good transportation is vital for access to activities and essential services that are needed to fully participate in society.

In automobile dependent communities, people who do not have the ability to drive or do not have access to vehicles can be at a great economic and social disadvantage. Forty percent of Minnesotans are not able to drive due to youth, old age, income or disability.¹³

Communities without adequate quality and quantity of transportation, including facilities for bicycling and walking, place residents at a distinct disadvantage when trying to access jobs, school, medical services and other daily needs.

Equity in transportation planning looks to more fairly distribute resources, particularly to those who have the least access to critical resources, including jobs, education, affordable housing, health care resources and other destinations important to daily life. When using an equity lens, it is possible to identify where transportation investments can improve health and accessibility for populations in need, including low-income households, communities of color and people with disabilities.

Many factors in the built environment contribute to the inequitable distribution and availability of resources to populations including the inadequate distribution, accessibility and quality of biking and walking facilities, the concentration and limitation of affordable housing options and the construction of high speed, high volume roads through low-income neighborhoods. Communities of color and low income residents are disproportionately represented in pedestrian and bicycle crashes and are at the highest risk.

Inequitable distribution of resources impacts vulnerable populations, through increased travel costs, worse health outcomes and higher health care costs and decreased accessibility and mobility.¹⁴

Equity Analysis Results

Understanding where and how particularly vulnerable populations live is an important aspect to any transportation planning process.

Equity Analysis Map Summary

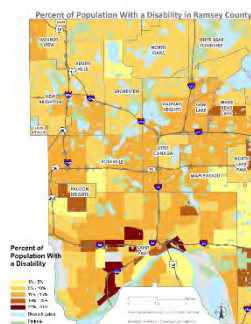
The equity analysis map presents the equity population concentration of a particular street segment, displayed in increasing intensity as the degree of concentration increases. General intensity is noticeable in the central core of Ramsey County, but clusters of equity population concentrations are spread across the county. These clusters tend to be in the commercial core areas of each community.

Based on a Ramsey County-specific subset of MnDOT recommendations for priority populations, the equity index creates a consolidated map of concentrations of these populations in Ramsey County. This score is generated as a combination of four primary equity populations:

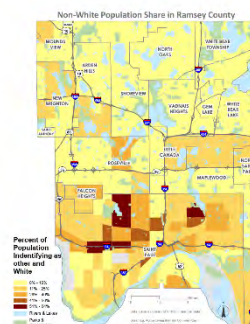
- Disabled population
- Non-white population
- Youth population
- Population in poverty

These maps are displayed in detail in the **State of Walking and Biking Environment Report**, and reproduced as thumbnails below.

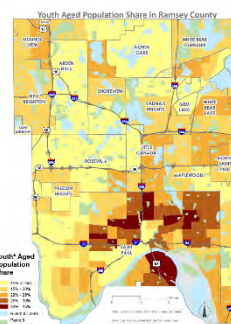
Population with a Disability



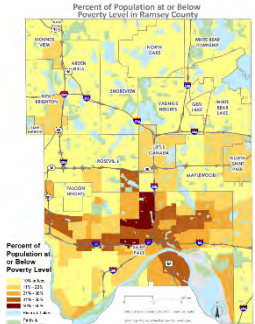
Non-White Population



Youth Aged Population



Population Living in Poverty



Findings and Notable Results

Outside of Saint Paul, some communities stand out with more significant concentrations of equity populations:

- Mounds View
- White Bear Township
- Roseville
- Falcon Heights
- Maplewood
- North Saint Paul

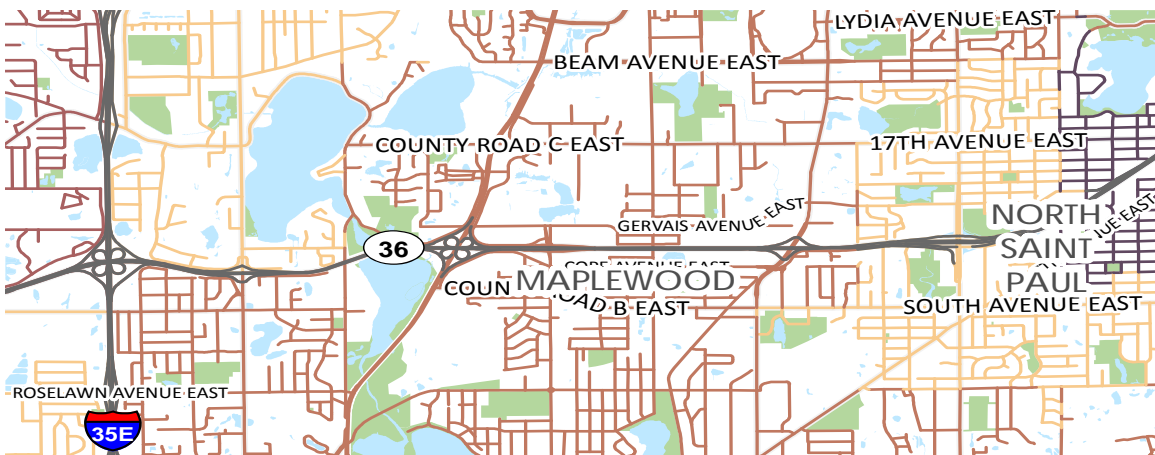
Implications to the Future Vision

The Connected Ramsey Community network must connect the residents most in need of active transportation facilities. By distributing the network equitably across the county and connecting into the core of equity population concentration areas, the county-wide network can function as a lifeline for regional travel.

The information in this analysis can be used along with the other analysis areas to evaluate and prioritize alignments along the Connected Ramsey Communities Network.

Analysis Details and Data

Data used for the equity analysis was Census Bureau American Community Survey 2013 5-year estimate data.¹⁵ Data was retrieved at the tract level and mapped down to individual street segments for analysis purposes. It is important to note that this represents the demographics of the overall tract-level area where the street segment is located, it does not show the level of population concentration for the street segment itself.



High concentrations of equity populations live in North St. Paul and Maplewood. For the full map, see page [2B-41](#).

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SYSTEM ANALYSIS CONCLUSIONS

Combining the four analysis areas results in a composite system analysis. The resulting hot spots identify network and service gaps where improvements may be needed the most.

To interpret the resulting maps, it may be necessary to refer back to the specific analysis areas. A particular hot-spot might arise due to a strong crash history in a particular location, or perhaps due to a high concentration of target equity populations. Understanding the reason for the hot spot can orient agencies and jurisdictions toward an appropriate response.

On these maps, all indices have been given 'equal' weighting. The particular balance should be adjusted to reflect the goals and objectives of the plan, and communities referencing this analysis should always review the individual index layers themselves to understand what factor may be influencing the final priority scoring.

Pedestrian and Bicycle System Analysis Results

Combining all levels of the system analysis reveals the areas that rank highest across each analysis area. The highest scoring locations combine high population densities and high concentrations of equity populations with a poor safety record and lower quality facilities. Improving these areas can do the most good for the most people.

Pedestrian and Bicycle System Analysis Map Summary

The system analysis maps presents the overall combined results of all previous analysis areas. Each street is ranked from low to high, representing the overall level of population demand and facility need. Moderate scores on this map, such as North Saint Paul or Roseville, indicate that an area may have scored highly on one analysis, but not on another. High scores, such as downtown Saint Paul, indicate an area that scores highly in many analysis areas.

Findings and Notable Results

Downtown Saint Paul stands out as the highest ranking area in the overall system analysis. The downtown core ranks highly across every analysis area, and improvements there would benefit many people and improve currently inadequate conditions.

Differences in Pedestrian and Bicycle Results

In general, the system analysis results for the bicycle system match those for the pedestrian system. This is because of the similar conditions and factors used for each mode. Some factors, such as a population density and equity concentration, are identical in the analysis for each mode. The safety analysis is unique for bicyclists or pedestrians, but the overall concentration of crashes involving these users tends to be clustered around the same areas and streets.

Areas ranked slightly higher on the bicycle system analysis are:

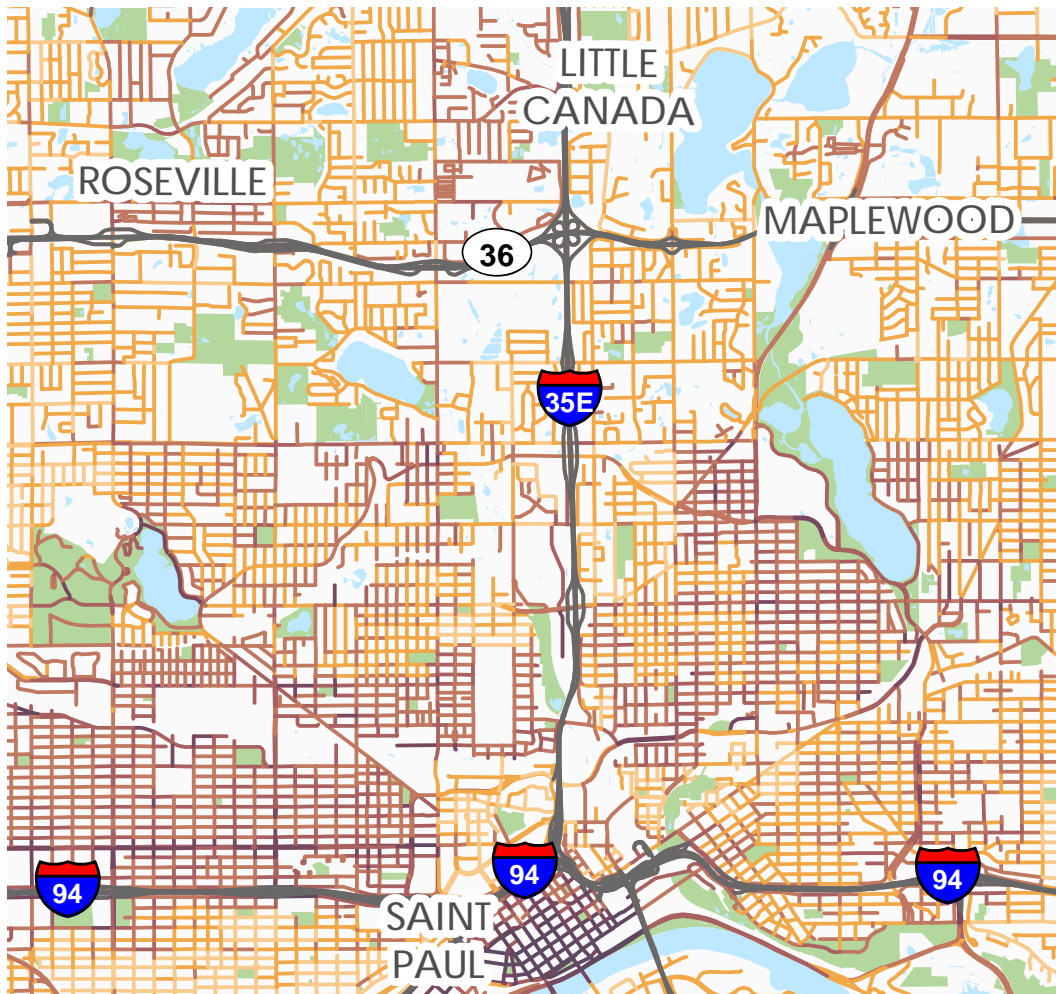
- Northern neighborhoods in Saint Paul
- The Highland neighborhood in Saint Paul
- The Baker-Annapolis neighborhood in Saint Paul

Areas ranked slightly higher on the pedestrian system analysis are:

- Little Canada
- Roseville
- Neighborhoods south of White Bear Lake

Implications to the Future Vision

This overall system analysis can be used to identify prioritization of Connected Ramsey Communities corridors or to focus local efforts for improvements to the walking environment.

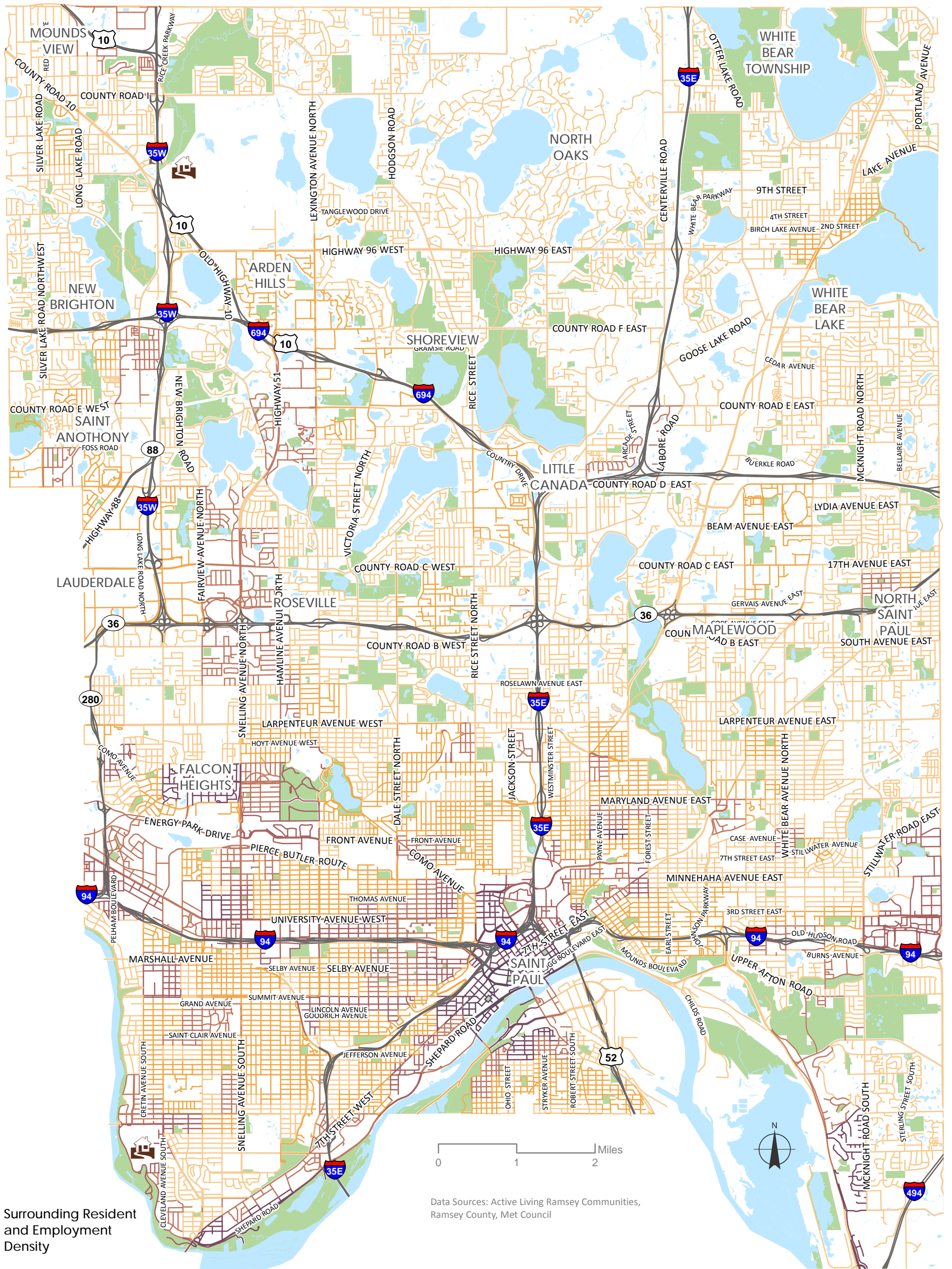


Maps were created for both the pedestrian and bicycle system analysis, which illustrate the differences in the two systems. For the full maps, see pages [2B-39](#) and [2B-40](#).

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Map 2B-1: Activity Concentration Analysis Results

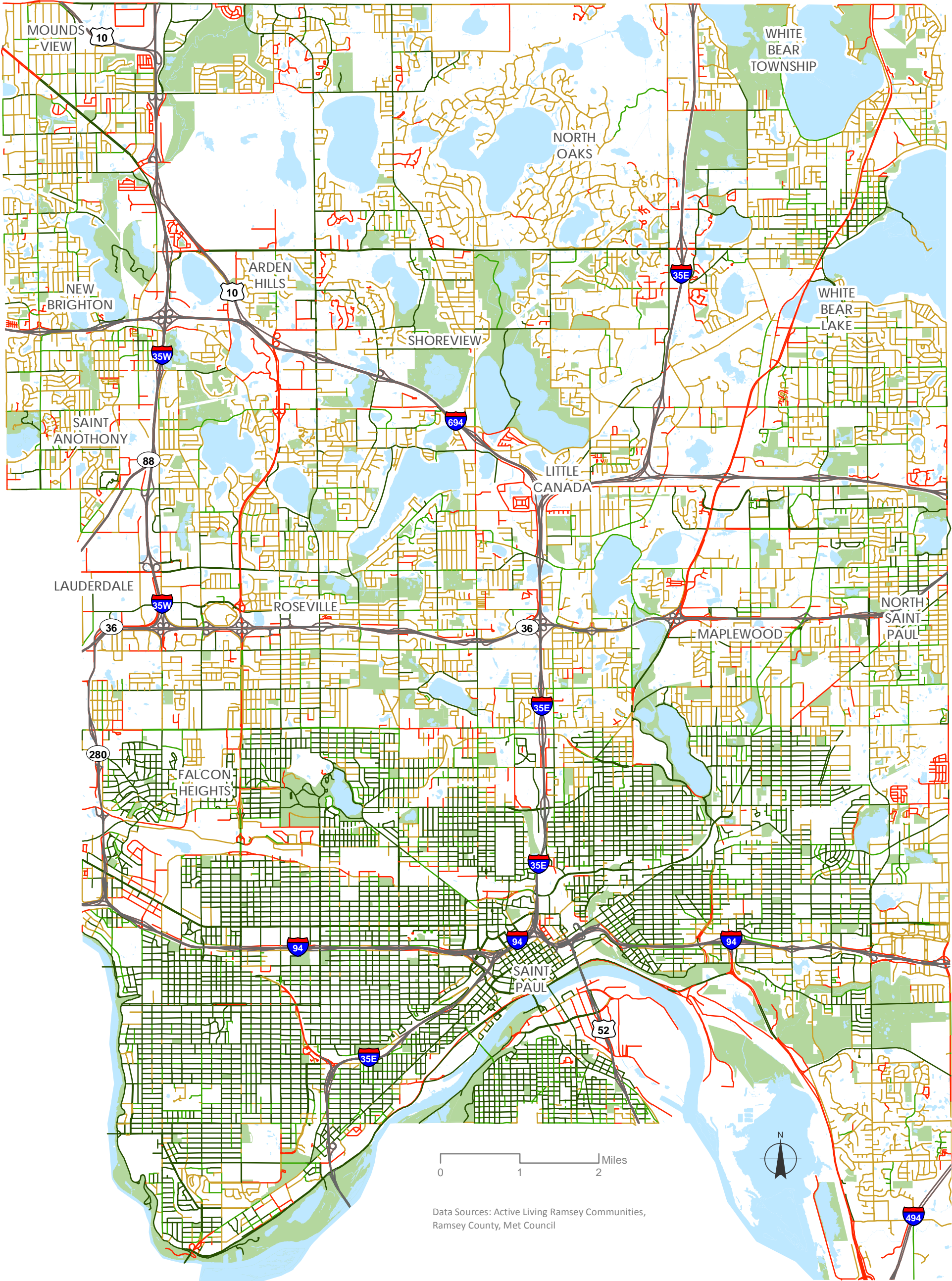


0 1 2 Miles

Data Sources: Active Living Ramsey Communities, Ramsey County, Met Council

- Surrounding Resident and Employment Density
- Lower Density
 - Higher Density
 - Rivers & Lakes
 - Parks & Greenspace
 - Future Development Area

Map 2B-2: Pedestrian Network Deficiency Analysis Results



Pedestrian Level of Service Results

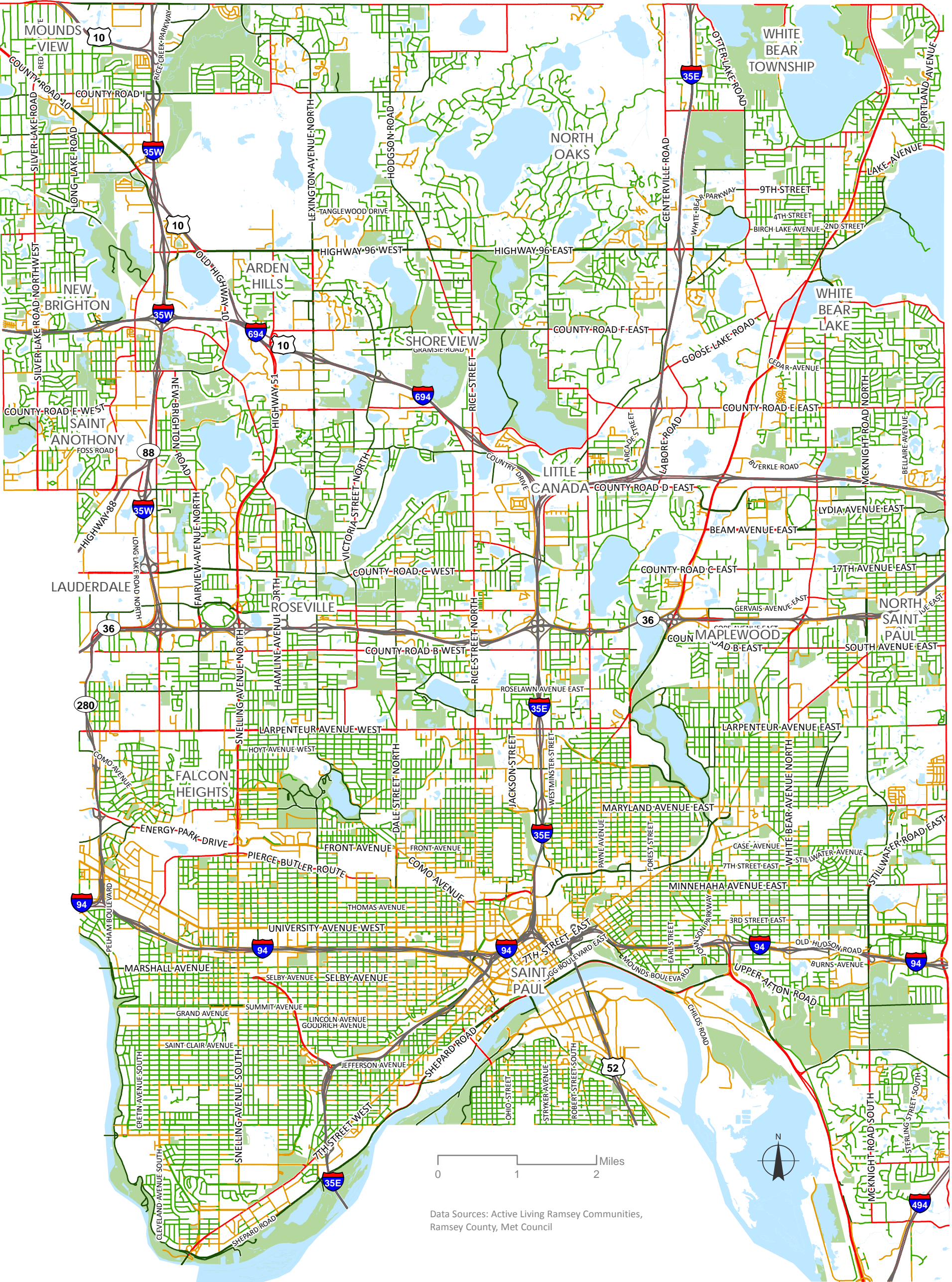
Lower Stress

Higher Stress

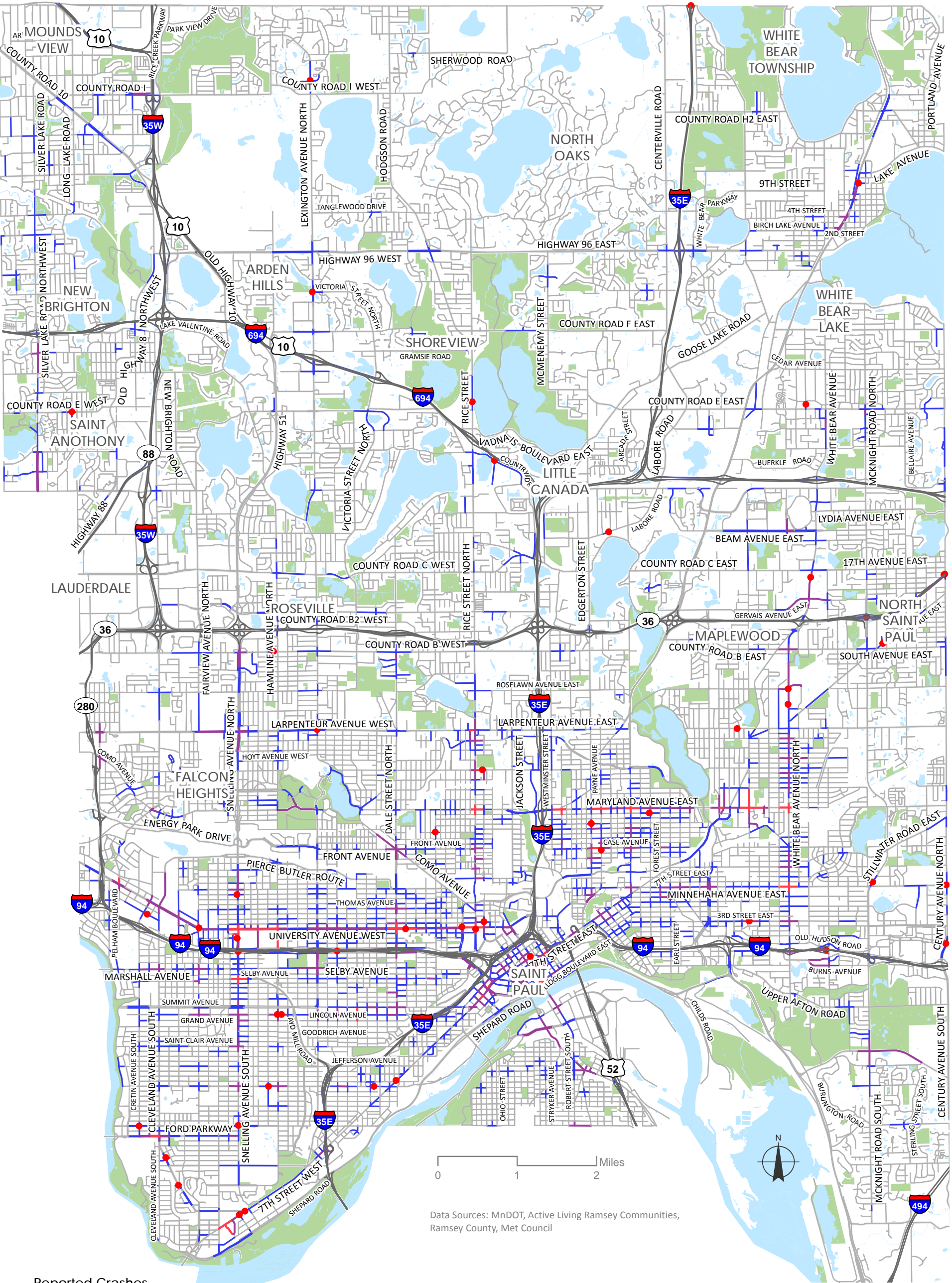
Rivers & Lakes

Parks & Greenspace

Map 2B-3: Bicycle Network Deficiency Analysis Results

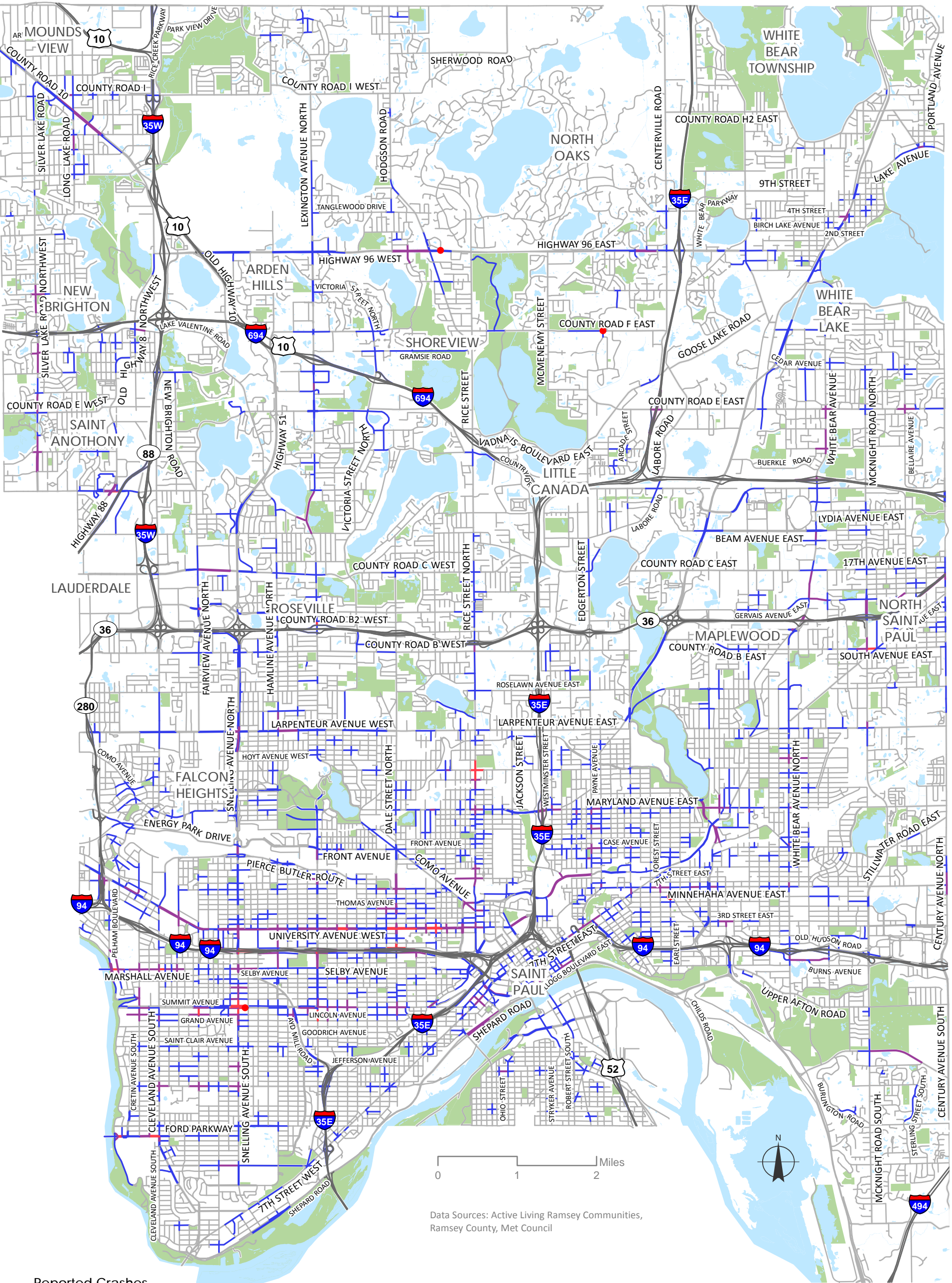


Map 2B-4: Pedestrian Safety Analysis Results

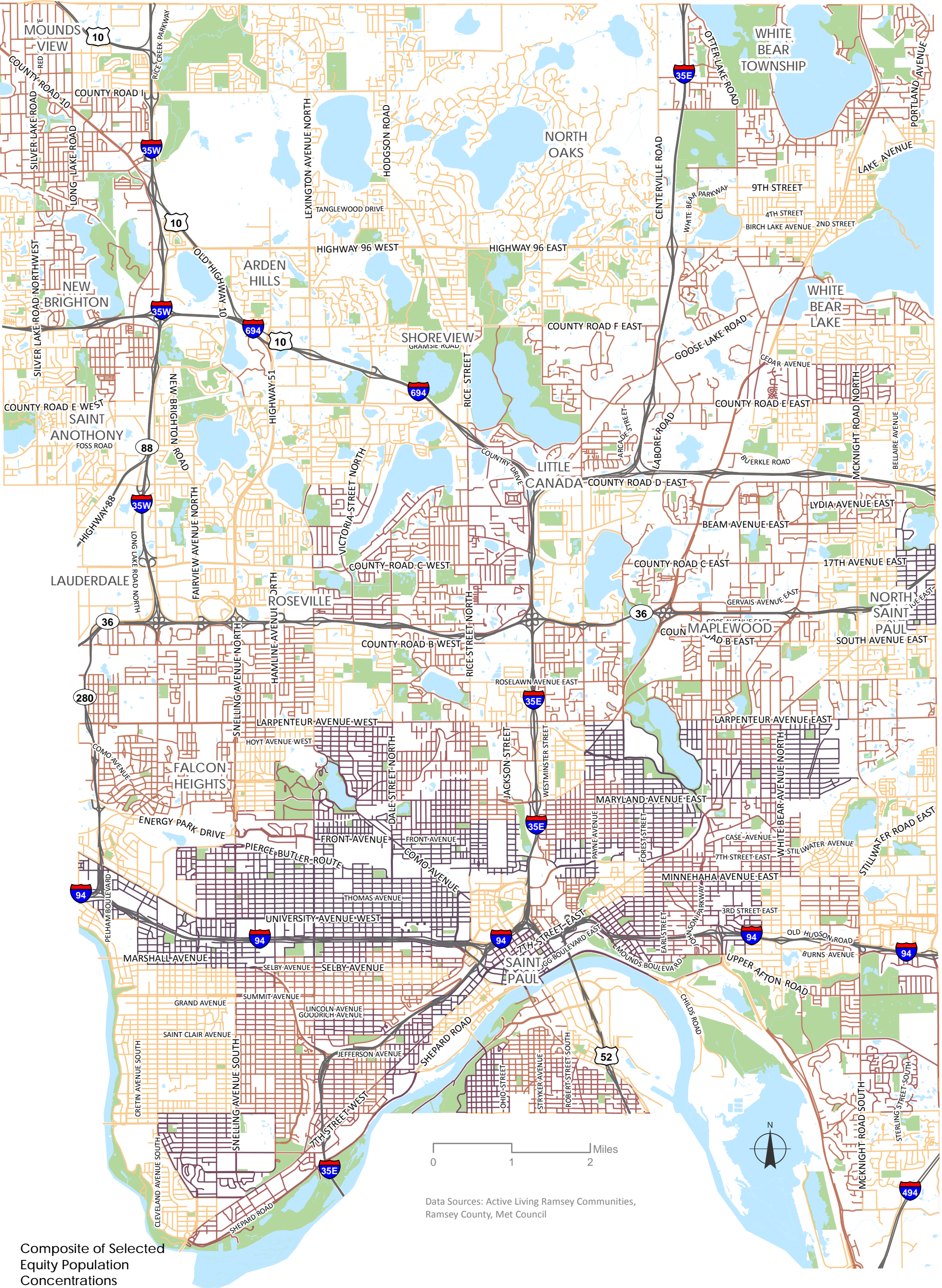


Data Sources: MnDOT, Active Living Ramsey Communities, Ramsey County, Met Council

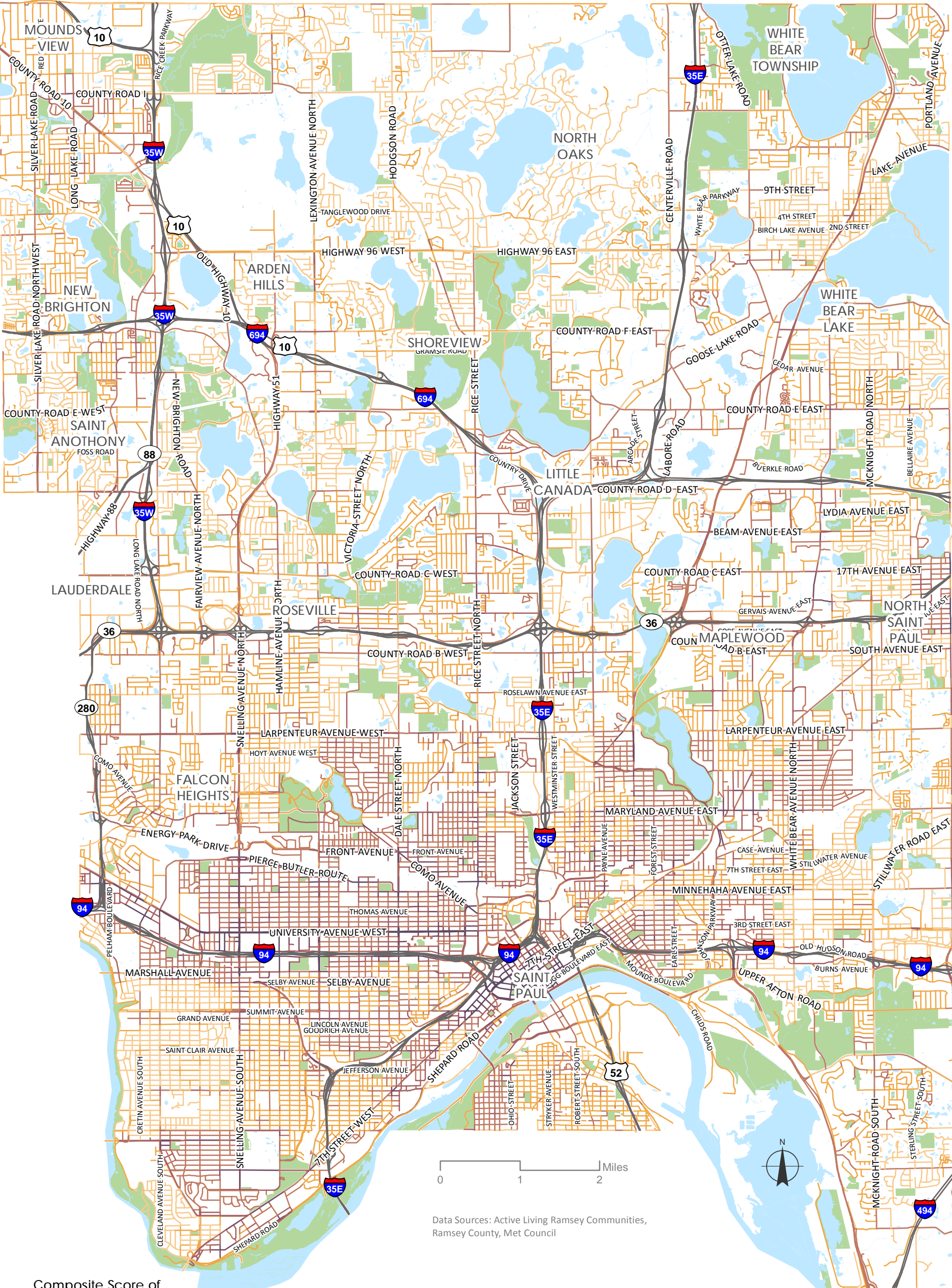
Map 2B-5: Bicycle Safety Analysis Results



Map 2B-6: Equity Analysis Results



Map 2B-7: Bicycle System Analysis



Map 2B-8: Pedestrian System Analysis

