

The Madison Area Transportation System

# Performance Measures Report

2017

# Madison Area Transportation Planning Board

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The contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation or WisDOT.

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## Regional Transportation Plan Goals and Measures

### Goal I: Create Connected Livable Neighborhoods and Communities

- Miles of Pedestrian Facilities
- Low-Stress Bike Network
- BCycle Utilization

### Goal II: Improve Public Health, Safety, and Security

- **Motor Vehicle Crash Fatalities**
  - 5-year average # of fatalities
  - 5-year average rate of vehicle fatalities
- **Motor Vehicle Series Injuries**
  - 5-year rolling average # of injuries
  - 5-year average rate of vehicle injuries
- **Pedestrian and Bicycle Fatalities and Serious Injuries**
  - 5-year rolling average # of non-motorized fatalities and serious injuries

### Goal III: Support Personal Prosperity and Enhance the Regional Economy

- Airline Passenger Traffic
- *Housing + Transportation Costs*
- Transit Access to Employment

### Goal IV: Improve Equity for Users of the Transportation System

- Transit Ridership
- Fixed Route Transit Service Area
- Transit Coverage for Minorities and Low Income Persons

### Goal V: Reduce the Environmental Impact of the Transportation System

- Vehicle Miles Traveled
- Mode of Transportation to Work
- Air Quality

### Goal VI: Advance System-wide Efficiency, Reliability, and Integration Across Modes

- Transit On-time Performance
- Percent of Key Destinations Served by Transit
- **Roadway Congestion and Reliability**
  - Percent of miles Traveled on the Interstate that are Reliable
  - Percent of miles Traveled on Non-Interstate NHS that are Reliable
- **Truck Travel Time Reliability (TTTR) Index**

### Goal VII: Establish Financial Viability of the Transportation System




- **Buses at or Past Replacement Age**
- **Bridge Condition**
  - Percentage of NHS Bridges Classified as in Good Condition
  - Percentage of NHS Bridges Classified as in Poor Condition
  - Bridge Condition of Non-NHS Bridges
- **Pavement Condition**
  - PCI/PASER Rating
  - Percentage of Pavements on the Interstate System in Good Condition
  - Percentage of Pavements on the Interstate System in Poor Condition
  - Percentage of Pavements on the non-Interstate NHS in Good Condition
  - Percentage of Pavements on the non-Interstate NHS in Poor Condition

Bold measures are federally required. *Italicized measures* are not in current report.



# Metropolitan Planning Area Boundary

for the Madison Area Transportation Planning Board

-  County Boundary
-  National Highway System (NHS)
-  MPA Boundary

Source: MATPB, Esri

0 1¼ 2½ 5 Miles





# Introduction

## Purpose

The Madison Area Transportation Planning Board (MATPB), the Metropolitan Planning Organization (MPO) for the Madison area, creates and maintains the Regional Transportation Plan (RTP) for the Madison Metropolitan Area. The RTP articulates the long-range transportation vision for the region and provides numerous policies and recommends key investments to meet both [regional](#) and [national](#) goals. The seven goals identified in the RTP serve as the framework for the Performance Measures Report (PMR). The purpose of the report is to gauge progress in achieving the RTP goals, inform decisions about investments and strategies, and provide an annual snapshot of how well the regional transportation system is performing over time. Further, the PMR helps the MPO meet [federal requirements for performance management](#) outlined in the [Fixing America's Surface Transportation \(FAST\) Act](#).

Some measures are applicable to more than one goal, but have been organized under the goal that fits best. Some aspects of the plan goals are not addressed by the measures due to unavailable or incomplete data. The measures in this report are not intended to be exhaustive, but rather allow tracking of meaningful progress towards goals for which accurate, easily obtainable data is available. As a result, some measures and methodologies may change from year to year. For questions regarding data sources or methodology changes please contact [MATPB staff](#).

## Federal Performance Measures

All federal performance measures have now been finalized. State department of transportations (DOTs) are required to establish performance targets for all federal measures. MPOs may either support the DOT's targets or establish their own. MATPB elected to support the state targets for the safety performance measures, and will likely do the same for the remaining measures. The state targets for each of the federal measures is included in the measure narratives later on in this report. Once MATPB adopts targets for the federal measures it must then document how roadway and transit projects programmed for the Madison metropolitan area help to achieve these targets in the annual [Transportation Improvement Program](#) (TIP).

## Report Findings

This is the third year that the PMR has been published. The following are notable trends:

### [Positive Trends](#)

- Decrease in fatal crashes
- Increase in airline passenger traffic
- Maintaining fixed-route transit service area
- Improving transit on-time performance

### [Negative Trends](#)

- Increase in number serious injury crashes, including non-motorized modes
- Continued decline in transit ridership
- Worsening pavement conditions



## Create Connected Livable Neighborhoods and Communities

Create interconnected livable places linked to jobs, services, schools, shops, and parks through a multi-modal transportation system that is integrated with the built environment and supports compact development patterns that increase the viability of walking, bicycling, and transit.



# Create Connected Livable Neighborhoods and Communities

## Miles of Pedestrian Facilities

Walking is the second most common mode of transportation, and pedestrian facilities—sidewalks, crosswalks, and off-street paths—are a cornerstone of the transportation network. These facilities make walking safer and more comfortable and form critical links between transit stops and destinations. As the only transportation facilities that can be used by all without charge and without vehicles or special equipment, they are especially valuable to children, seniors, the disabled, and the poor.

The Madison metropolitan area currently has 1,189 roadway miles with sidewalk, 77% of which have sidewalk on both sides of the road. This reflects a 4.7% increase in sidewalk mileage compared to 2016. The majority of these sidewalks (55%) are located in the City of Madison. In addition to sidewalks, there has been a 4.9% increase in other pedestrian facilities; there are now 153 miles of pedestrian paths and hiking trails and 254 miles of shared-use paths available for use by pedestrians in the metropolitan area. Total mileage of pedestrian facilities has increased by about 4.8%.

Most new sidewalks and pedestrian paths were built in newly developing neighborhoods. However, some infill sidewalks have been built in existing neighborhoods in Madison, Stoughton, and other communities in the MPO area.

### DESIRED TREND

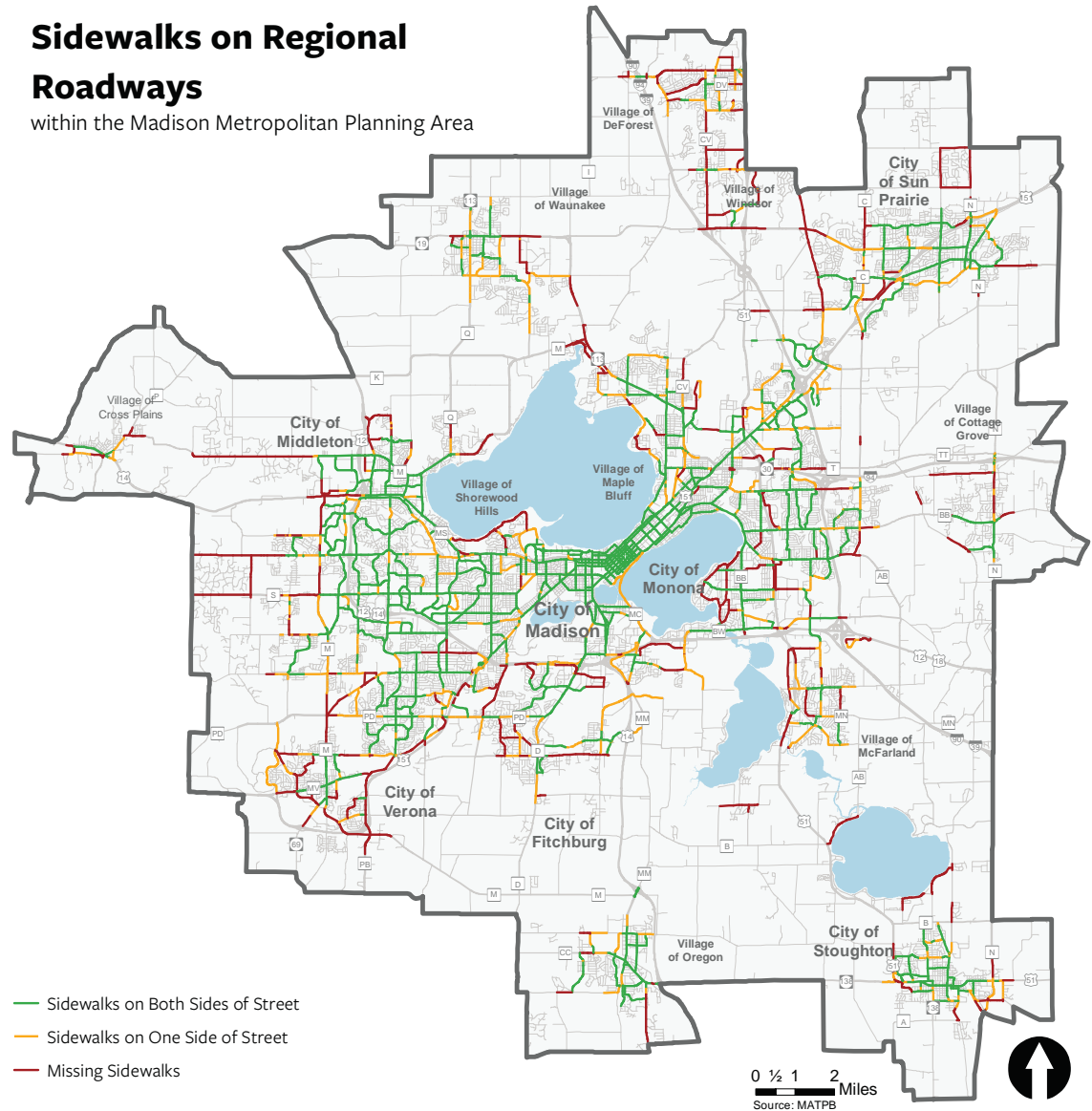


### ACTUAL TREND



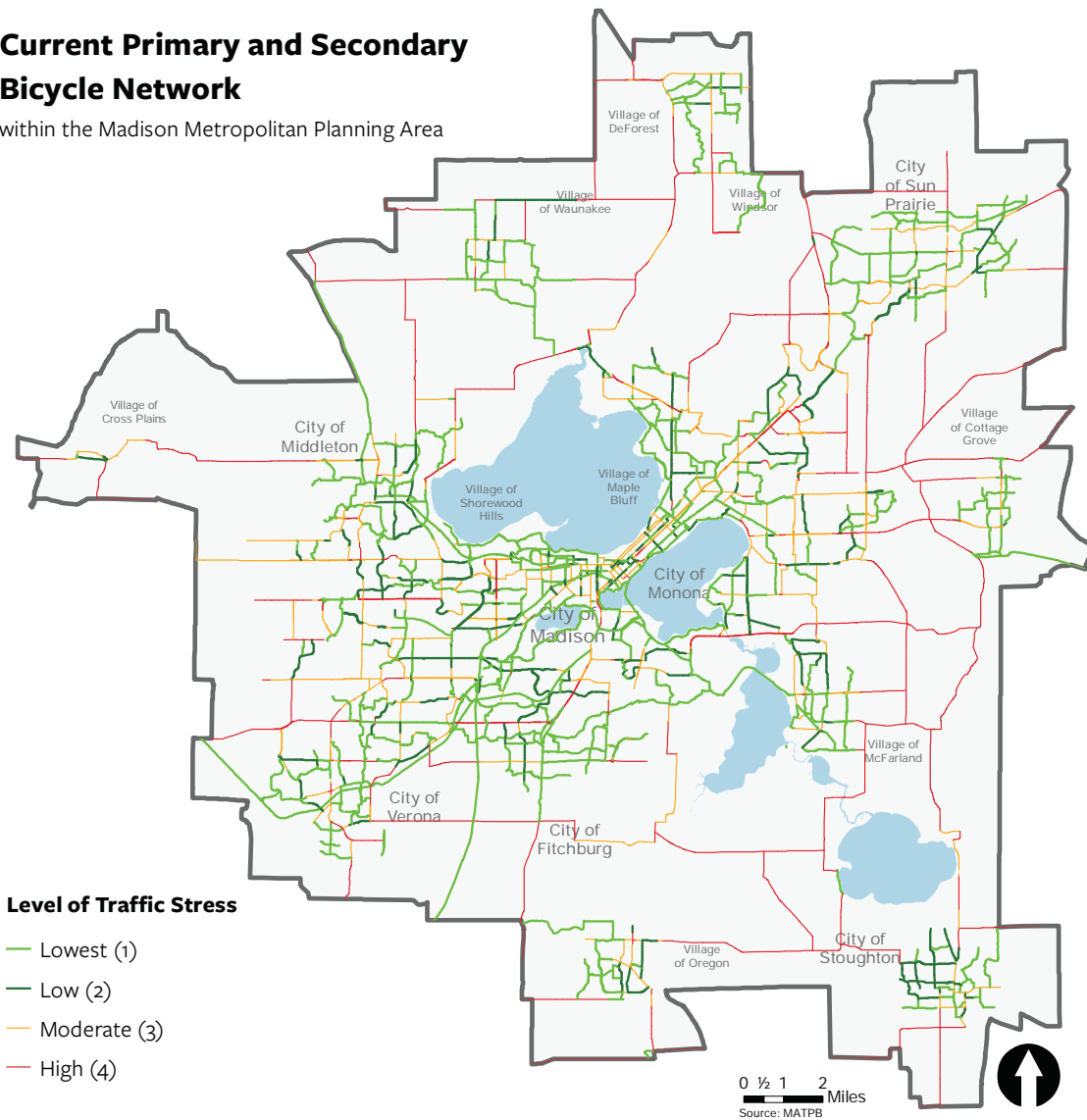
## Sidewalks on Regional Roadways

within the Madison Metropolitan Planning Area



## Current Primary and Secondary Bicycle Network

within the Madison Metropolitan Planning Area



### Level of Traffic Stress

- Lowest (1)
- Low (2)
- Moderate (3)
- High (4)

## Low-Stress Bicycle Network

The bicycle network includes more than just shared-use paths and bike lanes. Local streets make up the lion's share of bicycling infrastructure but it has been difficult to determine which routes are comfortable for most bicyclists. Bicycle Level of Traffic Stress analysis offers a comprehensive way to evaluate the bicycle network beyond purpose-built facilities.

Roads can be divided by their Level of Traffic Stress (LTS) into four groups based on automobile traffic, number of lanes, width of bicycle lanes, and other factors, and can be summarized as follows:

- LTS 1: Strong separation from all except low speed, low volume traffic. Simple-to-use crossings. LTS 1 indicates a facility suitable for children.
- LTS 2: Except in low speed / low volume traffic situations, cyclists have their own place to ride that keeps them from having to interact with traffic except at formal crossings.
- LTS 3: Involves interaction with moderate speed or multilane traffic, or close proximity to higher speed traffic.
- LTS 4: Cyclists mix with or are in close proximity to high-speed traffic.

All off-street paths are LTS 1. Routes rated as LTS 1 or 2 are considered low-stress, where an average person would be expected to feel comfortable riding a bicycle. Routes rated as LTS 4 are high-stress.

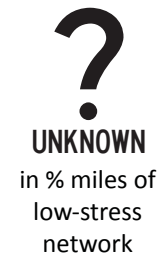
Overall, 65% of the bicycle network in the Madison MPO area qualifies as low-stress and 23% is high-stress. The table below details the percentage of the designated primary and secondary bicycle networks at each traffic stress level in the MPO area. The primary and secondary bicycle networks are the major and minor "trunks" of the bicycle transportation network. Increasing the low-stress portion of these networks makes these key routes more accessible for the many people who are interested in traveling by bicycle but are not comfortable riding in close proximity to motor vehicle traffic.

Level of Traffic Stress 2017	Primary Network		Secondary Network	
	Miles	%	Miles	%
Low Stress (1 & 2)	169	64%	264	45%
Moderate Stress (3)	46	17%	142	24%
High Stress (4)	49	19%	180	31%

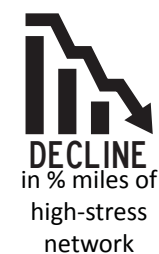
DESIRED TREND



ACTUAL TREND



DESIRED TREND



ACTUAL TREND





# BCycle Utilization

BCycle, Madison’s bike-share system, provides bicycles that can be checked out for short trips from over 40 stations in the Madison area, extending from Whitney Way, in the west, to the Madison College Truax campus, in the east, with the highest density of stations in the downtown area. All of the stations are easily accessible from the City’s expansive network of bike lanes and paths.

In 2017, system utilization increased by 13% from 2016. Some of this growth is attributable to a campaign directed at new UW-Madison students, which helped make September the highest ridership month, with 21,000 trips. The increase in trips occurred despite ten stations being closed for construction for part of the year.

The number of annual memberships increased by 84% between 2016 and 2017. Overall, annual members made 66% of BCycle trips. Casual riders, those with one-day memberships, made 26% of trips.

DESIRED TREND



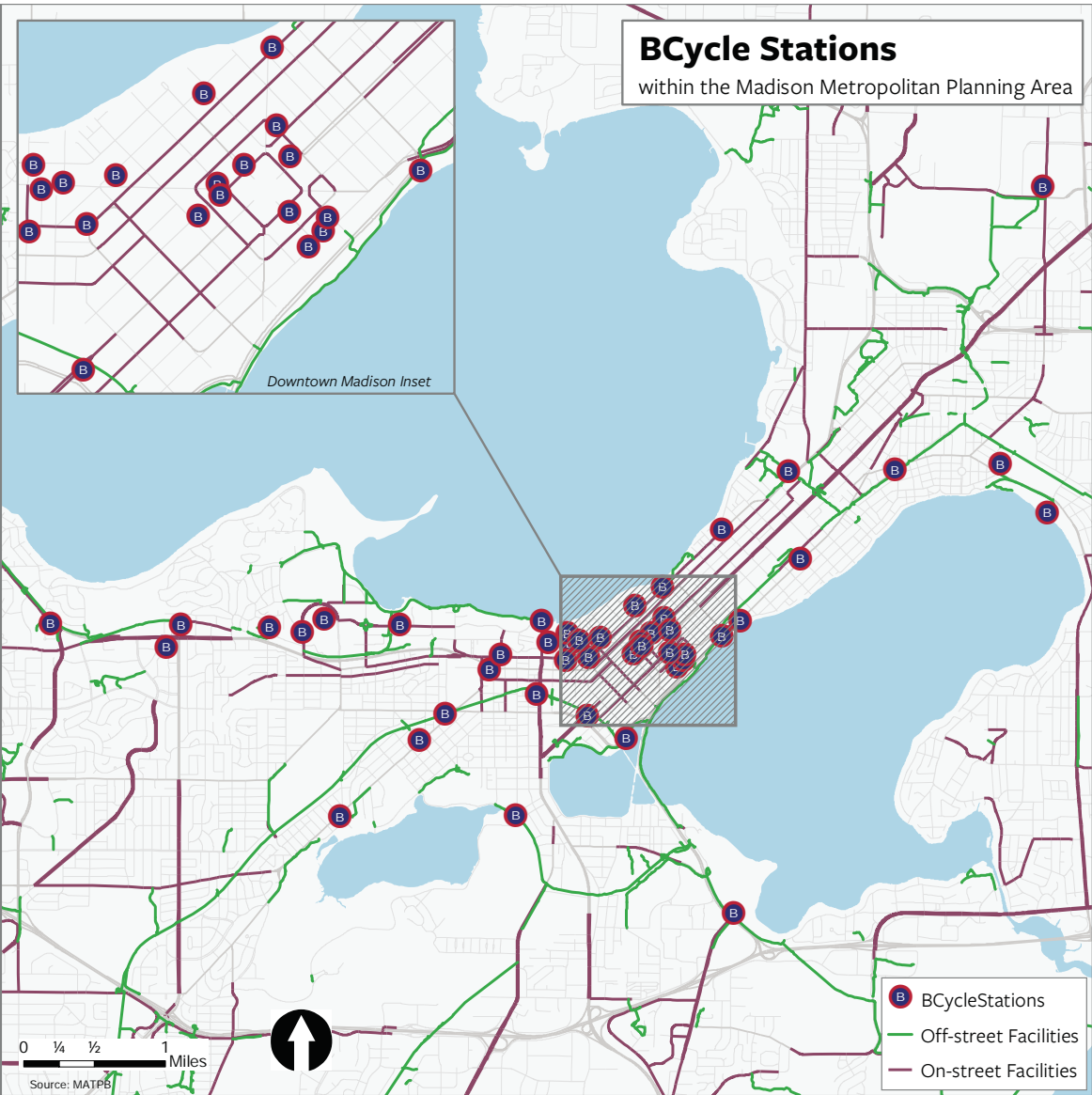
ACTUAL TREND



## BCycle in the Madison Metro Area

Year	Trips	Members	Miles Biked	Avg. Trip in Miles	Stations	Pop. Served
2011	18,501	475	39,618	2.14	27	39,664
2012	63,325	2,150	94,402	1.49	35	42,862
2013	81,662	1,843	173,940	2.13	35	42,862
2014	104,274	2,622	219,108	2.10	39	45,091
2015	101,339	2,789	307,241	3.03	40	45,465
2016	100,938	2,555	307,992	3.05	39	45,995
2017	114,432	4,711	301,337	2.63	46*	45,578

\* 10 stations were only open for part of 2017.





## Improve Public Health, Safety, and Security

Design, build, operate, and maintain a transportation system that enables people to get where they need to go safely and that, combined with supportive land use patterns and site design, facilitates and encourages active lifestyles while improving air quality.

Photo Credit: Madison Fire Department



# Improve Public Health, Safety, and Security

## Motor Vehicle Crash Fatalities

Rolling averages smooth out the year-to-year fluctuations in the number of crashes that can occur due to the randomness of crash events that can skew the data in a particular year, allowing for an examination of trends over time. To develop the averages, counts and rates are added for a series of years and averaged for the time period. Both the number of fatalities and the fatality rate show a general downward trend over time. Dane County experienced an average of 33.6 fatalities per year as a result of an automobile collision for the 5-year period from 2013-2017, a reduction of 1.2% from the previous reporting period. Within this period the county experienced a record low number of fatalities in 2014, however the 2016 fatality data shows the highest number of fatalities since 2008.

Crash rates help explain the relative safety of the system, allowing for locations with differing characteristics (including the amount of traffic) to be compared against other locations. Crash rates are calculated by factoring the number of crashes by the amount of vehicle miles traveled (VMT). In the 5-year reporting period there was little variance between the annual fatality rates, despite the fact that VMT exhibited an overall growth trend during this same time. This indicates that even though more people were using the roadways, a decreasing percentage of those users were involved in a fatal crash. The 2013-2017 5-year fatality rate for Dane County was 0.671, a reduction of 1.8% from the previous period.

## Motor Vehicle Serious Injuries

Serious, or incapacitating, injuries are classified as any injury other than a fatal injury which prevents the injured person from walking, driving, or from performing other activities which they performed before the accident. While the five-year rolling average for serious injuries had shown a steady decrease over time, there was a slight increase for the 2013-2017 reporting period, both in terms of the number and rate of serious injuries.

Dane County experienced an average of 192.8 serious injuries per year from 2013-2017, an increase of 1.9% from the previous period. The number of serious injuries annually ranged from a low of 175 injuries in 2014 to a high of 207 injuries in 2015.

The five-year serious injury rate for Dane County is 3.848, an increase of 1.2% from the previous period.

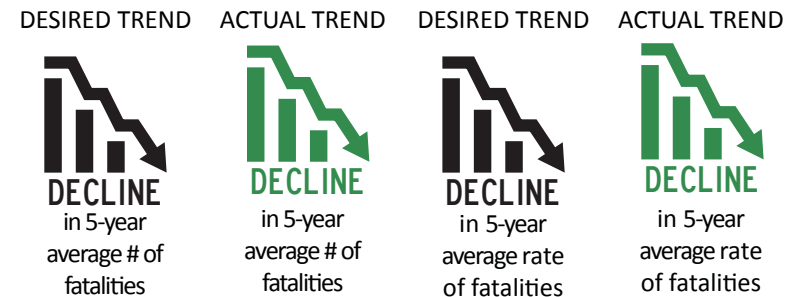
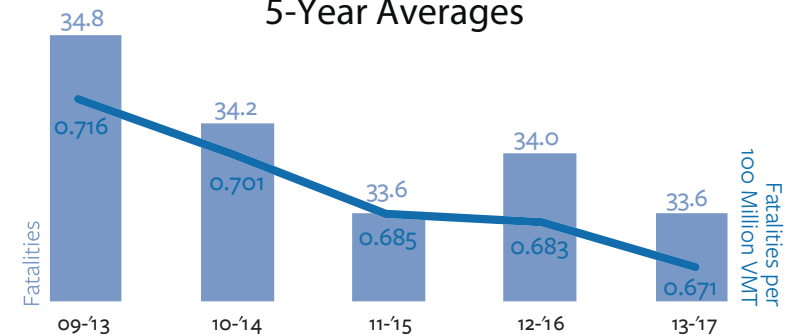
## Pedestrian and Bicycle Non-Motorized Fatalities and Serious Injuries

Pedestrian and bicyclist deaths and injuries had been in decline in recent years, however they increased in 2015, and in 2016 Dane County experienced the highest number of non-motorized fatalities since 2009. Non-motorized fatalities did decrease in 2017; however, there was an increase in the number of serious injuries. The average combined number of non-motorized fatalities and serious injuries for the 2013-2017 period increased 2.8% over the previous period.

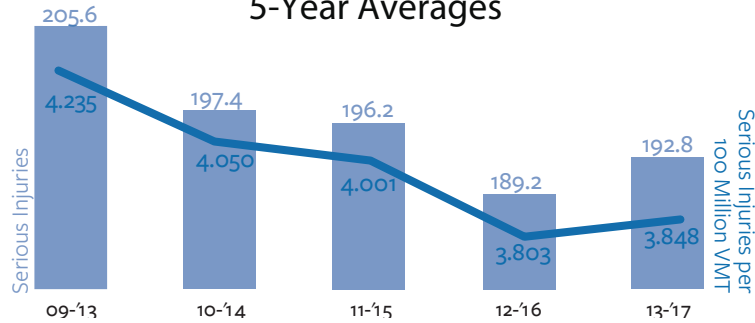
### Dane County Annual Motorized and Nonmotorized Fatalities and Serious Injuries

	2013	2014	2015	2016	2017
<b>Vehicular Fatalities</b>	35	30	34	38	31
<b>Vehicular Serious Injuries</b>	196	175	207	188	196
<b>Non-Motorized Fatalities</b>	6	3	6	9	5
<b>Non-Motorized Serious Injuries</b>	26	18	34	30	48

### Dane County Motor Vehicle Fatalities and Rates 5-Year Averages



## Dane County Motor Vehicle Serious Injuries and Rates 5-Year Averages



DESIRED TREND ACTUAL TREND



in 5-year  
average # of  
serious injuries



in 5-year  
average #  
of serious  
injuries

DESIRED TREND ACTUAL TREND

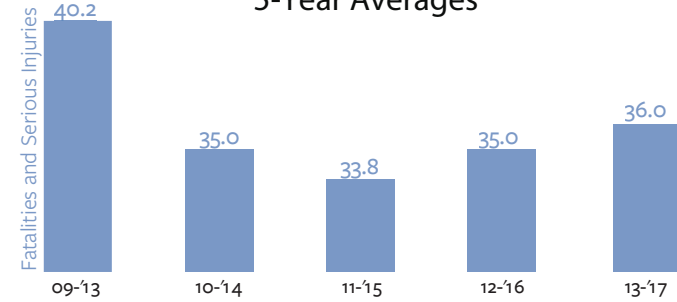


in 5-year  
average rate  
of serious  
injuries



in 5-year  
average rate  
of serious  
injuries

## Dane County Non-Motorized Combined Fatalities & Serious Injuries 5-Year Averages



DESIRED TREND ACTUAL TREND



in 5-year  
average # of  
non-motorized  
fatalities and  
serious injuries



in 5-year  
average # of  
non-motorized  
fatalities and  
serious injuries

## Federal Requirements

Improving safety is a top priority and is at the heart of many transportation investment decisions. In early 2016 the Federal Highway Administration (FHWA) released new rules establishing safety performance measures to track progress in achieving a reduction in fatalities and serious injuries on all public roads.

### Crash Reduction Targets for Wisconsin

WisDOT has set the following statewide safety targets for the 2019 reporting period:

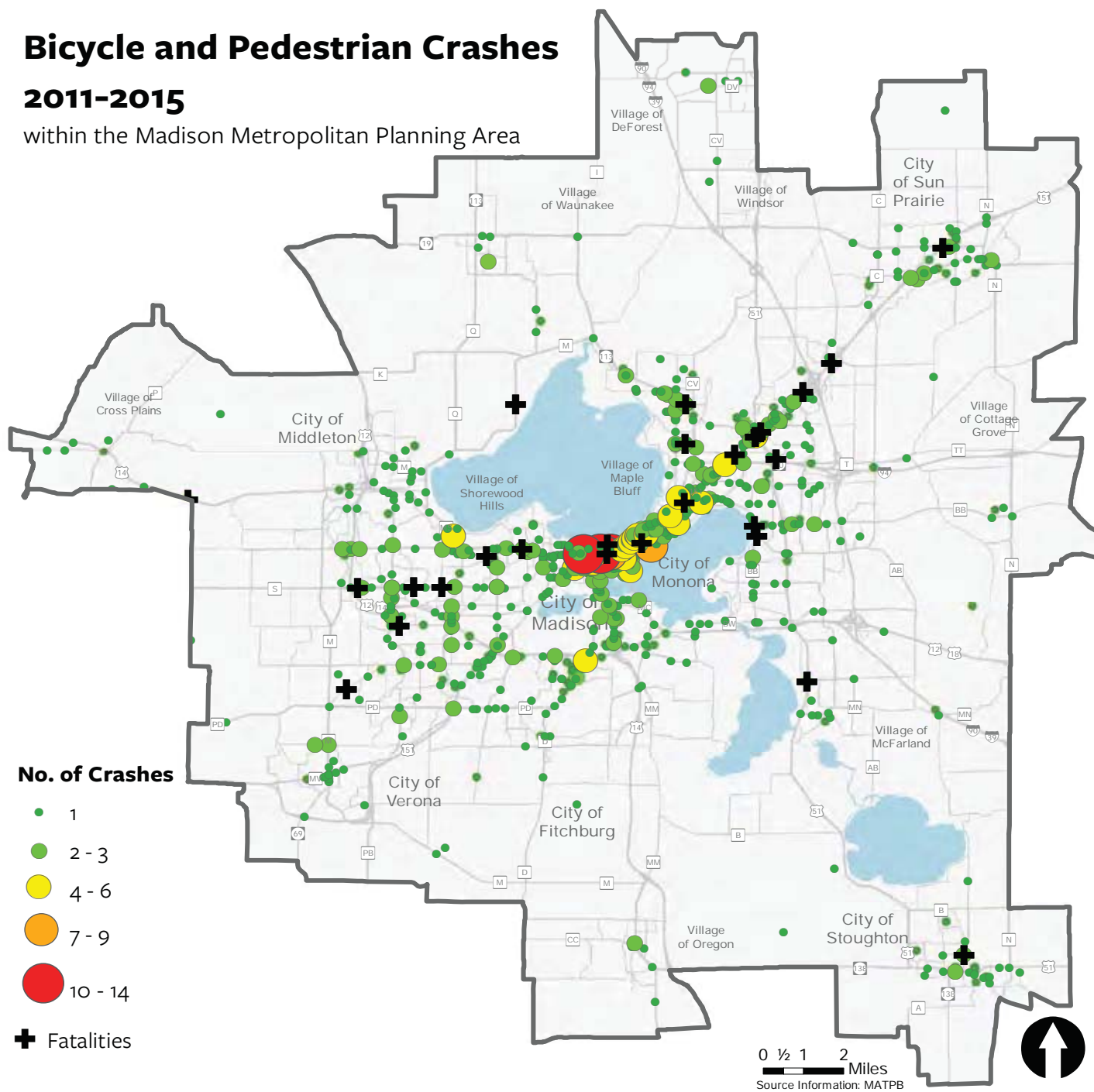
- Number of Fatalities: Reduce by 2% (Less than 555)
- Rate of Fatalities: Reduce by 2% (Less than .915)
- Number of Serious Injuries: Reduce by 5% (Less than 2,967)
- Rate of Serious Injuries: Reduce by 5% (Less than 4.785)
- Number of Non-Motorized Fatalities and Serious Injuries: Reduce by 5% (Less than 342)



# Bicycle and Pedestrian Crashes

2011-2015

within the Madison Metropolitan Planning Area





## Support Personal Prosperity and Enhance the Regional Economy

Build, operate, and maintain a transportation system that provides people with affordable access to jobs and enables the exchange of goods and services within the region and to/from other regions.

# Support Personal Prosperity and Enhance the Regional Economy

## Airline Passenger Traffic

Airline passenger traffic can be used to monitor business success as well as personal financial well-being. Some flights are bound for the area as a tourist destination, injecting money directly into the local economy. Each flight requires a trip to and/or from the airport, meaning that the success of the airport is tied to the quality and reliability of the greater transportation network.

Arrivals and departures fell at the Dane County Regional Airport (MSN) during the recession; however, arrivals and departures have increased each year since 2012, setting a record high in 2017, an increase of 3.0% over 2016. According to an airport press release, the increase can be attributed to the strong local economy and the additional routes and larger aircraft offered by the airlines that serve MSN, which will in turn help to continue to expand the options available to passengers. MSN provides non-stop service to Atlanta, Charlotte, Chicago, Dallas-Fort Worth, Denver, Detroit, Las Vegas, Minneapolis, New York, Newark, Orlando, Salt Lake City, and Washington D.C., with more than 100 arrivals and departures daily.

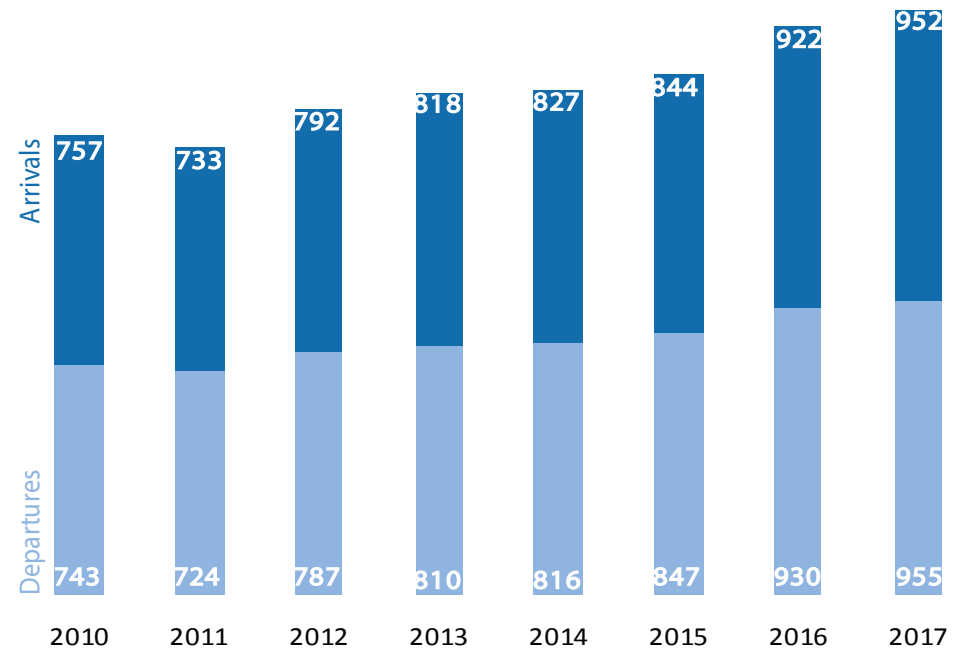
DESIRED TREND



ACTUAL TREND



## Dane County Regional Airport (MSN) Annual Passenger Volume (in thousands)

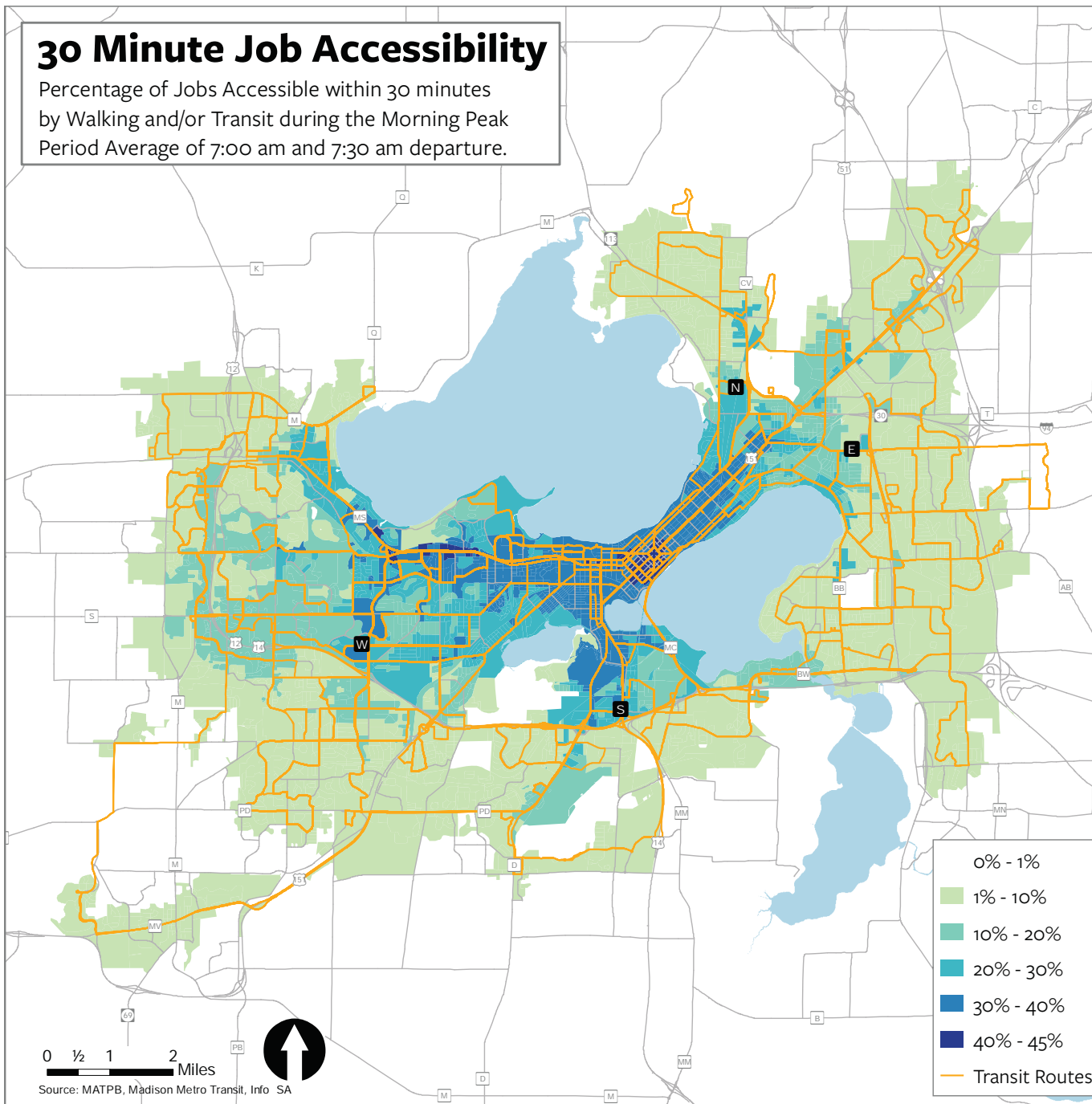


Source: Dane County Regional Airport Monthly Activity Report



## 30 Minute Job Accessibility

Percentage of Jobs Accessible within 30 minutes  
by Walking and/or Transit during the Morning Peak  
Period Average of 7:00 am and 7:30 am departure.



## Transit Access to Employment

According to US Census data, more than 6% of commuters in the Madison Metropolitan Area use public transportation to get to work. Public transit gives people an alternative to driving that conserves fuel and reduces emissions. Metro Transit, the City of Madison-owned transit system, is the largest bus system in the area and provides service in the City of Madison extending into several neighboring communities.

The Transit Job Accessibility maps show the percentage of jobs in the Madison Urban Area that a person residing within each Census Block can access within 30 minutes and 45 minutes by walking and/or using public transit. In the Madison area, a commute of 30 minutes or less is normal and many would likely consider a 45-minute commute tolerable. Transit commutes beyond 45 minutes are not competitive with other modes. The average transit commuter in the Madison area spends about 33 minutes getting to work, compared with about 20 minutes for commuters traveling by other modes.

Residents in central Madison have the greatest access to jobs by transit. This is due to the high concentration of jobs, the frequent transit service and numerous routes, and the fact that central Madison is in the middle of Metro Transit's service area, which provides residents with good access to jobs on the periphery.

Our analysis finds that nearly 70,000 people, about 17% of the urban area population, can access at least 50% of the jobs in the urban area by transit within 45 minutes. This is virtually unchanged from 2016. While there were some minor route changes between 2016 and 2017, overall job accessibility has remained steady.

DESIRED TREND



ACTUAL TREND



## Transit Job Accessibility

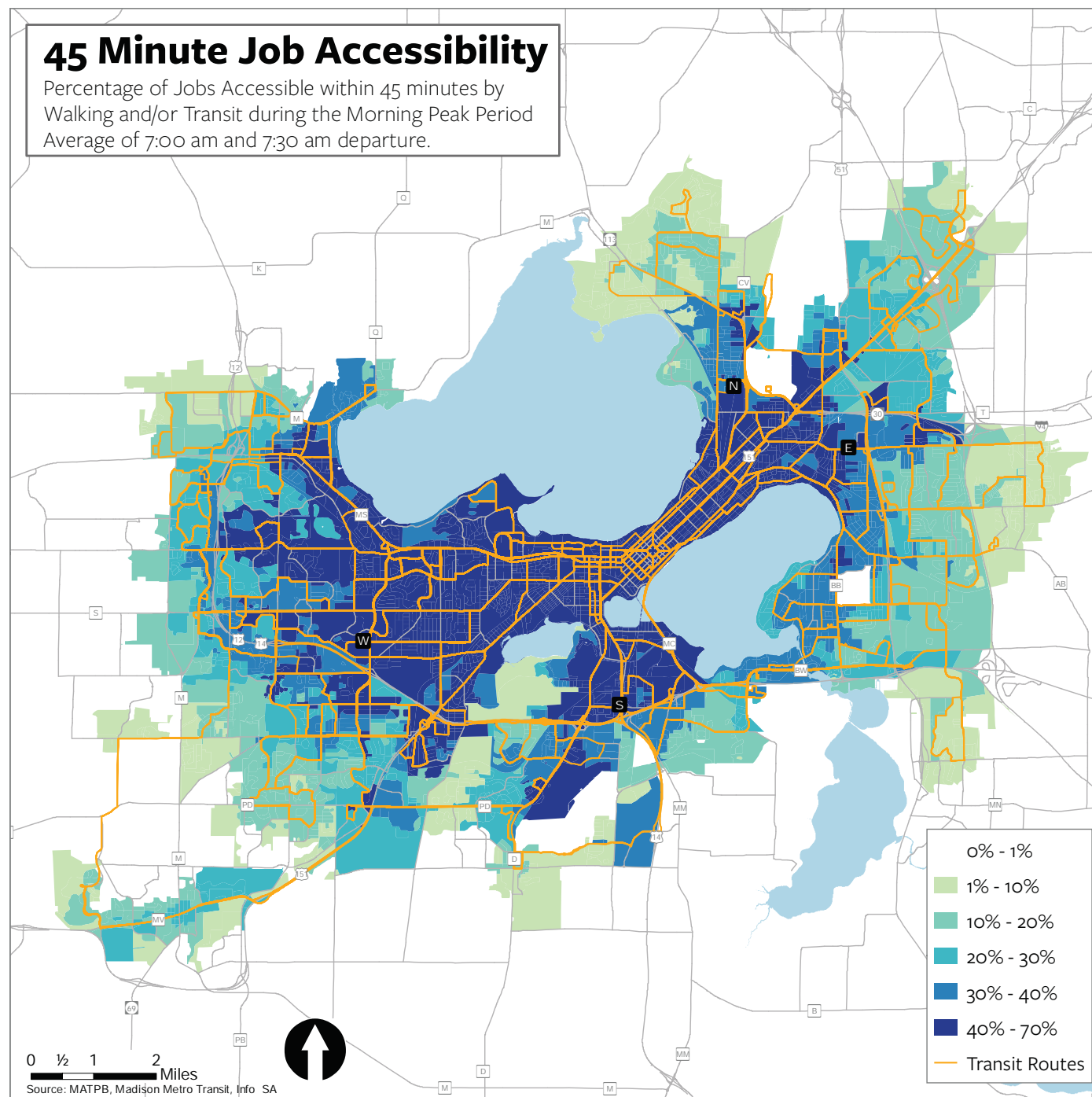
**% of Jobs  
Accessible  
by Transit**

**Number of people with  
access to jobs within:  
30 Minutes 45 Minutes**

Over 50%	N/A	69,702
40% - 50%	9,100	57,036
30% - 40%	52,462	46,539
20% - 30%	33,361	34,853
10% - 20%	41,262	48,420
1% - 10%	130,972	23,691
Less than 1%	140,967	127,883

## 45 Minute Job Accessibility

Percentage of Jobs Accessible within 45 minutes by  
Walking and/or Transit during the Morning Peak Period  
Average of 7:00 am and 7:30 am departure.







## Improve Equity for Users of the Transportation System

Provide an equitable level of transportation facilities and services for all regardless of age, ability, race, ethnicity, or income.



# Improve Equity for Users of the Transportation System

## Transit Ridership

Efficient and well-used public transit service is a key component of a well-balanced transportation system that serves all users. Two transit systems operate fixed-route bus service – Madison Metro Transit and Monona Transit – in the Madison Urban Area.

Metro Transit, serving Madison as well as neighboring partner communities, including Middleton, Fitchburg, and Verona, had seen increasing fixed-route ridership nearly every year between 1990 and 2014. However, ridership has been falling since 2015, and fell 3.7% between 2016 and 2017. Ridership today is only slightly higher than it was in 2007 despite an increase in revenue service hours.

Declining bus ridership is a national trend. A [report](#) from the American Public Transit Association (APTA) suggests several likely contributing factors:

- Erosion of cost competitiveness (low gas prices, easy access to auto loans, increased bicycling, increase use of ride hailing services)
- Erosion of time competitiveness (increasing traffic congestion)
- Reduced customer affinity and loyalty (more alternative work schedules, fewer monthly pass users)
- Other external factors.

DESIRED TREND



ACTUAL TREND

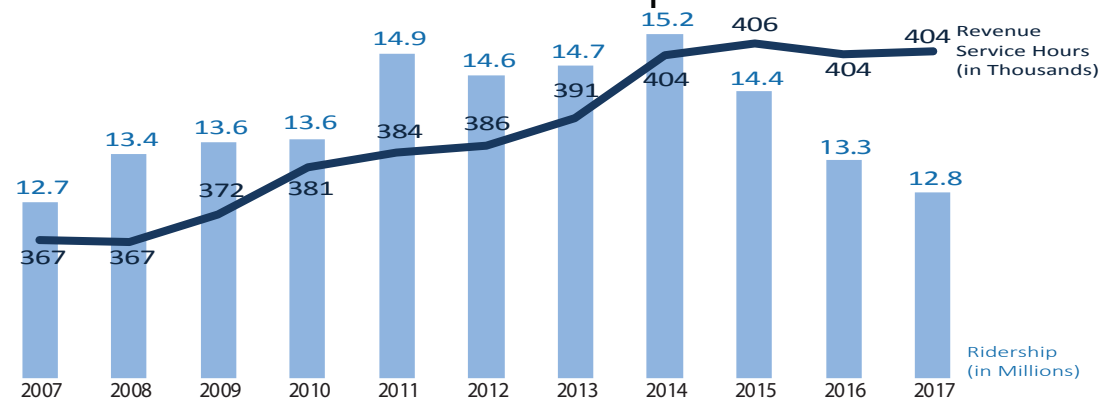


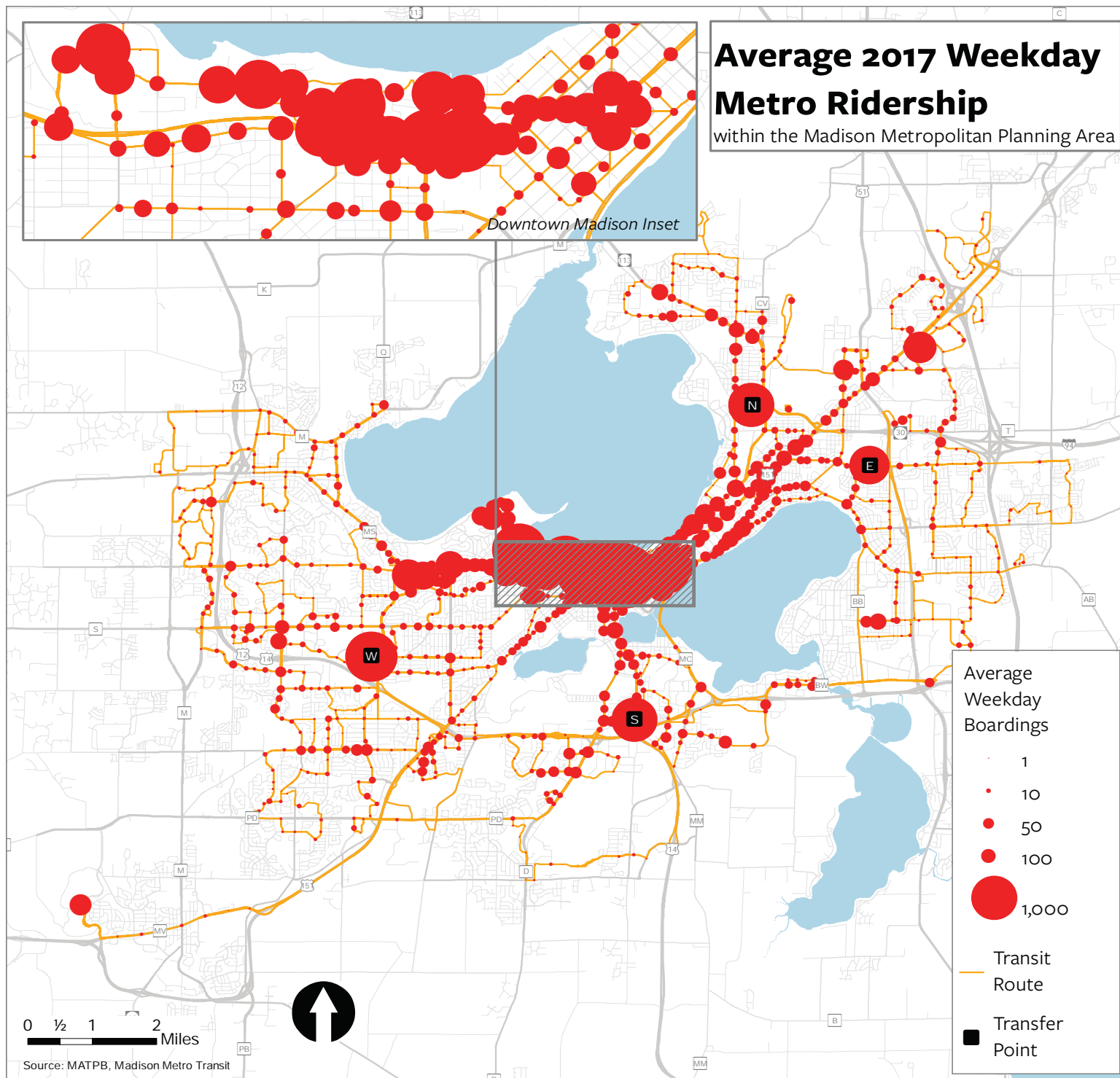
While the exact reasons for declining ridership are unclear, MATPB's [Regional Transportation Plan 2050](#) and [Transit Development Plan](#) make a number of recommendations to increase ridership and improve service:

- Implement a Bus Rapid Transit System
- Implement a regional transit authority to provide a dedicated funding source
- Provide regional express service to suburban communities and park-and-ride lots
- Improve existing transit service by reducing travel times, increasing service frequency, increasing capacity, serving new neighborhoods, and improving first and last mile connections.



Metro Transit Fixed-Route Ridership and Service Hours





# Fixed Route Transit Service Area

Fixed-route transit service provides transportation open to the public on set routes using reliable schedules with buses stopping to pick up and drop off passengers at signed bus stops. Riders use the service for many purposes, but surveys show that routine trips like work and school commutes are much more likely to be made by transit. Service area coverage is an important metric because it shows the population that has access to this service.

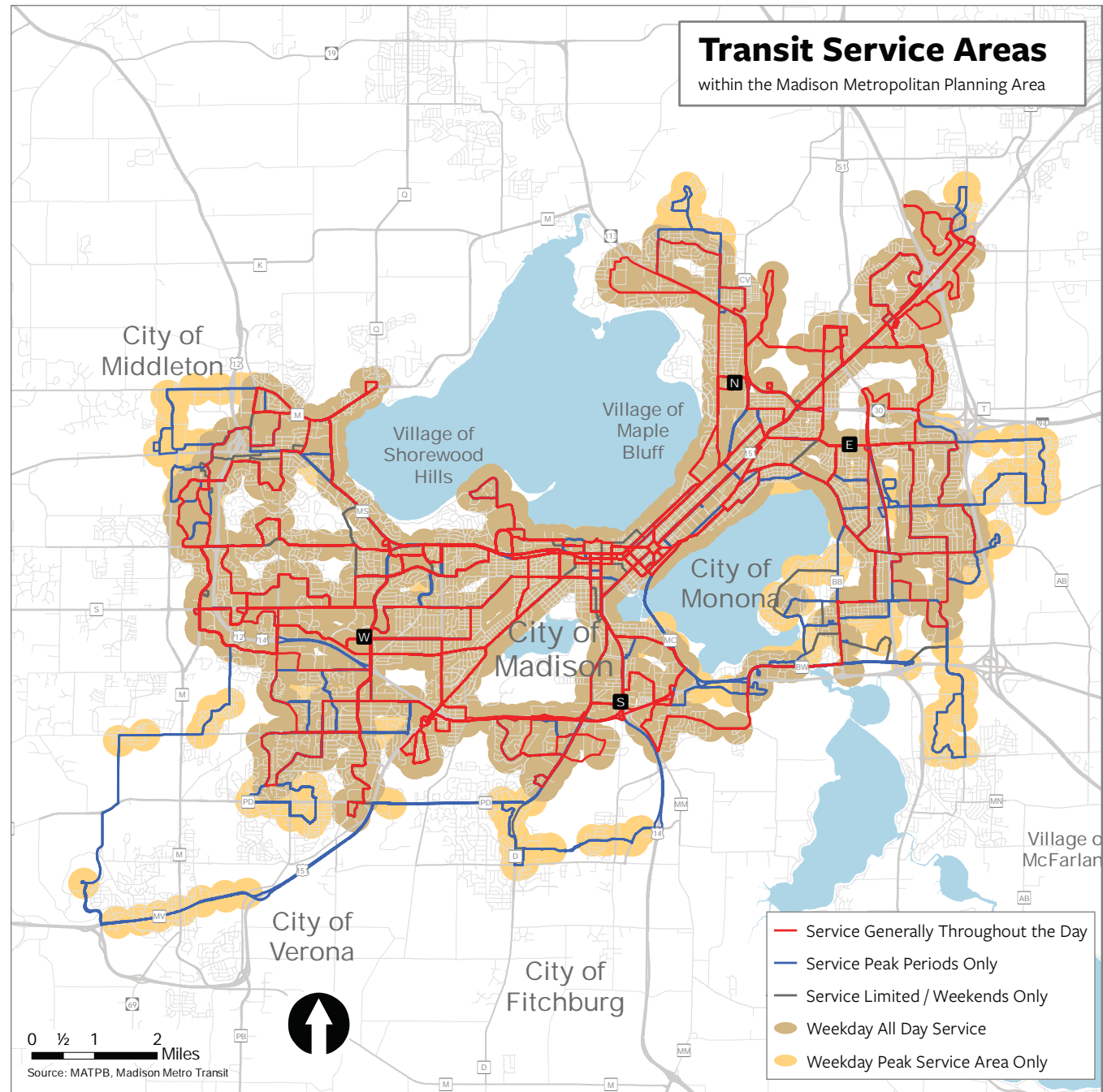
The fixed-route transit service area is defined as a ¼-mile buffer from a bus stop, equivalent to about a five-minute walk. All-day service covers roughly 55.8 square miles and roughly 54.4% of all residents living within the Madison Urban Area. Peak period-only routes extend coverage on weekday mornings and afternoons to 70.1 square miles and 61.6% of residents. Peak period service is useful for traveling to first shift jobs, but does not provide all-day mobility to people for many other trips.

The fixed-route transit peak-period and all-day service areas increased by 1 mile and ½ mile, respectively, in 2017 compared to 2016. The population served by all-day service remained the same and there was a slight increase in the number of people served by peak period-only service.

DESIRED TREND



ACTUAL TREND



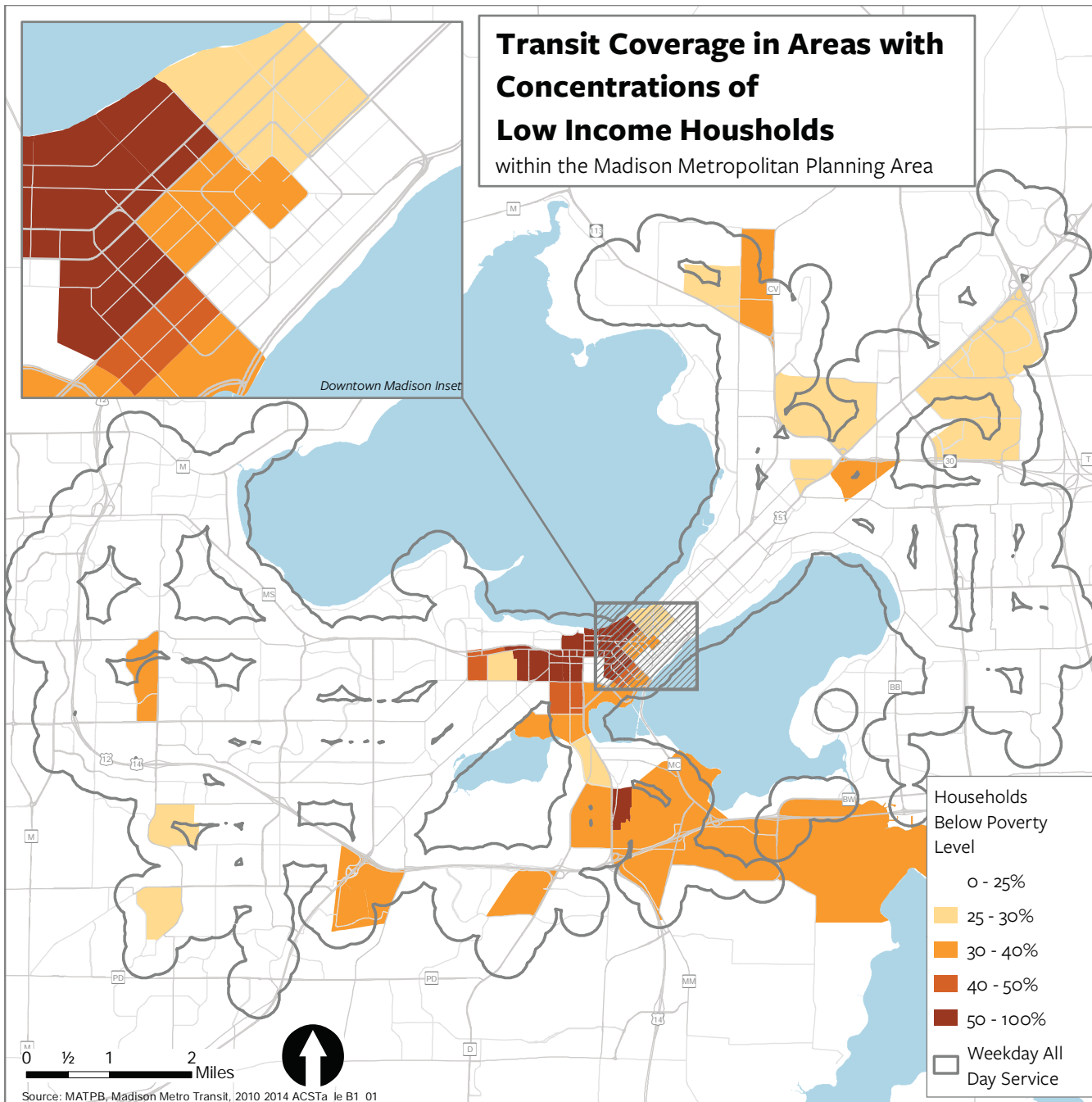


## Transit Coverage for Minority and Low Income Persons

Transit accessibility is important for all people, but especially for minorities and low-income families because they are more likely to rely on public transit than other segments of the general population.

The 2015 Metro Transit On-board Survey provides a glimpse into who uses the public transportation system in the region. The survey revealed that transit riders are much more likely to be members of racial and ethnic minorities than the population at-large and are likely to have significantly lower household incomes. Overlaying the all-day fixed-route bus service area with census data showing high concentrations of minority and low-income residents provides an indication of transit accessibility for these groups.

Overall, 78.5% of low-income households and 71% of minority residents in the Madison Urban Area had access to all-day bus service in 2017. Access to transit for low-income and minority households was virtually unchanged between 2016 and 2017.



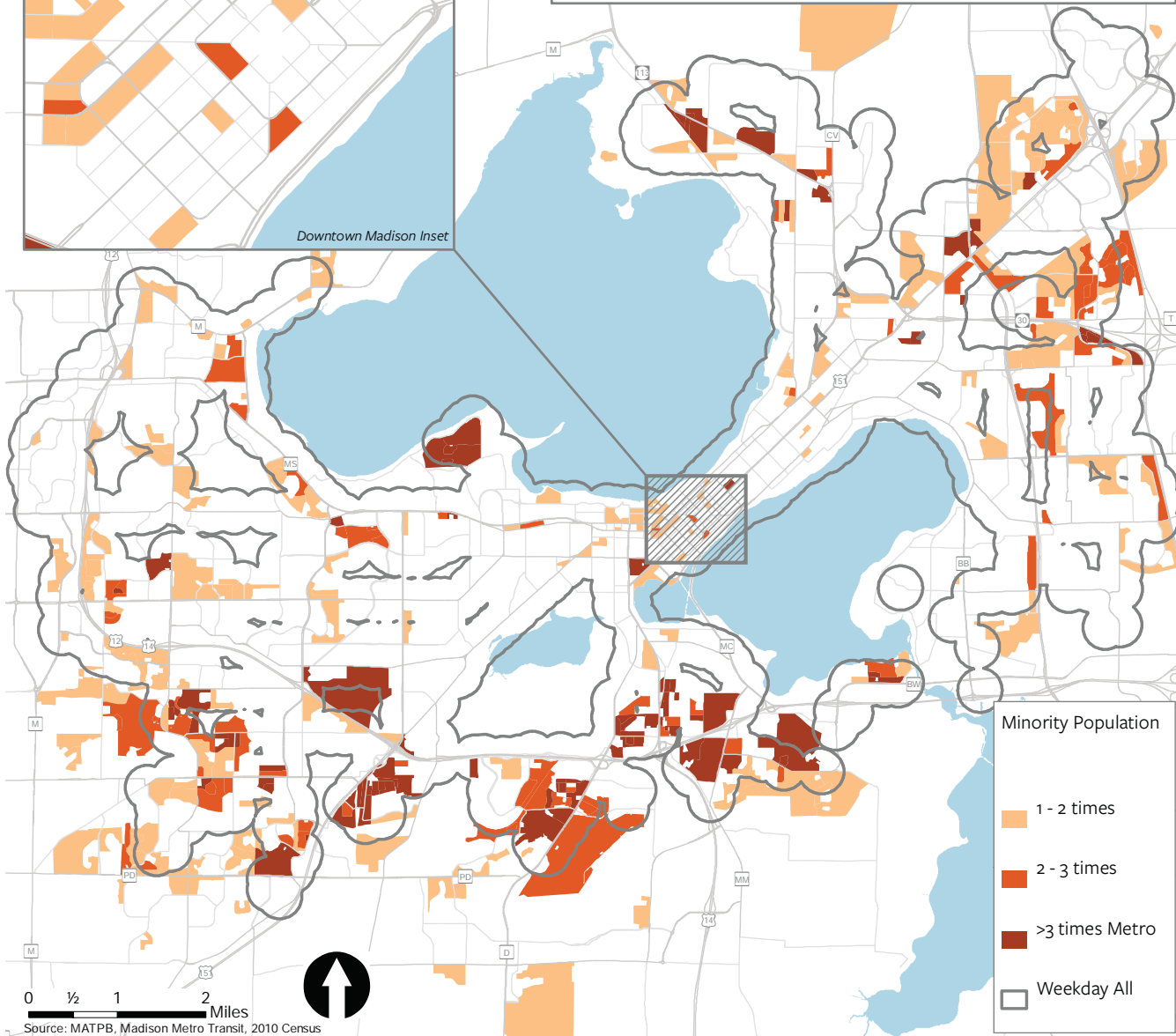
DESIRED TREND



ACTUAL TREND



## Transit Coverage in Areas with Concentrations of Minority Residents within the Madison Metropolitan Planning Area



## Related Links and Information:

- [2015 Madison Metro Transit On-board Passenger Survey](#)
- [2013 - 2017 Transit Development Plan for the Madison Urban Area](#)
- [Title VI Non-Discrimination Program / Limited English Proficiency Plan](#)
- [Section 5310 Program Management and Recipient Coordination Plan](#)
- [Public Transit Trends in the Madison Area](#)
- [Metro Transit Paratransit Service Area Map](#)
- [Group Access Service Information](#)



An aerial photograph of a city, likely Chicago, showing a large body of water (Lake Michigan) in the background. In the foreground, there is a large stadium with a white, dome-like roof, surrounded by parking lots and other buildings. A major highway interchange is visible in the lower right. The city skyline is visible in the distance across the water.

## Reduce the Environmental Impact of the Transportation System

Ensure that the transportation system is designed, built, operated, and maintained in a way that protects and preserves the natural environment and historic and cultural resources, and is supportive of energy conservation.



# Reduce the Environmental Impact of the Transportation System

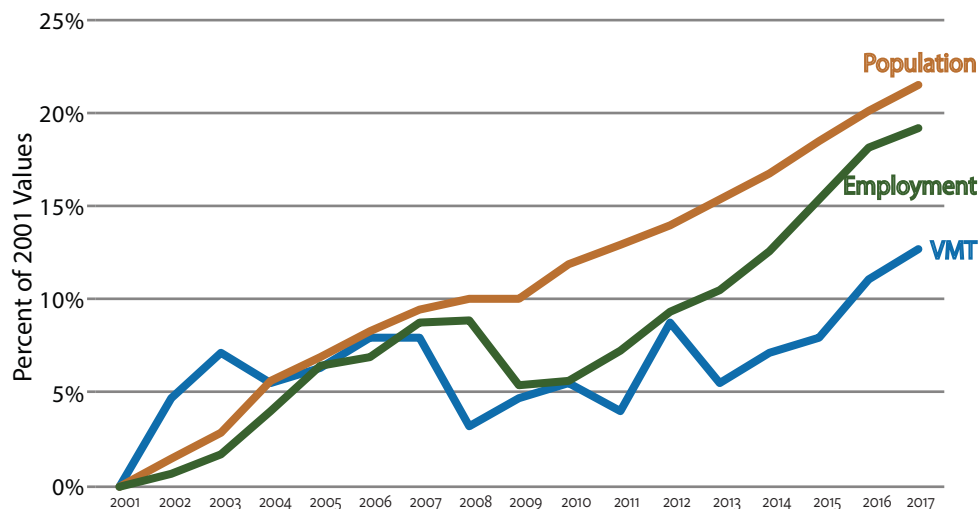
## Vehicle Miles Traveled

Vehicle Miles Traveled (VMT) is a measure of all the miles driven within an area within a specified period. VMT can be influenced by a multitude of factors - population growth, the health of the economy, fuel and parking costs, accessibility of public transit and other transportation alternatives, weather, mix of land uses, and more.

VMT peaked in 2005 at the height of the housing boom and 2000s economic growth. In late 2007, fuel oil and heating-oil prices began to rise as the “housing bubble” burst. The result was the Great Recession, in which local unemployment increased to over 6%, while national unemployment increased to 10% at its height, and VMT sharply dipped.

In Dane County VMT began to rebound in 2012 and has continued to increase gradually ever since. **Although VMT growth outpaced the rate of population and employment growth in the early 2000s, since the Great Recession VMT is increasing at a relatively slower rate compared to growth in both population and employment.** The average daily VMT for Dane County in 2017 was 14,208,516, a slight increase of 1% over 2016. While it is likely that VMT will continue to rise as the region adds more people, the desired trend is that the growth of VMT will not outpace the growth of the region’s population, so that while there may be more people on the road, they are driving less frequently and/or shorter distances.

### Dane County Annual Growth Trends: 2001 - 2017




Source: WisDOT, WIDOA, BEA

## Madison Area Car Facts 2017

 **\$13,507**  
Annual Transportation Costs

 **1.83**  
Autos Per Household

 **21,486**  
Vehicle Miles Traveled per Household

 **9.92**  
Annual Tons of Greenhouse Gas Emissions per Household  
Source: CNT - MATPB fact sheet, 2016

DESIRED TREND  
  
**STEADY**  
total VMT

ACTUAL TREND  
  
**STEADY**  
total VMT

# Mode of Transportation to Work

Commuting to work is one of the most predictable and common trips made by adults. About 70 percent of people aged 16 and older are part of the workforce population-roughly 46 percent of the total population. Work trips most often occur during congested time periods and are the largest contributor to travel time delay. They are also slightly longer than trips for other purposes and anchor travel for other purposes. In all, commuting represents more than 28 percent of all miles of personal travel. By reducing the number of work trips made by single occupant vehicles (SOVs), the region can reduce greenhouse gas emissions and increase the efficiency of the transportation network.

In Dane County nearly three-quarters (71%) of all resident workers drove alone to work in 2017, comparable to previous years. Almost a quarter (23%) of City of Madison resident workers use public transit, bicycle, or walk to work compared to 14% of all Dane County residents. 61% of Madison workers drive alone to work. Notable for 2017 is a small increase in working from home, true for both Madison and Dane County as a whole.

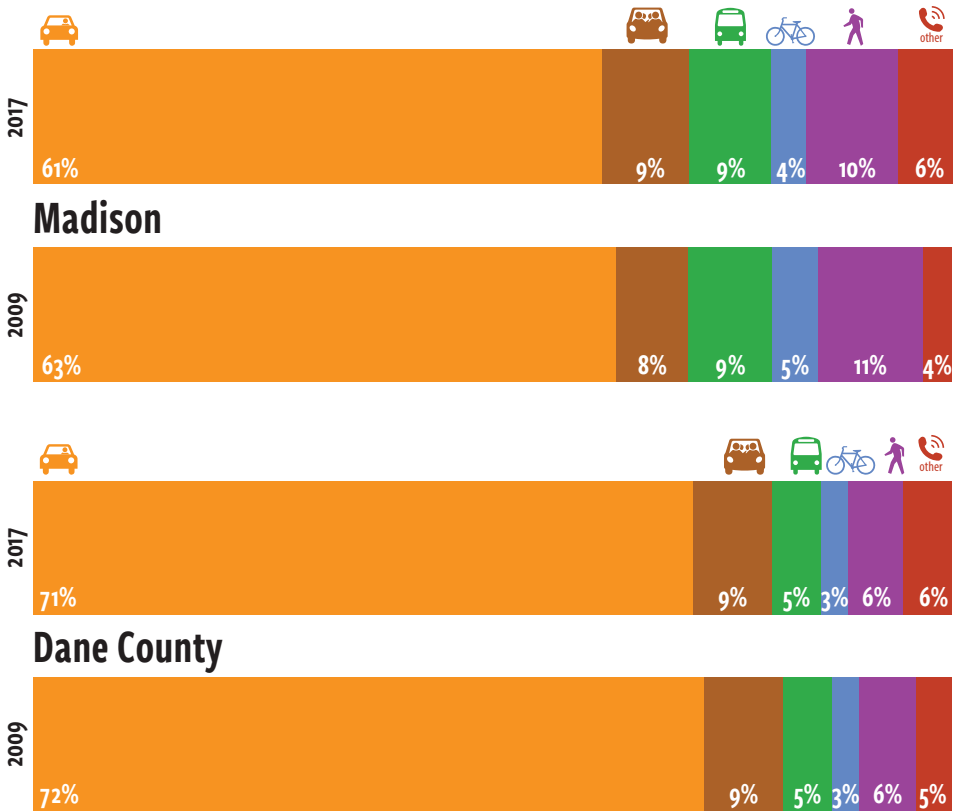
### DESIRED TREND



### ACTUAL TREND



## Mode of Transportation to Work



American Community Survey 1-year data

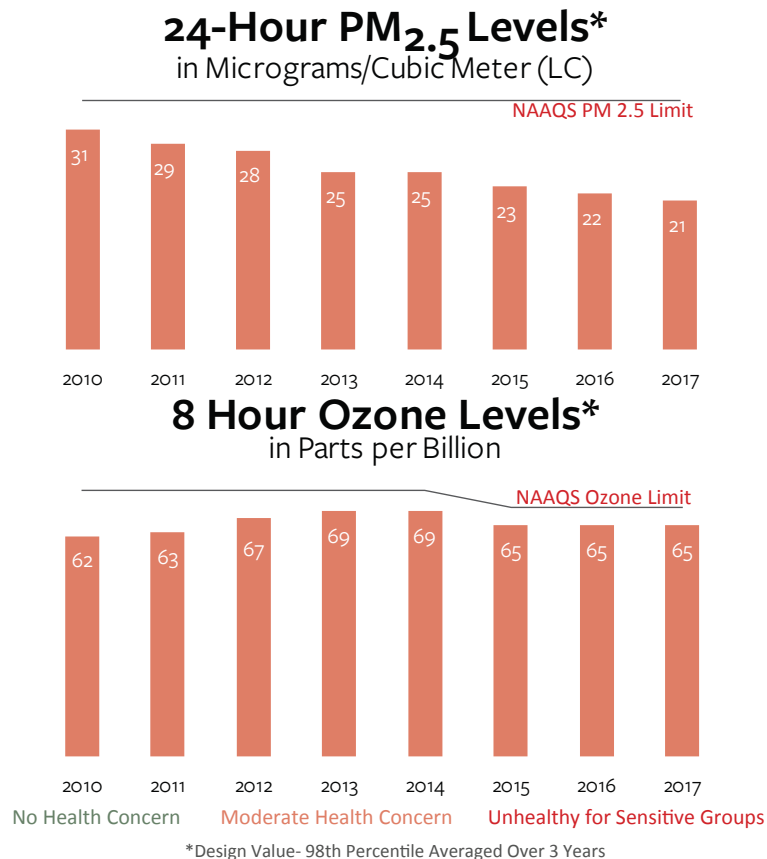
## Air Quality

Examining the air quality of a region is one of the ways of measuring the impact of the transportation system on the environment. The Clean Air Act provides standards intended to protect human health and the environment for a variety of pollutants including ozone, fine particulate matter (PM 2.5), carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead. Each of these air pollutants can be linked to specific adverse environmental and public health impacts. PM 2.5 is a component of acid rain, and is the main cause of reduced visibility (haze). Exposure to PM 2.5 can also lead to a variety of adverse health effects, as particle pollution can be absorbed into the body through the lungs and has been linked to a variety of serious health conditions or illnesses such as coughing/difficulty breathing, decreased lung function, asthma, irregular heartbeat, nonfatal heart attacks, and premature death in people with heart or lung disease. Ozone's health effects include causing shortness of breath, damaging the airways, aggravating lung diseases, increasing the frequency of asthma attacks, and causing chronic obstructive pulmonary disease.

Advances in technology and federal policies have led to improved air quality over the past decades; however transportation decisions and investments can still negatively impact air quality. Emissions from transportation account for 26% of total U.S. greenhouse gas emissions- second only to the electricity sector. An urbanized area with a population greater than 50,000 people may be classified as a non-attainment area if any of the annual design values for the six pollutants identified under the Clean Air Act exceeds the National Ambient Air Quality Standards (NAAQS). If an MPO is in a designated non-attainment area there are additional requirements on how federal transportation dollars can be spent to ensure consistency with achieving air quality goals.

PM 2.5 and Ozone are continuously monitored in the Madison area. Over the past six years, PM 2.5 levels have steadily declined, staying safely below the NAAQS limit of 35 micrograms/cubic meter. The region's current PM 2.5 levels pose no significant health risks.

Unlike PM 2.5, the region's ozone levels have remained relatively consistent, posing a moderate health concern for area residents. In 2012 levels on some summers days were high enough to be considered "unhealthy for sensitive groups." In 2015 the NAAQS limit for ozone was reduced from 75 parts per billion (ppb) to 70 ppb. The design value for 2017 was 65 ppb, unchanged from the two prior reporting years. If the region's ozone levels, which are greatly influenced by summer weather, do not begin to trend downwards the region may be at risk of being designated as a non-attainment area for ozone in the future.



### DESIRED TREND



### ACTUAL TREND







## Advance System-wide Efficiency, Reliability, and Integration Across Modes

Design, build, operate, and maintain an efficient transportation system with supportive land use patterns that maximizes mobility, minimizes unexpected delays, and provides seamless transfers between all modes.

# Advance System-Wide Efficiency, Reliability, and Integration Across Modes

## Transit On-time Performance

Reliability is crucial for transit systems. Many people using transit are commuting to work and unreliable transportation options can result in people arriving late to work through no fault of their own. Further, many trips require transfers between buses – missed transfers can strand riders for up to an hour. When these things happen, riders are likely to stop using transit.

For this analysis, a bus is classified as late if it departs a “time point” five or more minutes late. Conversely, a bus is early if it departs from a “time point” one minute or more early. In many cases, late buses are the result of non-recurring traffic congestion, often the result of accidents and road construction. Early buses, however, are sometimes caused by drivers not waiting at time points - a behavior that Metro can remedy.

Metro Transit’s on-time performance fluctuated between 84% and 86% between 2010 and 2016 but improved markedly to nearly 89% in 2017. This improvement was due to a sharp reduction in the percentage of buses arriving late.

### DESIRED TREND

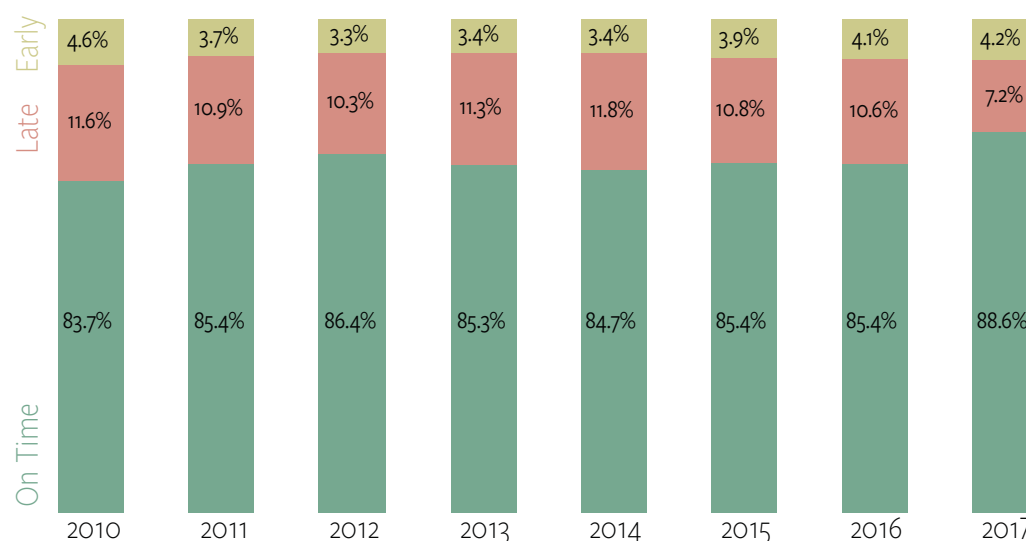


### ACTUAL TREND



## Madison Metro Transit On-Time Performance

Percentage of buses arriving on-time, 5+ minutes late, or 1+ minutes early



Source: Metro Transit

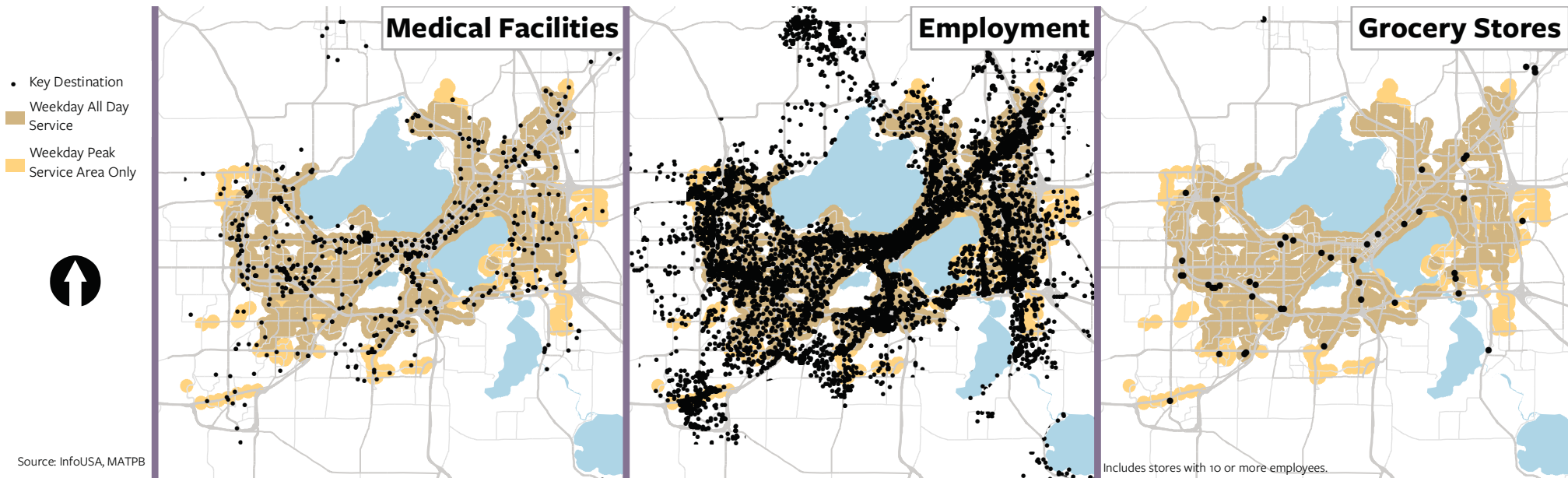
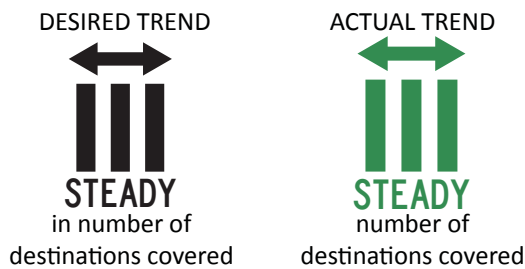
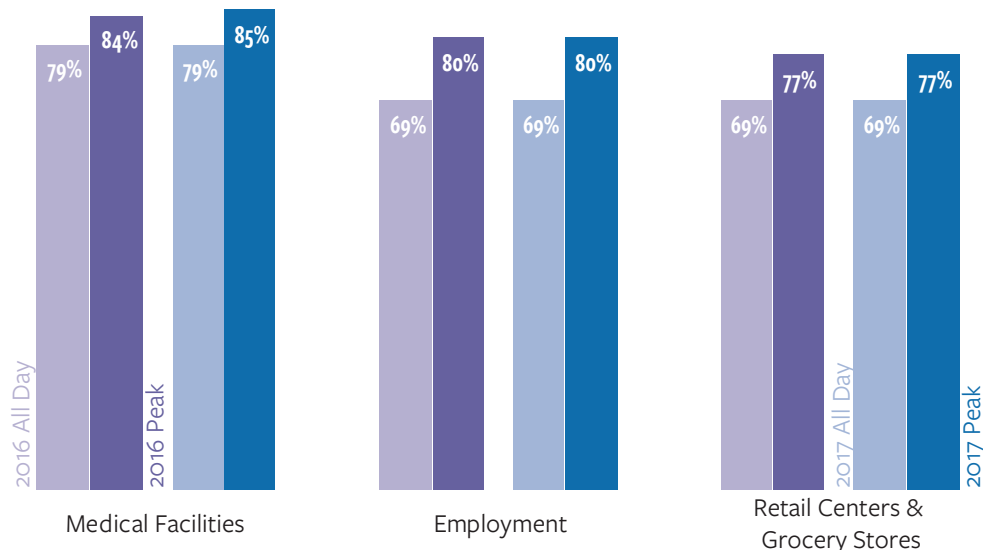


# Percent of Key Destinations Served by Transit

To be a benefit to riders, transit must provide service to the places they want to go. Key destinations include medical facilities, jobs, and grocery stores. While some jobs can be adequately served with morning and afternoon peak period bus service, all-day service is required to provide adequate transportation to these destinations.

Peak-period transit accessibility to medical facilities in the urbanized area improved slightly between 2016 and 2017 due to some minor route changes. All day service to medical facilities remained constant. Transit access to employment and grocery stores was also unchanged.

### Percent of Destinations Served by Transit within Metropolitan Planning Area Boundary





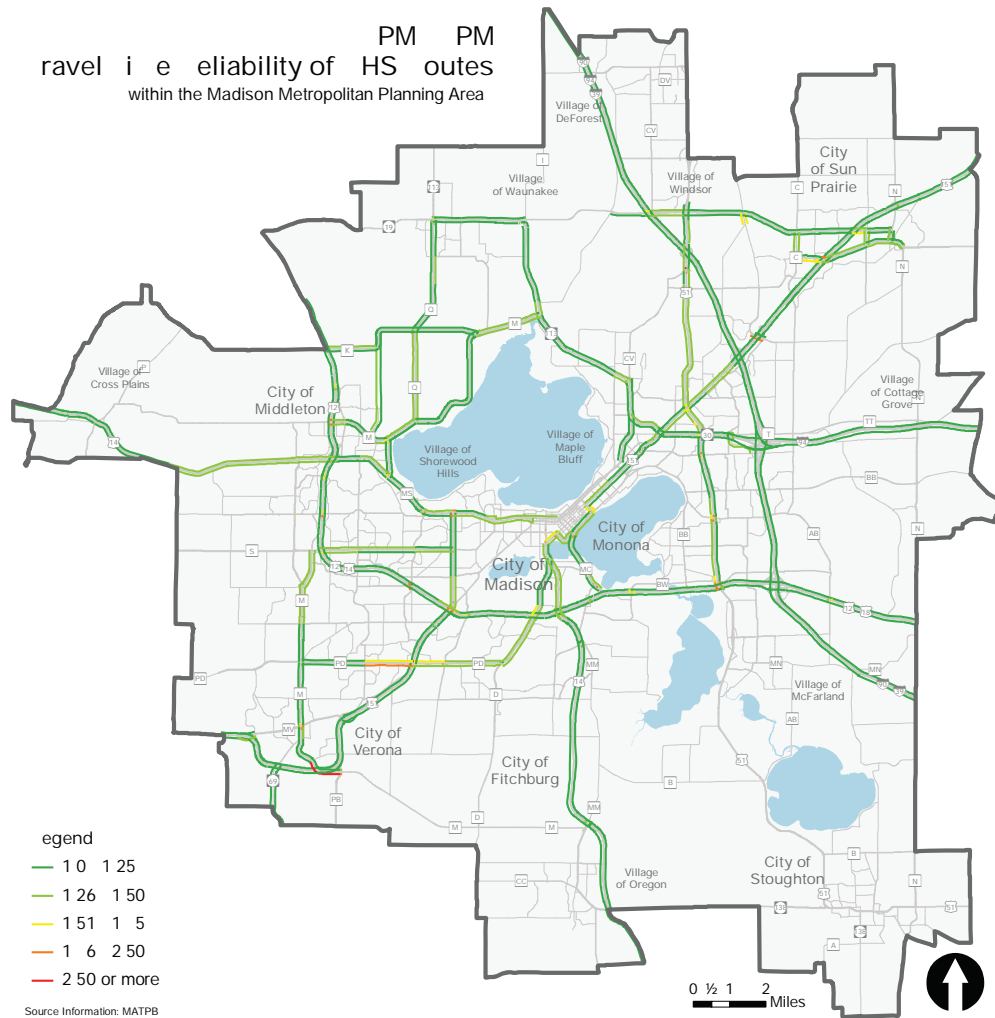
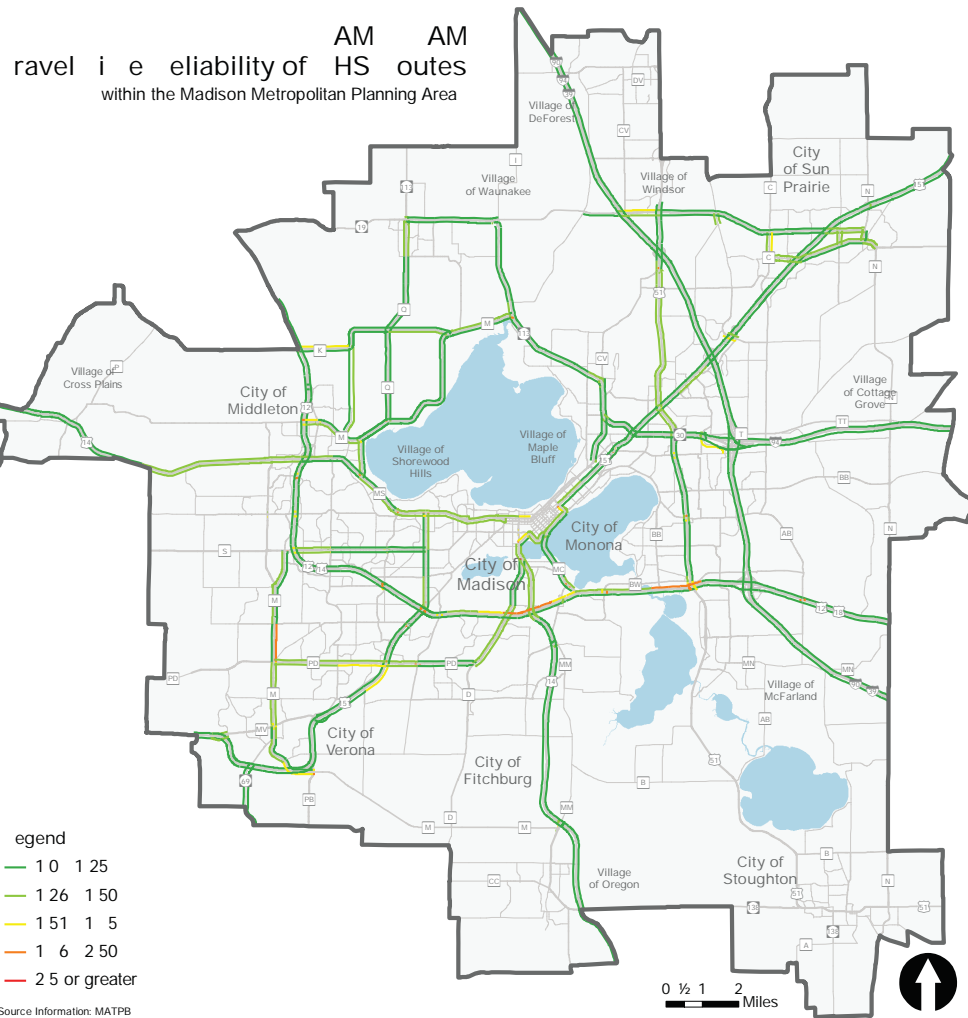
# Roadway Congestion and Reliability

Roadway congestion is a common challenge commuters in urban areas face during the morning and evening rush hours. Congested roadways are typically characterized by slower speeds resulting in longer trip times. Roughly 50% of congestion is considered recurring, that is congestion that is expected on any given day due to physical bottlenecks, limited capacity, or operational issues caused by things such as inadequately timed traffic signals or poor access management. Recurring congestion typically occurs during peak travel periods in the morning and evening and with roadways functioning at normal speeds during non-peak hours. The other 50% of congestion is considered non-recurring, caused by unexpected temporary disruptions such as traffic incidents, including crashes or vehicle mechanical issues, work zones, poor weather conditions, and special events that may lead to a surge in traffic demand.

Drivers generally budget extra time to allow for recurring travel delays, whereas unanticipated variability or delays can be a source of frustration as it can make commuters late for work, cause buses to run late, make business travelers late for appointments or meetings, cause truckers to be charged for later deliveries, and can disrupt the just-in-time delivery process. Complicating things, many of these non-recurring sources of congestion can trigger another source to occur (weather event causing crash, special event making work zone bottleneck worse, etc.).

In many cases, rush hour congestion is difficult or impossible to solve due to physical constraints and the costs and negative impacts of roadway and intersection capacity expansion. However, reliability can be improved through a variety of operational enhancements or incident response management techniques. This means that by implementing a comprehensive congestion management process that includes transportation demand and system management and operations strategies such as transit and ride-sharing incentives, advanced traffic signal coordination, traveler information, and enhanced incident response, along with physical bottleneck relief through targeted capacity expansion where feasible, unexpected delays can be expected to occur less frequently, and for a shorter duration.





## Federal Requirements

The federal performance measure rules for congestion and reliability introduce a new measure, level of travel time reliability (LOTTTR), which reports the percentage of the Interstate System and non-Interstate NHS providing for reliable travel times, as well as a measure of truck time reliability to measure freight movement.

## Travel Time Reliability

Level of travel time reliability is the ratio between “normal” travel times and peak-period travel times. For instance, if the LOTTTR is 1.5 for a segment, that means that a trip that would normally take 10 minutes would instead take 15 minutes (10 minutes x 1.5 = 15 minutes). The higher the LOTTTR ratio is, the more delay that roadway segment experiences during the peak period. Rather than peak hour, the federal measure utilizes 4-hour AM and PM peak periods.

States and MPOs must set 2- and 4-year targets for 1) the percent of person-miles traveled on the Interstate, and 2) the percent of person-miles traveled on the non-Interstate National Highway System (NHS). A segment is considered reliable if it has a ratio of 1.5 or less for all time periods.

WisDOT Travel Time Reliability Performance Targets

- Percent of Person-Miles Traveled on the Interstate that are Reliable
  - 2-Year Target: 94%
  - 4-Year Target: 90%
- Percent of Person-Miles Traveled on the Non-Interstate National Highway System that are Reliable
  - 2-Year Target: N/A
  - 4-Year Target: 86%

In 2017 100% of the person-miles traveled on the Interstate in the Madison Metro Area were considered reliable by the federal measure, and 89% of the person-miles traveled on the non-Interstate NHS were reliable.

It should be noted that MATPB was only able to obtain the data in 4-hour blocks of time for the AM and PM peak travel periods used for the federal rule. The 4-hour average data does not adequately reflect the levels of congestion experienced in the Madison area during the typical 1-hour peak period.

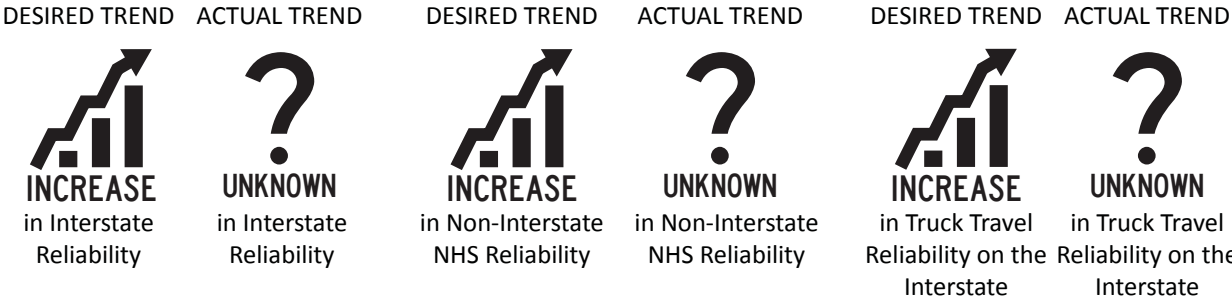
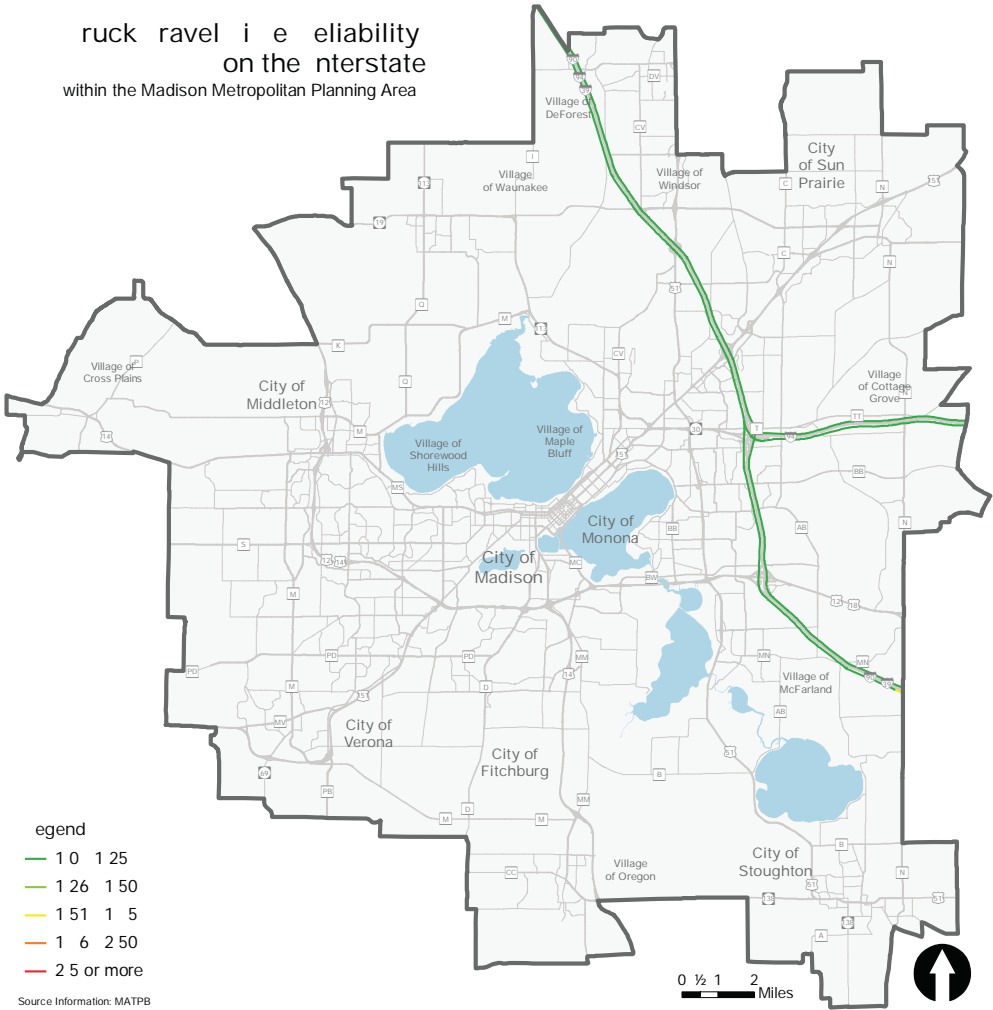
Freight Reliability

The freight reliability performance measure measures the efficiency of freight movement on the Interstate. The truck travel time reliability index is a ratio between “normal” truck travel times on the Interstate and the “worst” truck travel times. The truck travel time reliability index is reported as the average truck travel time reliability index for all Interstate roadway segments. The higher the truck travel time reliability index, the greater the delay.

WisDOT Freight Reliability Performance Targets

- Truck Travel Time Reliability Index on the Interstate
  - 2-Year Target: 1.40
  - 4-Year Target: 1.60

In 2017 the truck travel time reliability index for the Interstate in the Madison Metro area was 1.09.







## Establish Financial Viability of the Transportation System

Achieve and maintain a state of good repair for the existing transportation system, invest in cost-effective projects, and ensure adequate, reliable funding to meet current and future needs.

# Establish Financial Viability of the Transportation System

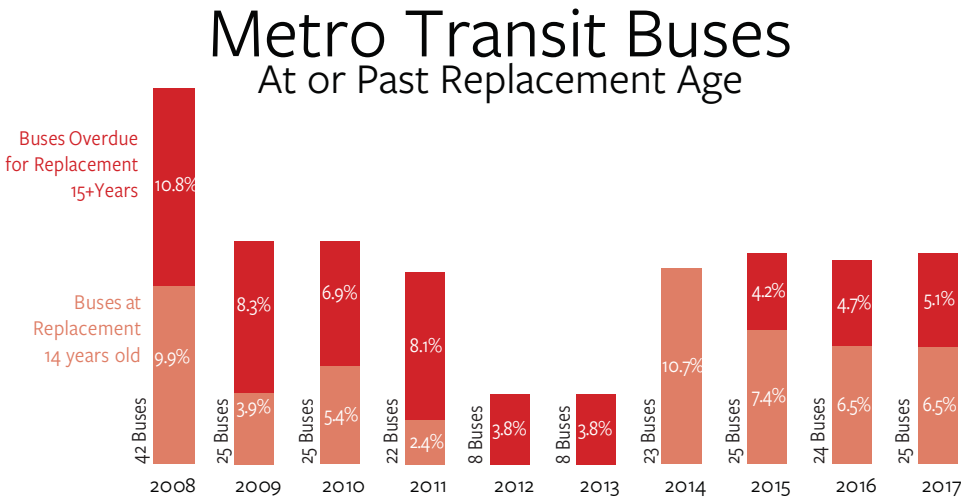
## Buses At or Past Replacement Age

Buses cost more to operate and repair near the end of their useful life. However, replacing buses is expensive and not always feasible due to funding constraints. Metro Transit uses its oldest buses for supplemental school service, other peak period only service, and as backups for buses in service, where they log far fewer miles than buses on regular routes. Maintaining some older buses for this type of limited service helps to minimize costs.

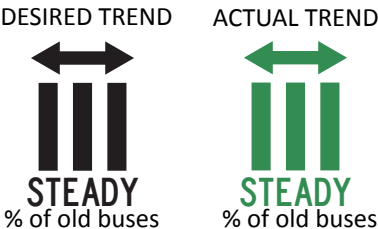
Between 2016 and 2017, the number of buses at or past what Metro considers replacement age—14 and 15+ years respectively—increased slightly, from 11.2% to 11.6% of the fleet. Madison Metro recently defined 14 years as the official bus replacement age for use in its required transit asset management plan and for federal performance measure reporting. The figures in the chart below reflect this change.

## State of Good Repair Performance Targets

Madison Metro has set a target of having no more than 11% of its buses past replacement age (over 14 years old). MATPB has adopted this target.



Source: Metro Transit





## Bridge Condition

In the Madison metropolitan area there are 208 National Highway System (NHS) bridges, including culverts. 103 of these, representing 47% of total deck area, are in good condition and just 1, representing 0.2% of total deck area, is in poor condition. There are an additional 167 bridges in the Madison metropolitan area that are not part of the NHS. 92 of these, representing 64% of total deck area, are in good condition, while 17, representing 6% of total deck area, are in poor condition.

2017 is a baseline year for this measure due to changes in the measure to match the federal rule.

## Federal Requirements

A rule enacted last year by the Federal Highway Administration (FHWA) has changed the required bridge condition performance measures. Under this rule, states and MPOs must track the percentage of NHS bridges, including culverts, which are in good and poor condition. Each bridge is rated on the condition of its deck, superstructure, and substructure, and its overall condition is determined by the lowest of these scores. Culverts receive a single score. Scores of 7 or more are considered “good,” and scores of 4 or below are considered “poor.” The percentage of bridges in good or poor condition is based on the total deck area of the bridges in each category.

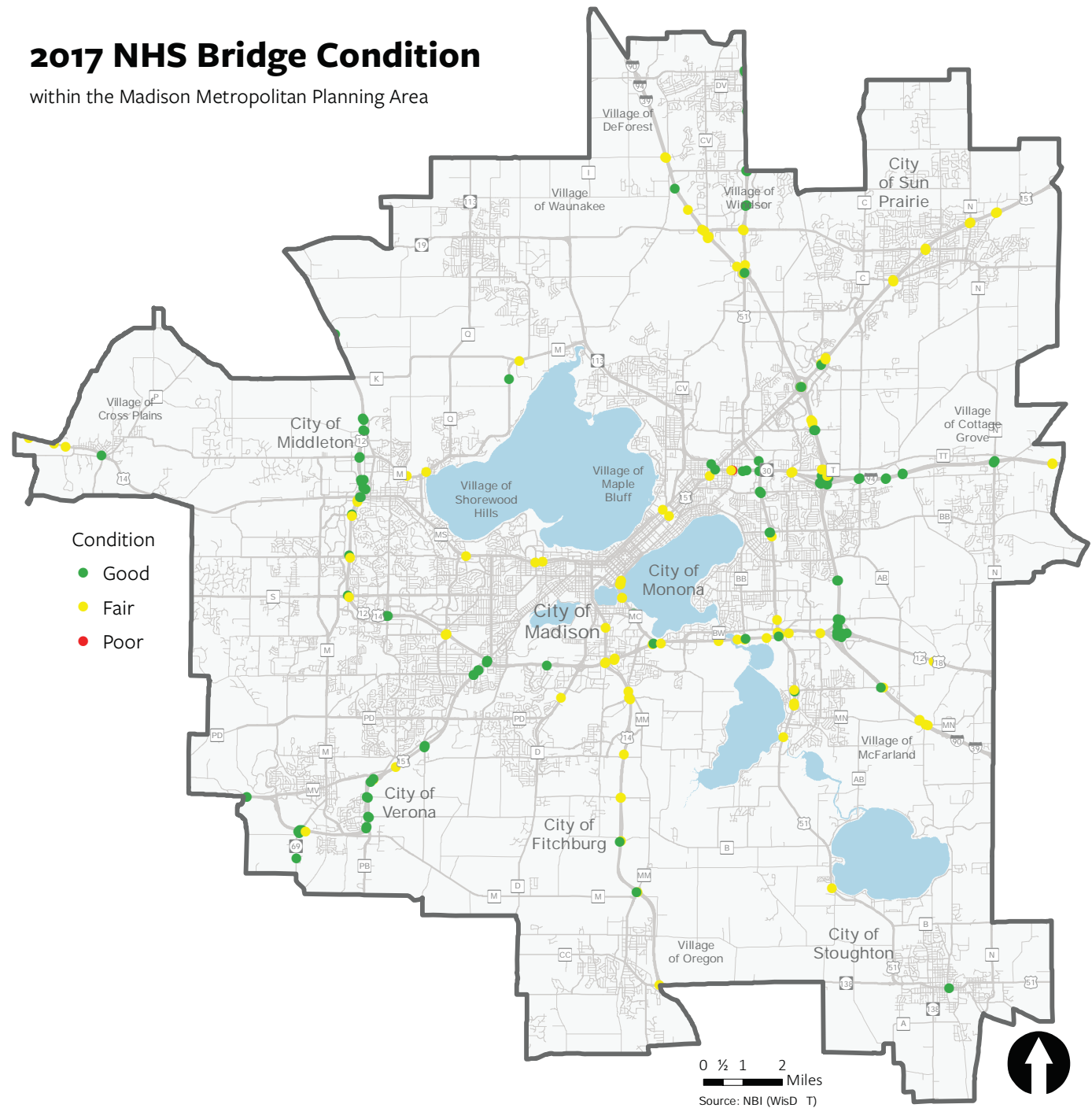
## Bridge Condition Targets for Wisconsin

WisDOT has set the following statewide bridge condition targets for the 2019 reporting period:

- Percentage of NHS bridges by deck area in good condition: At least 50%
- Percentage of NHS bridges by deck area in poor condition: No more than 3%

## 2017 NHS Bridge Condition

within the Madison Metropolitan Planning Area





DESIRED TREND



**INCREASE**

in NHS bridges in  
Good condition

DESIRED TREND



**STEADY**

in NHS bridges in  
Poor condition

ACTUAL TREND



**UNKNOWN**

in NHS bridges in  
Good condition

ACTUAL TREND



**UNKNOWN**

in NHS bridges in  
Poor condition

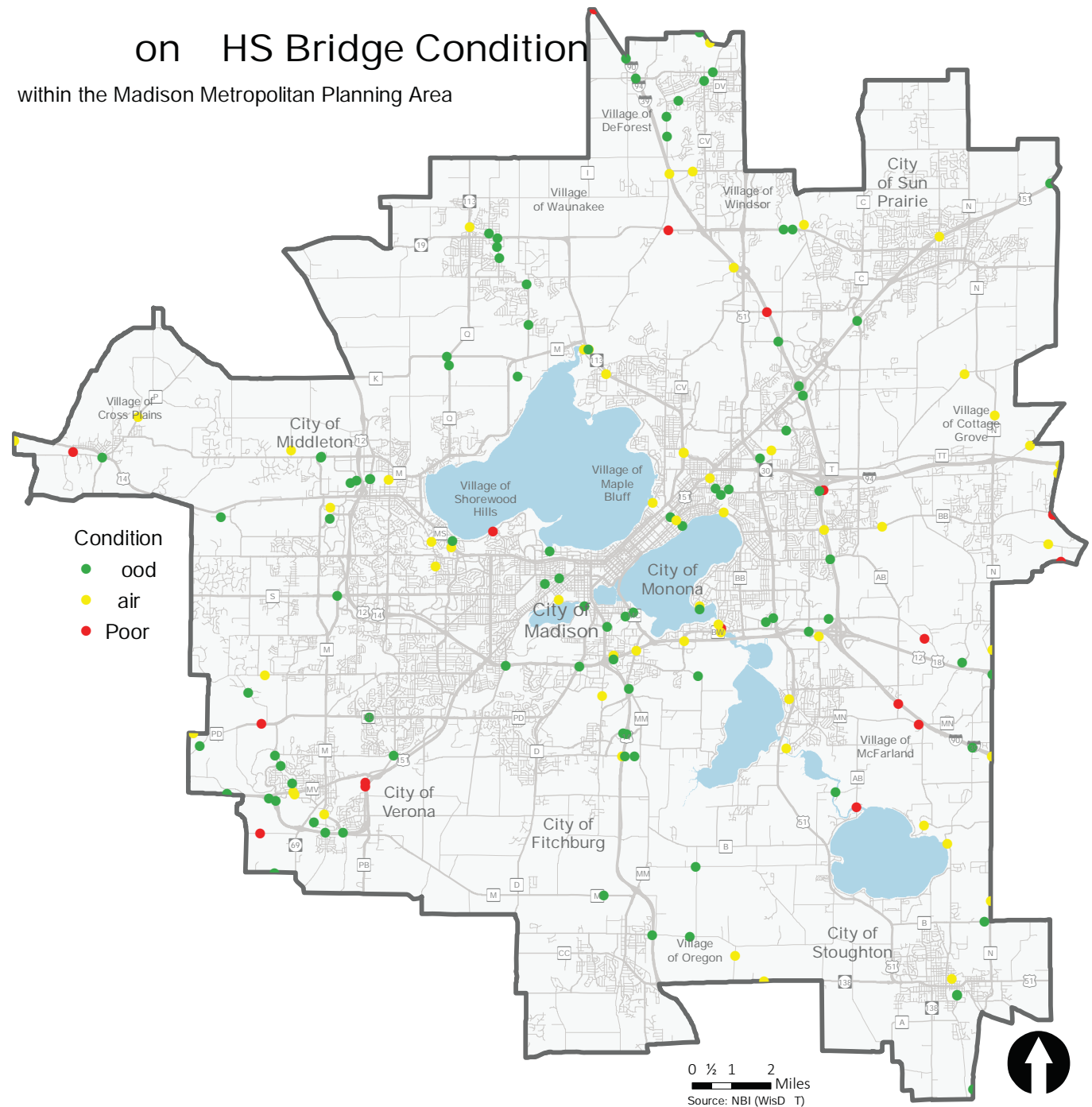
### 2017 NHS Bridge Condition

Condition	# of Bridges	Deck Area (m <sup>2</sup> )	% of Deck Area
Good	103	1,006,011	47%
Fair	103	1,123,418	53%
Poor	1	4,959	0.2%
Total	207	2,134,387	100%

### 2017 Non-NHS Bridge Condition

Condition	# of Bridges	Deck Area (m <sup>2</sup> )	% of Deck Area
Good	92	45,551	64%
Fair	58	21,094	30%
Poor	17	4,589	6%
Total	167	71,234	100%

## on HS Bridge Condition within the Madison Metropolitan Planning Area

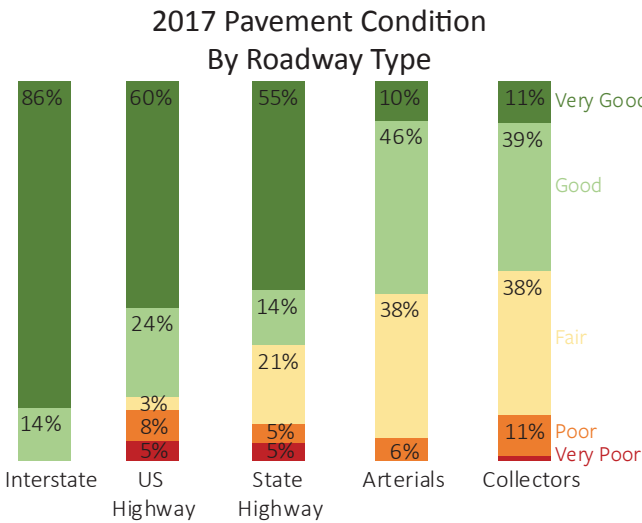


# Pavement Condition

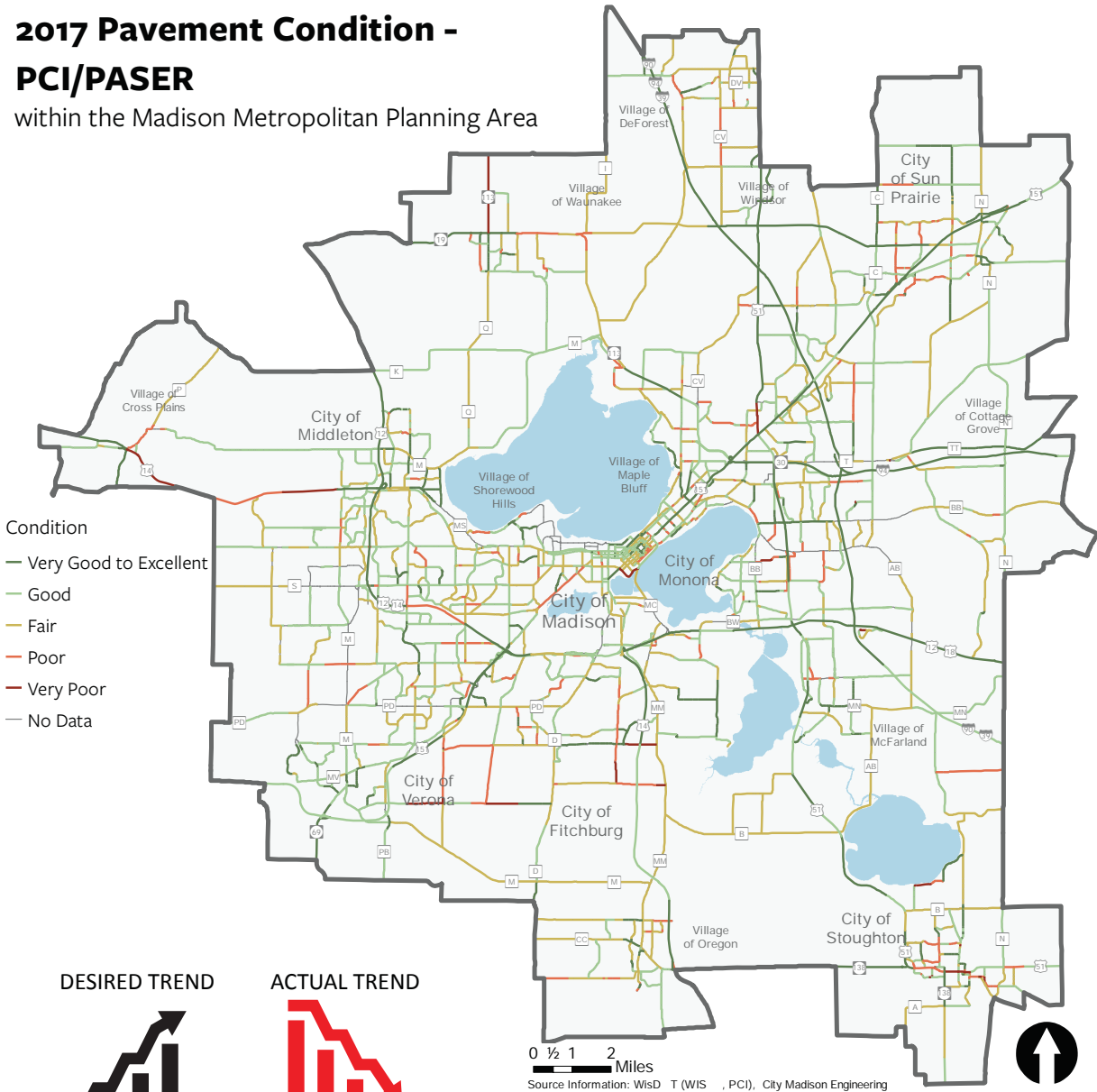
Timing road maintenance projects appropriately extends the useful life of the roadway and saves money over the life of the pavement. Extreme pavement degradation can be minimized by performing preservation treatments early in the life cycle of a roadway.

Pavement condition in Wisconsin has been measured using a combination of two different ways of measuring pavement deterioration. The Pavement Surface Evaluation Rating (PASER) system is used to evaluate local roads and the Pavement Condition Index (PCI) system is used to evaluate state roadways.

In the Madison area, 59% of all major roadways, including all state-owned facilities and locally-owned arterial and collector routes, are in good or excellent condition and 10% are poor or very poor. This reflects a decline in condition compared to 2015 (this data is collected every other year). At that time, 65% of all major roadways in the area were in good or excellent condition and 8% were poor or very poor. Overall, the condition of state routes has improved while local arterials and collectors have deteriorated somewhat.



## 2017 Pavement Condition - PCI/PASER within the Madison Metropolitan Planning Area



# Federal Requirements

2018 is the first year of new Federal performance management requirements for pavement condition. States and MPOs are required to measure the percentage of Interstate Highways and other non-Interstate routes on the National Highway System (NHS) that are in good and poor condition, and are required to set targets for improvement. Condition is to be determined using a combination of several types of data—international roughness index (IRI), cracking, and either rutting or faulting, depending on pavement type. States are only required to report IRI data to FHWA in 2018 and must begin reporting data on the other measures in 2019 for Interstate Highways, and by 2021 for non-Interstate NHS routes.

## International Roughness Index (IRI)

The most recent IRI data for the Madison metropolitan area was collected in 2016. Complete data for measures other than IRI is currently unavailable. Based on IRI alone, 47% of Interstate highways in the MPO area are in good condition and 7% are in poor condition, and 26% of non-Interstate NHS routes are in good condition and 25% are in poor condition. Because these condition ratings are based on limited information and a new methodology, the PASER/PCI ratings described above are likely to provide a more accurate portrayal of conditions in the Madison area.

## Pavement Condition Targets for Wisconsin

WisDOT has set the following statewide pavement condition targets for the 2019 reporting period:

- Non-Interstate NHS routes in good condition: At least 20%
- Non-Interstate NHS routes in poor condition: No more than 12%

DESIRED TREND



INCREASE

in Non-Interstate NHS Pavements in "Good Condition"

ACTUAL TREND



UNKNOWN

in Non-Interstate NHS Pavements in "Good Condition"

DESIRED TREND



DECLINE

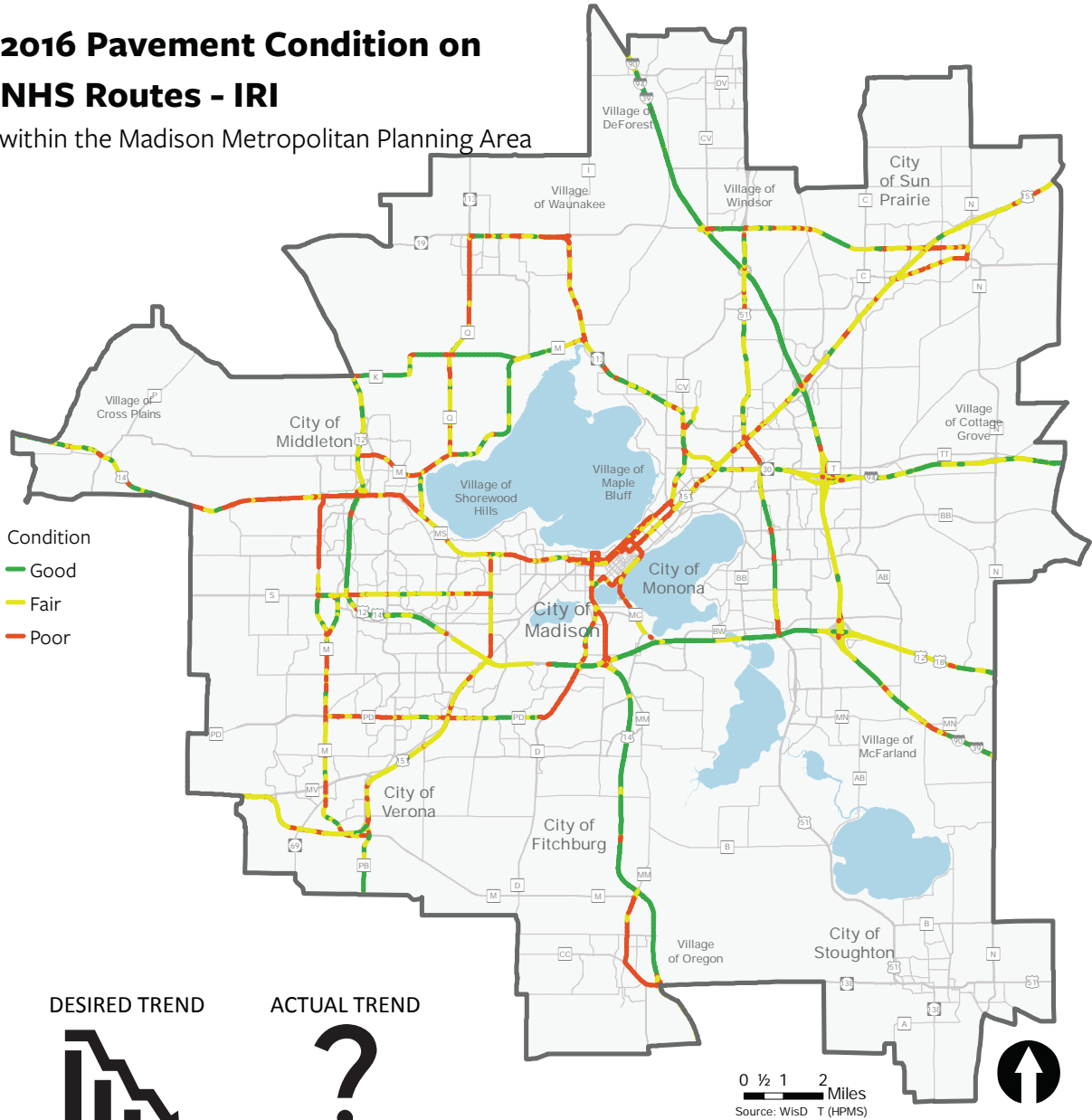
in Non-Interstate NHS Pavements in "Poor Condition"

ACTUAL TREND






UNKNOWN

in Non-Interstate NHS Pavements in "Poor Condition"





# 2017 Performance Measures Overview

Measure	Desired Trend		Actual Trend		Analysis
Miles of Pedestrian Facilities		Increase in miles of facilities		Increase in miles of facilities	Increase of 5% compared to 2016.
Low-Stress Bicycle Facilities		Increase in % miles of low-stress network		New measure; Baseline year	New measure for 2017. 64% of the primary network is rated low-stress.
		Decrease in % miles of high-stress network		New measure; Baseline year	New measure for 2017. 19% of the primary network is rated high-stress.
BCycle Utilization		Increase in utilization		Increase in utilization	BCycle memberships increased by 84% and the number of trips increased by 13%.
Motor Vehicle Crash Fatalities		Decline in 5-year average # of fatalities		Decline in 5-year average of fatalities	Decrease of 1.2% compared to prior 5-year average.
		Decline in 5-year average rate of fatalities		Decline in 5-year average rate of fatalities	Decrease of 1.8% compared to prior 5-year average.
Motor Vehicle Serious Injuries		Decline in 5-year average # of serious injuries		Increase in 5-year average of serious injuries	Increase of 1.9% compared to prior 5-year average.
		Decline in 5-year average rate of serious injuries		Increase in 5-year avg. rate of serious injuries	Increase of 1.2% compared to prior 5-year average.
Pedestrian and Bicycle Fatalities and Serious Injuries		Decline in 5-year average # of non-motorized fatalities and serious injuries		Increase in 5-year average of non-motorized fatalities and serious injuries	Increase of 2.8% compared to prior 5-year average.
Airline Passenger Traffic		Increase in passengers		Increase in passengers	Passenger volume increased by nearly 3% in 2017, setting a record high.
Transit Access to Employment		Increase in access to employment		Steady access to employment	No significant change compared to 2016.
Transit Ridership		Increase in ridership		Decline in ridership	Decrease in ridership of 4% compared to 2016.
Fixed-Route Transit Service		Maintain coverage and population served		Maintain coverage and population served	Coverage hasn't changed significantly.
Transit Coverage for Minorities and Low Income Persons		Increase in coverage and population served		Steady coverage and population served	No significant change compared to 2016.
Vehicle Miles Traveled		Maintain total VMT		Steady total VMT	VMT increased 1% in 2017.
Mode of Transportation to Work		Decline in number of residents driving to work alone		Steady number of residents driving to work alone	71% of people drive to work alone in Dane County.
Air Quality		Decline in air pollution levels		Declining air pollution levels	While particulate levels have been dropping for years, Ozone has remained relatively close to non-attainment limits.
Transit On-time Performance		Increase percentage of on-time buses		Increase in percentage of on-time buses	On-time performance increase by 4% compared to 2016, resulting in buses being on-time 89% of the time in 2017.
Percent of Key Destinations Served by Transit		Maintain number of destinations served		Maintain number of destinations served	Because funding is unavailable to expand service, maintaining service is the desired trend. No significant change compared to 2016.
		Increase in Interstate reliability		Baseline year	New federal measure, data only available for 2017.
Roadway Congestion and Reliability		Increase in Non-Interstate NHS reliability		Baseline year	New federal measure, data only available for 2017.
		Increase in Interstate truck travel reliability		Baseline year	New federal measure, data only available for 2017.
Buses at or Past Replacement Age		Maintain percentage of old buses		Maintaining in percentage of old buses	Proactive management of the bus fleet and creative funding has led to maintaining the number of buses at or past replacement age for 5 years.
Bridge Condition		Increase number of NHS Bridges in Good Condition		Baseline year	Measure changed to align with federal requirements.
		Maintain number of NHS Bridges in Poor Condition		Baseline year	Measure changed to align with federal requirements.
Pavement Condition		Increase in PCI/PASER Rating		Decline in PCI/PASER Rating	Condition of state routes has improved, while the condition of local arterial and collector routes has declined somewhat.
		Increase in Interstate and NHS Pavements in "Good" Condition		Baseline year	New federal measure.
		Decline in Interstate and NHS Pavements in "Poor" Condition		Baseline year	New federal measure.