City of Novi Non-motorized Master Plan
DRAFT Inventory and Analysis
September 7, 2010

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Existing Conditions and Analysis

This information is used to assess the state of the existing pedestrian and bicycle facilities. It is also used to help determine potential non-motorized facilities and to support recommendations.

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- Bicycle and Pedestrian Crash Locations
- Pedestrian Crash Data
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Potential Facilities Analysis

This analysis evaluates what is possible or appropriate, but should not be confused with recommendations.

- Potential Near-term Road Conversions
- Potential Neighborhood Connectors and Off-Road Trails

Relative Demand Analysis

This is a parcel based grid analysis that evaluates population density, land use diversity, activity generators and connectivity. This analysis helps to identify where there is demand for pedestrian and bicycle use and is used to help prioritize improvements.
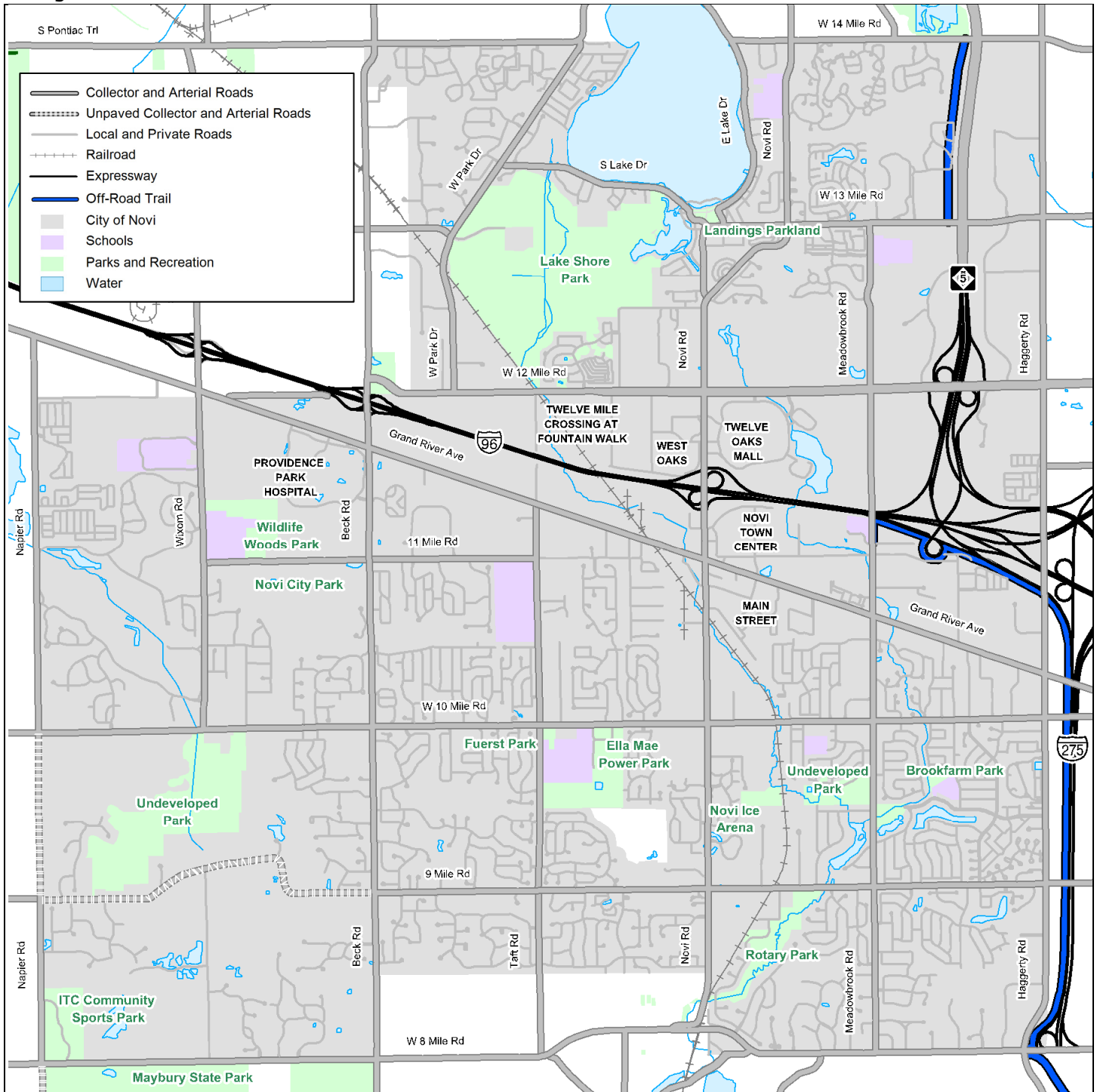
- Relative Demand Analysis Components:
    - Population Density
    - Land Use Diversity
    - Activity Generators
    - Connectivity
- Relative Demand Analysis

Comparative Demand Analysis

This analysis identifies where there is demand and deficiency for pedestrian and bicycle facilities and is used to help prioritize improvements

- Neighborhood Connectors Location Analysis
- Neighborhood Connectors Impact on Large Blocks
- Demand for Road Crossing Improvements
- Degree of Road Crossing Improvements

Project Overview

The map includes the following legend:

- Collector and Arterial Roads
- Unpaved Collector and Arterial Roads
- Local and Private Roads
- Railroad
- Expressway
- Off-Road Trail
- City of Novi
- Schools
- Parks and Recreation
- Water

Map labels include: S Pontiac Trl, W 14 Mile Rd, W Park Dr, S Lake Dr, E Lake Dr, Novi Rd, W 13 Mile Rd, Landings Parkland, Lake Shore Park, Meadowbrook Rd, Haggerty Rd, W 12 Mile Rd, W Park Dr, TWELVE MILE CROSSING AT FOUNTAIN WALK, WEST OAKS, TWELVE OAKS MALL, Grand River Ave, PROVIDENCE PARK HOSPITAL, Napier Rd, Wixom Rd, Beck Rd, Wildlife Woods Park, 11 Mile Rd, NOVI TOWN CENTER, Novi City Park, MAIN STREET, Grand River Ave, I-275, W 10 Mile Rd, Fuerst Park, Ella Mae Power Park, Undeveloped Park, Brookfarm Park, Undeveloped Park, Novi Ice Arena, 9 Mile Rd, Beck Rd, Taft Rd, Novi Rd, Rotary Park, Meadowbrook Rd, Haggerty Rd, Napier Rd, ITC Community Sports Park, W 8 Mile Rd, Maybury State Park

Population: currently estimated to be 52, 231 (city special census 2007)

Size: Over 30 Square Miles

Scale: 0   1/4   1/2   1   MILES
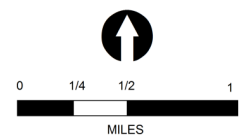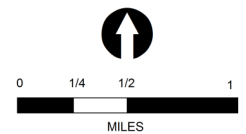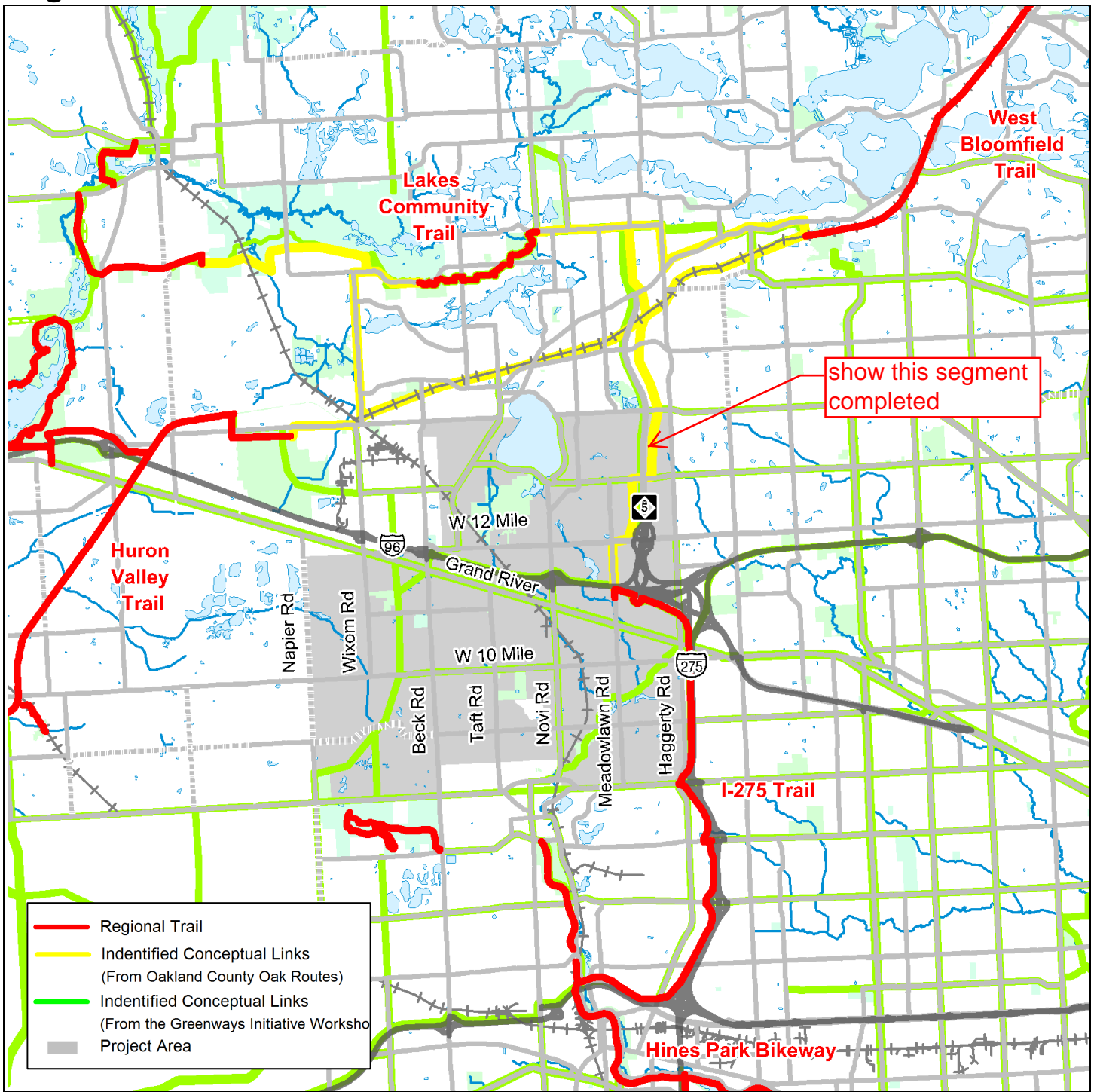
Existing Non-motorized Facilities Inventory
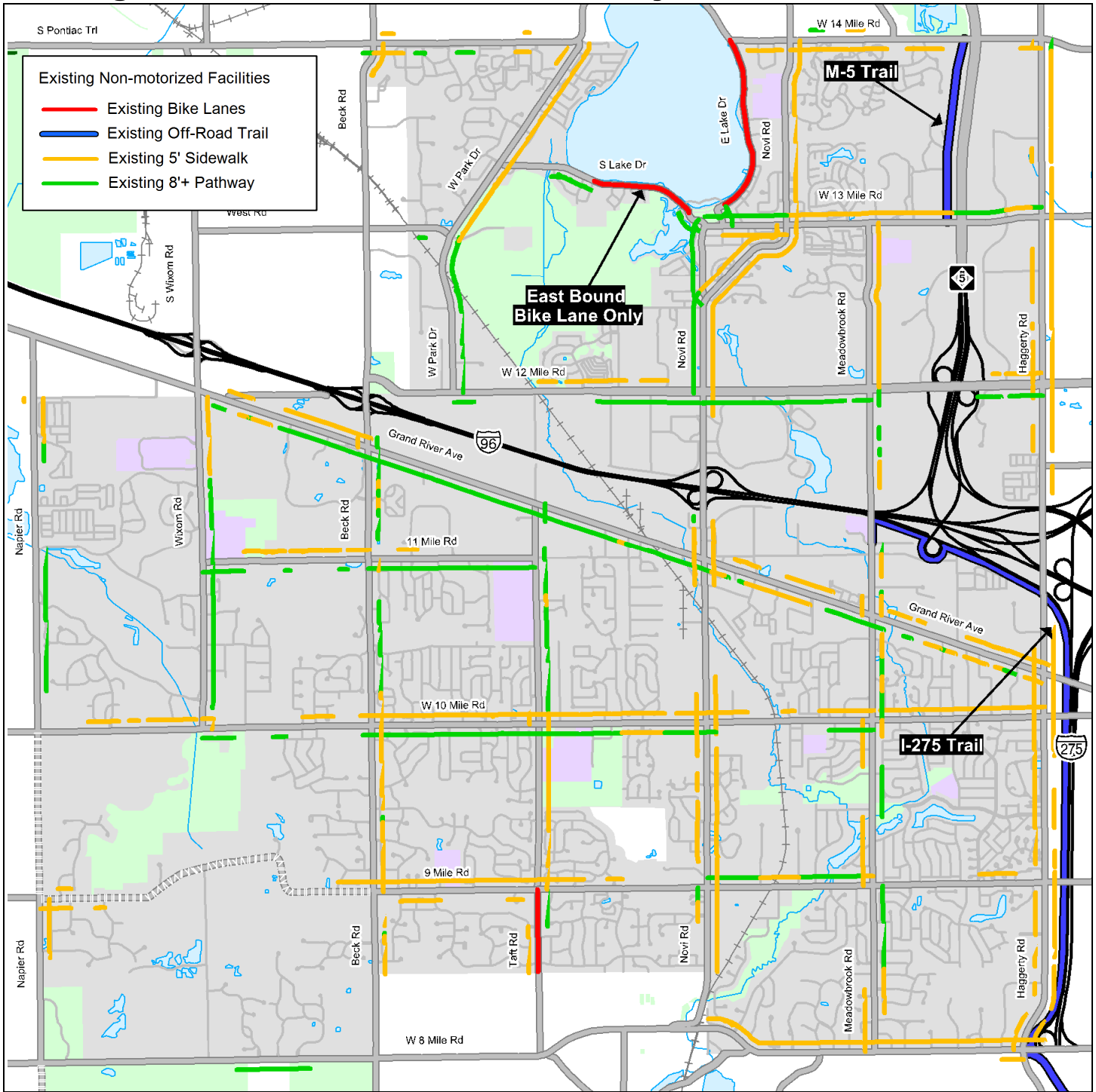
The I-275 Trail is a 40 mile bikeway that links communities in Wayne, Oakland and Monroe counties. The trail terminates at Meadowbrook Road just to the south to the I-96 expressway. The M-5 Trail was just recently built in 2010 with plans to extend north along M-5.

Regional Trails Overview

West Bloomfield Trail

Lakes Community Trail

show this segment completed

Huron Valley Trail

Napier Rd

Wixom Rd

W 12 Mile

96

Grand River

W 10 Mile

Beck Rd

Taft Rd

Novi Rd

Meadowlawn Rd

Haggerty Rd

275

I-275 Trail

Hines Park Bikeway

Legend:
- Regional Trail
- Indentified Conceptual Links (From Oakland County Oak Routes)
- Indentified Conceptual Links (From the Greenways Initiative Worksho
- Project Area

0   1/4   1/2   1
MILES

The existing I-275 Trail and under development M-5 run up the eastern boarder of the city. When completed it will provide a key link between the extensive regional trail system to the south and the proposed cross state trail to the north. The ITC corridor that generally runs north-south between Wixom Road and Beck Road between Maybury State Park and just east of Lyon Oaks County Park has the potential to link to key regional parks to the residents.
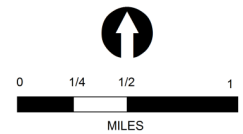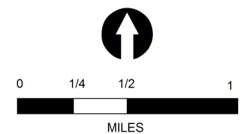
Bicycle and Pedestrian Crash Locations
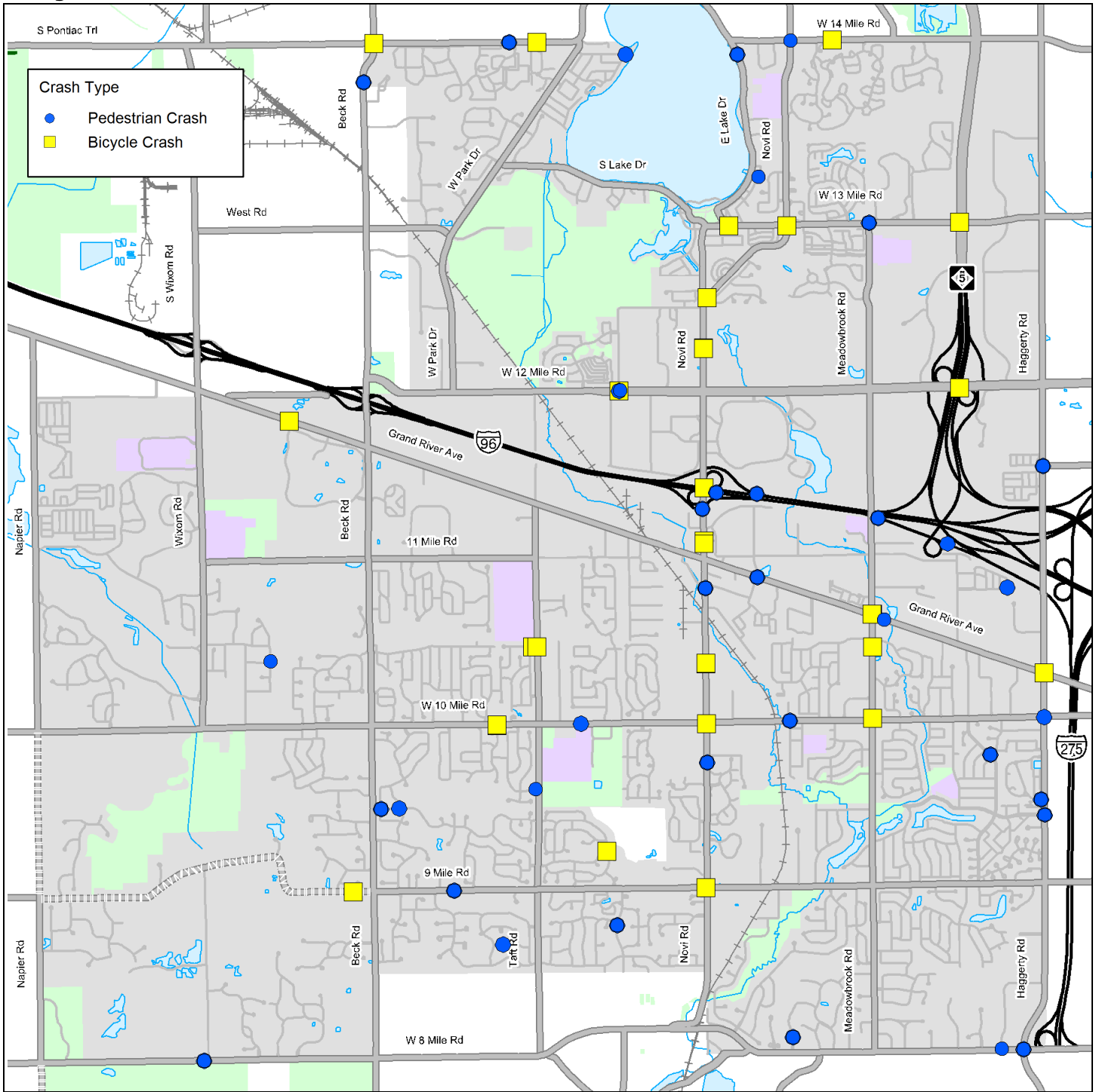
The crashes shown are from a five year period, 2004 – 2009.

There were 31 bicycle involved crashes, none were fatal and six resulted in serious injury.   Drinking or drug use was involved in 1 of the crashes.   There was no traffic control at 38% of the crashes; a signal was present at 43% and a stop sign at 19% of the locations.
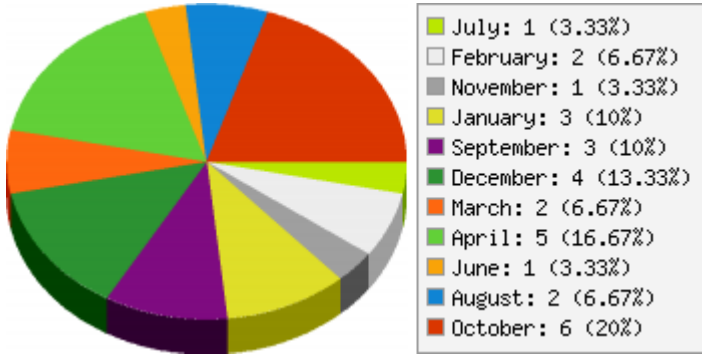
There were 30 pedestrian involved crashes, none were fatal and ten resulted in serious injuries. Drinking or drug use was involved in 3 of the crashes. There was no traffic control at 70% of the crash locations.

The Michigan Traffic Crash Fact website was the source of the data and charts.
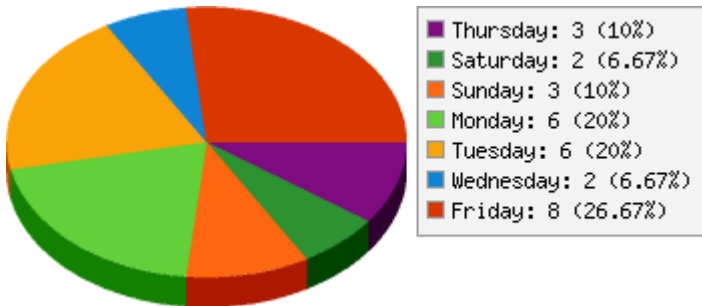
Pedestrian Crash Data

Month of Crash
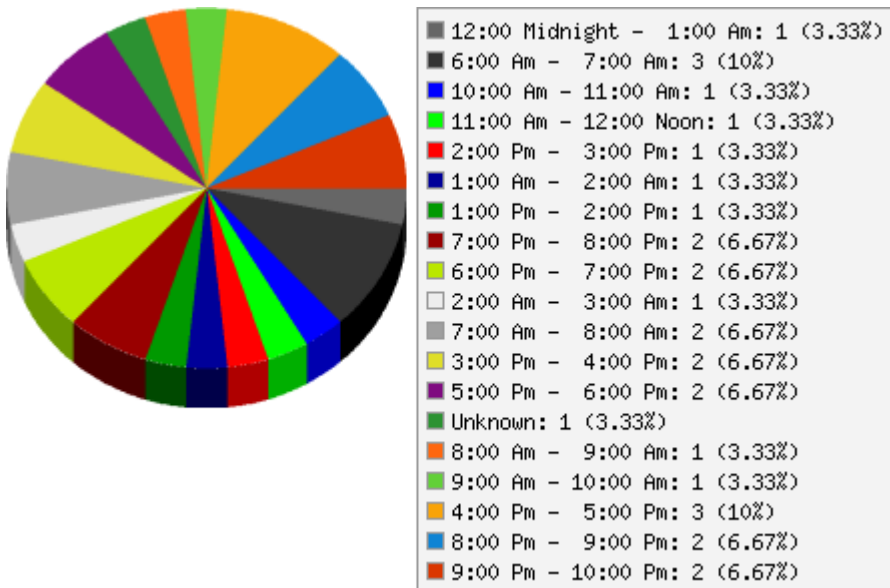Pedestrian crashes occurred in every month except February.

- July: 1 (3.33%)
- February: 2 (6.67%)
- November: 1 (3.33%)
- January: 3 (10%)
- September: 3 (10%)
- December: 4 (13.33%)
- March: 2 (6.67%)
- April: 5 (16.67%)
- June: 1 (3.33%)
- August: 2 (6.67%)
- October: 6 (20%)

Day of Week
Crashes took place on every day of the week with the most occurring on a Friday.

- Thursday: 3 (10%)
- Saturday: 2 (6.67%)
- Sunday: 3 (10%)
- Monday: 6 (20%)
- Tuesday: 6 (20%)
- Wednesday: 2 (6.67%)
- Friday: 8 (26.67%)

Time of Day
All but one crash took place between 6:00 AM and 10 PM. Half the crashes took place during daylight, 7% took place during dawn and 40% took place in the dark (3% was not coded).
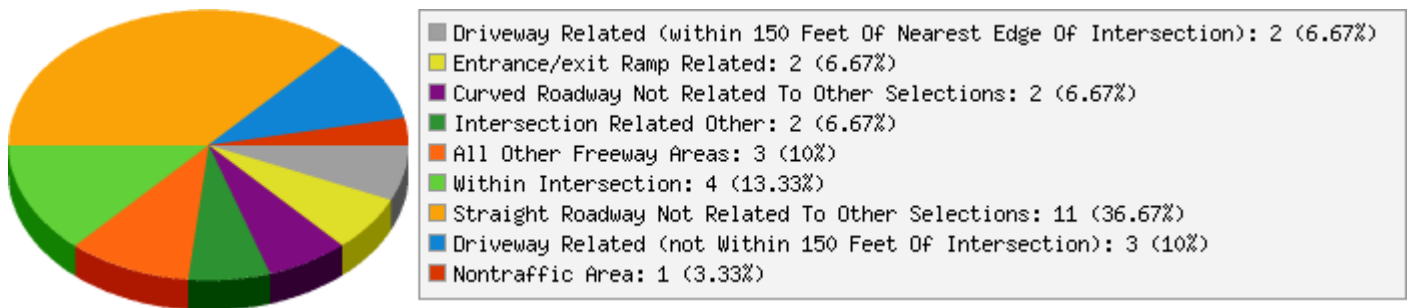

- 12:00 Midnight – 1:00 Am: 1 (3.33%)
- 6:00 Am – 7:00 Am: 3 (10%)
- 10:00 Am – 11:00 Am: 1 (3.33%)
- 11:00 Am – 12:00 Noon: 1 (3.33%)
- 2:00 Pm – 3:00 Pm: 1 (3.33%)
- 1:00 Am – 2:00 Am: 1 (3.33%)
- 1:00 Pm – 2:00 Pm: 1 (3.33%)
- 7:00 Pm – 8:00 Pm: 2 (6.67%)
- 6:00 Pm – 7:00 Pm: 2 (6.67%)
- 2:00 Am – 3:00 Am: 1 (3.33%)
- 7:00 Am – 8:00 Am: 2 (6.67%)
- 3:00 Pm – 4:00 Pm: 2 (6.67%)
- 5:00 Pm – 6:00 Pm: 2 (6.67%)
- Unknown: 1 (3.33%)
- 8:00 Am – 9:00 Am: 1 (3.33%)
- 9:00 Am – 10:00 Am: 1 (3.33%)
- 4:00 Pm – 5:00 Pm: 3 (10%)
- 8:00 Pm – 9:00 Pm: 2 (6.67%)
- 9:00 Pm – 10:00 Pm: 2 (6.67%)

Road Conditions

Wet, Snowy or Icy roads were a factor in about half the crashes.

- Other/unknown: 1 (3.33%)
- Snowy: 4 (13.33%)
- Dry: 12 (40%)
- Wet: 10 (33.33%)
- Icy: 1 (3.33%)
- Uncoded & Errors: 2 (6.67%)
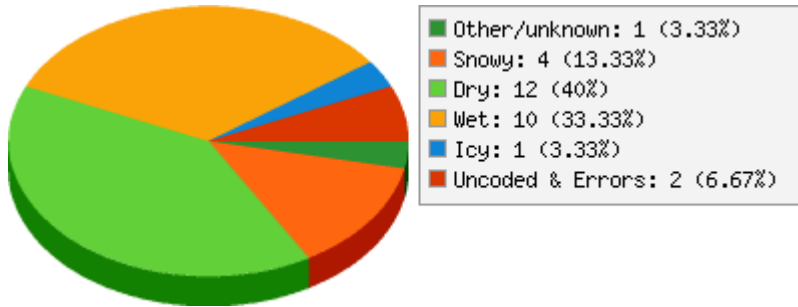
Area of Road at Crash

43% of the crashes are related to an intersection or driveway.

- Driveway Related (within 150 Feet Of Nearest Edge Of Intersection): 2 (6.67%)
- Entrance/exit Ramp Related: 2 (6.67%)
- Curved Roadway Not Related To Other Selections: 2 (6.67%)
- Intersection Related Other: 2 (6.67%)
- All Other Freeway Areas: 3 (10%)
- Within Intersection: 4 (13.33%)
- Straight Roadway Not Related To Other Selections: 11 (36.67%)
- Driveway Related (not Within 150 Feet Of Intersection): 3 (10%)
- Nontraffic Area: 1 (3.33%)

Relation to Roadway

70% of the crashes took place on the roadway.

- Other/unknown Relationship: 1 (3.33%)
- On The Shoulder: 3 (10%)
- Uncoded & Errors: 3 (10%)
- On The Road: 21 (70%)
- Outside Of The Shoulder/curb-line: 2 (6.67%)
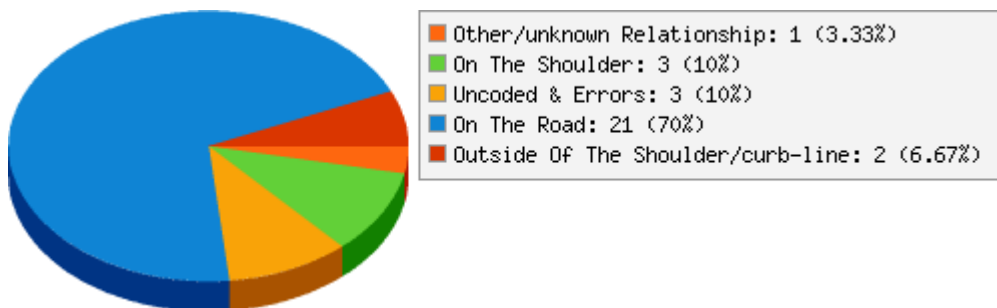
Bicycle Crash Data

Month of Crash
There were no crashes during the months of December, January, February and March. This is likely due to fewer bicyclists during the winter months and that winter bicyclists are more experienced bicyclists.

■	November: 1 (4.76%)
■	March: 1 (4.76%)
■	June: 3 (14.29%)
■	September: 2 (9.52%)
■	October: 2 (9.52%)
■	April: 2 (9.52%)
■	May: 3 (14.29%)
■	August: 7 (33.33%)
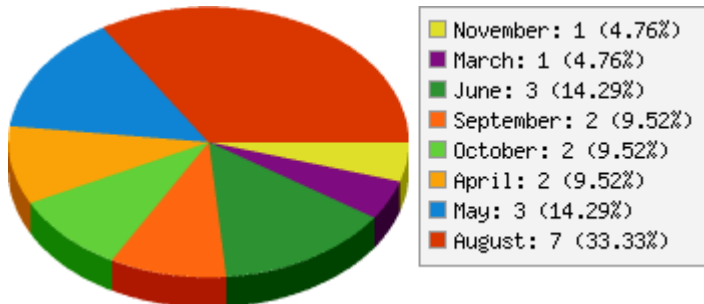
Day of Week
Crashes were evenly distributed throughout the week.

■	Wednesday: 3 (14.29%)
■	Thursday: 3 (14.29%)
■	Saturday: 2 (9.52%)
■	Tuesday: 3 (14.29%)
■	Friday: 2 (9.52%)
■	Sunday: 4 (19.05%)
■	Monday: 4 (19.05%)
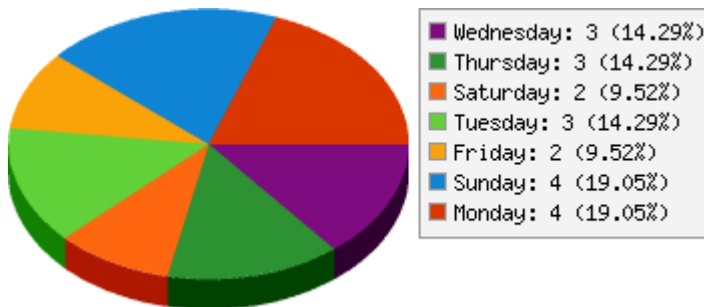
Time of Day
The crashes took place between 7:00 AM and 10 PM. 81% of the crashes took place in daylight, 5% at dusk and 10% took place when it was dark (9% was not coded).

■	2:00 Pm – 3:00 Pm: 1 (4.76%)
■	6:00 Pm – 7:00 Pm: 1 (4.76%)
□	9:00 Pm – 10:00 Pm: 1 (4.76%)
■	7:00 Am – 8:00 Am: 3 (14.29%)
■	8:00 Am – 9:00 Am: 1 (4.76%)
■	10:00 Pm – 11:00 Pm: 1 (4.76%)
■	Unknown: 1 (4.76%)
■	7:00 Pm – 8:00 Pm: 1 (4.76%)
■	8:00 Pm – 9:00 Pm: 1 (4.76%)
■	3:00 Pm – 4:00 Pm: 3 (14.29%)
■	4:00 Pm – 5:00 Pm: 3 (14.29%)
■	5:00 Pm – 6:00 Pm: 4 (19.05%)
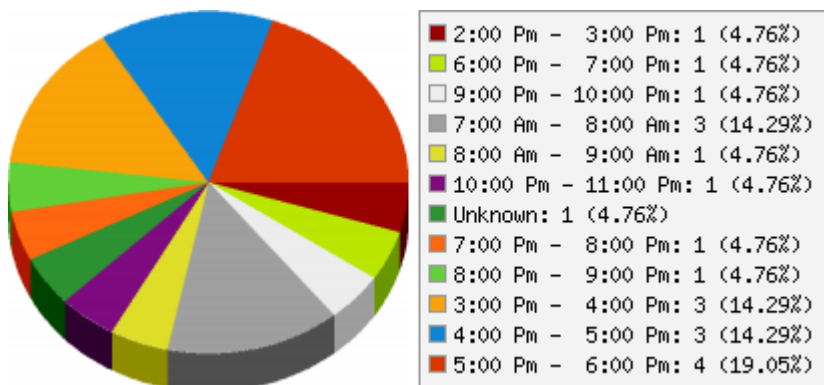
Road Conditions

The road was dry for 80% of the crashes.

Wet: 1 (4.76%)
Other/unknown: 3 (14.29%)
Dry: 17 (80.95%)
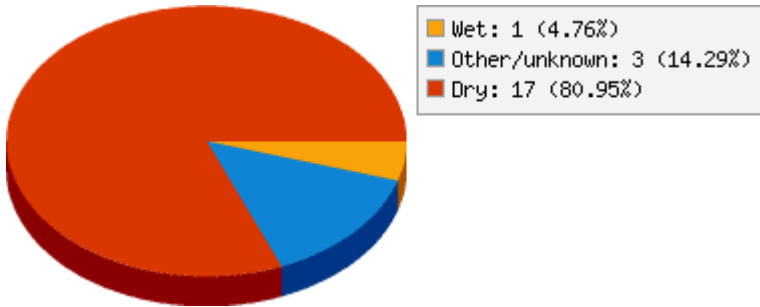
Area of Road at Crash

67% of the crashes were related to a driveway or intersection.

Driveway Related (within 150 Feet Of Nearest Edge Of Intersection): 2 (9.52%)
Within Intersection: 5 (23.81%)
Driveway Related (not Within 150 Feet Of Intersection): 2 (9.52%)
Intersection Related Other: 5 (23.81%)
Straight Roadway Not Related To Other Selections: 7 (33.33%)
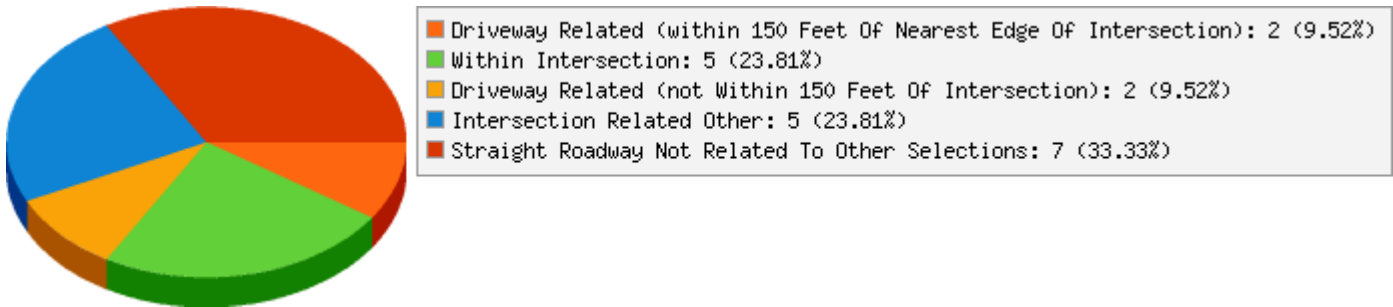
Relation to Roadway

86% of the crashes took place in the roadway.

On The Shoulder: 1 (4.76%)
Other/unknown Relationship: 1 (4.76%)
Uncoded & Errors: 1 (4.76%)
On The Road: 18 (85.71%)
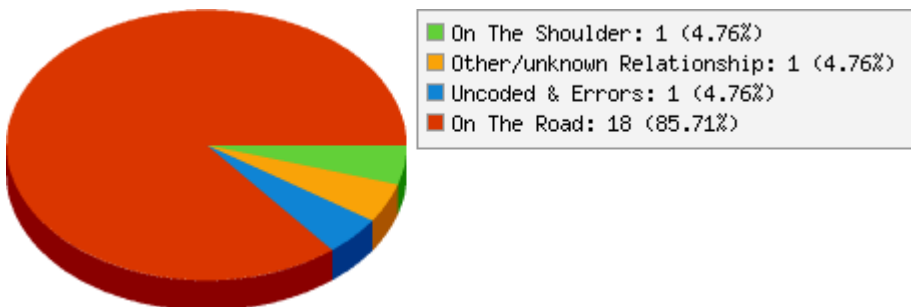
Average Daily Traffic Volumes
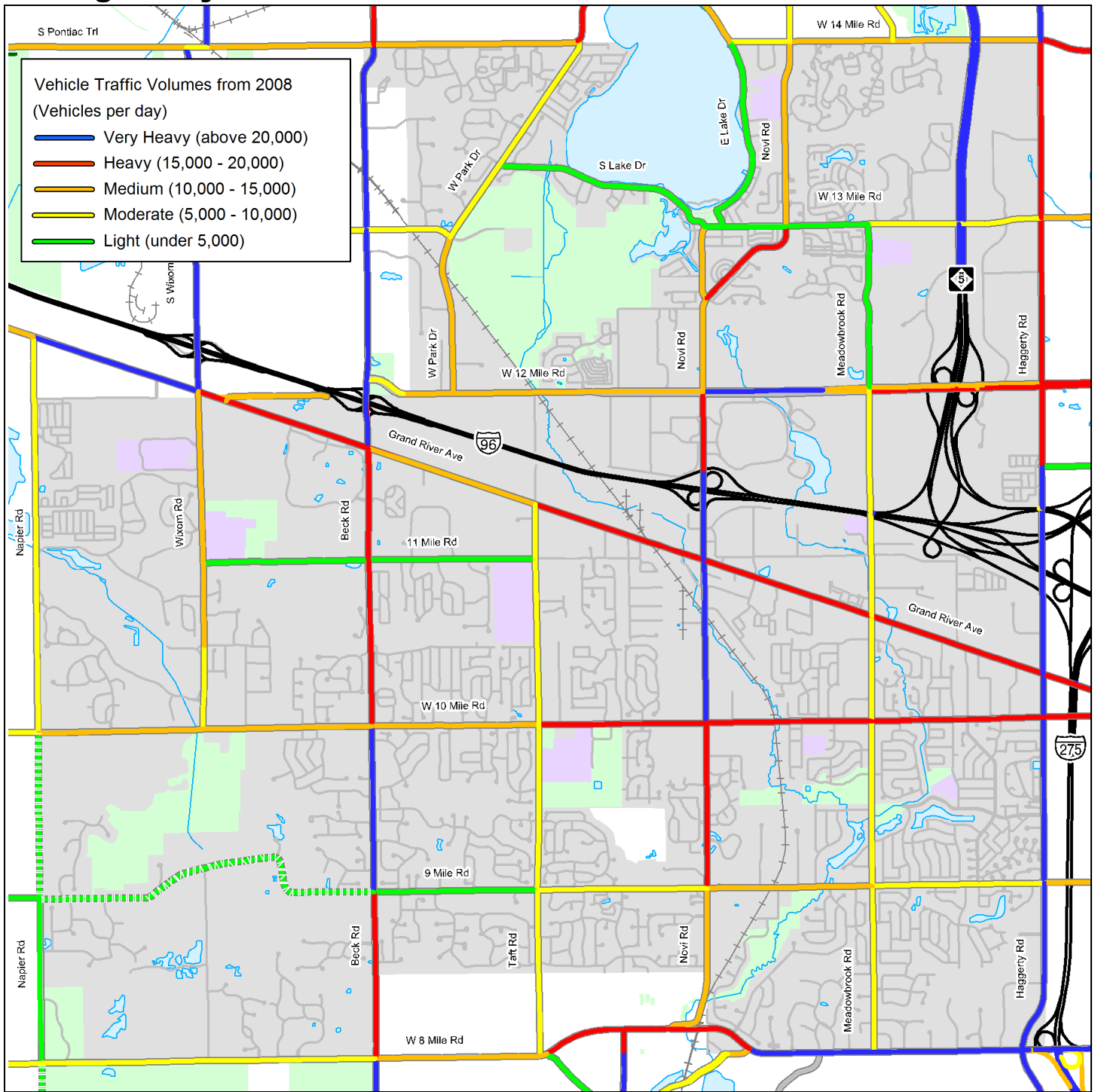
Annual Average Daily Traffic (AADT) is an estimate of traffic volumes. The volumes based on total two-way traffic over a 24-hour period and may vary by season or day of the week. The volumes are determined from a combination of actual traffic counts and modeling. The map shows 2008 data provided by SEMCOG.
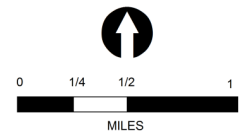
The gradations used generally reflect noticeable changes in the comfort level of bicyclists sharing a roadway with motorists, all other factors being equal.

Posted Speed Limit

Speed Limit
- 25
- 30
- 35
- 40
- 45
- 50
- Unposted
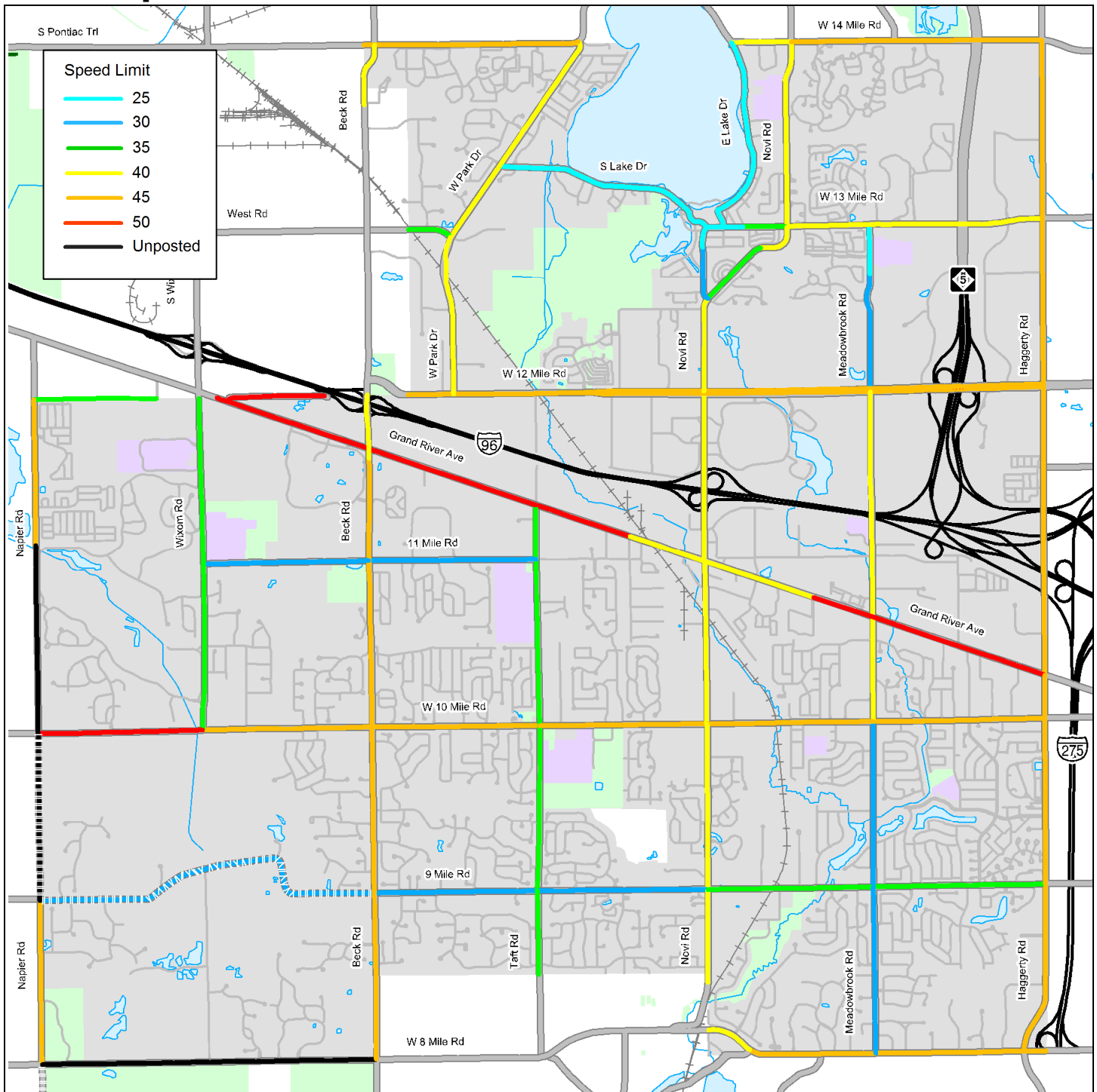
Roadways with high speeds can reduce the comfort level for bicycles and pedestrians traveling along a road corridor, and my even discourage bicycle and pedestrian use all together. Actual running speeds are likely higher than posted speeds.

Please note that speed limits along some roads are in the process of changing so some of the speeds listed above may be outdated.
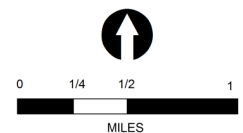
Existing Road Cross Section
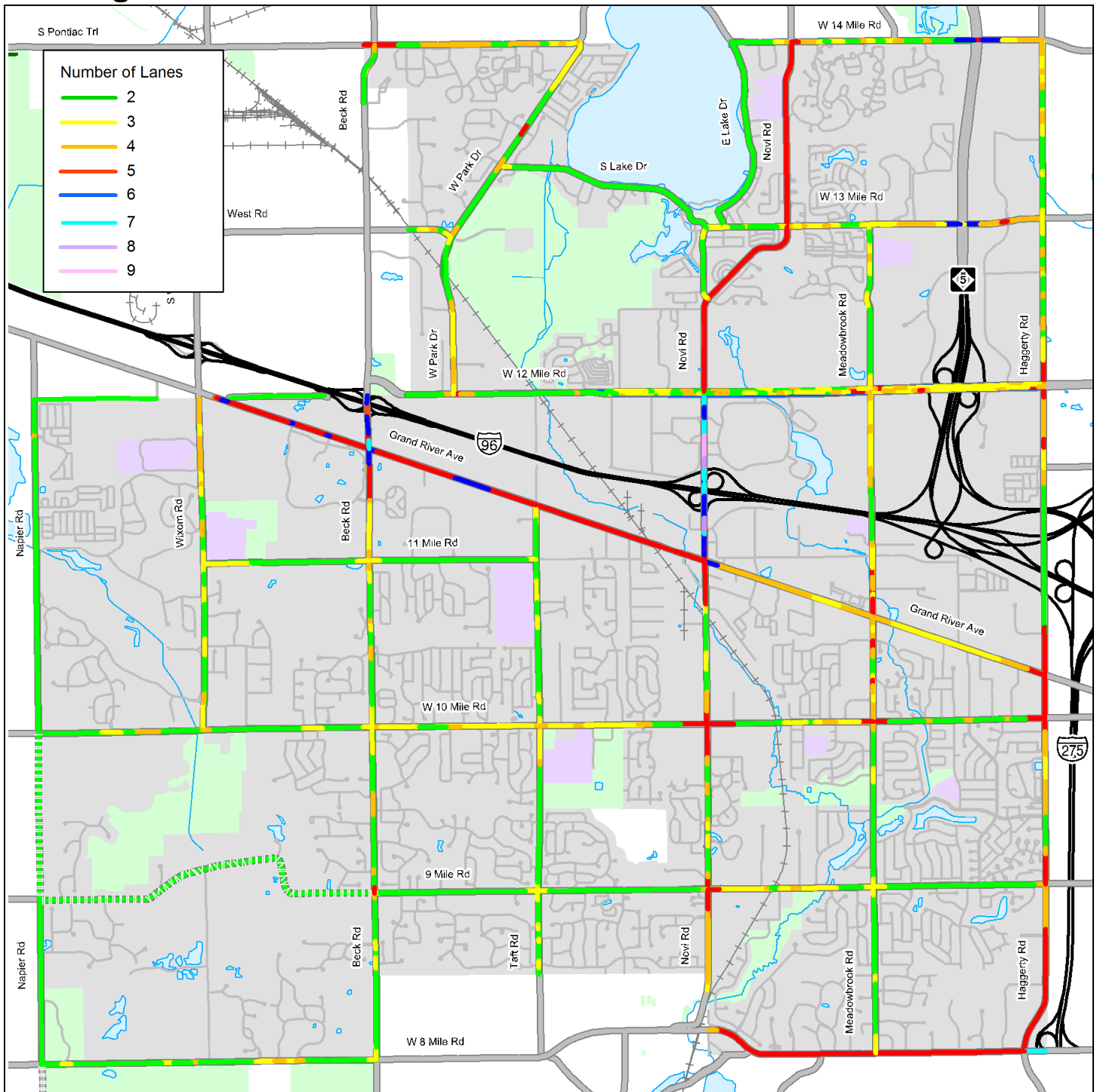
The majority of the roads in the city are two lane roads, although many of these roads have designated turn lanes and by-pass lanes in places. The widest roads for the most part boarder the freeway corridors.
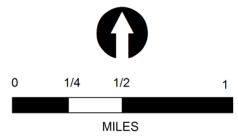
In-Road Bicycling Quality
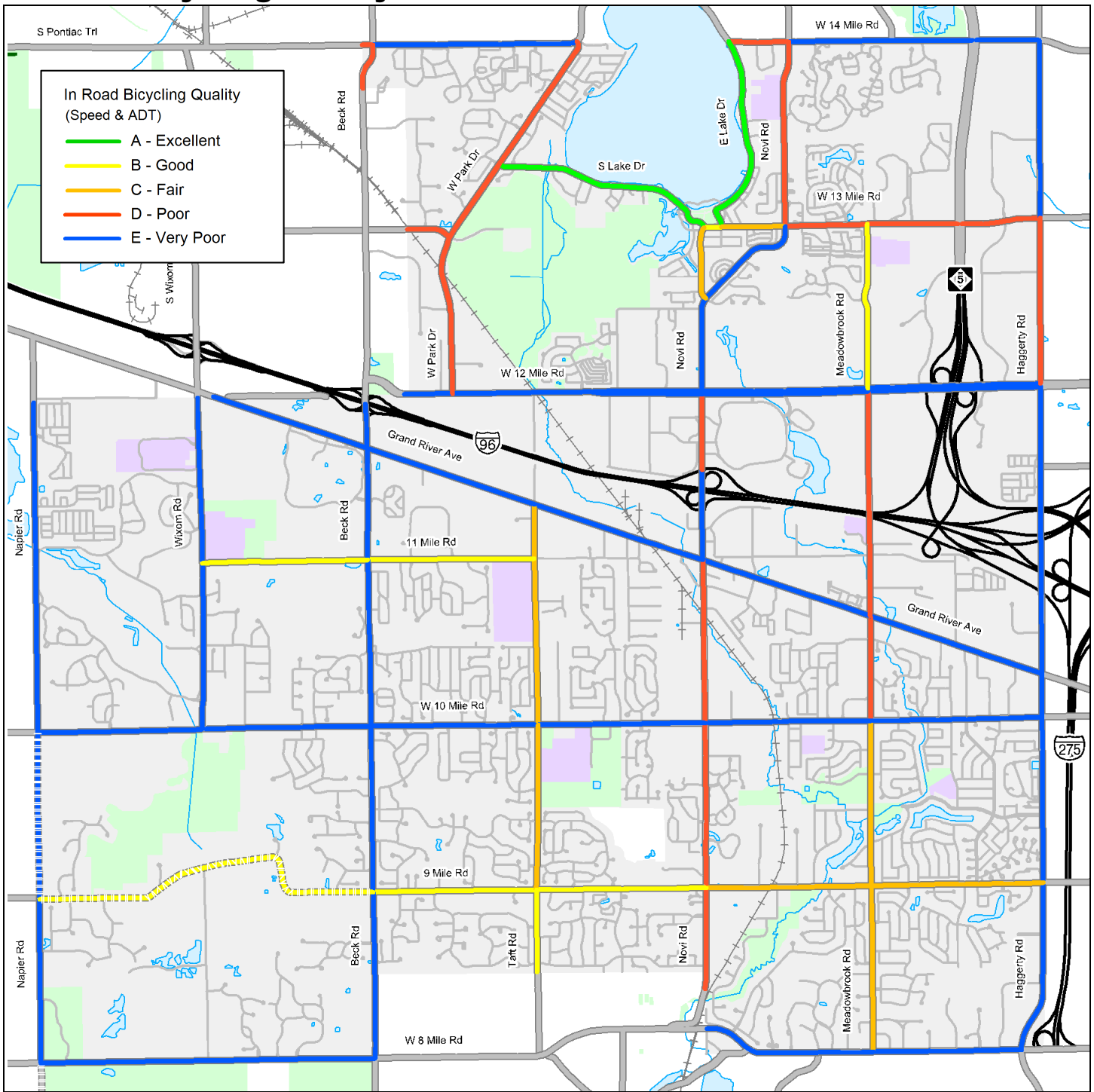
In-road bicycling facilities improve the quality of the bicycling experience on busy roads. Quality of the in-road bike facilities is based on speed limit and daily traffic volumes. A road with an existing bike lane has a higher quality; however, there are few existing bike lanes in the city.

Without Bike Lane	With Bike Lane	ADT	Speed Limit
A	A	0 -5,000	25
B	A	5,000 – 10,000	30
C	B	10,000 – 15,000	35
D	C	15,000 – 20,000	40
E	C	20,000 – 25,000	45
E	D	Over 25,000	50

Quality of the in-road bike facilities is based on speed limit and daily traffic volumes. For example a road that has 12,000ADT and a posted speed limit of 40mph with no existing bike lane would get a D rating. An ADT of 12,000 puts the road in the C range, however the 40mph speed limit makes it a D rating because the most restrictive rating is applied (please refer to the chart above).

Road Crossing Difficulty

Crosswalk Difficulty
(Speed, No. Lanes & ADT)

- A - Excellent
- B - Good
- C - Fair
- D - Poor
- E - Very Poor
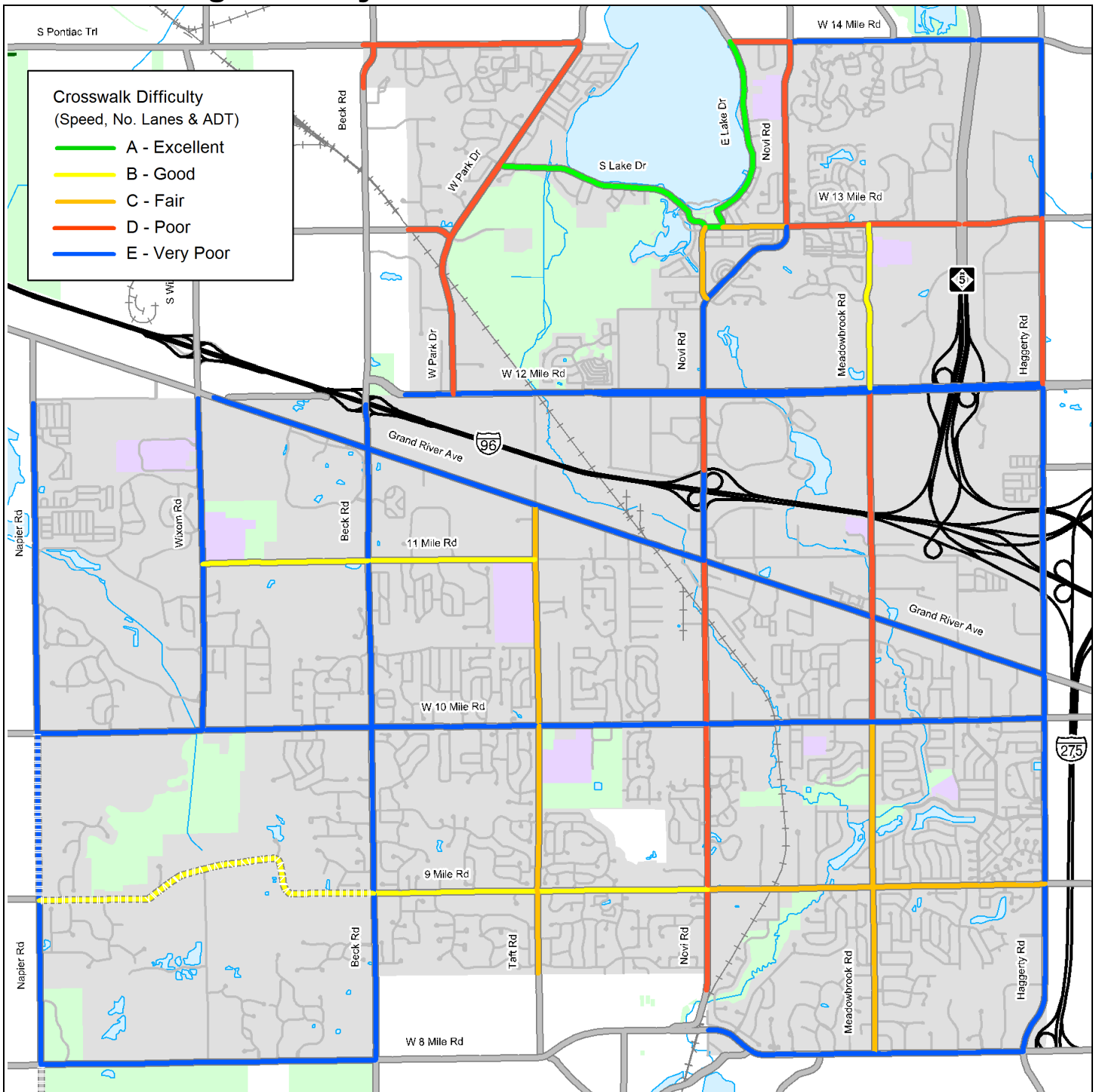
Road crossing difficulty is a measurement of how difficult a person would typically find it to cross a road at an unmarked mid-block crosswalk. It is based on the number of lanes, speed and average daily traffic. Overall, it is generally difficult to cross with ADT being the most restrictive factor on primary roads in the city.

Grade	Lanes	Speed	ADT
A	2	<30	<5,000
B	3	30	5,000-10,000
C	4	35	10,000-15,000
D	5	40	15,000-20,000
E	6	45+	20,000+

Road crossing difficulty is based on the number of lanes, speed limit and daily traffic volumes. For example a road that has 25,000ADT, 4 lanes and a posted speed limit of 40mph with no existing bike lane would get a E rating. A 5 lane with a speed limit of 40mph receives a D rating, however the 25,000ADT makes it a D rating because the most restrictive rating is applied (please refer to the chart above).

Crosswalk Spacing Analysis

Distance Between Crosswalks
- 0 to 1/8 Mile
- 1/8 Mile to 1/4 Mile
- 1/4 Mile to 1/2 Mile
- Over 1/2 Mile

○ Signalized Crosswalk
● Unsignalized Crosswalk
● No Crossing at Signal
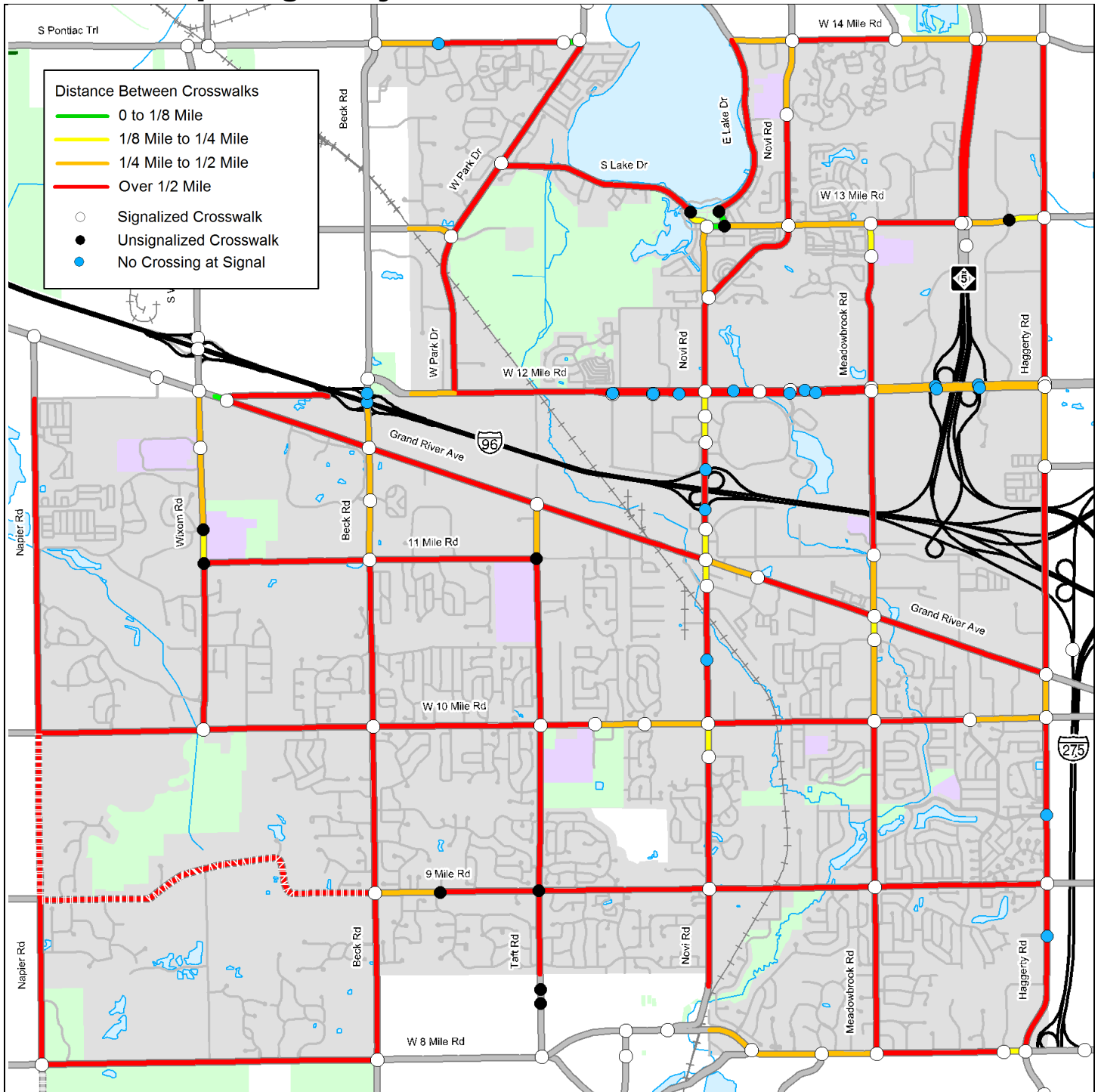
Crosswalk spacing is a key factor in directness of travel. Most pedestrian trips for personal business (like walking to the store) are about ½ mile long. Where there is demand to cross the road and crosswalk spacing is over 1/8 of a mile apart, midblock crossings are likely to occur. There are numerous stretches or roadway on primary streets within the city with over ½ mile between crosswalks. This analysis measure the distance that a pedestrian would have to travel in order to cross the road at a designated crossing.

This analysis was based on existing conditions. Signalized intersections without pedestrian crossings were not used in this calculation because they do not provide a safe crossing. However, please note that existing signalized crossings that were used in this analysis may not be up to ADA standards, so even if they have a crossing, they may not be accessible to everyone.

Sidewalk Level of Service Assessment

A key factor to a pedestrians comfort level on a sidewalk is the degree of separation from the roadway.   Elements such as lawn buffers and vertical elements tend to make a pedestrian feel more separated from the roadway, increasing the pedestrian's level of comfort when on a sidewalk.

The sidewalk quality rating system is designed to help identify a pedestrian's level of comfort when on a sidewalk based on the amount of separation from the roadway. The rating system is broken up into five categories A, B, C, D and E. A sidewalk with a rating of "A" has the best pedestrian comfort level and a sidewalk with a rating of "E" has the worst pedestrian comfort level.

A – Rating
Sidewalk is setback from roadway and contains vertical elements such as closely spaced trees and/or light poles.

B – Rating
Sidewalk is setback from roadway but contains no vertical elements.
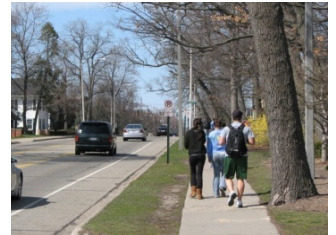
C – Rating
Sidewalk is directly adjacent to the roadway along the curb and has no buffer space or vertical elements.

D – Rating
No sidewalk facility is built, but the area is physically passable by foot.
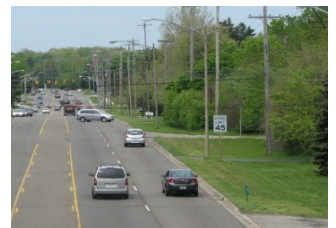
E– Rating
No sidewalk facility is built and the area is not physically passable by foot. Physical barriers such as streams or expressway overpasses usually contribute to this type of situation.

Existing Sidewalk Level of Service Analysis

Sidewalk Rating
- A - Facility with Vertical Buffer
- B - Facility with Buffer
- C - Facility along Curb
- D - No Facility/Passable
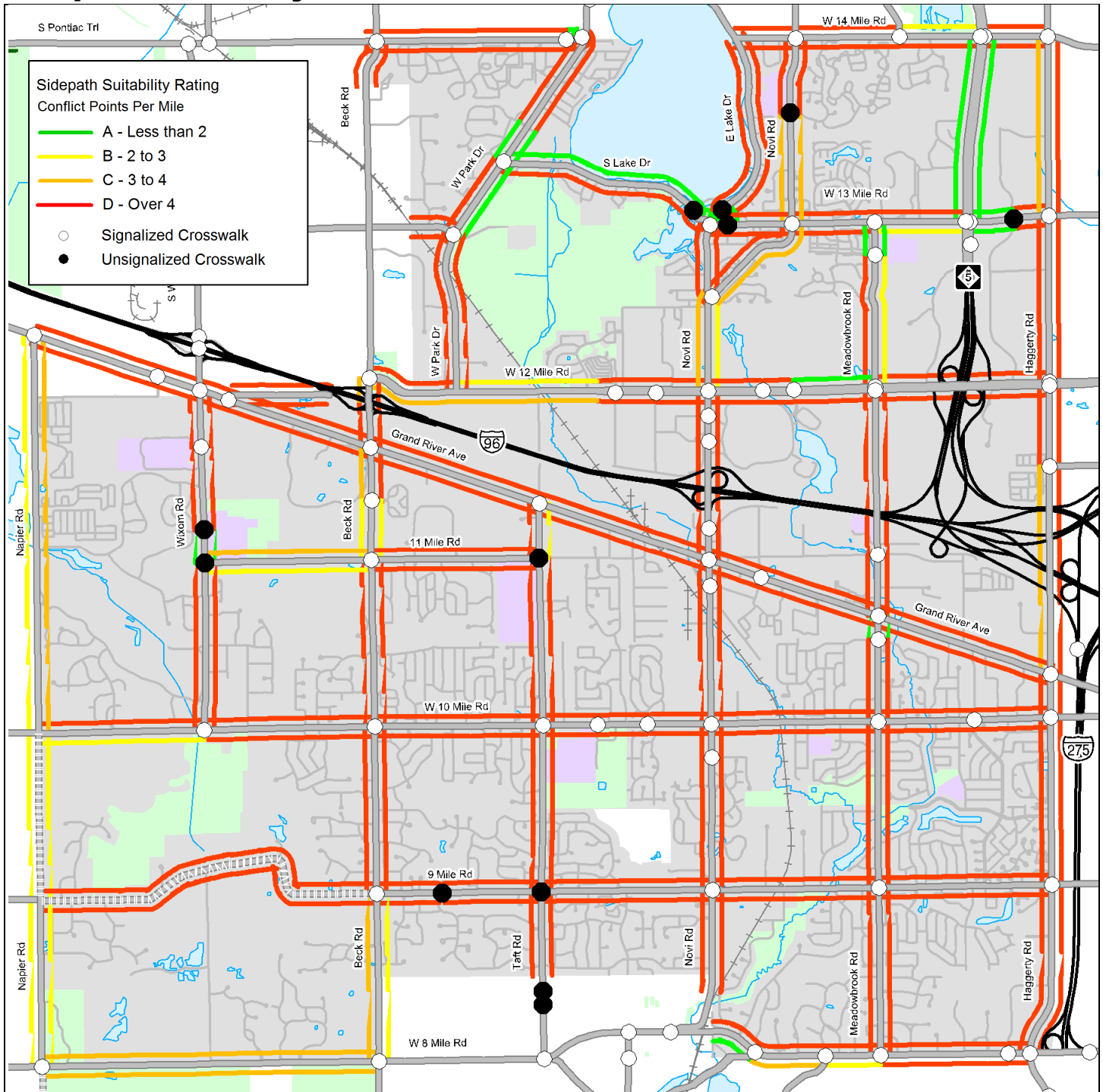- E - No Facility/Not Passable
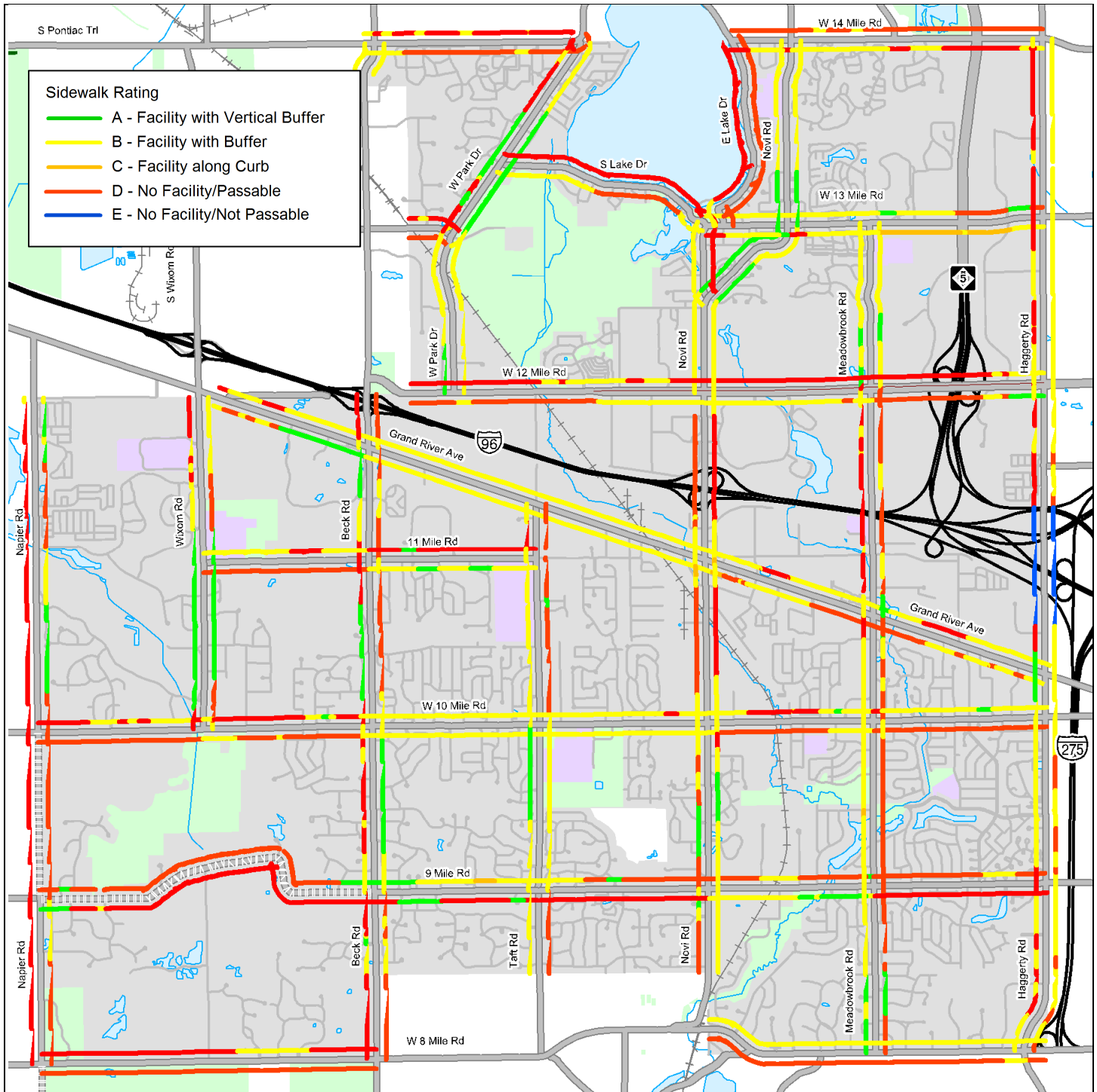
In Progress – waiting on approval of database format.

A key factor to a pedestrians comfort on a sidewalk is the degree of separation from the roadway. Buffer (lawn extensions) and vertical elements such as trees and light poles increase the pedestrians comfort level.
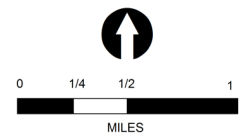
Sidepath Suitability Assessment

A conflict point is a local road or high traffic volume commercial driveway. For this analysis, each segment of sidewalk between two major roadways was given a rating from A to E based on the number of conflict points (see legend). Ten minor/residential driveways or one local road or high volume driveway was conserved equal to one conflict point.

The AASHTO Guide for the Development of Bicycle Facilities generally considers sidewalks undesirable as shared-use paths. This is due to the inherent conflicts between bicycles and motorists where a pathway intersects with driveways and roads. Suitable sidepath locations are uninterrupted by driveways and roadways for long distances and provide safe and convenient road crossing opportunities to destinations on the other side of the road

Block Size Analysis

Block Size in Acres
- 0 to 15
- 15 to 50
- 50 to 100
- Over 100
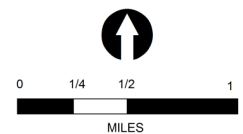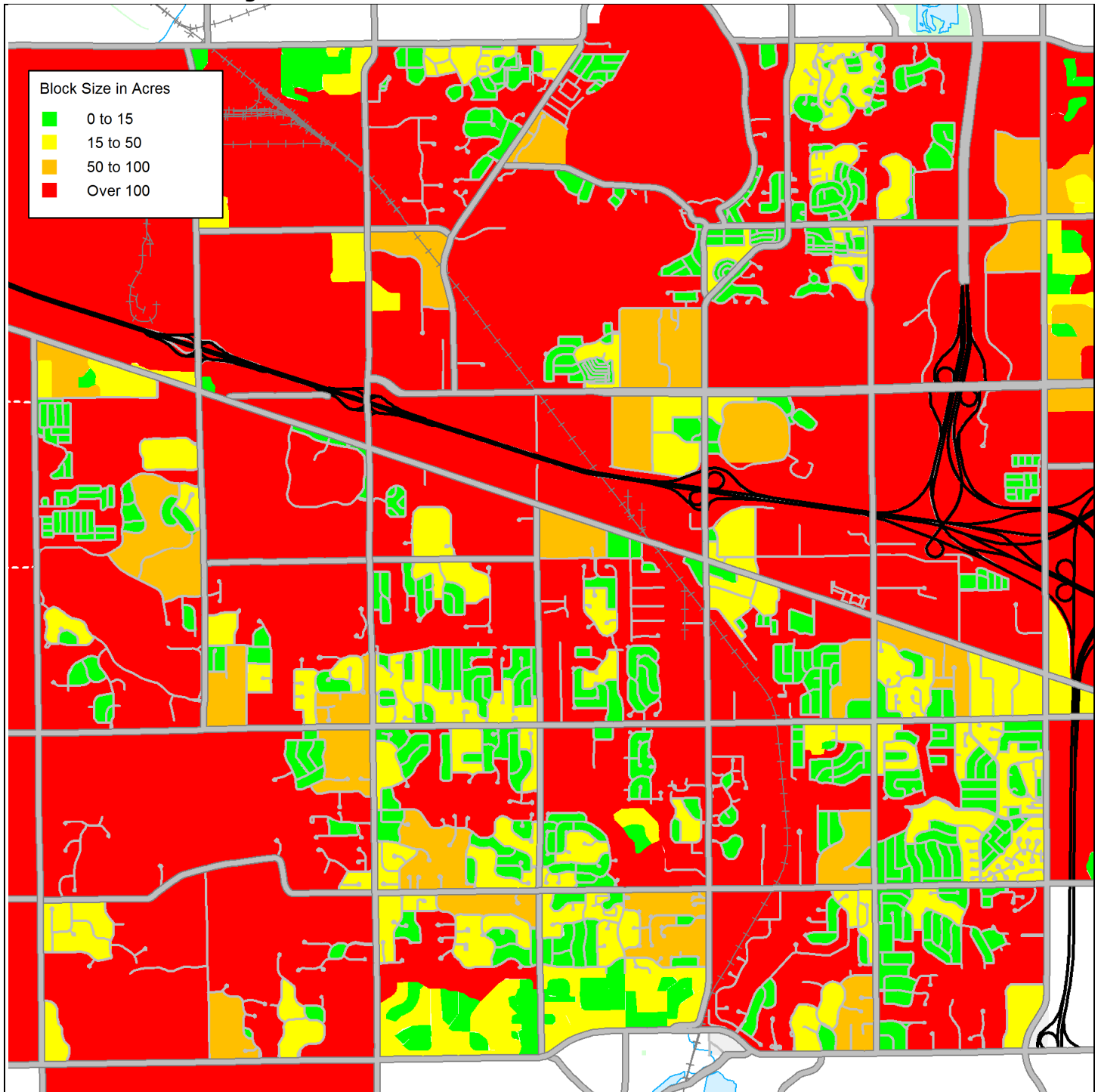
Block size is an excellent measurement of directness of travel and a key indicator in the level of pedestrian activity. A block is defined as an area that a person cannot pass through. These areas usually do not have any sidewalks, roadways or bike paths allowing access between two points. One example is an expressway where you may have to go a mile or more out of your way just to get to the other side.

The majority of the city's landmass is in blocks over 100 acres in size. There are no large contiguous areas where the block size is 15 acres or less in size. Finding ways to create more direct pedestrian travel ways will be key to making Novi a more walkable community.

Potential Near-term Bike Lanes

Bike Lane Potential

— Existing Bike Lanes/Paved Shoulders
— Bike Lanes through Lane Narrowing
— Bike Lanes through Paved Shouders
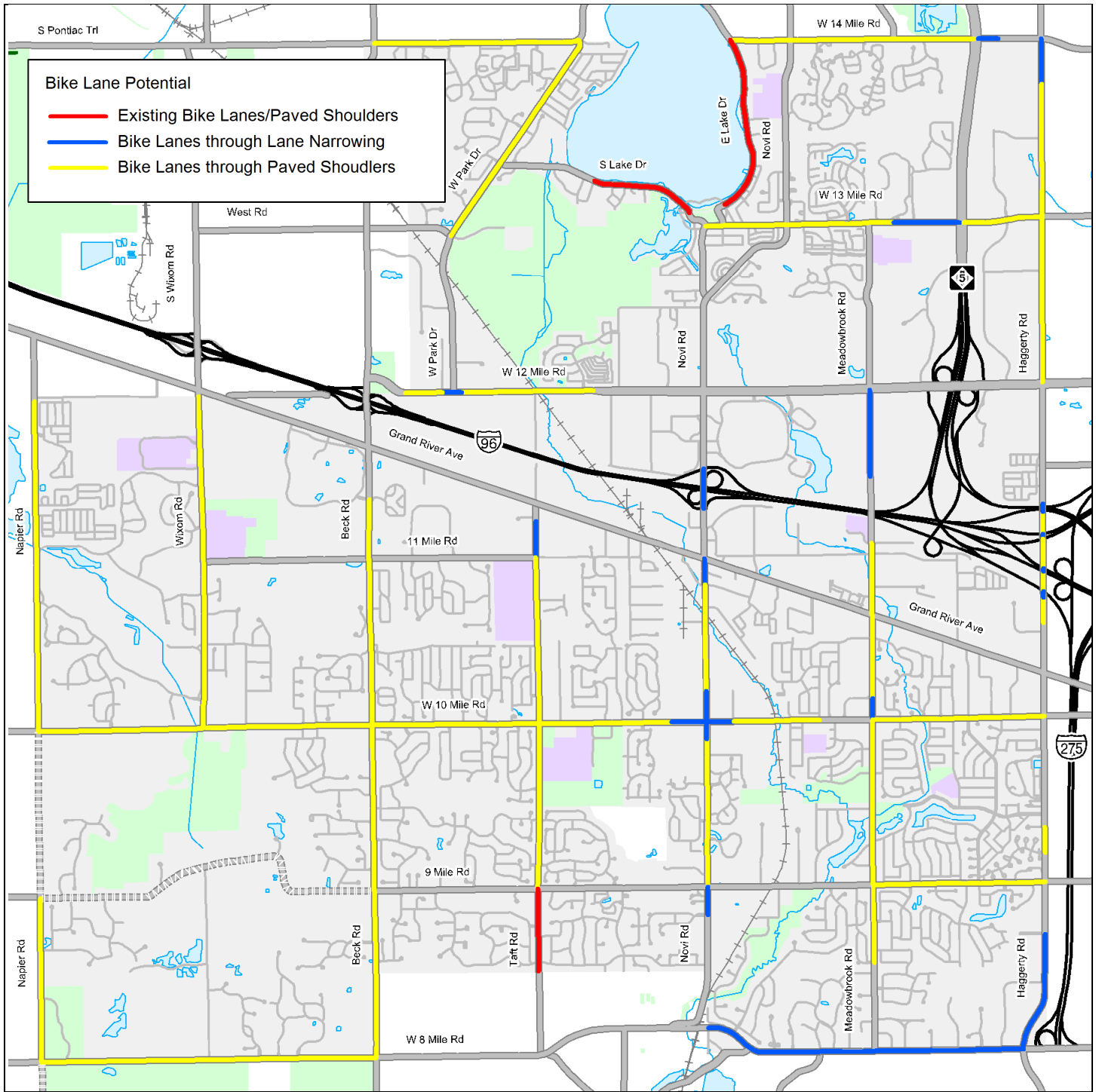
There are very limited opportunities to add bike lanes via narrowing existing motor vehicle lanes. The most potential to add bike lanes is through paving the road shoulders. Paving road shoulders has many benefits to motorists and the longevity of the roadway beyond providing a facility for bicyclists and pedestrians where a sidewalk is not present.

0   1/4   1/2   1

MILES

Potential Neighborhood Connectors and Off-Road Trails

Legend:

Potentail Off-Road Trails
- I-275 Trail
- Potential Off-Road Trails

Potentail Neighborhood Connectors
- Potential On-Road Connections
- Potentail Off-Road Connnections
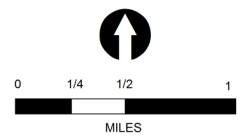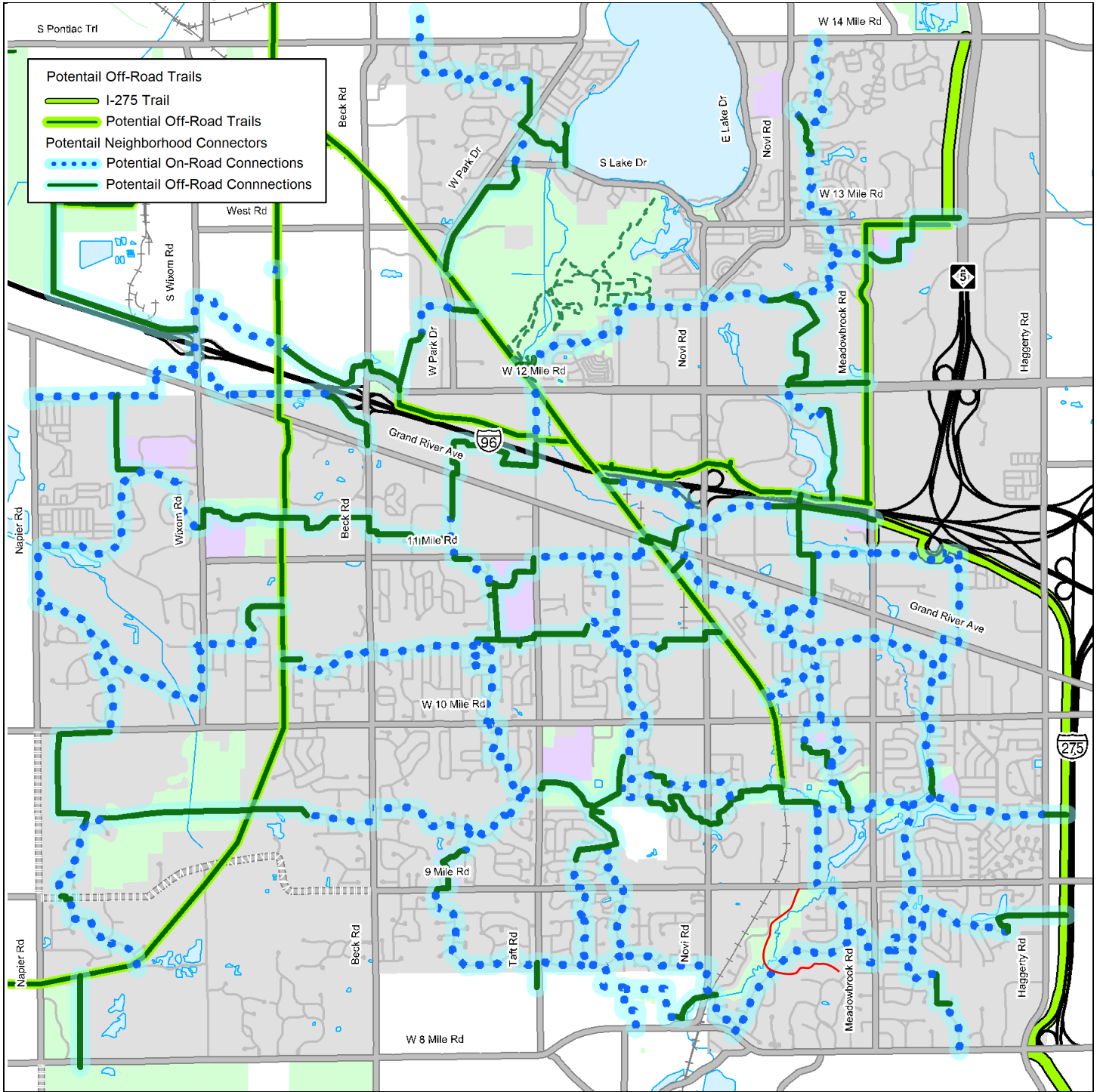
Neighborhood Connectors are non-motorized routes that utilize the local road system and off-road trails to provide links to key destinations while generally avoiding busy roadways. These routes appeal to bicyclists and pedestrians who are not comfortable walking or bicycling along busy roadways. The key to making these routes work is to provide safe ways to cross the primary roads.

The City of Novi's neighborhood roads in conjunction with some new off-road trails provide the opportunity for an outstanding network of neighborhood connectors that link the residents to parks, schools, regional trails and commercial centers.

Demand Analysis – Population Density

Population Density
(people per acre)

- Over 16
- 8 to 16
- 6 to 8
- 1 to 6
- 0
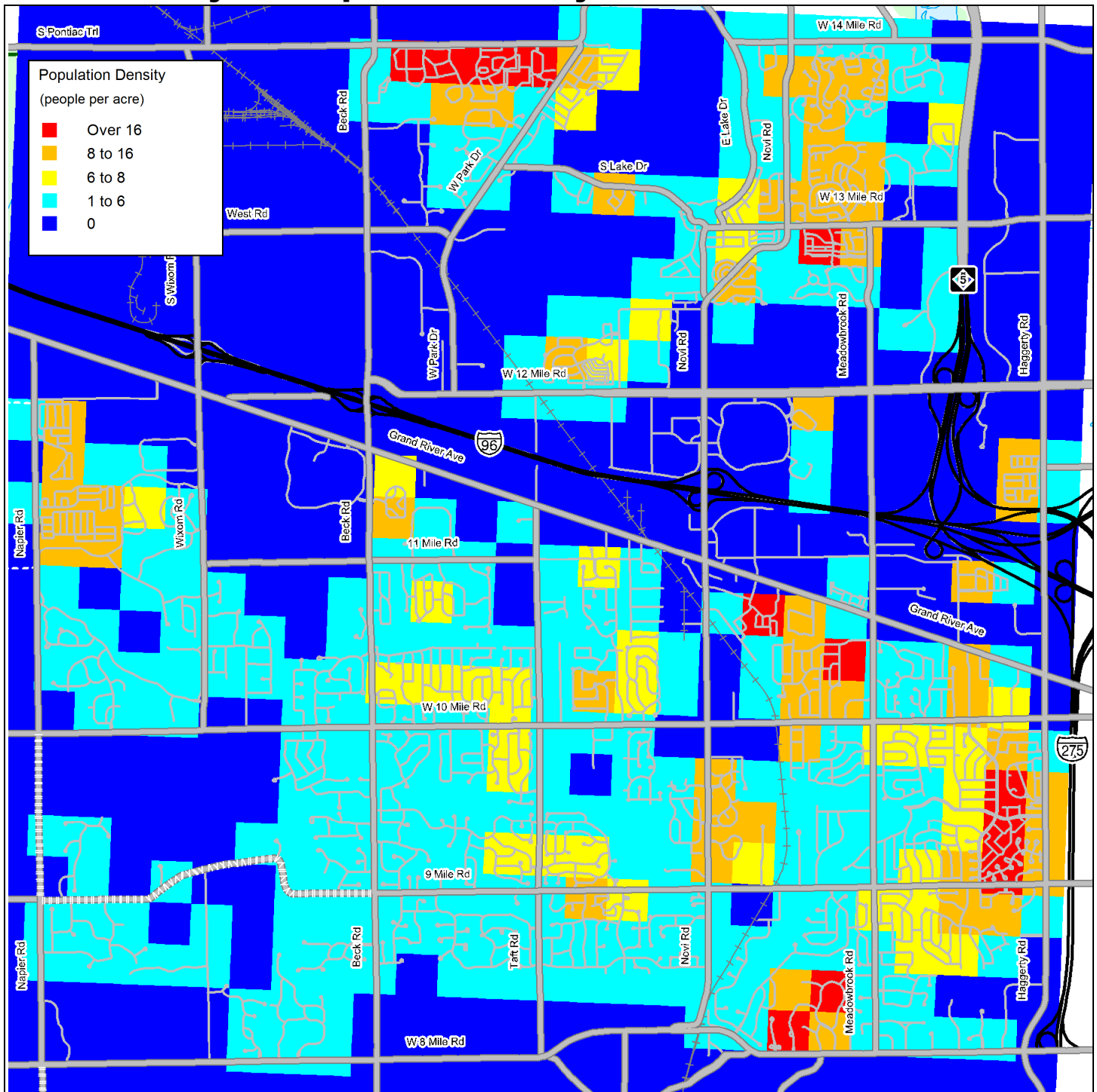
In general, population density in the City of Novi is relatively low. There are pockets of high population density generally located in areas where apartment and multifamily residence are located.

Population density is an important factor from two standpoints. First, even if the percentage of people who walk does not change, more people will be walking in areas with higher population density. Second, increased population density generally brings with it more destinations for people to walk to such as stores, schools, bus stops, etc.

For this analysis a ¼ mile grid was superimposed over the project area. The population density score was based on the number of people per acre. Where a cell spanned multiple census blocks, a proportional average of the intersection census blocks was used to determine the cells average population density.
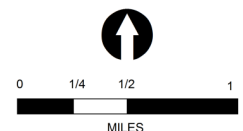
# Demand Analysis – Land Use Diversity
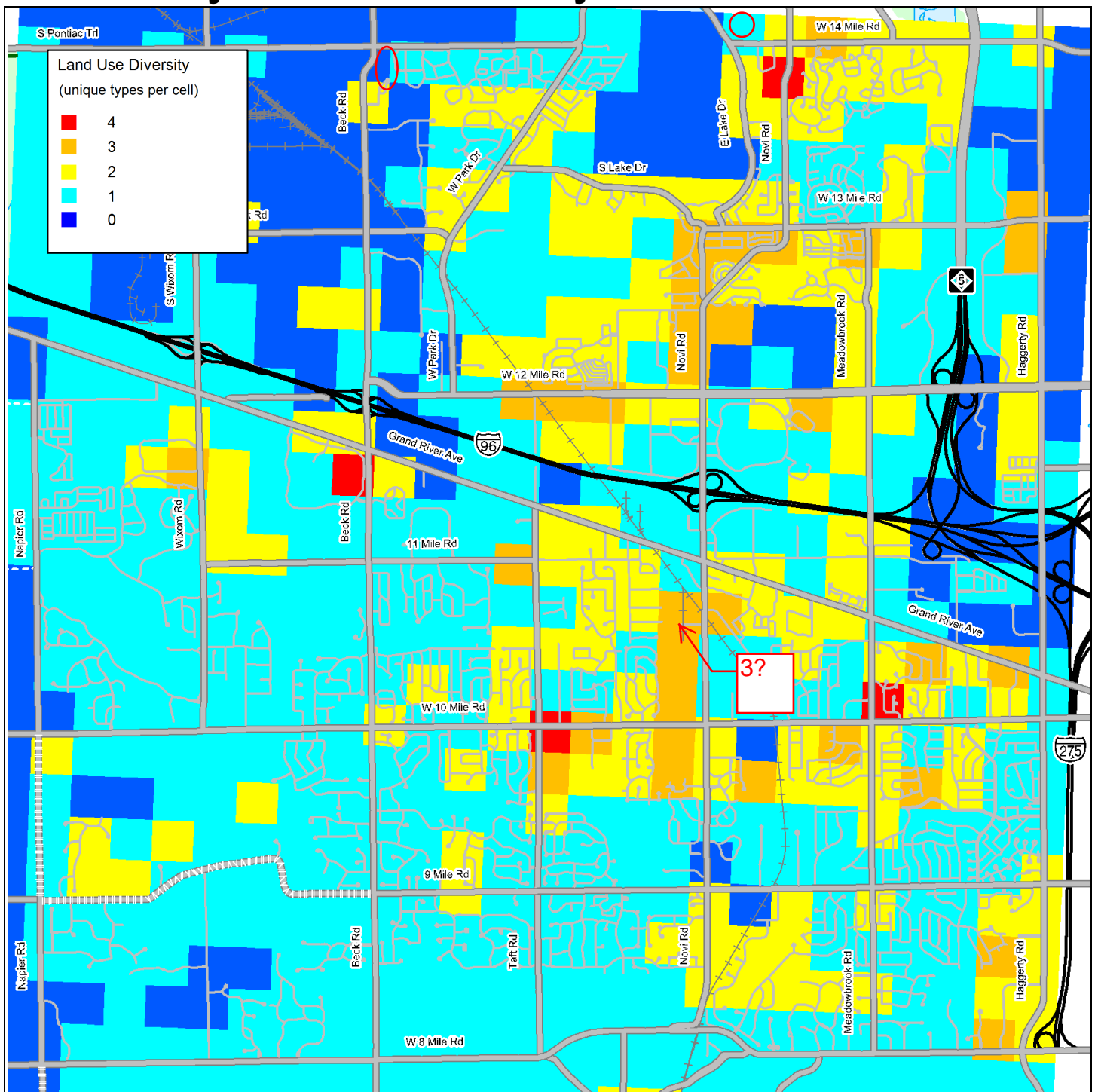
Generally an area with many different types of land uses within close proximity of each other is beneficial to non-motorized users because they do not have to travel great distances to get from one place to another. Land use diversity is important because the greater number of nearby land uses means there is a greater number of potential walking or bicycling trips.
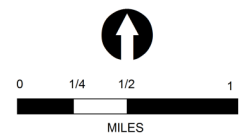
Land use diversity was measured by the number of following distinct land uses within a cell: commercial/retail, office, residential, school, park or mixed-use. This data is a measurement of trip potential.

Demand Analysis – Activity Generators
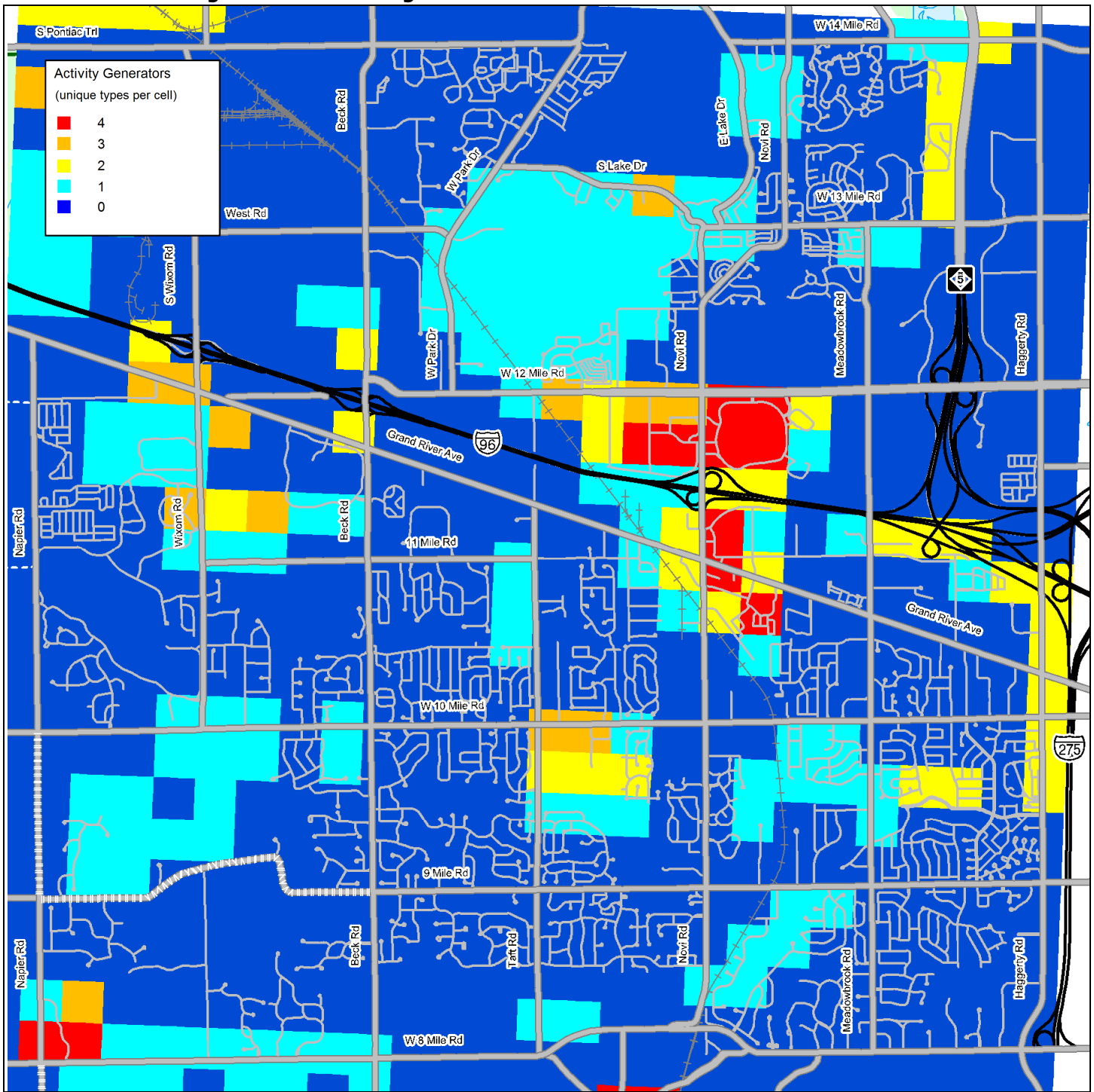
Some land uses are even more likely to generate non-motorized travel than others. For this analysis activity generators included primary destinations for non-motorized user groups such as schools, parks, trails, recreation centers and regional shopping centers.
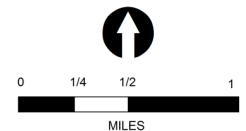
Each cell was given a score from 0 to 4 based on the number of concentration of special activity generators (see legend). One point was given for containing a school or park. A recreation center or a regional trail received an additional two points. Colleges, downtowns and regional shopping centers received 1 to 4 points based on the percentage of coverage within the cell.

Demand Analysis - Connectivity
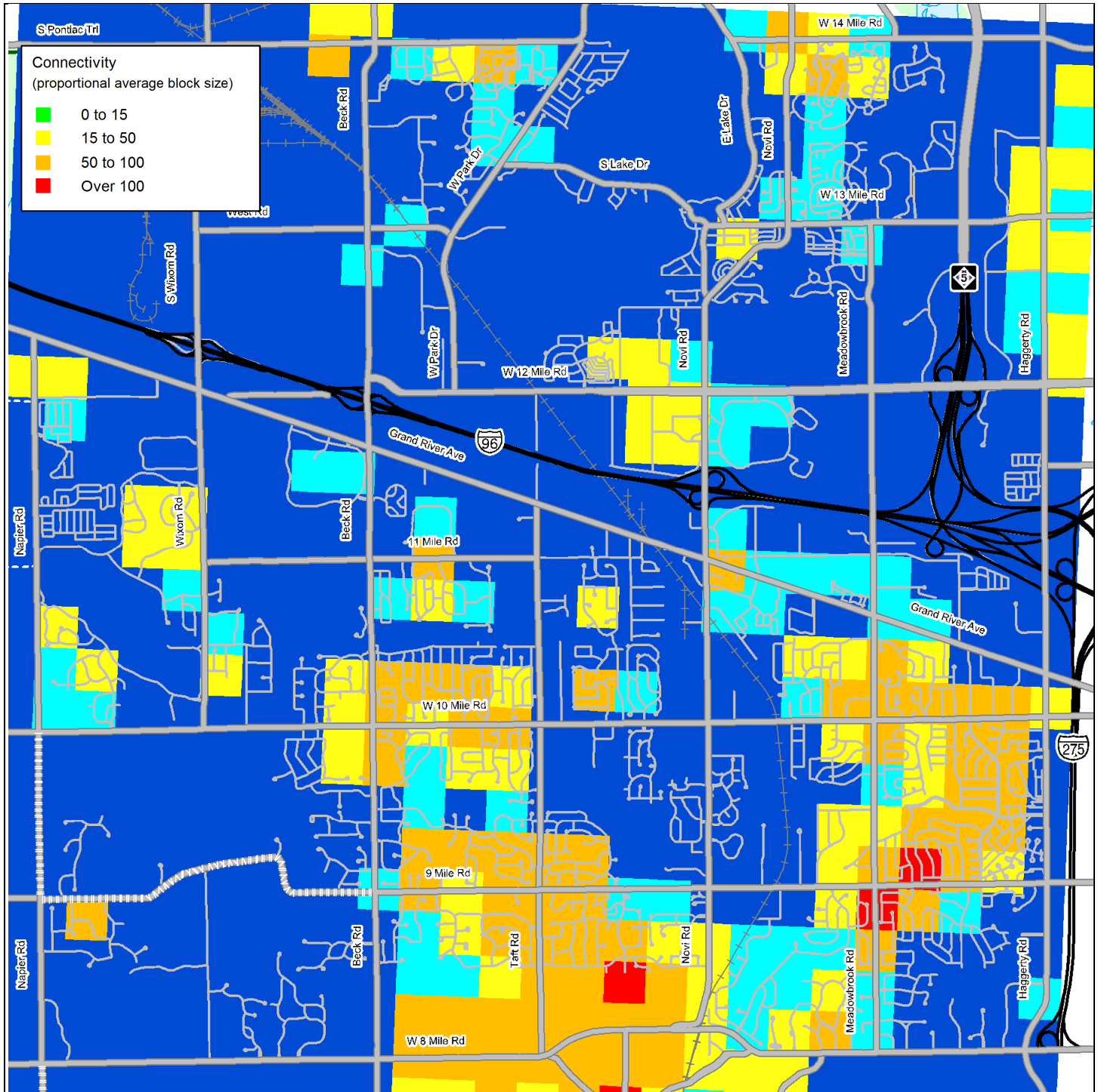
This analysis determines how much bicycle and pedestrian connectivity is within a designated area. Areas with high connectivity (0 to 15 acre blocks) are generally easy for a bicyclist or pedestrian to travel through, allowing for a relatively direct route. Areas with low connectivity (Over 150 acre blocks) are generally difficult for a bicyclist or pedestrian to travel through, causing them to travel out of their way.

This analysis is based on the Block Size Analysis. Block size has been shown to have a close correlation with the amount of pedestrian travel in an area. For this analysis each cell was assigned a value of 0 to 4 based on the proportional average of the block sizes within the cell (see legend).
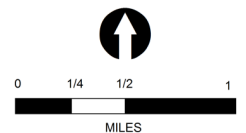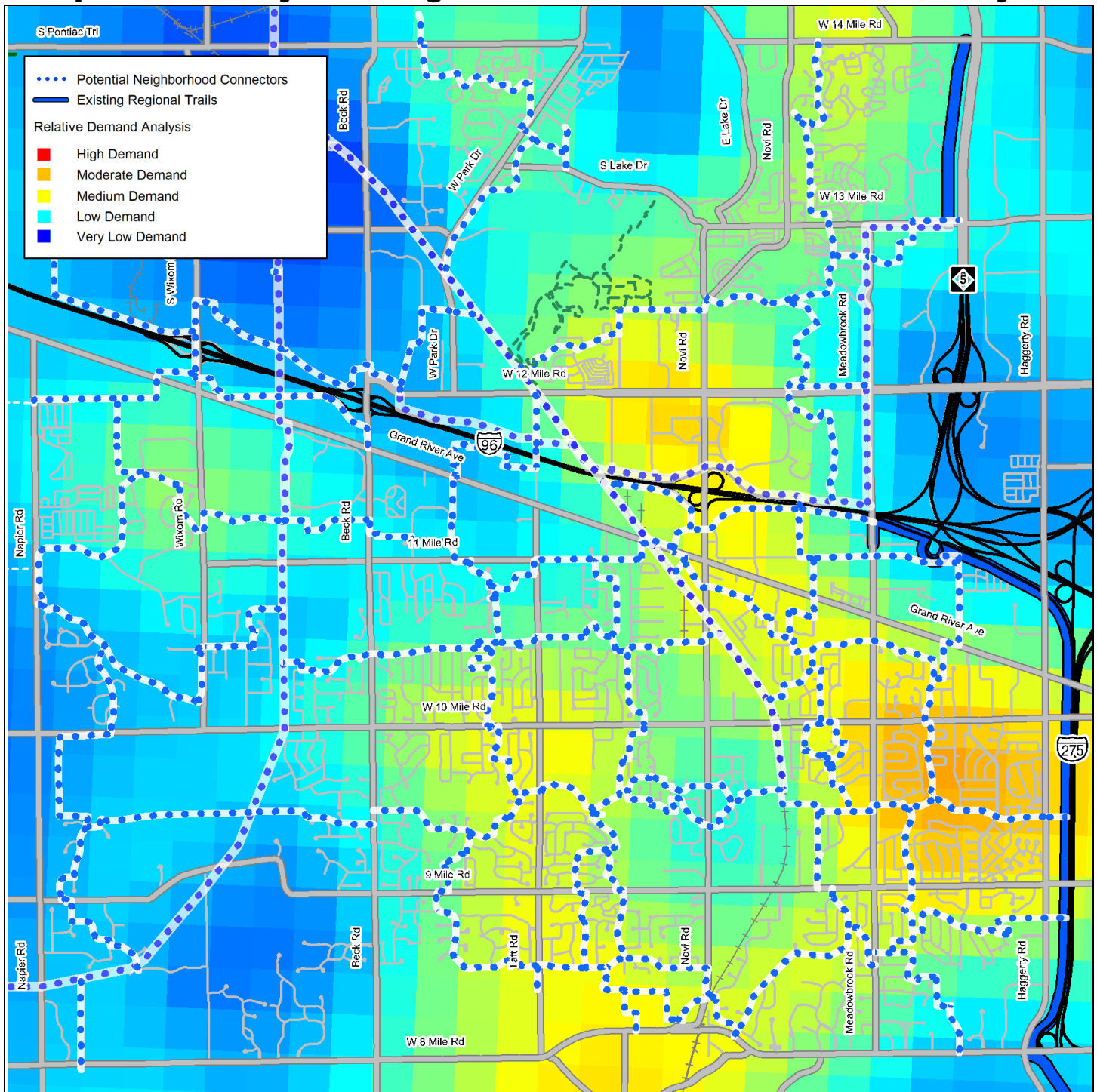
Relative Demand Analysis
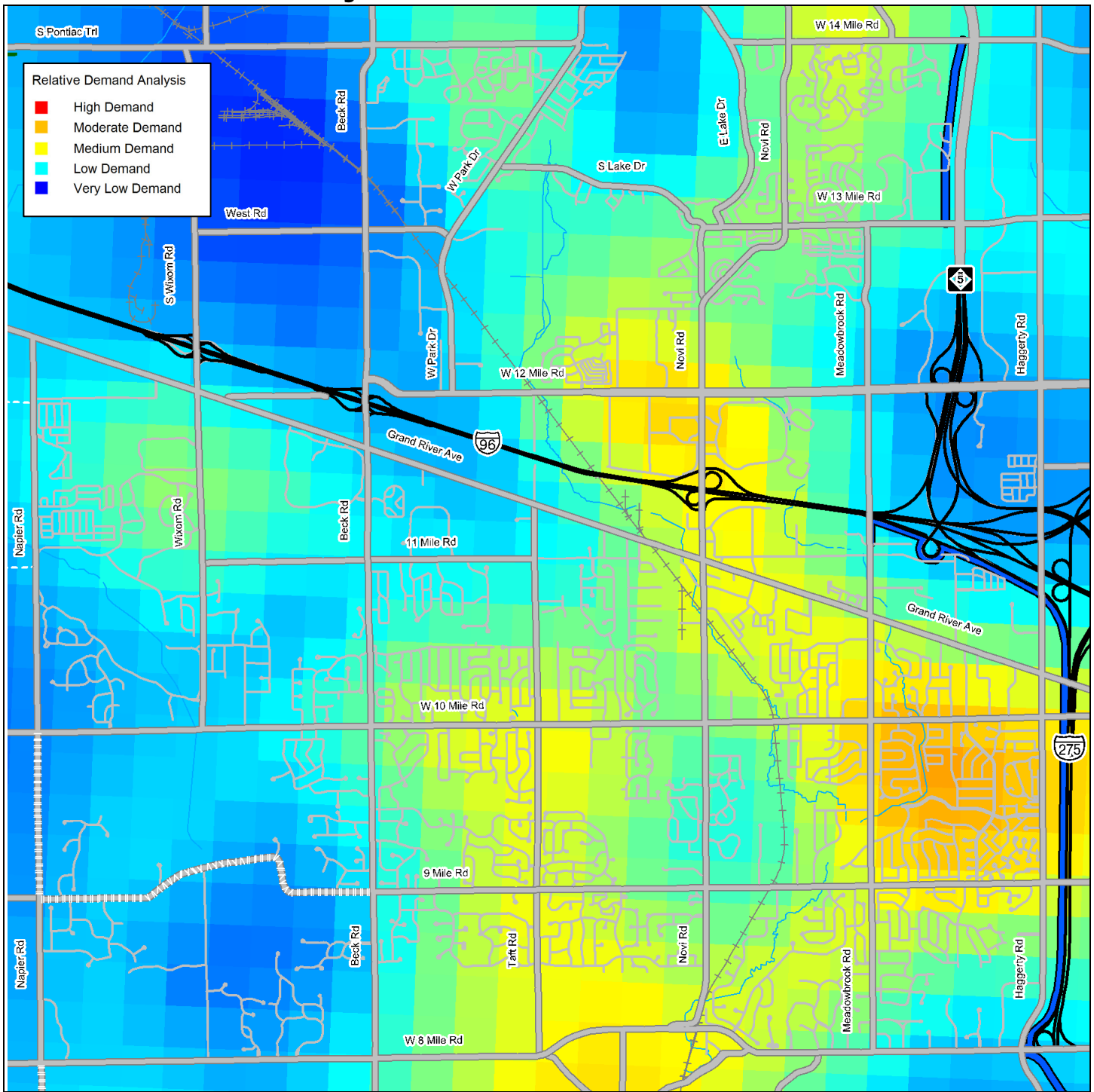
This assessment is a parcel based grid analysis that evaluates population density, activity generators, connectivity and land use diversity. This analysis has been adjusted to highlight the areas where there is potential for the most bicycle and pedestrian activity. These are generally areas located where there is a combination of high population density, schools and parks, regional shopping and high connectivity.

The composite rating reflects an approximation of the latent demand for non-motorized travel in an area. Other factors may promote or inhibit actual non-motorized travel levels. The composite analysis is a useful tool to contrast with facility deficiencies, potential facilities and to prioritize improvements. This analysis is used to help prioritize improvements.

The demand is determined by adding up the score of the four demand analysis components. Then an inverse distance weighting calculation is performed where the value of all cells within 1.5 miles is used to determine the final value. The inverse distance calculation is a straight line weighting were the value of a cell at 1.5 miles has 0 influence.
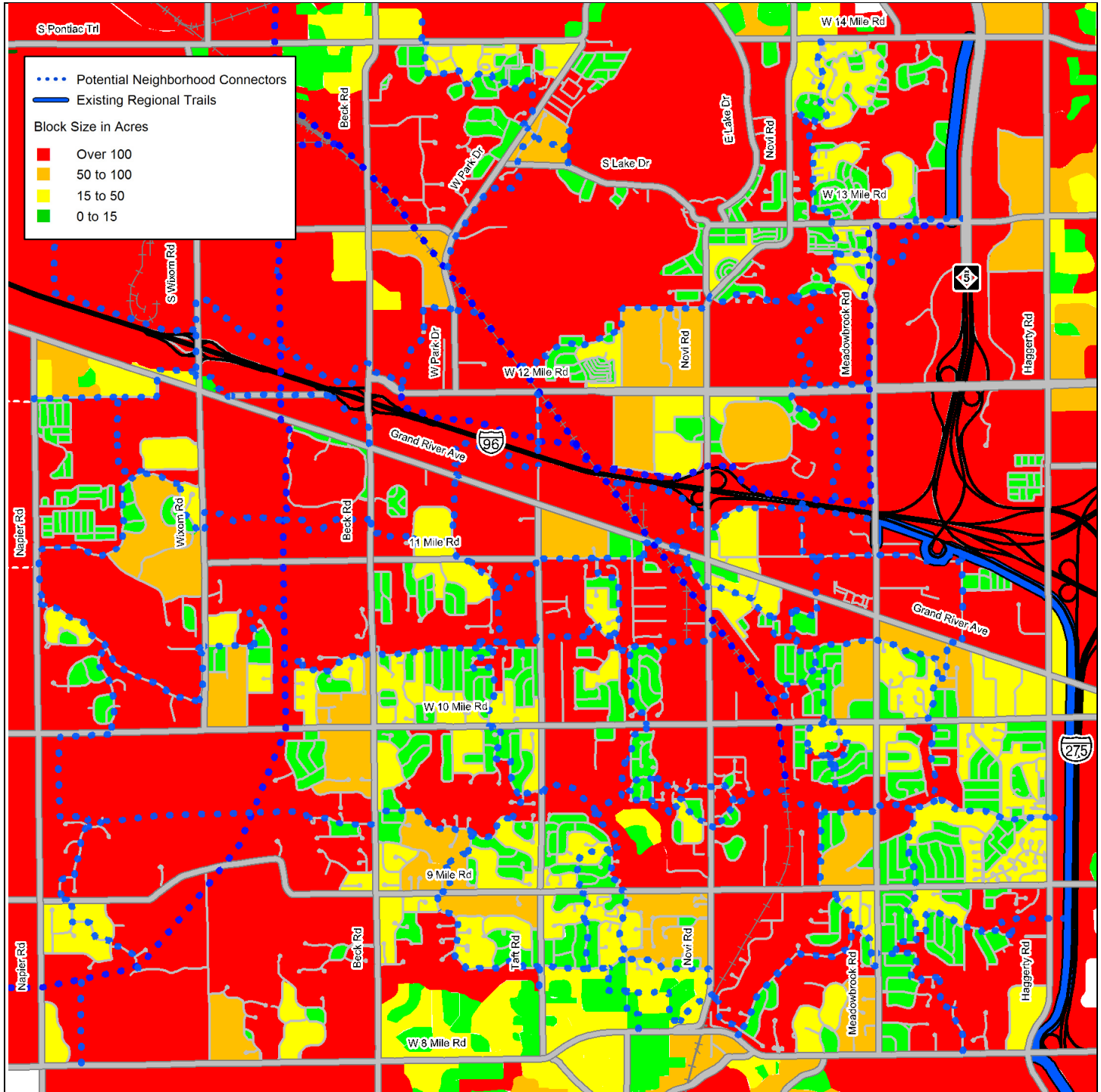
# Comparative Analysis – Neighborhood Connectors Location Analysis

This analysis is a combination of the Relative Demand Analysis and the Potential Neighborhood Connector Routes. This analysis identifies the routes that pass through the areas with the highest demand which will help with prioritization.
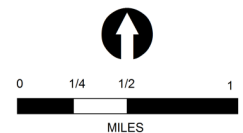
Comparative Analysis – Neighborhood Connectors Impact on Large Blocks
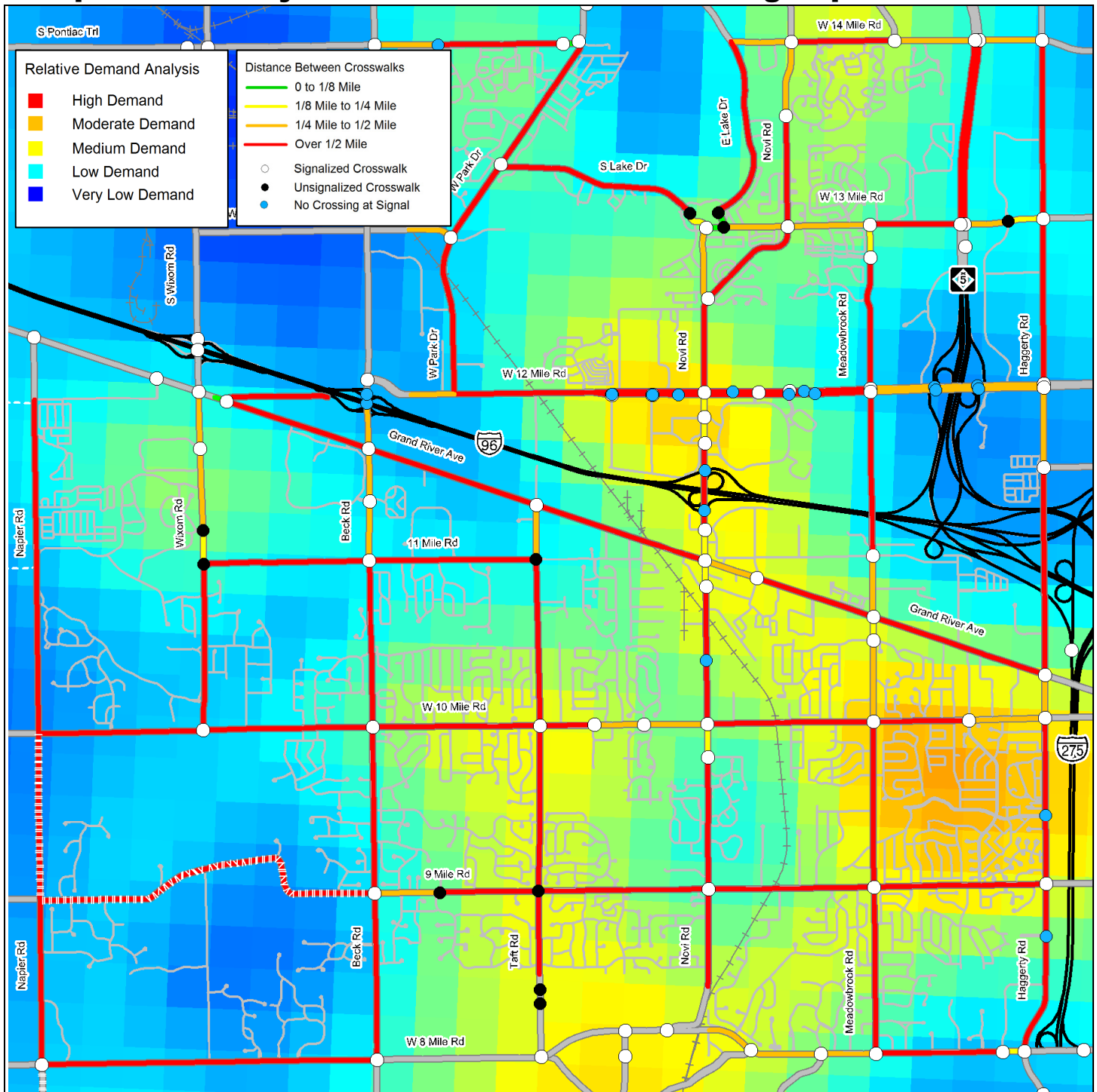

This analysis is a combination of the Block Size Analysis and the Potential Neighborhood Connector Routes. This analysis identifies where the potential neighborhood connector routes help to reduce the size of some of the large blocks.
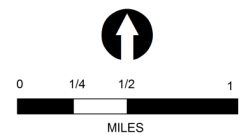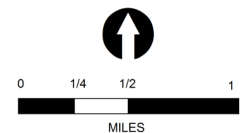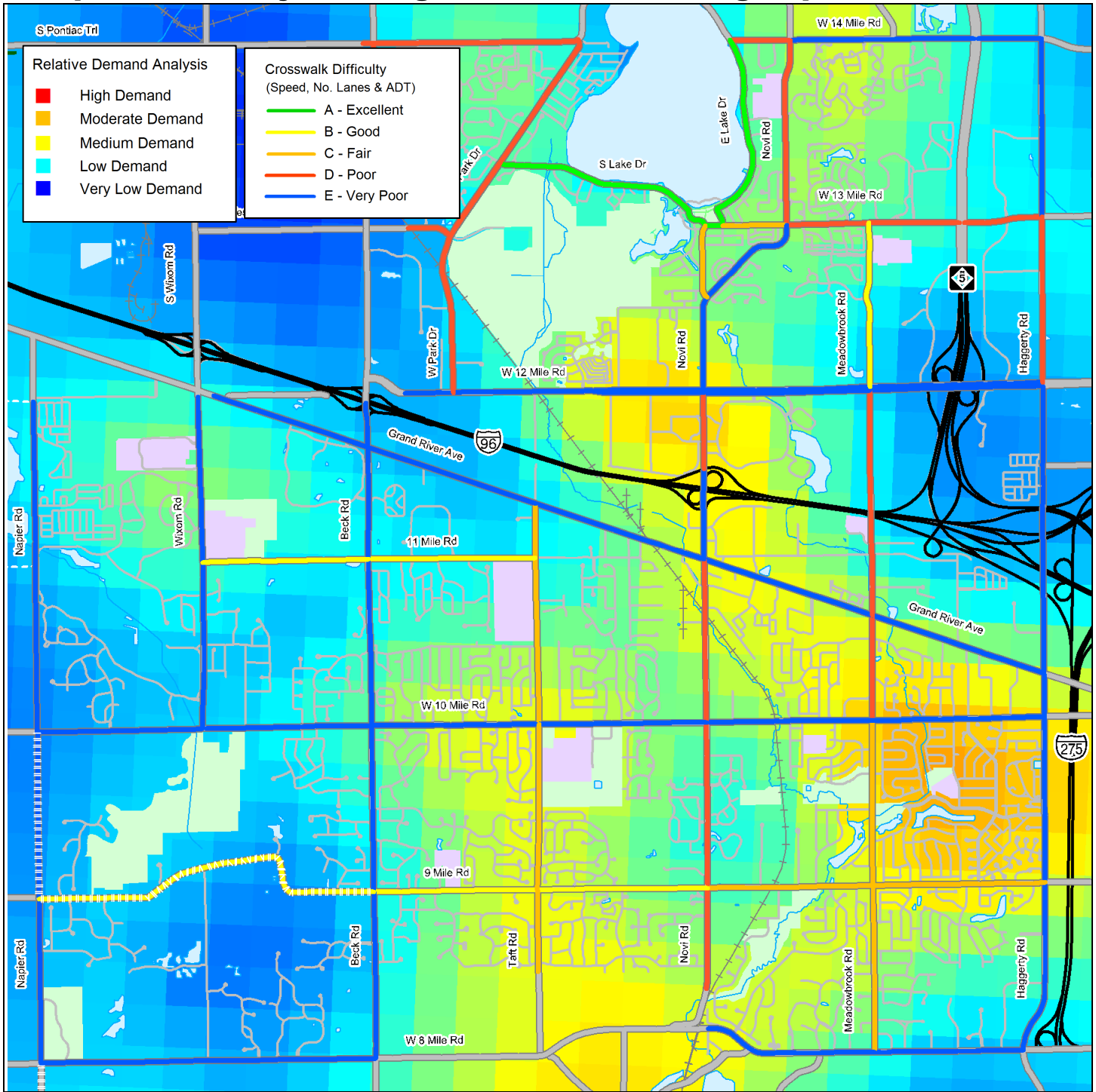
Comparative Analysis – Demand for Road Crossing Improvements

This analysis is a combination of the Relative Demand Analysis and the Crosswalk Spacing Analysis. This analysis helps to identify where additional road crossing improvements are needed. Midblock crossing improvements are needed where there is high demand on both sides of the road and long distances between crosswalks.

Comparative Analysis – Degree of Road Crossing Improvements

Relative Demand Analysis
- High Demand
- Moderate Demand
- Medium Demand
- Low Demand
- Very Low Demand

Crosswalk Difficulty
(Speed, No. Lanes & ADT)
- A - Excellent
- B - Good
- C - Fair
- D - Poor
- E - Very Poor

This analysis is a combination of the Relative Demand Analysis and the Road Crossing Improvement Assessment. This analysis helps to identify the level of improvement that may be needed at potential midblock crossings. Areas with high demand and difficult crossing environment need may need additional improvements to the road crossings.