Regional Transportation Plan 2050

Madison Area

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Regional Transportation Plan 2050

for the Madison Metropolitan Area

Adopted April 5, 2017 by the

Madison Area Transportation Planning Board

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Madison, WI 53703

Madison Area Transportation Planning Board

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The preparation of this report has been financed in part through grants from the Federal Highway Administration and Federal Transit Administration, U.S. Department of Transportation, under the Metropolitan Planning Program, Section 104(f) of Title23, U.S. Code, and by the Wisconsin Department of Transportation (WisDOT).
The contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation or WisDOT.

Resolution TPB No. 126

Adopting the Regional Transportation Plan 2050 for the Madison Metropolitan Area

WHEREAS, the Madison Area Transportation Planning Board (MATPB) is the designated Metropolitan Planning Organization (MPO) for the Madison, Wisconsin Metropolitan Area with responsibilities to perform regional transportation planning and programming, in cooperation with the Wisconsin Department of Transportation and Metro Transit, the major transit operator; and

WHEREAS, one of the primary responsibilities of the MATPB is to prepare and approve a long-range regional transportation plan in accordance with the Fixing America's Surface Transportation (FAST) Act (23 U.S.C. 104, 134) and implementing U.S. Department of Transportation (DOT) regulations (23 C.F.R. 450); and

WHEREAS, the regional transportation plan is a multi-modal transportation systems plan that defines the goals for the region and specifies the policies, projects, and strategies to help achieve these goals, and also ties the goals to performance measures to be used to track the region's progress in meeting plan goals over time; and

WHEREAS, the MATPB has updated the current adopted plan, the *2035 Regional Transportation Plan Update,* and extended the planning horizon from the year 2035 to 2050 using new population, household, and employment forecasts and revised travel demand forecasts to the year 2050; and

WHEREAS, the MATPB has followed the prescribed federal guidance for development of regional transportation plans as set out in the Metropolitan Transportation Planning rule, 23 C.F.R. 450 in the preparation of the plan, including consideration of the federal planning factors, identification of performance measures, and preparation of financial, environmental, and environmental justice analyses of the plan; and

WHEREAS, the MATPB's public involvement process for the plan included use of an interactive plan website where materials, including the draft plan, and notices of meetings were posted, oversight by a plan advisory committee to guide the planning process, a regional values and priorities survey, three series of public meetings throughout the process, other presentations and updates, and a March 1 public hearing on the draft plan, and comments have been considered throughout the process and changes made to draft materials and the draft plan as determined to be appropriate; and

WHEREAS, the regional transportation plan is intended to guide implementing agencies in development of projects and implementation of other recommendations and supporting actions to guide improvements for all modes of transportation until the next major update of the plan in five years; and

WHEREAS, in the meantime the MATPB commits to working with WisDOT and Metro Transit to identify the performance targets for the federal required transportation system performance measures as these measures are finalized, implement other requirements of the new

performance-based approach to planning, and annually prepare a performance measures report indicating progress achieved in reaching the selected targets for the federal measures as well as progress on the other measures selected by the MATPB to gauge success in achieving the goals of the regional transportation plan:

NOW THEREFORE BE IT RESOLVED, the MATPB adopts the *Regional Transportation Plan (RTP) 2050 for the Madison Metropolitan Area*, which incorporates the changes to the Draft RTP 2050, dated February 2017, listed in the Addition/Change sheet dated April 5, 2017, as the official transportation plan for the region to serve as a guide for transportation planning, system development, and investments and as the basis for the MATPB's review of proposed projects in the Transportation Improvement Program; and that this plan supersedes the *2035 Regional Transportation Plan Update*.

BE IT FURTHER RESOLVED that the MATPB certifies that the federal metropolitan transportation planning process is addressing major issues facing the metropolitan area and is being conducted in accordance with all applicable federal requirements, including:

1. 23 U.S.C. 134 and 49 U.S.C. 5303, and this subpart;
2. Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d-1) and 49 C.F.R. Part 21;
3. 49 U.S.C. 5332, prohibiting discrimination on the basis of race, color, creed, national origin, sex, or age in employment or business opportunity;
4. Sections 1101(b) of the Fixing America's Surface Transportation (FAST) Act (Pub. L. 114-357) and 49 C.F.R. Part 26 regarding the involvement of disadvantaged business enterprises in U.S. DOT funded projects;
5. 23 C.F.R. Part 230, regarding the implementation of an equal employment opportunity program on Federal and Federal-aid highway construction contracts;
6. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) and 49 C.F.R. Parts 27, 37, and 38;
7. The Older Americans Act, as amended (42 U.S.C. 6101), prohibiting discrimination on the basis of age in programs or activities receiving Federal financial assistance;
8. 23 U.S.C. 324 regarding the prohibition of discrimination based on gender; and
9. Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. 794) and 49 C.F.R. 27 regarding discrimination against individuals with disabilities.

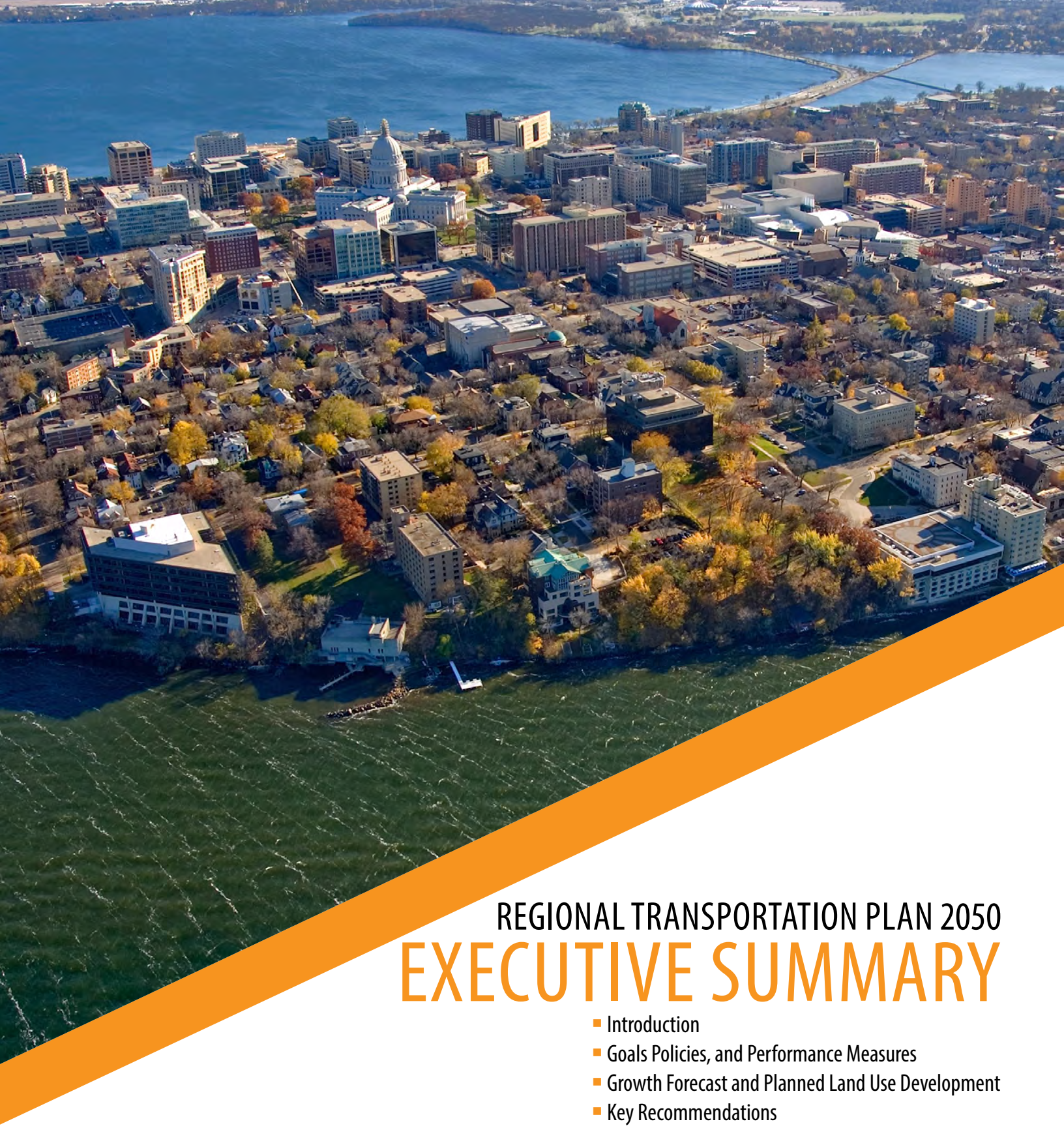
04/05/2017
Date Adopted

Al Matano, Chair
Madison Area Transportation Planning Board

Table of Contents

List of Acronyms

ACS	American Community Survey
ADA	Americans with Disabilities Act (1990)
ADAD	Advanced Driver Assistance Systems
ADT	Average Daily Traffic
AWT	Average Weekday Traffic
BIC	Beltline-Interstate Interchange
BLS	Bureau of Labor Statistics
BR	Bridge Replacement Rehabilitation Program
BRT	Bus Rapid Transit
CAC	Citizen Advisory Committee
CARPC	Capital Area Regional Planning Commission
CBD	Central Business District
CMP	Congestion Management Process
CO2	Carbon Dioxide
CP	Canadian Pacific Railroad
CRSC	Capital Region Sustainable Communities Consortium
CRFC	Critical Rural Freight Corridor
CSS	Context Sensitive Solutions
CTH	County Trunk Highway
CUFS	Critical Urban Freight Corridor
DCDHS	Dane County Department of Human Services
DCRA	Dane County Regional Airport
DCRTA	Dane County Regional Transit Authority
EA	Environmental Assessment
EIS	Environmental Impact Statement
EJ	Environmental Justice
EPA	Environmental Protection Agency
FAST Act	Fixing America's Surface Transportation Act
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
FUDA	Future Urban Development Area
FY	Fiscal Year
GIS	Geographic Information System
GPS	Global Positioning System
GTA	General Transportation Aids
HSIP	Highway Safety Improvement Program
HSMO	Highway System Management and Operations Program
HUD	U.S. Department of Housing and Urban Development
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITS	Intelligent Transportation Systems
LED	Light Emitting Diode
LEED	Leadership in Energy and Environmental Design
LEHD	Longitudinal Employer-Household Dynamics (Survey)
LOS	Level of Service
LRIP	Local Roads Improvement Program
MAP-21	Moving Ahead for Progress in the 21st Century Act
MATC	Madison Area Technical College/Madison College
MATPB	Madison Area Transportation Planning Board
MPO	Metropolitan Planning Organization
MUTCD	Manual on Uniform Traffic Control Devices
NBI	National Bridge Inventory
NEPA	National Environmental Policy Act
NHFN	National Highway Freight Network
NHFP	National Highway Freight Program
NHPP	National Highway Performance Program
NHS	National Highway System Program
NHTS	National Household Transportation Survey
NHTSA	National Highway Traffic Safety Administration
NMFN	National Multimodal Freight Network
NTD	National Transit Database
O/D	Origin - Destination
O & M	Roadway Operations and Maintenance Costs
QCEW	Quarterly Census of Employment and Wages
PASER	Pavement Surface Evaluation and Rating
PCI	Pavement Condition Index
PDI	Pavement Distress Index
PEL	Planning and Environmental Linkages
PHFS	Primary Highway Freight System
PM 2.5	Fine particulate matter suspended in air
PNR	Park-and-Ride
ROW	Right of Way
RSVP	Retired Senior Volunteer Driver Escort Program
RTA	Regional Transit or Transportation Authority
RTP	Regional Transportation Plan
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SASY	Schenk-Atwood-Starkweather-Yahara Neighborhood
SHR	State Highway Rehabilitation
SHSP	Strategic Highway Safety Plan
SOV	Single Occupant Vehicle
SRTS	Safe Routes to School
STBG	Surface Transportation Program Block Grant
STH	State Trunk Highway
STOC	State Traffic Operations Center
STP	Surface Transportation Program
TAP	Transportation Alternatives Program
TAZ	Traffic Analysis Zone
TCC	Technical Coordinating Committee
TDM	Travel Demand Management
TDP	Transit Development Plan
TID	Tax Increment District
TIGER	Transportation Investment Generating Economic Recovery (Grant Program)
TIP	Transportation Improvement Program
TMA	Transportation Management Area
TOD	Transit-Oriented Development
TOIP	Transportation Operations Infrastructure Plan
TOPS	(UW-Madison) Traffic Operations and Safety (Laboratory)
TPC	Transportation Projects Commission
TSM	Transportation Systems Management
UAFP	Urbanized Area Formula Program
UAS	Unmanned Aircraft System
UAV	Unmanned Aerial Vehicle
UP	Union Pacific Railroad
UPWP	Unified Planning Work Program
USA	Urban Service Area
USDOT	United States Department of Transportation
USH	U.S. Highway
UW	University of Wisconsin
V/C	Volume-to-Capacity Ratio
VMT	Vehicle Miles Traveled
V2I	Vehicle to Infrastructure Communication
V2V	Vehicle to Vehicle Communication
WisDNR	Wisconsin Department of Natural Resources
WisDOA	Wisconsin Department of Administration
WisDOT	Wisconsin Department of Transportation
WISLR	Wisconsin Information System for Local Roads
WRRTC	Wisconsin River Rail Transit Commission
WSOR	Wisconsin & Southern Railroad Company
3C	Continuing, Comprehensive, and Cooperative Transportation Planning Process
3-E	Engineering, Education, and Enforcement

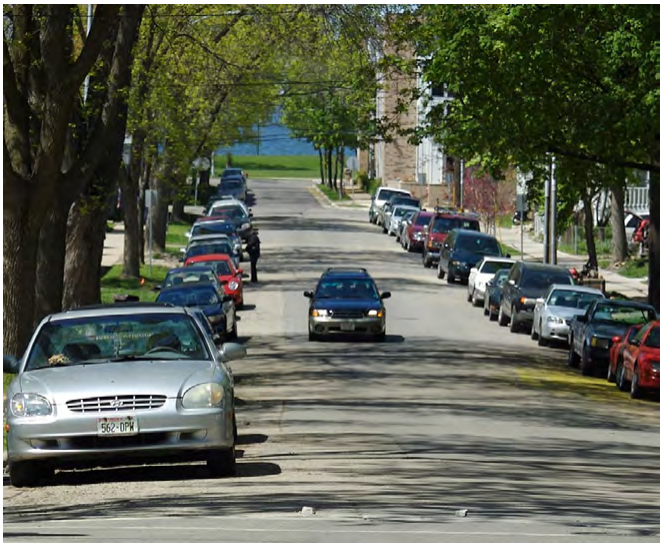


REGIONAL TRANSPORTATION PLAN 2050
EXECUTIVE SUMMARY

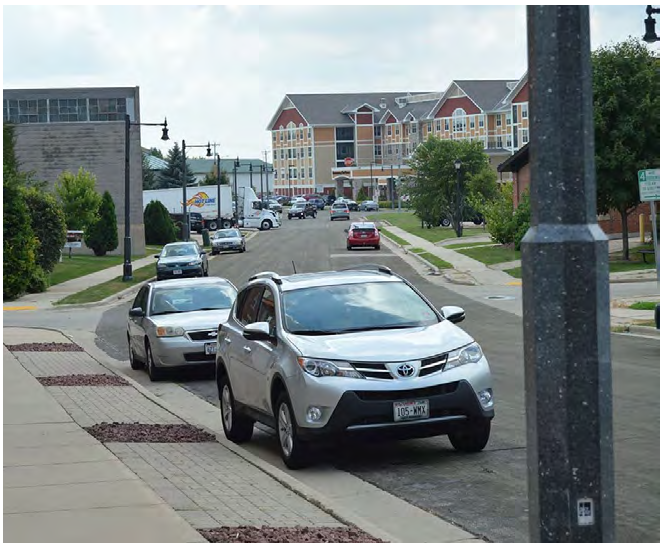
- Introduction
- Goals Policies, and Performance Measures
- Growth Forecast and Planned Land Use Development
- Key Recommendations

INTRODUCTION

Dane County's population and economy are growing and changing. The population is becoming more diverse and the economy is becoming more private sector oriented with job growth at the higher and lower ends of the economic spectrum. While the City of Madison continues to garner a large share of this growth, its share of population and employment has declined and is expected to continue to do so. Within the city, however, a higher percentage of new housing and employment is locating in redevelopment areas, most notably East Washington Avenue. A safe, efficient, integrated multimodal regional transportation system is needed to support this growth.



The Greater Madison Region Values and Priorities survey, conducted in early 2016, identified the key factors that make the region attractive to residents, regional values, and perceived needs for the future. Results of the survey demonstrated that regional growth is due to many factors – an excellent educational system, a robust economy, local agriculture, a strong sense of community, and access to nature and outdoor recreation – which have led to a high quality of life and positive regional outlook. Six out of ten survey participants believed that "lots more growth will be coming to this region whether we want it or not – the best thing we can do is prepare for it." At the same time, seven out of ten of participants believed regional growth "has and will continue to bring many benefits and advantages to the region . . . and should be strongly encouraged and fostered." Perhaps unsurprisingly, 67% of participants believed that it was very or extremely important to have a long range plan for growth while 81% agreed that "investing in regional transportation is an important priority for the region."



The Regional Transportation Plan (RTP) 2050 is the Madison region's blueprint for its future multimodal transportation system. The plan builds upon previous RTPs, with updated analysis, growth forecasts, goals, and policies. The plan also builds upon recent and ongoing MPO, WisDOT, and local plans and studies such as the MPO's Madison Transit Corridor – Investigating Bus Rapid Transit Study and the Bicycle Transportation Plan for the Madison Metropolitan Area. Finally, the plan includes some updates to meet new federal requirements, most notably related to performance management. Planning is a continuing process, and the RTP will be updated again in five years.

GOALS, POLICIES, AND PERFORMANCE MEASURES

The goals and policies in the RTP build upon those identified in previous planning efforts, refined through outreach with the public and key stakeholders. Throughout the goals and policies, the principles of sustainability are prominently featured:

- Social Equity: The transportation system should be designed to provide an equitable level of services to all segments of the population across all modes.
- Environment: The transportation system should be designed and operated within the context of its environment, minimizing negative impacts and fostering efficient development patterns that optimize travel, housing, and employment choices. The system should support existing and planned development and discourage growth in rural areas.
- Economy: The transportation system should ensure that businesses have maximum opportunities to serve customers, reach clients, export goods, and obtain workers. The system should play a significant role in raising the region's standard of living and quality of life.

The goals featured in the plan began as a set of aspirational statements about desired outcomes that the region would work towards achieving. These were refined into a set of goals to guide the plan's policy and project recommendations:

1. 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 public transit.
2. 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.
3. 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.
4. 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.
5. 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.
6. Advance System-wide Efficiency, Reliability, and Integration Across Modes: Design, build, operate, and maintain an efficient transportation system with supportive land use patterns that maximize mobility, minimizes unexpected delays, and provides seamless transfers between all modes.
7. 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.

Each goal is supported by a number of policies that provide a structure for regional project prioritization and transportation decision-making. The goals and policies are tied to a number of performance measures, including some federally required measures that correspond to national transportation system performance goals as well. The purposes of this performance based approach are to ensure that investment decisions are made based on objective information and to improve communications between decision-makers, stakeholders, and the public while achieving regional, state, and national performance goals.

GROWTH FORECASTS & PLANNED LAND USE DEVELOPMENT

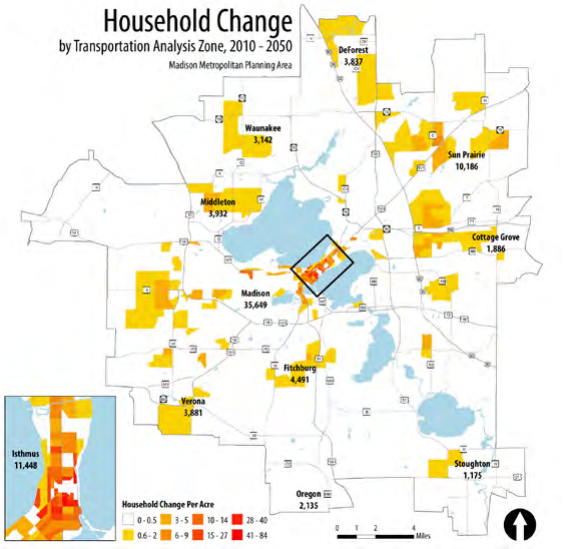
The Madison region has been growing steadily for several decades. The population, household, and employment forecasts used for development of the RTP were prepared by the Capital Area Regional Planning Commission and reflect recent trends. This includes the trend of many suburban communities' population growing at faster rates than the City of Madison and also increased commuting by workers into Dane County from adjacent counties.

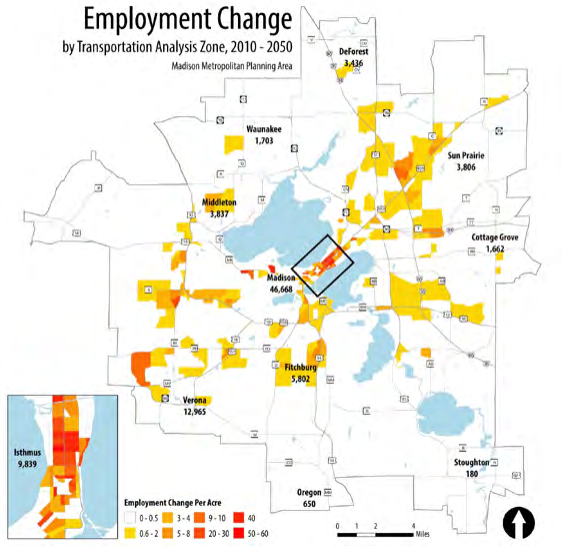
Between 2010 and 2050, the City of Madison's population is projected to increase by 57,900, or 25%, while the regional population will increase by 149,350, or 31%, for a total future population of 637,450 within the metropolitan planning area. During this time, the average size of household in the region is expected to continue to decline, while the aged population increases, and the region becomes increasingly diverse.

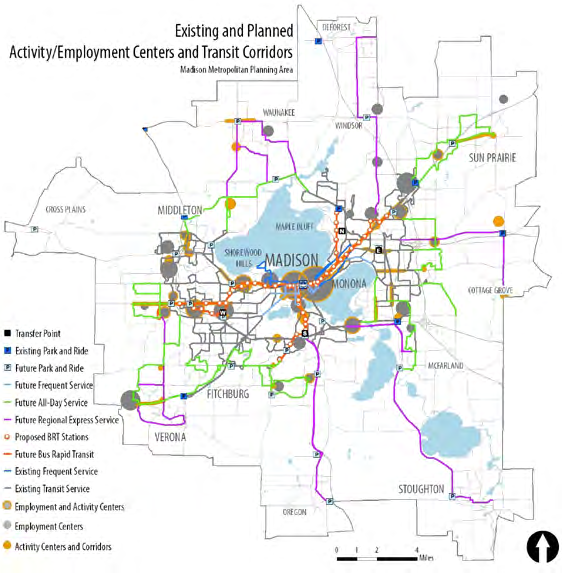
Dane County's employment is forecast to increase from 314,000 to 398,700, while the 2050 resident employed labor force is projected to be 316,300. Assuming the percentage of Dane County workers working in other counties remains at 5.3%, the number of workers commuting into the county from other counties would increase to 99,100, a 136% increase from today's numbers. This reinforces the need for regional transportation improvements, including an increase in options to driving alone. Roughly 53% of the new jobs are projected to be located in the City of Madison, with all but about 2,000 of the remainder in the rest of the metro area.

Travel demand is dependent upon the location, density, and mixture of land uses. The allocation of future growth was based on the regional land use policy plan and local comprehensive plans. It reflects both regional and City of Madison policy to encourage development in higher density, mixed-use centers and corridors with existing and planned high capacity and frequent transit service.

Within the City of Madison, over one-half of new housing units were allocated to infill/redevelopment areas as opposed to peripheral "greenfield" areas, reflecting recent trends, with 11,500 new units located in the Isthmus area along with almost 10,000 new jobs. This compact, centers and corridors based land use development pattern was used to develop future travel forecasts. The map to the right shows how the recommended transit system could serve and connect existing and planned mixed-use activity centers and corridors and employment centers.







KEY RECOMMENDATIONS

Recommendations include a mixture of policies, strategies, studies, and projects. Key recommendations include:

Land Use and Transportation Integration

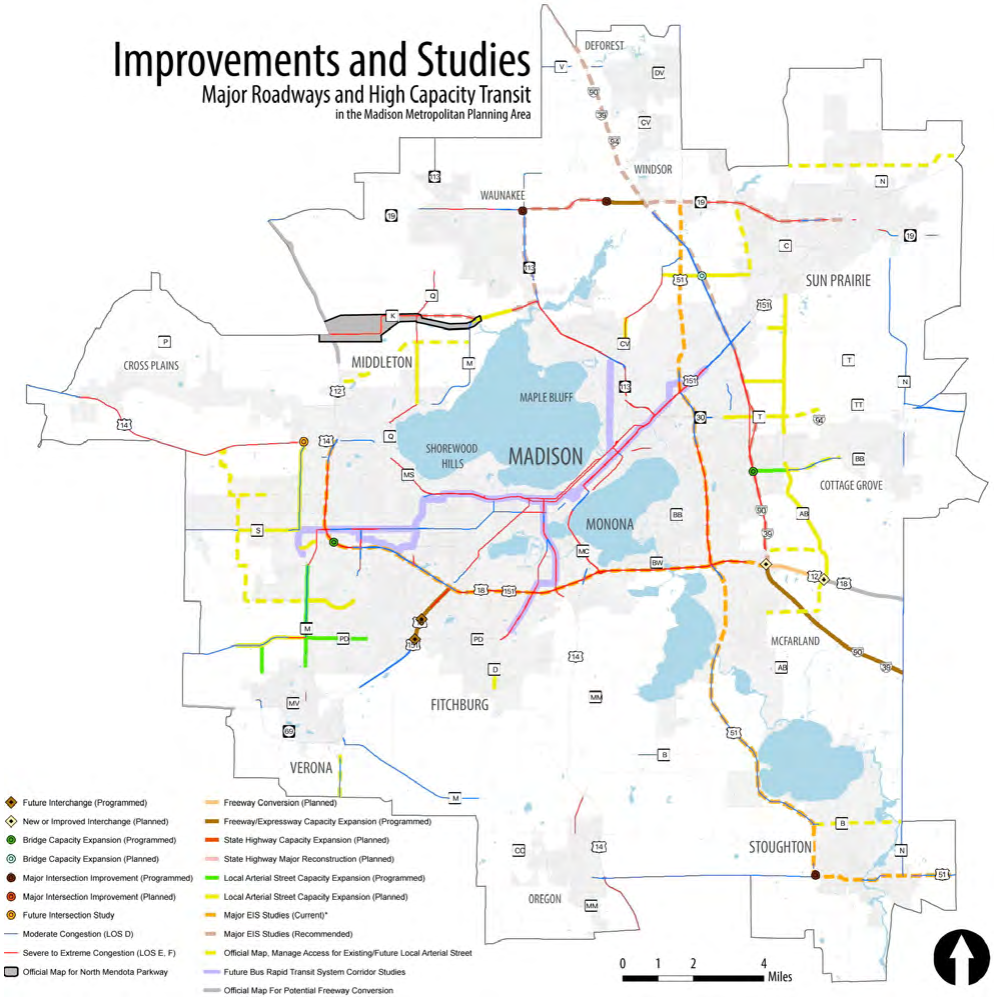
- Adopt local land use plans and policies that support land use related RTP goals and policies.
- Develop urban areas with a mix of housing types and land uses to provide walkable, affordable neighborhoods.

Streets and Roadways

- Preserve and maintain the region's street and highway system.
- Build a well-connected network of regional roadways to accommodate future growth and efficiently distribute traffic.
- Incorporate complete streets and green streets concepts for regional and local roadways.
- Expand regional roadway system capacity to address critical bottlenecks and accommodate future planned growth consistent with RTP goals and policies.
- Address safety needs on the regional roadway system through a comprehensive "3-E" approach.

Public Transit

- Implement a BRT system.
- Improve the local bus network.
- Add all-day service in developing neighborhoods.
- Enhance transit stops.
- Utilize alternative service delivery models to serve low-demand areas.
- Implement a regional express bus network.
- Expand park-and-ride facilities in conjunction with BRT and express services.
- Implement a regional transit entity with stable funding and representative governance.



Bicycles

- Expand the bikeway network with new shared-use paths and on-street facilities.
- Maintain and modernize existing bicycle facilities.
- Eliminate bicycle barriers and hazards in the bikeway network.
- Provide adequate bicycle parking.
- Improve bicyclist safety through a "3-E" approach.
- Continue bike share, education, and bicycle supportive policies.

Pedestrians

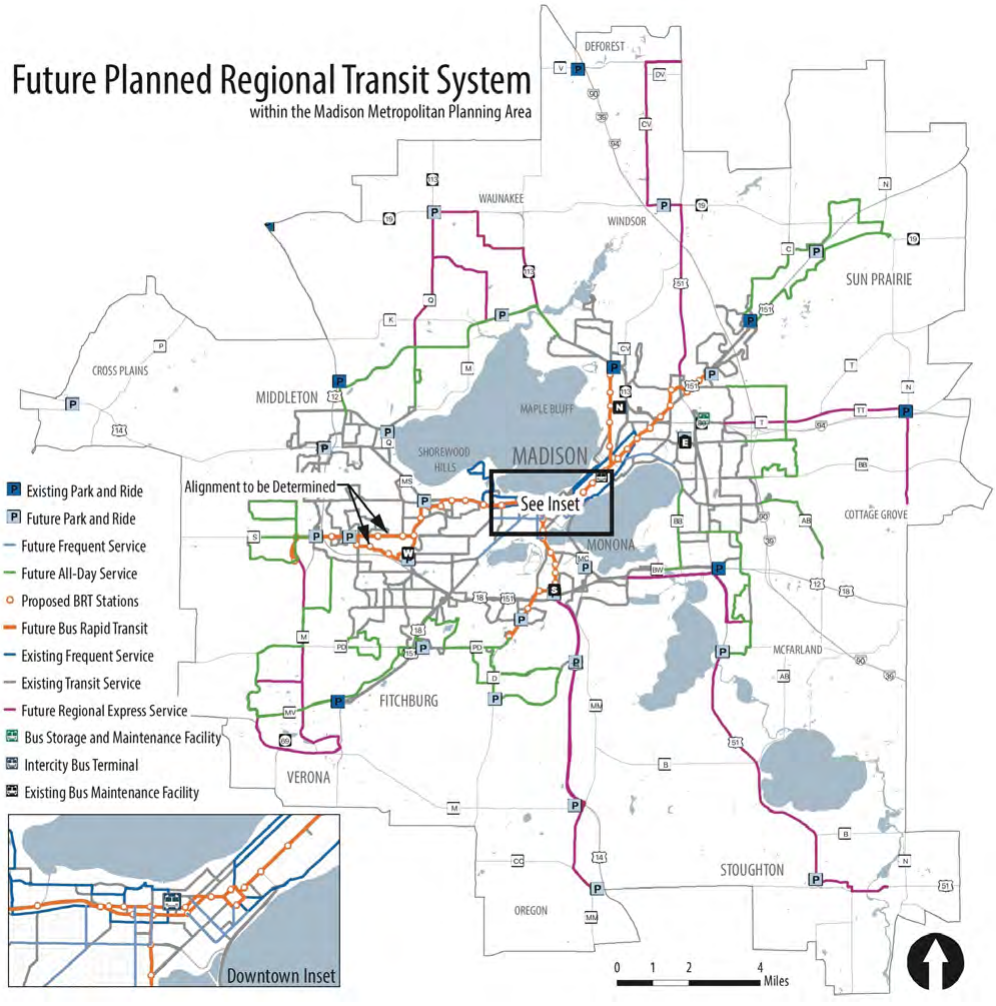
- Provide sidewalks and appropriate pedestrian amenities in developing neighborhoods.
- Retrofit regional streets with modern, safe pedestrian accommodations.
- Improve safety and usability for pedestrians at intersections and crossings.
- Maintain sidewalks and pedestrian facilities for year-round use.
- Design new streets and retrofit existing streets to reduce speeding.

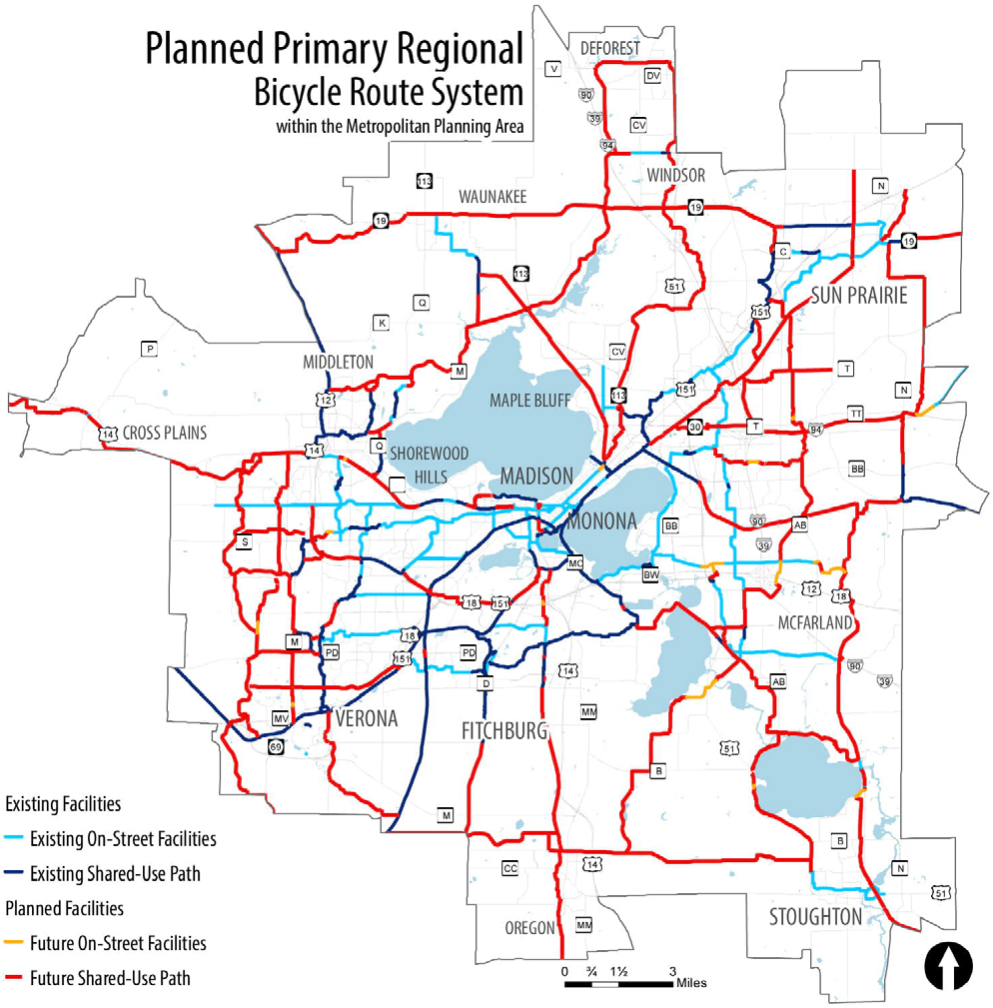
Inter-regional Travel

- Initiate planning for and build an inter-city bus terminal.
- Support new and improved inter-city bus service.
- Maintain and preserve the rail network for future passenger rail service.

Specialized Transit

- Expand the coverage of accessible fixed-route bus and paratransit service.
- Work collaboratively with private taxi operators to ensure accessible taxi service is available and costs for the service are shared equitably.
- Continue and expand specialized work-based transportation for low-income people.
- Utilize emerging technologies to lower operating costs and expand travel options.
- Improve interagency coordination of the various specialized transit services and private services.





Travel Demand Management (TDM)

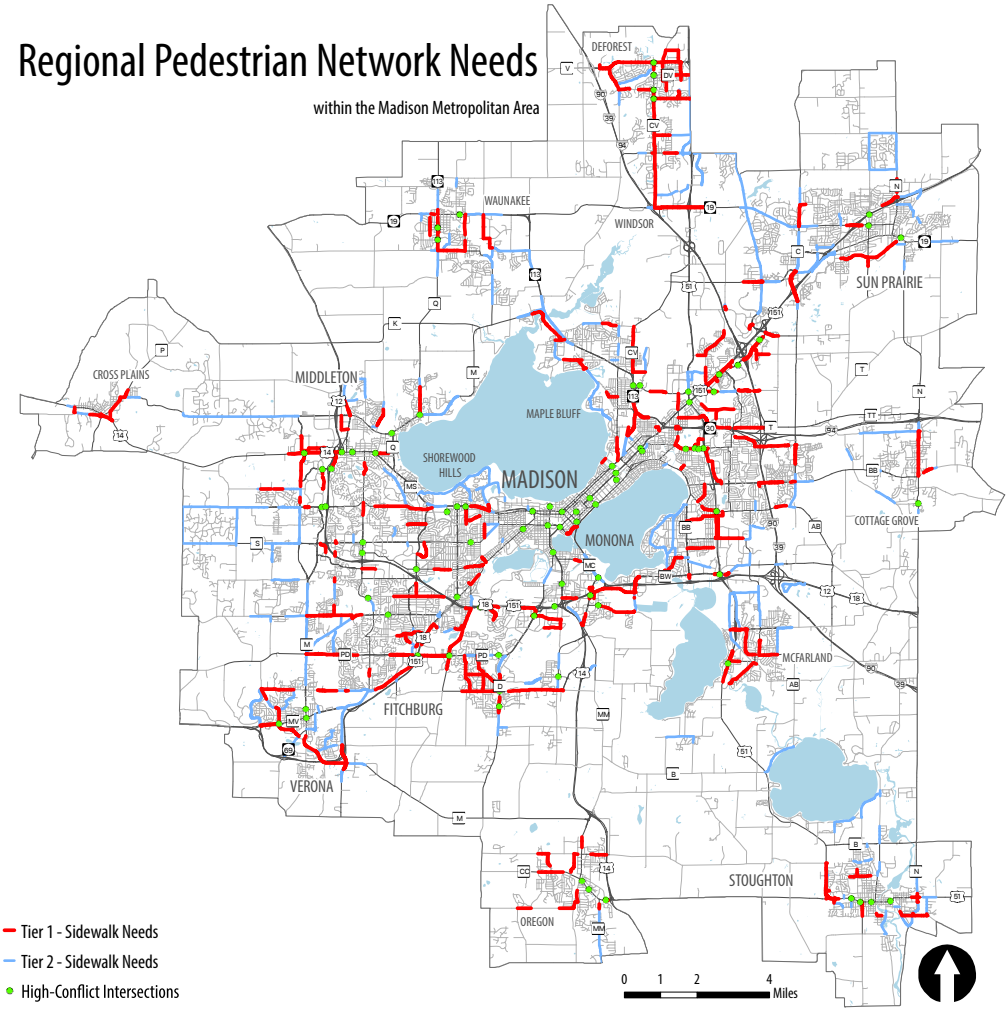
- Expand the regional network of park-and-ride lots to encourage carpooling, transit use, and bicycling.
- Expand the state vanpool program and support the development of additional vanpool programs.
- Continue to encourage and provide support to large employers, institutions, and municipalities to develop and promote strategies to reduce single-occupant motor vehicle trips.
- Provide financial incentives for people to use alternative transportation and increase funding for marketing programs.
- Support transportation options at schools through Safe Routes to School programs.

Transportation System Management (TSM), Operations, and Intelligent Transportation Systems (ITS)

- Expand the regional network of park-and-ride lots to encourage carpooling, transit use, and bicycling.
- Expand the state vanpool program and support the development of additional vanpool programs.
- Continue to encourage and provide support to large employers, institutions, and municipalities to develop and promote strategies to reduce single occupant motor vehicle trips.
- Provide financial incentives for people to use alternative transportation and increase funding for marketing programs.
- Support transportation options at schools through Safe Routes to School programs.

Freight, Air, and Rail

- Maintain and promote new industrial uses along freight corridors.
- Maintain and expand existing infrastructure on the multimodal freight network, prioritizing projects that improve safety, increase efficiency, and minimize lifetime costs.
- Increase focus on freight planning for regional and local transportation facilities.
- Maintain the availability of rail facilities for current and future uses.
- Mitigate conflicts between rail and other uses.
- Ensure the compatibility of uses near airports.



- Improve airport facilities to enhance usability and convenience for passenger traffic.
- Improve the airport's freight accommodations and connections.

Parking

- Use parking management strategies to reduce congestion within downtown areas and major activity centers.
- Modify parking requirements to encourage multi-modalism and innovative design using a more market-based approach.
- Ensure flexibility of parking facilities to accommodate future technologies.

For more information contact:

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The preparation of this report has been financed in part through grants from the Federal Highway Administration and Federal Transit Administration, U.S. Department of Transportation, under the Metropolitan Planning Program, Section 104(f) of Title23, U.S. Code, and by the Wisconsin Department of Transportation (WisDOT).
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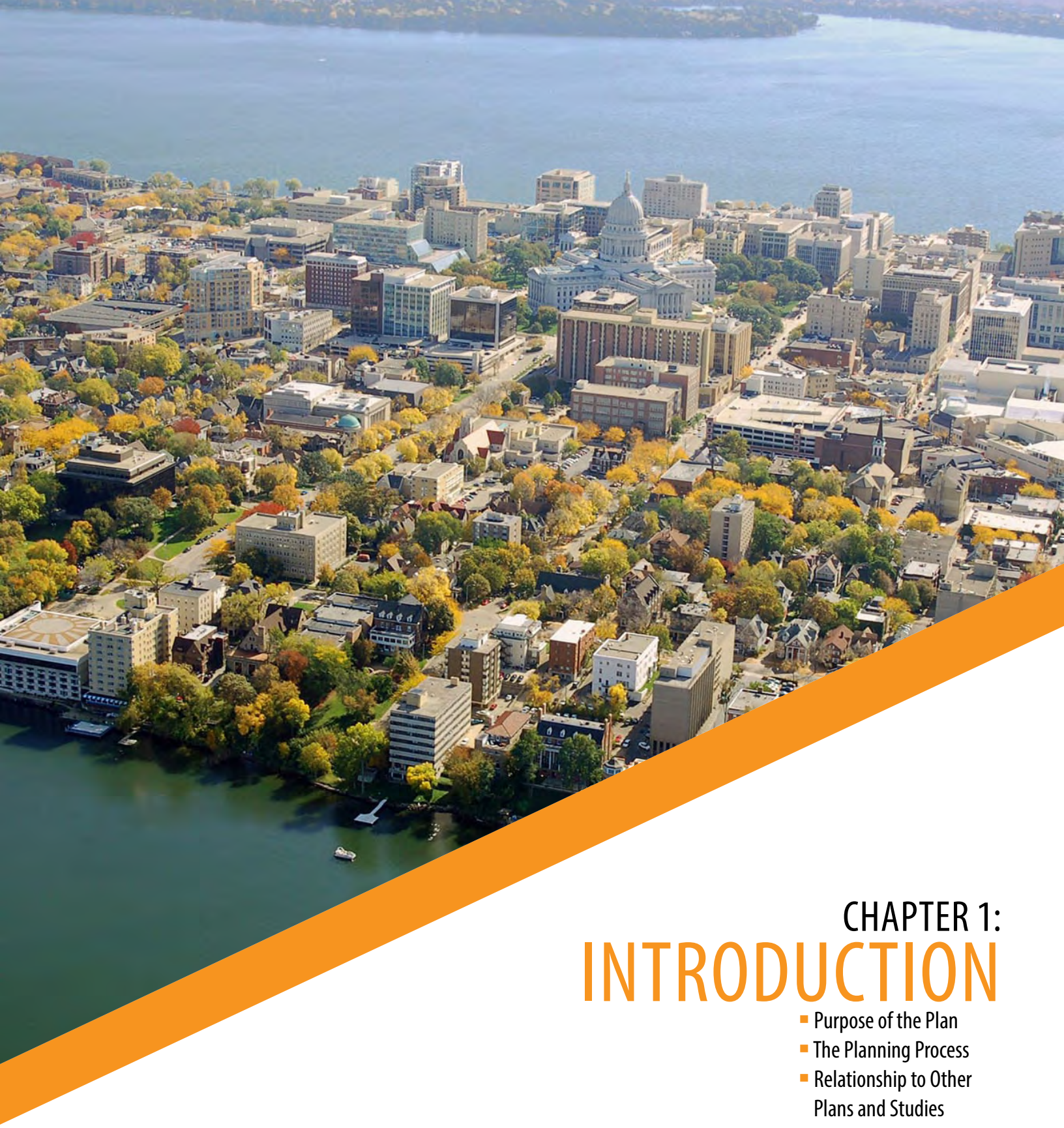


CHAPTER 1: INTRODUCTION

- Purpose of the Plan
- The Planning Process
- Relationship to Other Plans and Studies
- Stakeholder Involvement and Public Outreach

PURPOSE OF THE PLAN

The Madison Region is Growing

Since 2000, over 22% of the state of Wisconsin's population growth occurred within Dane County. A highly urban county, nearly 90% of the county population lives in the Madison Urban Area. During the same time period, employment within the county grew by nearly 37,000. As the region grows and evolves, it will need an efficient, safe, and integrated transportation system. The system must provide a mix of transportation choices – walking, biking, transit, and driving – that provide a variety of ways to access jobs, recreational facilities, shops, restaurants, and other communities.

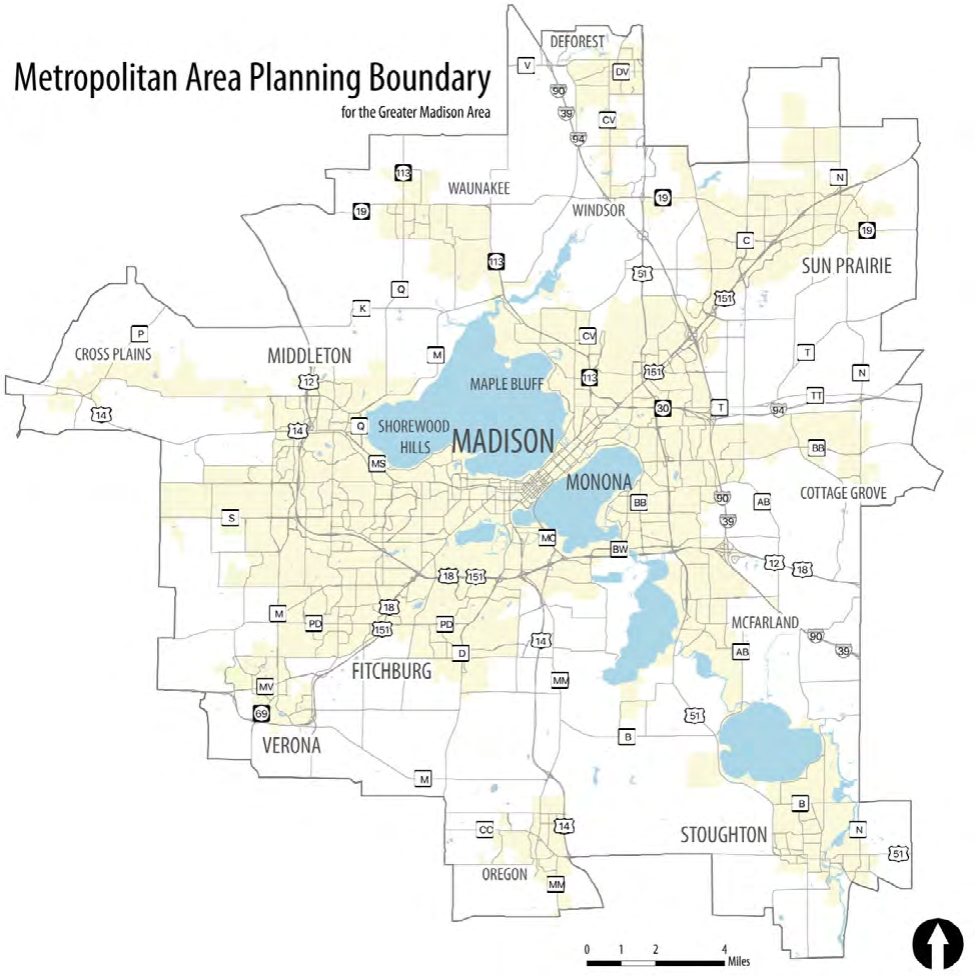


Figure 1-1: MATPB Planning Boundary

The purpose of this plan is to identify how the region will invest in the transportation system across all modes over the next 30+ years. The plan will ensure that transportation projects are coordinated between the various levels of government (municipal, county, and state.)

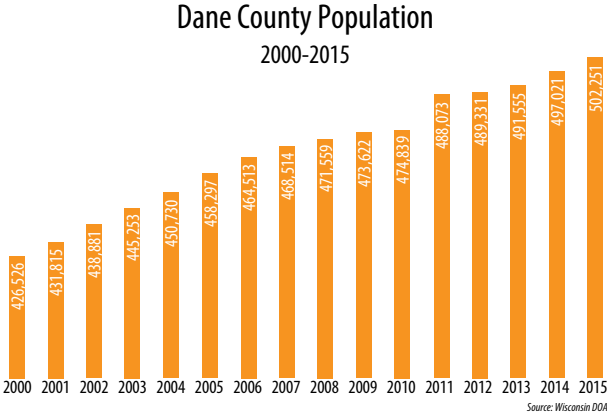


Figure 1-2: Dane County Population 2000 - 2015

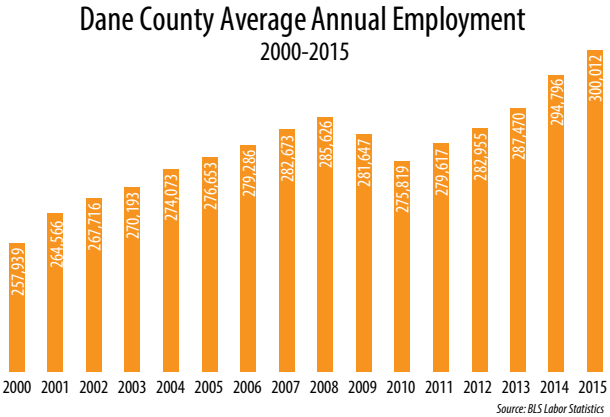


Figure 1-3: Dane County Average Annual Employment 2000 - 2015

Why is the Transportation System Important?

In late 2015, the Madison Area Transportation Board (MATPB), the Metropolitan Planning Organization (MPO) for the Madison area, teamed with the Capital Area Regional Planning Commission (CARPC) on the Greater Madison Region Values and Priories Survey. The purpose of the survey was to determine the values and priorities of area residents to ensure that planning decisions speak to and correspond with the desires of the region's residents.

Results of the survey show that financial well being – the ability to afford to live in the region – is the value driving most regional residents. To that end, the transportation system is critical to the economic success of residents and businesses in the region.

For businesses, a well-developed transportation network allows for the quick and efficient movement of services and goods. For example, "just-in-time" delivery has been used in the manufacturing industry as an inventory management strategy. The businesses increase their efficiency and reduce their overhead by receiving raw materials or production inputs just before they are needed in the production process. In the retail, restaurant, and hospitality industries,it is important to have a network that is reliable and convenient to ensure a steady stream of customers. For biotech and software businesses, convenient access to an airport for freight shipments and business flights could be the difference between locating in the region or not. A high quality transportation system with transit and bicycling options is also important for businesses in attracting young, educated, and skilled workers. National surveys have shown this is one of the top criteria of Millennials in choosing where to live.

For residents, an integrated multi-modal transportation system provides multiple options for commuting, shopping, leisure, and regional travel. Transportation also impacts neighborhood and community affordability, as well as the viability of community development. The transportation network also has a direct impact on the quality of life in the region. Safe and efficient regional transportation facilities ensure convenient business and leisure travel. An integrated, well-connected network makes traveling by all modes more convenient and enjoyable. The network can also help to foster community with streets acting as community, gathering and meeting spaces.

The Role of the Metropolitan Planning Organization

MPOs, such as MATPB, are statutorily required in all urbanized areas with a population of more than 50,000. As required by federal law, MPOs are policy boards comprised of mostly local elected officials that perform six core functions:

1. Establish a setting for effective transportation planning and decision-making that is a fair and impartial.
2. Identify and evaluate transportation improvement options, and use data and planning methods to determine whether the options support long-range regional goals and system performance targets.
3. Prepare and maintain a Regional Transportation Plan (RTP).
4. Develop and maintain a Transportation Improvement Program (TIP).
5. Identify performance measure targets and monitor whether implemented projects are achieving targets.
6. Involve the general public and other affected constituencies in the planning process.

During the RTP, TIP, and Unified Planning Work Program (UPWP)[1] development and maintenance processes, MPOs engage state departments of transportation, transit providers, and local municipalities in a continuing, comprehensive, and cooperative (3C) multimodal transportation planning process. This 3C process ensures that resources are used in the most effective manner

[1] https://www.transit.dot.gov/regulations-and-guidance/transportation-planning/unified-planning-work-program-upwp

possible and that there is continuity of the transportation system across jurisdictions.

MPOs do not own nor operate transportation systems, but rather serve to coordinate and build consensus in the planning and programming of funds for transportation projects and operations. MATPB involves a variety of stakeholders into the planning process including Metro Transit, WisDOT, the airport authority, rail-freight providers, private providers of transit, and local municipalities.

Urbanized areas with populations of more than 200,000, such as the Madison region, are designated as Transportation Management Areas (TMAs). TMAs have additional planning responsibilities, including the creation of a congestion management process. Further, TMAs must include officials of public agencies that administer or operate public transportation systems within the metropolitan area on the policy board as well as appropriate state officials.[2]

Federal Regional Transportation Planning Requirements

Most major transportation projects are funded through a mix of federal, state, and local funding. Likewise, projects can have a variety of lead agencies that are responsible for planning, construction, and maintenance, including communities, counties, and states. To ensure a unified metropolitan transportation planning process, FHWA's Metropolitan Planning Program provides funding for MPOs to act as a coordinating agency. MPOs work with all stakeholders involved on projects to ensure a seamless transportation network, logical timing of project construction, and to eliminate reduncancy between communities. Agreed upon projects are added to the TIP. Projects that are not in the TIP cannot receive federal transportation funding.

MPOs are bound by a number of statutory requirements that are incorporated into transportation funding and authorization bills. For example, in 2012, the Moving Ahead for Progress in the 21st Century Act (MAP-21) was authorized. MAP-21 largely built upon the previous authorization and added requirements to use a performance-based approach to transportation decision making and the development of transportation plans.[3] To meet this requirement, MPOs create performance reports that contain targets set to correspond with plan goals.

The most recent authorization bill, the Fixing America's Surface Transportation Act (FAST), builds upon MAP-21, and adds requirements that MPOs:

- Identify and list intercity bus providers, intercity bus routes, intercity bus facilities, and commuter van pool providers in regional transportation plans. Identify public transportation facilities and providers in regional transportation plans
- Add a representative of a transit provider to the MPO board with equal authority as other members and allow them to also represent their local community
- Consult with additional local planning officials during the planning process, including tourism and natural disaster preparedness planners
- Expand the scope of the regional transportation plan to add improving the transportation system resiliency and reliability; reducing or mitigating the storm water impacts of surface transportation, and enhancing travel and tourism
- Develop strategies to reduce the vulnerability of existing transportation infrastructure to natural disasters
- Consider the role that intercity buses may play in reducing congestion, pollution, and energy consumption in a cost-effective manner; and strategies and investments that preserve and enhance both public and privately owned and operated intercity bus systems
- Ensure that public ports and private providers of transportation, including intercity bus operators and employers with commuting programs be given reasonable opportunity to comment on the RTP

MATPB has worked to fulfill these and other requirements since the FAST Act was authorized.

[2] http://www.fhwa.dot.gov/planning/publications/briefing_book/part01.cfm
[3] http://www.fhwa.dot.gov/map21/factsheets/mp.cfm

A Performance-Based Approach

MAP-21 introduced a requirement for MPOs to take a performance-based approach to planning and programming. This performance-based approach will produce measurable outcomes that can influence future decisions. The FAST Act continues this transition towards a performance-based, outcome-driven approach.

The U.S. Department of Transportation (USDOT) recommends the following performance-based planning and programming process:

- Strategic Direction– a vision for the future, as articulated by the public and key stakeholders:
  - Goals– an aspiration or desired result of the plan
  - Objectives – Strategies or implementation steps to attain the identified goals
  - Performance Measures – Ways to quantitatively examine and track the progress towards implementing objectives over time
- Planning Analysis – a public involvement and performance-driven review of existing and projected future conditions used to develop investment and policy priorities:
  - Identification of Trends and Targets – review of the performance data to find the general direction of measures and setting of desired levels of performance to be achieved within a certain time frame
  - Identification of Strategies and Analysis of Alternatives – development of scenarios with packages of policies and/or projects that could be used to reach identified performance targets or explore the types of funding that would be required to achieve a certain level of performance
  - Development of Investment Priorities – selection of the scenario that supports attainment of the targets, considering trade-offs between different goal areas as well as policy priorities
- Programming – Selecting specific investments to include in the transportation improvement program or TIP:
  - Development of Investment Plan – an optional mid-range (10-year) plan that links the TIP to the RTP
  - Allocation of Resources / Programming Projects – TIP project prioritization based upon the basis of performance with a demonstrated clear link to meeting performance objectives
- Evaluation of Implementation – Ongoing review of success and failures:
  - Monitoring – gathering information on actual conditions
  - Evaluation – analysis to understand the extend implemented strategies have been effective
  - Reporting – communicating information about system performance and effectiveness of plans and programs to policymakers, stakeholders, and the public

MATPB completed the first Performance Measures Report for the Madison area in 2016. The results of the report informed the recommendations in the RTP and will also inform projects selected for inclusion in the TIP.

Performance-Based Planning and Programming Framework

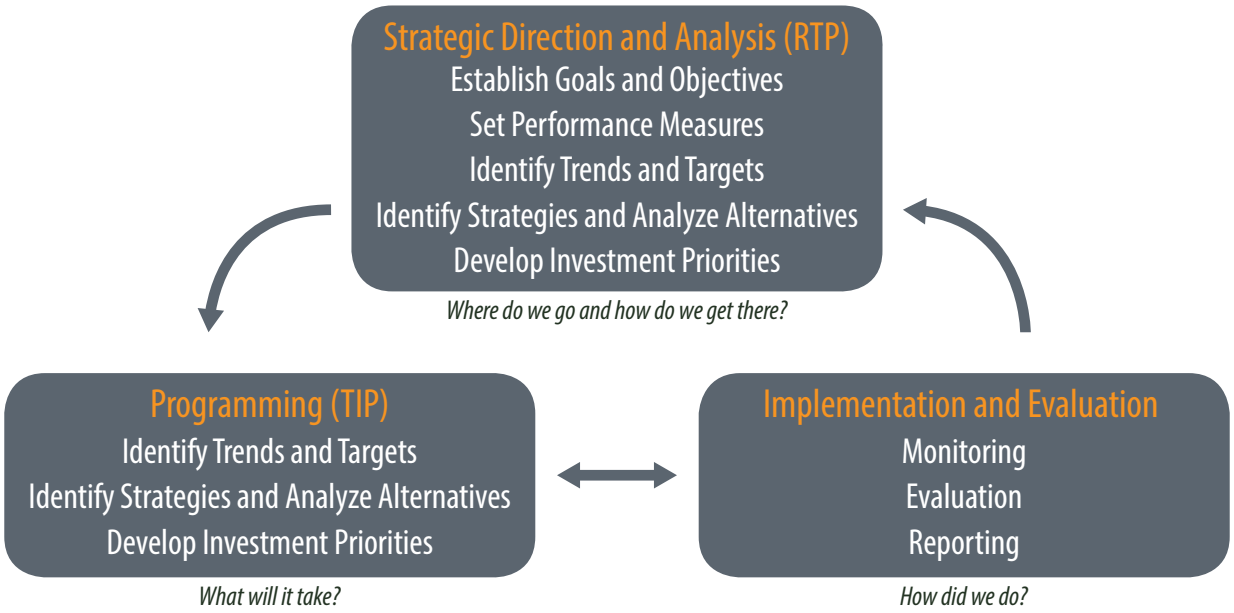
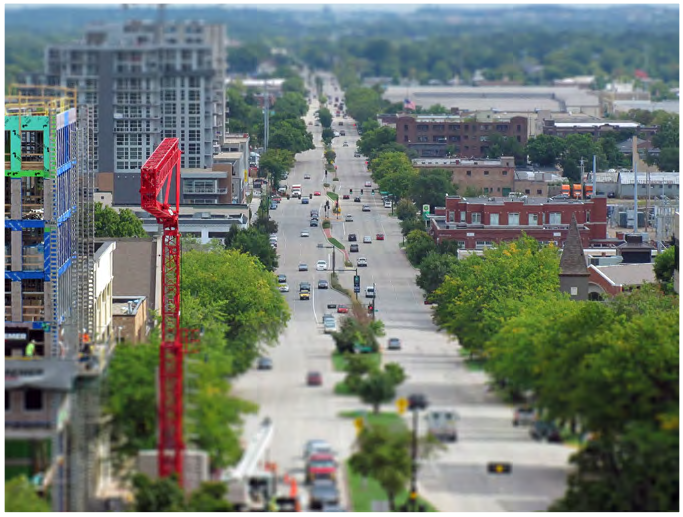


Figure 1-4: Performance-Based Planning and Programming Framework

THE PLANNING PROCESS

What is the Regional Transportation Plan?

The RTP is an integrated, multi-modal plan that articulates how the region intends to manage and operate its multi-modal transportation system (including transit, highway, bicycle, pedestrian, and other modes) to meet the region's economic, transportation, development, and sustainability goals. The RTP defines the transportation goals for the region and specifies the policies, projects, and strategies that will achieve these goals. Additionally, the plan ties goals to performance measures and sets performance goals to track the region's progress in meeting plan goals. Further, a board-approved and FHWA-accepted RTP is required for a metropolitan area to be eligible to receive federal funding for transportation projects.



The RTP acts as a transportation investment guide that MATPB, local jurisdictions, and the Wisconsin Department of Transportation (WisDOT) use to ensure a unified regional transportation network. As a "fiscally constrained " plan, the RTP must demonstrate that the projects listed in the plan can be implemented using committed, available, or reasonably available revenue sources. The RTP must be updated every five years and cover a minimum of 20 years.

The RTP is based upon and designed to support CARPC's regional land use policy plan and local comprehensive plans for growth and development.

Plan Development Process

The RTP was developed using a process that can be broken down into various steps including:

- Establish a regional vision and goals by engaging the public and stakeholder groups in a robust involvement process
- Perform an existing conditions analysis in which trends related to demographics, the economy, land use development, travel, and transportation system performance are examined and their relationship to plan goals and performance measures established
- Develop population and employment forecasts for the planning period
- Analyze the existing conditions in combination with forecasts to develop improvement strategies and projects and determine the capital requirements, operational strategies, and land use policy changes that may be needed in combination with these strategies and projects
- Evaluate and prioritize the strategies and projects in order to ensure consistency with plan goals and make progress towards performance targets

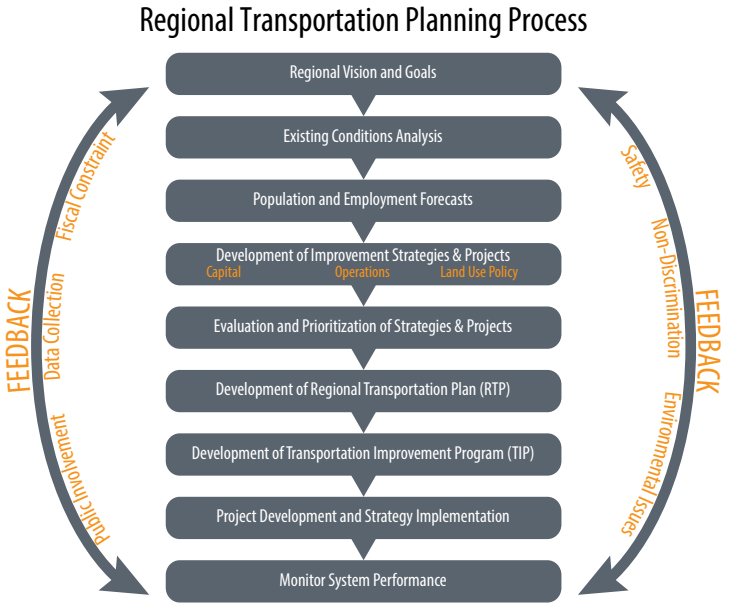


Figure 1-5: Regional Transportation Planning Process

Additionally, while preparing the RTP the following National Planning Factors guided the planning process:

- Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency
- Increase the safety of the transportation system for motorized and non-motorized users
- Increase the security of the transportation system for motorized and non-motorized users
- Increase accessibility and mobility for people and freight
- Protect and enhance the environment, promote energy conservation, and improve the quality of life for the community
- Promote consistency between transportation improvements and planned State and local growth and economic development patterns
- Enhance the integration and connectivity of the transportation system for all modes
- Promote efficient system management and operation
- Emphasize the preservation of the existing transportation system
- Enhance travel and tourism
- Improve the resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts of transportation

Once these steps were completed, a financial capacity analysis was performed to ensure that any recommendations made in the RTP could be completed between now and 2050 using cost and revenue estimates. The draft RTP was then submitted to MATPB policy board for adoption.

MATPB adoption of the RTP demonstrates regional agreement upon the transportation vision for the metropolitan area. Upon adoption, the RTP implementation and performance measurement begin. Implementation can include building new facilities, adding transit service, implementing traffic and transit operational improvements, adding new trails, adopting policies, and completing further studies to refine improvements or strategies recommended in the plan.

Plan Development Timeline

The development of the RTP took place along a timeline that began in the fall of 2015 and concluded in the spring of 2017, with a public engagement process taking place concurrently. While many engagement activities were timed with plan development steps, others, such as social media and website updates and committee meetings, occurred throughout the planning process.

In the fall and winter of 2015, MPO staff began to collect data, analyze existing conditions, and prepare growth forecasts. While this was occurring, MATPB partnered with CARPC and the City of Madison to conduct the Madison Area Regional Values and Priorities survey in an effort to learn more about the values and concerns area residents.

Early 2016 was spent developing goals and policy objectives based on feedback from the first series of public information meetings that were held during that same time period. The RTP online engagement tools were also launched at this time.

During the summer and fall of 2016, MATPB staff used information obtained from community involvement activities (such as the earlier public meetings and survey tools), committee meetings, and information gathered previously in the planning process to develop improvement projects and strategies. At this time, the RTP began to be drafted.

In the fall and winter of 2016, the second series of public engagement activities took place. The meetings sought feedback on the improvement projects and strategies that MPO staff developed, as well as suggestions for additional projects. Feedback from these activities helped to inform the prioritization of projects and strategies that took place during this time. During the same time period, the MPO launched the online transportation budgeting tool to learn more about how area residents would like to see their transportation dollars spent.

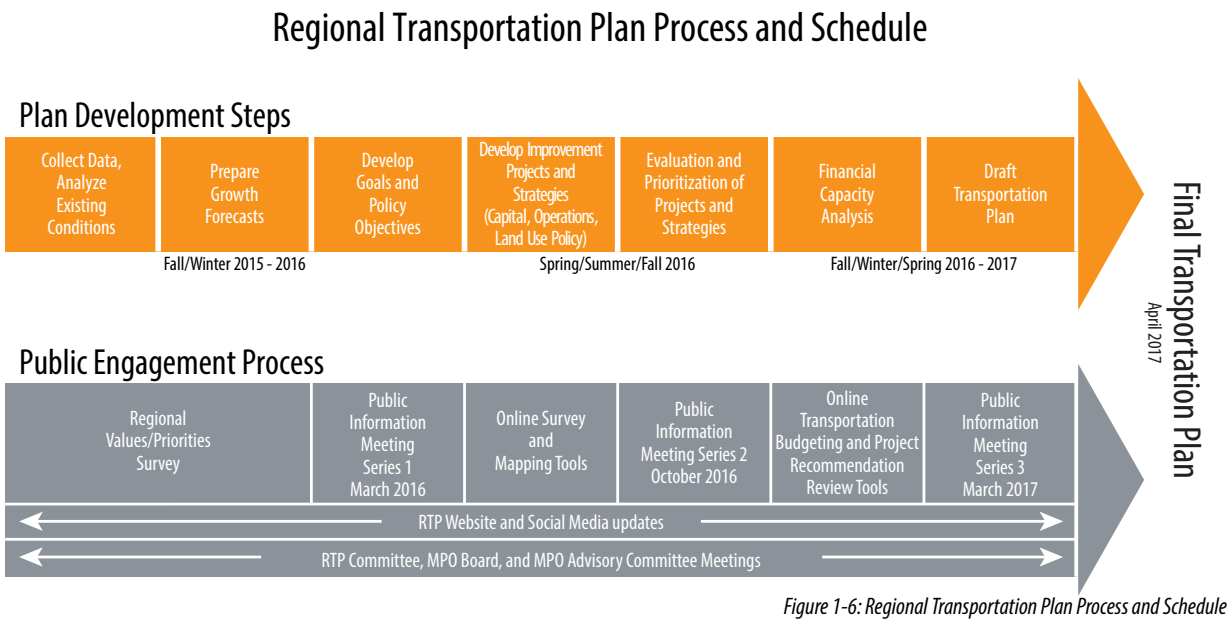


Figure 1-6: Regional Transportation Plan Process and Schedule

In the winter 2016 through the spring of 2017, staff completed a financial capacity analysis. This analysis determined which projects and strategies from the prioritized list would be included in the plan based on available funding. Once prioritized, the draft RTP was completed. During this same period environmental justice and environmental analyses of the draft RTP were completed to evaluate the impacts of the RTP on minority, low-income, and autoless households, and screen major projects for potential environmental impacts. The draft RTP was then presented at a public meeting, RTP Advisory Committee/TCC/CAC meetings, and the MPO board. Feedback from these meetings was incorporated into the final draft RTP, which was, in turn, approved by the MPO board on April 5, 2017.

RELATIONSHIP TO OTHER PLANS AND STUDIES

Transportation planning is a continuous process. The RTP builds upon a number of other planning efforts, studies, reports, and programmed transportation projects. Where applicable, the RTP has incorporated recommendations and policies from current plans including (but not limited to):

MPO Plans and Studies

2035 Regional Transportation Plan Update (2012)

MATPB's previous RTP. The 2035 RTP Update was a minor update to the RTP 2030 (2006) to account for new and modified land use plans, growth and development, new household, employment and traffic forecasts, and other changes and trends affecting the system since the RTP 2030 was adopted. As with all RTPs, it is an integrated, multi-modal system plan that provides the overall framework for transportation planning and investment decision making in the region. It identifies transportation projects and strategies or actions to be implemented.

Bicycle Transportation Plan (2015)

The Bicycle Transportation Plan for the Madison Metropolitan Area and Dane County is a comprehensive bicycle plan to serve as a blueprint for continuing to improve bicycling conditions and increase bicycling levels throughout Dane County. The planning horizon is 2050. It provides a framework for cooperation between state agencies, Dane County, and local governments in planning for and developing bicycle facilities and programs. It is intended to educate citizens and policy makers on bicycle transportation issues and the needs of bicyclists as well as present resources for planning, designing, and maintaining bicycle facilities. The plan is a component of MATPB's RTP.

Madison Area Bus Rapid Transit Study (2013)

This feasibility study investigated how Bus Rapid Transit (BRT) might be used in the Madison Area. This study investigated four corridors radiating from Central Madison – west, south, east, and north – connected by a central spine through the Isthmus. BRT is a fast, frequent, high-capacity, limited-stop transit service that offers an improved rider experience on busy travel corridors. It offers many similar advantages to rail transit. The study identified a proposed system, provided cost and ridership estimates, and identified next steps for potential implementation of BRT.

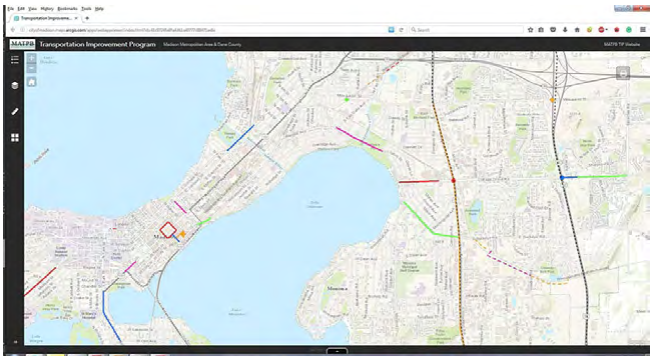
2017-2021 Transportation Improvement Program (2016)

The Transportation Improvement Program (TIP), which MATPB updates annually, is a coordinated listing of short-range transportation improvement projects anticipated to be undertaken in the next five-year period. The TIP is the mechanism by which the long-range RTP is implemented, and represents the transportation improvement priorities of the region.

Projects within MATPB Planning Area must be included in the TIP in order to be eligible to receive federal funding assistance. Outer county area projects are also listed for information and coordination purposes. The list is multi-modal. In addition to streets/roadways, it includes transit, pedestrian, bicycle, parking, and rideshare/transportation demand management projects.

The coordinated listing of projects in the TIP is a cooperative effort by state and local implementing agencies and the staff of MATPB, and is primarily based upon capital improvement programs and budgets. Implementing agencies submit their lists of proposed projects to MATPB staff to coordinate into a comprehensive list of proposed transportation improvements, with information about project scope, cost timing, etc. The listing is subject to review by local units of government, MATPB Technical Coordinating Committee (TCC), and MATPB. Opportunities are also provided for public involvement and comments.

The TIP is not a final schedule of project implementation. The time frame shown in the TIP is a "best estimate." The timing of projects can change due to delays in project development activities, changes in implementation priorities, and other factors. Annual updates to the TIP allow for these adjustments to project schedules and changing transportation improvement priorities. In addition, the TIP may be amended after it is adopted in order to add or delete projects, change project timing, or accommodate cost, phasing, or scope changes to a project. These amendments are usually minor. If a major change were to be adopted, an opportunity for formal review and comment would be provided.



An image from the Transportation Improvement Program interactive website. Click on the image to view the website.

MATPB Performance Measures Report (2016)

The Performance Measures Report measures progress towards regional transportation goals, identified in the RTP, using data from a variety of sources. The report, which is released annually, is used along with the TIP and RTP in the new performance-based planning process.

Cover of MATPB Performance Measures Report. Click on the image to view the report.

2013-2017 Transit Development Plan (2013)

The Transit Development Plan (TDP) for the Madison Urban Area is a short- to medium-range strategic plan intended to identify transit needs and proposed improvements and studies over a five-year planning horizon. MATPB is responsible for developing and maintaining the TDP. MATPB works in close cooperation with Metro Transit and other transit providers, funding partners, and jurisdictions in the Madison area to develop the plan. The TDP is developed within the overall framework of the long-range RTP.

Congestion Management Process (2011)

Metropolitan Planning Organizations with planning area populations over 200,000 are designated as Transportation Management Areas (TMA) by FHWA. In these areas, a Congestion Management Process (CMP) must be developed and implemented as a part of the metropolitan planning process. The CMP is an 8-step process:

- Develop Congestion Management Objectives;
- Identify Area of Application;
- Define System or Network of Interest;
- Develop Performance Measures;
- Institute System Performance Monitoring Plan;
- Identify and Evaluate Strategies;
- Implement Selected Strategies and Manage Transportation System; and
- Monitor Strategy Effectiveness.

MATPB developed its first CMP in 2011 based on a cooperatively developed and implemented metropolitan-wide strategy that provides for the safe and effective management and operation of the transportation system. Strategies from the CMP are incorporated into the RTP and TIP. Strategies used to manage travel demand, reduce single occupant vehicle (SOV) travel, and improve transportation system management and operations are all to be considered, as well as those that explicitly address bicycling and walking.

Madison Metro Transit Bus Size Study (2014)

The Bus Size Study contains a detailed analysis of Metro Transit bus routes to determine the suitability of larger or smaller vehicles for different routes on the system. The study includes supplemental analysis on the introduction of larger or smaller buses into the fleet, including the financial implications of such a move, an analysis of whether or not existing bus maintenance facilities and stops can accommodate larger buses, and the effects larger buses would have on vehicle scheduling and operations.

WisDOT Plans and Studies

Connections 2030 (2009)

Connections 2030 is WisDOT's long-range transportation plan for the state of Wisconsin. This plan addresses all forms of transportation over a 20-year planning horizon: highways, local roads, air, water, rail, bicycle, pedestrian, and transit. The plan outlines priority projects and studies within the metropolitan planning area.

Wisconsin State Freight Plan (2017)

The State Freight Plan is WisDOT's first attempt at articulating a statewide vision for multimodal freight transportation. The plan includes five key elements: linking transportation investments to economic development activities, placing Wisconsin within a national and global context, engaging and reflecting the interests of a wide array of freight stakeholders, implementation - from planning to project development and programming, and performance measures and management. Local freight routes were ranked as part of the planning process.

Madison Beltline Study (ongoing)

The Madison Beltline Study is a three part study process that will focus on improving safety and mobility for all modes of travel while reducing congestion and limiting social, cultural, and environmental impacts. An origin-destination study was completed in 2012. WisDOT began a planning and environmental linkages (PEL) study for the corridor in 2013. A National Environmental Policy Act (NEPA) study will follow the completion of the PEL Study.

U.S. Highway (US) 51 Stoughton Road Corridor Study (ongoing)

This study is evaluating long-term alternatives to address the safety, congestion, and gaps in the bicycle and pedestrian facility network along this corridor. This study will follow a phased implementation approach that will identify sections of the corridor for construction and potential timing. Interim improvements may be needed for sections of the corridor in subsequent phases in order to meet the project purpose and need until construction of those phases can occur.

US 51 Corridor (Stoughton – McFarland) Study (ongoing)

This study is evaluating alternatives that will improve safety and congestion along the corridor, and address needs of bicyclists and pedestrians. Improvements in the corridor are being addressed in an environmental assessment (EA) to identify near-term improvements. A Tier 1 environmental impact statement (EIS) to analyze long-term improvements was suspended because of the unlikelihood of funding being available in the near future for a major capacity expansion project. The US 51 study corridor is an important regional and commuter route and serves as an important link to the Madison area and beyond.

US 12 Freeway Conversion Study (ongoing)

This corridor study examines a 6.1 mile stretch of US 12 in the northwestern portion of the MPO planning area. The route is part of Wisconsin's National Highway System and provides a parallel route from the Madison metro area to I-39/90/94. The study aims to develop an alternative that will increase highway functionality and safety along corridor. Dane County's North Mendota

Parkway Study intends to tie into US 12 for the western terminus. The environmental documentation is on schedule to be completed in the Summer of 2017. WisDOT intends to initiate a final official mapping of this corridor phase in 2018.

US 18/151 Freeway Conversion Study (ongoing)

This study examines a 28-miles portion of US 18/151 in portions of Iowa and Dane counties, from Dodgeville to Verona, to develop a long-term plan for freeway conversion. This study will result in the eventual removal of all direct local road and driveway access onto US 18/151. Originally completed in 2014, an official re-evaluation of the environmental document is currently underway, focusing on the Barneveld area, which will be followed by the adoption of the official map.

I-39 & US 12/18 Madison Beltline Interchange (BIC) Study (ongoing)

The purpose of this project is to improve the overall safety of the interchange by improving its geometrics, providing additional capacity to accommodate increased future traffic volumes, and enhance connectivity with the regional transportation network in the area. The Beltline Interchange was included in the 2010 finding of no significant impact (FONSI) for the I-39/90 expansion project, however due to expanded study limits and unique natural and cultural resources an environmental impact statement is currently being prepared for the interchange.

WIS 19 Safety and Operations Study (2016)

WIS 19 is an important regional route serving the northern metropolitan area of Madison, functioning as a connector to the I-39/90/94, US 151, and US 12 corridors. The study analyzed safety and operational issues, including access, to produce a corridor management plan that identifies corridor deficiencies, in addition to improvement recommendations, to extend the highway's useful life.

WisDOT Southwest Region Park-and-Ride System Study (2015)

WisDOT Southwest Region initiated the Southwest Region Park-and-Ride System Study to provide more efficient and sustainable commuting choices and reduce traffic volumes on the state highway system by locating park-and-rides at optimal locations. The first step in the location selection process is identifying areas where park-and-ride lots may be practical, with potential to attract users and meet WisDOT's park-and-ride program goals. The purpose of this report is to present the screening methodology for assessing the most efficient locations for future park-and-ride facilities in the sixteen county study area of the Southwest Region.

Local Plans and Studies

CARPC Future Urban Development Area (FUDA) Plans

FUDA is a collaborative, locally-driven effort among neighboring jurisdictions and the Capital Area Regional Planning Commission. The purpose is to protect vital natural resources, promote efficient development, and preserve farmland through cooperative planning for long-term growth. FUDA provides additional resources that local communities may use to update their comprehensive plans.

Madison in Motion – Sustainable Madison Transportation Master Plan (2017)

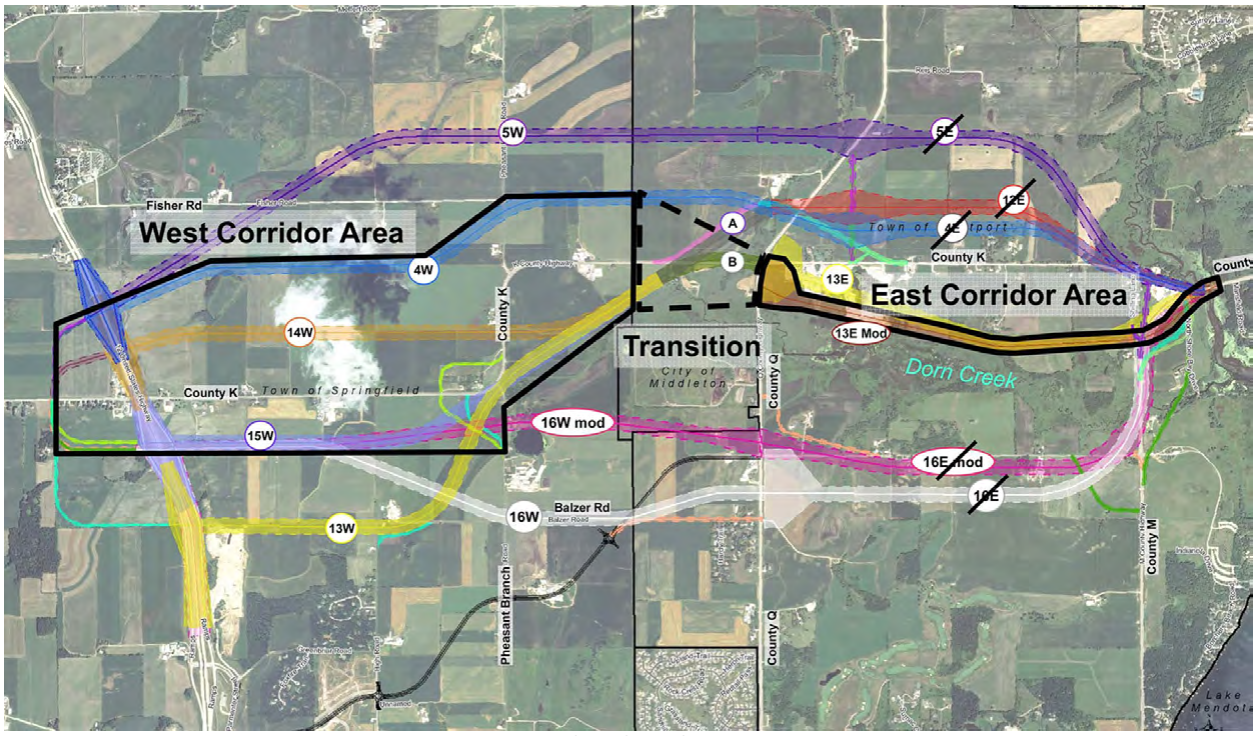
Madison in Motion, the City of Madison's Sustainable Madison Transportation Master Plan, will guide future transportation decisions in Madison, in order to help make Madison a more walkable, bikeable, and transit-oriented city. Madison in Motion will build on adopted transportation and land use plans to improve coordination, connectivity, and transportation choice while establishing a framework to strengthen neighborhoods with context-appropriate future development.

Dane County's North Mendota Parkway Study (2009)

The North Mendota Parkway Study developed a series of recommended study areas for a future north-metro parkway route:

- An eastern corridor area between County Highway M and County Highway Q;
- A broader western corridor area between the Town of Westport / Town of Springfield line and U.S. Highway 12, and;
- A transition area to connect the eastern corridor and western corridor areas.

Additionally, the study recommended a natural resource area boundary to protect the environmental, water, scenic, and recreation resources in the North Mendota area. The plan was adopted and incorporated into the Dane County Parks and Open Space Plan; however, capital funds have not yet been identified to construct this route.



North Mendota Parkway

STAKEHOLDER INVOLVEMENT AND PUBLIC OUTREACH

The intent of the RTP is to offer a vision and blueprint for the future of the transportation network in the Madison area. To develop this vision and find consensus between completing interests, it is important to have a robust dialogue between the community, stakeholders, and local officials. MATPB staff worked to facilitate opportunities for all interested parties to participate in the planning process and attempted to make that process more inclusive for those that may not feel comfortable or have the time for traditional forms of participation.

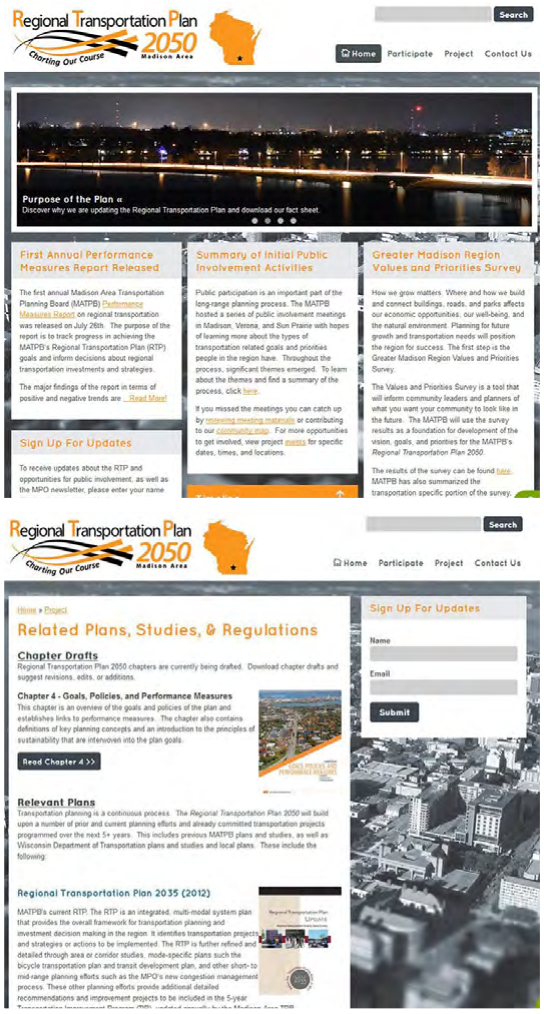
The public involvement process for RTP 2050 included:

- An interactive public participation website
- A RTP advisory committee made up of local elected officials and community leaders
- A community values and priorities survey
- Three series of three public involvement meetings
- MATPB newsletter updates

Specific materials delivered during the involvement process can be found in Appendix I.

Public Participation Website

At the start of the planning process, MATPB worked with a consultant to create an interactive website for the RTP in an effort to increase public participation and interest in the planning process. The website, MadisonAreaRTP.com, provided project news, descriptions of the plan development process, a listing of RTP related boards and committees and corresponding membership, a timeline of public engagement activities and meetings, links to related plans and studies, information about MATPB, and interactive tools at specific points in the planning process.



Images of the RTP 2050 website.

RTP Committee

An ad hoc RTP Advisory Committee was created to help guide development of the plan. The committee consisted of primarily elected officials, citizen members of local transportation related committees, and others representing important stakeholders and constituencies in the region. Membership included:

- Stephen Flottmeyer – Planning Chief, WisDOT SW Region & MPO Policy Board Member
- Jennifer Sarnecki – Statewide Planning Chief, WisDOT
- Chuck Kamp – General Manager, Metro Transit & MPO Policy Board Member
- Paul Esser - Mayor, City of Sun Prairie
- Hans Hilbert - Alder, City of Middleton, District 7 & Chair of the Ped/Bike/Transit Committee
- Elizabeth Doyle - Alder, City of Verona, District 1 & Council President
- Kim Lobdell - Chair, City of Fitchburg Transportation & Transit Committee
- Carl Chenoweth - Dane County Supervisor, District 35 & Member, Commission on Economic and Workforce Development
- Rod Clark, Member – Village of McFarland, Finance &Ad Hoc Transportation Needs Committees
- Kevin Little – Managing Director of Economic Development, Greater Madison Chamber of Commerce
- Amanda Larson – YW Transit Program Coordinator, YWCA Madison
- Dave Porterfield – Real Estate Developer, Movin' Out, Inc.
- Jessie Lerner – Executive Director, Sustain Dane
- Ken Golden – Member of CARPC, Member of City of Madison Transit & Parking Commission, Member of MPO Policy Board
- Betty Hicks – Member, City of Madison Disability Rights Commissions and ADA Transit Subcommittee
- Tom Wilson - Attorney/Administrator/Clerk - Treasurer, Town of Westport
- Chad Lawler - Director of Government Relations & Advocacy - Madison Area Builders Association
- Susan Schmitz - President - Downtown Madison, Inc.

The committee helped identify important issues facing the regional transportation system and how those issues impact their constituencies. Additionally, the committee provided feedback on plan goals and policies, public outreach strategies, project recommendations, and chapter drafts.

Community Values and Priorities Survey

MATPB partnered with the Capital Area Regional Planning Commission (CARPC) to conduct the Priorities and Values Survey of the greater Madison region, with the support of the consulting firm Heart+Mind Strategies. The scientific survey of 457 residents was conducted December 8-22, 2015. Midway through the scientific study, an open survey was conducted, garnering 1,179 responses, primarily from the Madison urban area. The purpose of the survey was to determine regional priorities, values, and motivations that could be used to guide the planning process in the area. The survey asked general questions about the region, as well as transportation-specific questions.

The key findings of the survey were as follows:

1. Madison region residents enjoy a high quality of life and have a relatively positive outlook – well above the national average. However, residents believe that the local economic recovery has been sluggish.
2. While growth is viewed as inevitable, most believe it brings benefits and should be encouraged.
3. Education (K-12 and Higher) and agriculture are seen as the top regional equities. Jobs, income inequality, affordable housing, crime, and access to healthcare are top regional challenges.
4. Financial wellbeing, personal security, and a sense of community are the dominant personal values of residents in the region.
5. High support for regional visioning (or planning) that focuses on safe neighborhoods, affordable housing, revitalization and reinvestment to reduce crime, and improving base infrastructure.
6. Strong support for regional transportation investment, particularly increases in road maintenance, and improvement/ expansion of public transportation.

Specific to transportation, the survey asked participants if they agreed with a number of growth management and transportation strategies. Some of the most popular strategies included "Improving Neighborhood Walking and Biking Safety/ Convenience" (85% favorable), "Improving Base Infrastructure" (79% favorable), and "Investing in High Poverty/Crime Areas" and "Revitalizing Old Neighborhoods" (both 77% favorable).

Participants were also asked if having a long-range regional transportation plan was important, with 67% saying that it was "Extremely Important" or "Very Important." Though participants viewed planning to be important, only 33% believed that the planning and implementation of transportation solutions was going "Good" or "Excellent."

Participants were then asked about what they felt the appropriate level of investment was for a variety of transportation projects across all modes. Overall, participants desired increased investment in road maintenance, new and expanded highways, and new and expanded transit service.

When asked about the top transportation priorities, participants said that using the latest transportation technology, locating

Values and Priorities Survey presentation at the Madison Public Library - Central Library on Feburary 16th, 2016. Photo credit: CARPC.

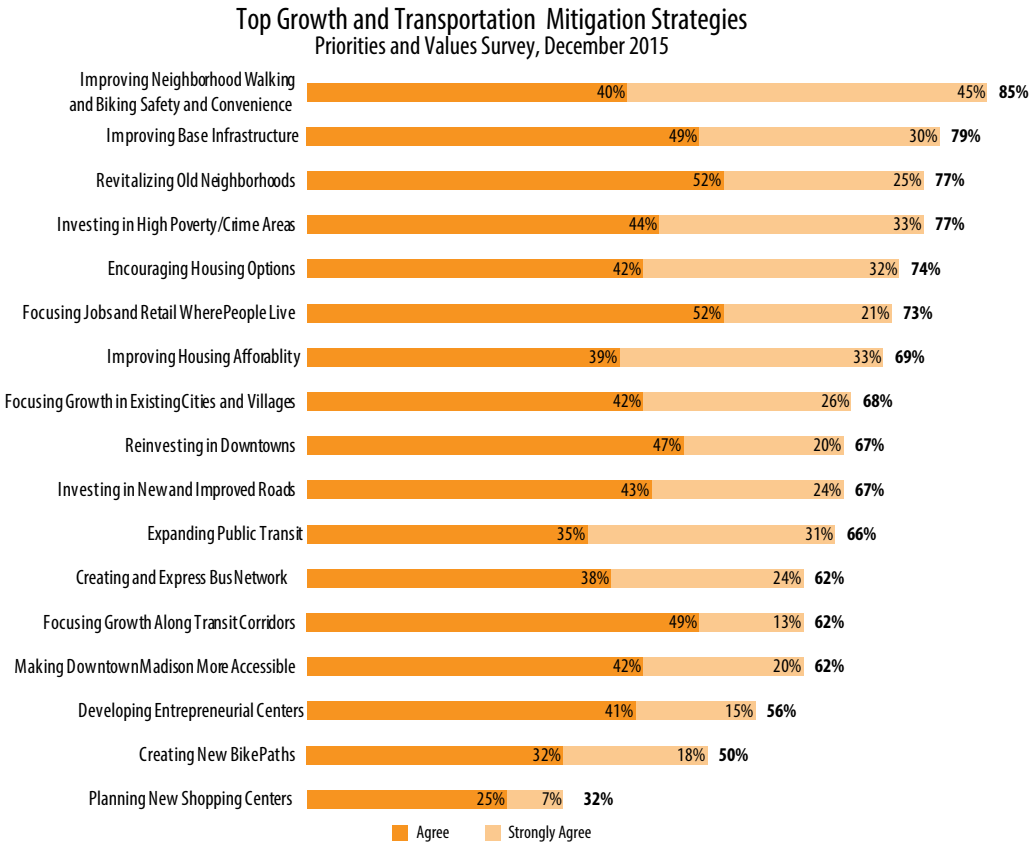


Figure 1-7: Top Growth and Transportation Mitigation Strategies

attractions near transit, ensuring that the transportation network supports the regional economy, improving roadway maintenance, and expanding public transit ranked highly. Interestingly, the lowest rated priority was improving biking and walking infrastructure.

When asked about the performance of specific aspects of the transportation system, participants responded that biking and walking infrastructure, roadway maintenance, locating attractions near transit, and roadway capacity were performing well. The lowest rated included "high-capacity transit" and "incentives for driving alternatives," the former is unsurprising because the region does not currently have high-capacity transit service. There is a correlation between the priorities and perceived network performance, with some high performers not being high priorities, such as biking and walking infrastructure.

Finally, participants were asked if they supported use of local taxes to fund transit operations and improvements. Overwhelmingly, the region's residents support funding transit with local taxes. Residents were not specifically asked about support for a new local funding option, such as a Regional Transit Authority with ability to levy a sales tax.

Results from the survey were used to refine the RTP goals and policies, and to inform RTP recommendations.

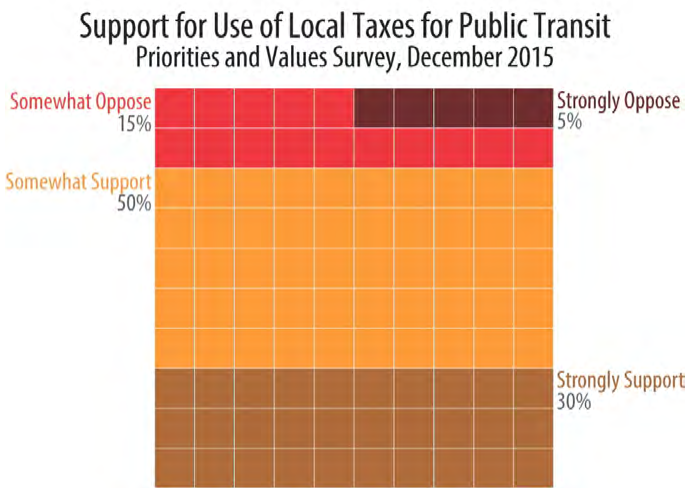


Figure 1-8: Support for Use of Local Taxes for Public Transit

Public Involvement Meetings

Locations and Context

MATPB made a priority of engaging the public in the planning process, engaging people at nine outreach meetings during the three phases of the project:

Series One: Introduction to the Planning Process and Goal Setting. March 2016.

- the Urban League of Greater Madison,
- City of Verona Fire Department
- the Sun Prairie City Hall.

Series Two: Existing Conditions. October 2016.

- the Fitchburg City Hall,
- the Middleton City Hall, and
- the Warner Park Community Recreation Center in Madison.

Series Three: Recommendations. March 2017.

- the Madison Senior Center,
- the Waunakee Village Hall, and
- the Sun Prairie City Hall.

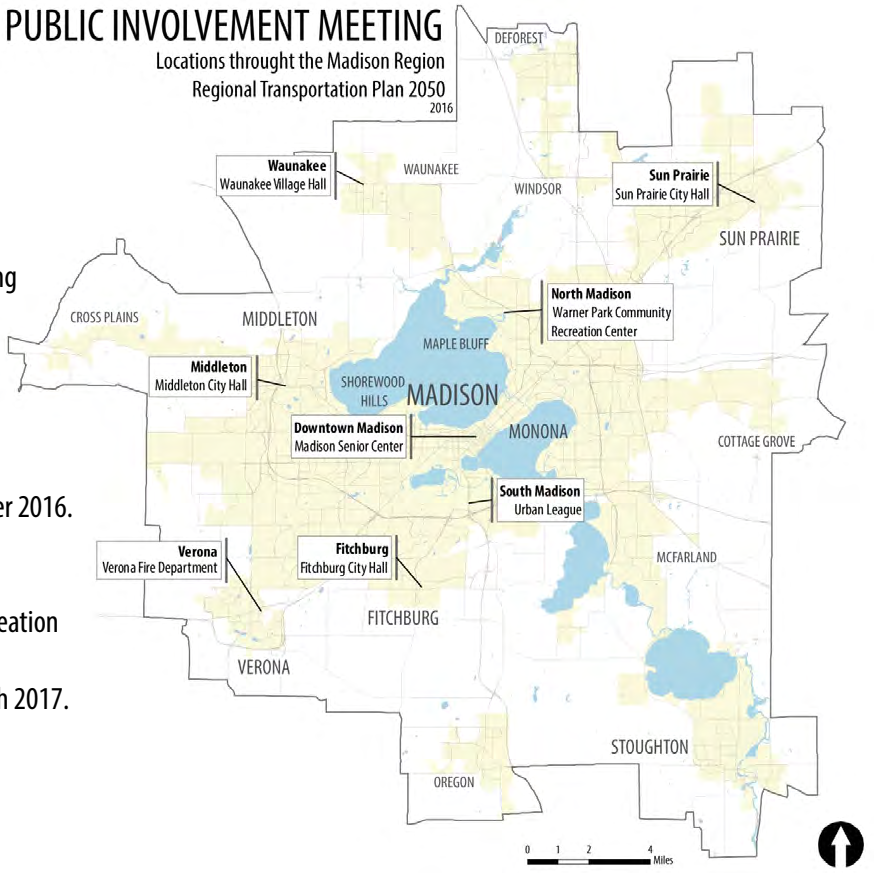


Figure 1-9: Public Involvement Meeting Locations

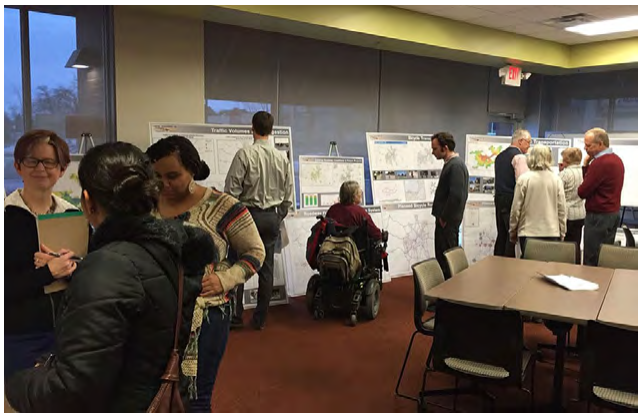
In addition to the involvement meetings, MATPB held a public hearing on the draft RTP 2050 during its March 1 board meeting in Madison.

Meeting Feedback

After each series of public involvement meetings, MATPB staff summarized the key takeaways and sentiments from the events. They are as follows:

Series One

- Transportation Funding– Strong support for Regional Transportation/Transit Authorities (RTAs) and alternative transportation funding mechanisms. An RTA would allow for truly regional transit service and allow for local service in suburban communities. If an RTA is not feasible, a use-based fee/tax could allow for funding of local projects and encourage more local control over the transportation network. Funding must be sustainable.
- The Economy – The link between transportation and the economy should be emphasized. There is a need for improved facilities/services providing connections



South Madison Public Involvement Meeting at the Urban League of Greater Madison on March 2, 2016.

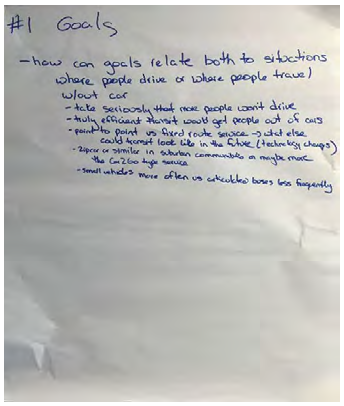
between housing and jobs/destinations, particularly in areas outside of the central city.

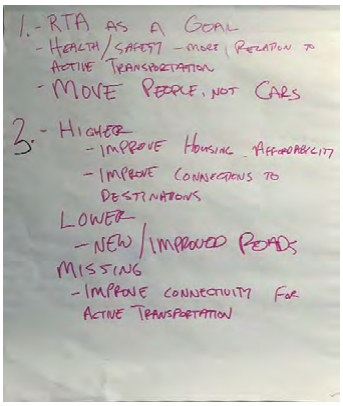
- Equity – The equity goal should be more inclusive than currently defined.
- Mode Choice & Connectivity – Regardless of location, citizens should have the ability to choose between a variety of transportation options with the ability to live a "car-free" lifestyle, if desired. We should work to retrofit existing roads with bicycle and pedestrian facilities.
- Land Use – The transportation network should support efficient, compact land use patterns. Land use patterns that support transit should be encouraged. Where applicable, encourage retrofitting streets in areas of higher density and mixed-use development to support public transportation.
- Transit – Regional transit and local transit for suburban communities is desired. There is a strong desire to increase transit service frequency, capacity, and service area. Paratransit service areas should be expanded. Transit between suburban communities should be supported as well. Suburban communities should explore alternative forms of transportation – shared ride taxis, car sharing, and new technologies as they become available.
- Health & Safety – The definition of health in the plan goals should be expanded to include "improve access to healthy food." The links between health and safety should be strengthened.
- Technology – The transportation network should adapt to new technologies as they become available. Regionally, we must be aware of new technologies, such as autonomous transit, that could solve issues that are on the horizon, such as baby boomers' desire to age in place.
- MATPB will use the feedback from the meetings to inform plan development and to revise goals. New plan goals will be posted once they are available.

Presentation at the South Madison public involvement meeting on March 2, 2016.

Group discussion at the Verona public involvement meeting held at the Verona Fire Department on March 3, 2016.

Sun Prairie public involvement meeting held at City Hall on March 8, 2016.





Participants helped to determine plan goals at the first series of public involvement meetings.

Involvement meeting at Warner Park in October 2016.

Inolvement meeting in Middleon in October 2016.

Involvement meeting in Fitchburg in October 2016.

Involvement meeting in Fitchburg in October 2016.

Series Two

The second series of engagement meetings focused on reviewing the existing and potential future transportation network. Attendees also had the opportunity to review a presentation that outlined the planning process and reviewed feedback from series one. Finally, attendees were given the opportunity to critique project recommendations and identify needs by providing feedback via a table activity.

Series Three and Public Hearing

The final series of engagement meetings involved presenting the draft plan and presentation boards to meeting attendees. Much like series two, attendees were given the opportunity to critique needs and recommendations identified in the plan, as well as give feedback about specific projects.

Major ideas and issues discovered in the public engagement sessions were incorporated into the RTP as appropriate.

MPO Newsletters

MPO staff prepared newsletters briefing the public on general MATPB happenings as well as RTP-specific news, updates, and results. Newsletters provided links to draft chapters, the RTP website, and RTP apps.

Madison Area T • P • B Transportation Planning Board

Moving the Region

Newsletter of the Madison Area Transportation Planning Board

March 2017

ARTICLES

- Draft Regional Transportation Plan Now Available
- WisDOT Cancels I-39/90/94 Study
- Park Street Corridor Connected Vehicle Pilot Project
- New Staff at MATPB

Stay in the know..... Like Us on Facebook

In Case You Missed It...

In 2015-16, Dane County Parks in partnership with the Madison Area Transportation Planning Board contracted with Toole Design Group to develop a county wide Bicycle Wayfinding Manual. The manual provides guidelines for communities to use for designing and implementing a uniform wayfinding and information sign system for the bicycle network throughout Dane County.

The project also included the development of six bicycle wayfinding plans for the Capital City Trail, Cannonball Path, Ice Age Junction Trail, Monona Lake Loop, University Avenue, and Military Ridge State Trail. The completed Wayfinding Manual and sample plans are now available on Dane County Parks website.

About US

Draft Regional Transportation Plan Now Available

The Madison Area Transportation Planning Board (MATPB) has completed the draft Regional Transportation Plan (RTP) 2050, culminating a planning process that began in 2015. The plan identifies transportation system needs and makes recommendations across all modes and seeks to coordinate investments of implementing agencies, including the Wisconsin Department of Transportation (WisDOT), Dane County, and local communities.

The robust planning process involved input from the public, standing boards and committees, and an ad hoc RTP Advisory Committee comprised of stakeholders from across the region. These groups helped to refine the plan throughout its development process, which included:

- Establishing a regional vision and goals;
- Examining demographic, economic, land use, and travel data, transportation system performance, and emerging technologies to identify trends that may impact the future transportation system;
- Developing population, household, and employment forecasts for the planning period;
- Analyzing the existing condition of the transportation system in combination with forecasts to develop improvement strategies, policies, and projects to address future travel demand; and
- Evaluation and prioritization of strategies and projects to ensure consistency with the regional vision and plan goals

Regional Transportation Plan 2050

Click on the image above to view the plan.

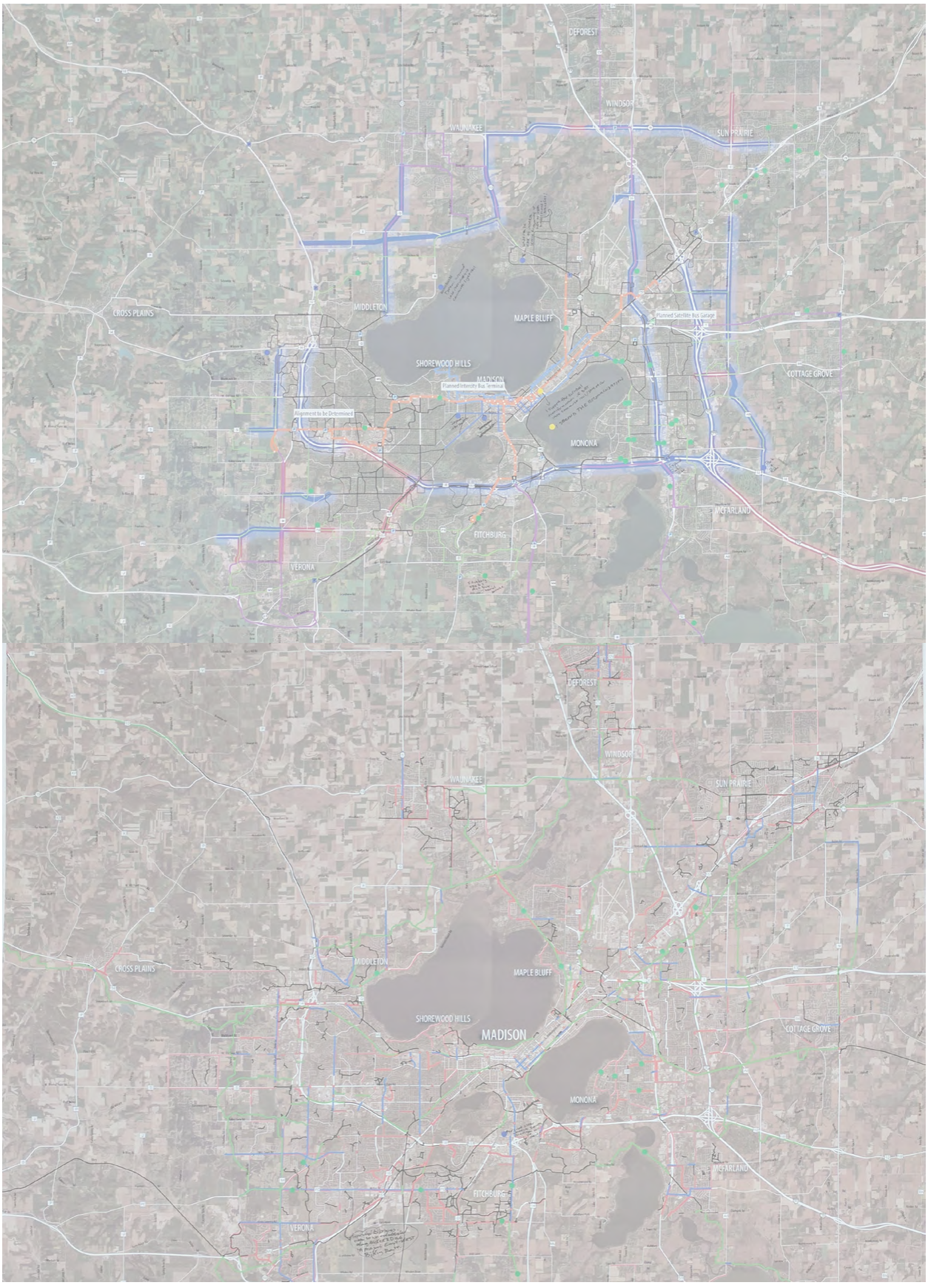
The draft RTP is available for review on MadisonAreaRTP.com. A final series of public information meetings was just completed. Comments are requested by March 22 to ensure incorporation into the final plan. The final RTP will be available after board adoption.

WisDOT Cancels I-39/90/94 Study

In late February the Wisconsin Department of Transportation and Federal Highway Administration announced the cancellation of the I-39/90/94 Study from Madison to Portage, citing a reprioritization of major transportation projects. The study had previously identified seven possible alternatives, including widening the existing Interstate as well as four new off-alignment corridors. The termination of the study removes all of these alternatives from consideration. A new environmental study will be initiated to evaluate the replacement of the Interstate bridges over the Wisconsin River in Columbia County, which was previously included in the I-39/90/94 Study.

39-90-94 INTERSTATE STUDY

MATPB newsletter. Click to view newsletters on MATPB website.


DEFOREST
WINDSOR
WAUNAKEE
SUN PRAIRIE
CROSS PLAINS
MIDDLETON
MAPLE BLUFF
Planned Satellite Bus Garage
SHOREWOOD HILLS
MADISON
Planned Intercity Bus Terminal
COTTAGE GROVE
Alignment to be Determined
MONONA
MCFARLAND
FITCHBURG
VERONA
DEFOREST
WINDSOR
WAUNAKEE
SUN PRAIRIE
CROSS PLAINS
MIDDLETON
MAPLE BLUFF
SHOREWOOD HILLS
MADISON
COTTAGE GROVE
MONONA
MCFARLAND
FITCHBURG
VERONA

CHAPTER 2:
NATIONAL & REGIONAL TRENDS AND FORECASTS

- Introduction
- Demographics
- Economics
- Land Use and Development
- Commuting Patterns
- Emerging Technologies

INTRODUCTION

National and regional trends and forecasts such as shifting demographics and growth provide insight into how best to invest in the transportation system to meet future needs while accommodating present needs. Demographic changes, commuting patterns, economic shifts, land use development patterns, and emerging technologies all influence the type, location, and amount of demand on transportation facilities and services and also pose potential equity considerations. The need to account for these changes is especially true in the greater Madison region – the fastest growing and fastest changing region in the state. The Madison area is out-pacing the rest of the state in all key economic indicators, including job creation, business growth, and construction activity.[1] The area's population growth is out-pacing the rest of the state and at the same time the population is becoming increasingly diverse.

Figure 2-1

DEMOGRAPHICS

Demographic projections have an impact on the type of solutions planned for the future transportation network. When coupled with commuting patterns, economic forecasts, and land use development patterns it is possible to prepare forecasts for future travel demand and identify issues and needs.

Population

The country's population continues to grow, with a majority of this growth occurring in the southern and western states. Wisconsin is growing at a slower pace than other states due to high out-migration without comparable in-migration of either domestic or foreign-born immigrants. However, Dane County and the City of Madison have deviated from that trend and are projected to continue to do so in the future with population continuing at a moderate rate. Dane County added nearly 100,000 new residents, while the City of Madison added nearly 41,000, between 2000 and 2015. This growth accounted for nearly ¼ of the state's growth over that time frame.

The population growth rate of Dane County as a whole outpaced the City of Madison's growth from 1990-2010 continuing a historical trend. As a result, the city's share of county population has decreased from 52.0% to 47.8%. This

Population Growth in Dane County and Madison

	Total Population			Change	
	1990	2000	2010	1990-2000	2000-2010
Dane County	367,085	426,526	488,073	16.2%	14.4%
City of Madison	190,766	208,054	233,209	9.1%	12.1%
City as % of County	52.0%	48.8%	47.8%		

Figure 2-2

Population Growth in Selected Communities

	Total Population			Change	
Community	1990	2000	2010	1990-2000	2000-2010
Cottage Grove, Village	1,131	4,059	6,192	258.9%	52.5%
Fitchburg, City	15,648	20,501	25,260	31.0%	23.2%
Madison, City	190,776	208,054	233,209	9.1%	12.1%
Madison, Town	6,442	7,005	6,279	8.7%	-10.4%
Maple Bluff, Village	1,352	1,358	1,313	0.4%	-3.3%
Middleton, City	13,785	15,770	17,442	14.4%	10.6%
Monona, City	8,637	8,018	7,533	-7.2%	-6.0%
McFarland, Village	5,232	6,416	7,808	22.6%	21.7%
Shorewood Hills, Village	1,680	1,732	1,565	3.1%	-9.6%
Stoughton, City	8,786	12,354	12,611	40.6%	2.1%
Sun Prairie, City	15,352	20,369	29,364	32.7%	44.2%
Verona, City	5,374	7,052	10,619	31.2%	50.6%
Waunakee, Village	5,897	8,995	12,097	52.5%	34.5%
Westport, Town	2,732	3,586	3,950	31.3%	10.2%

[1] Connect Madison, City of Madison Economic Development Strategy (Dec. 2016).

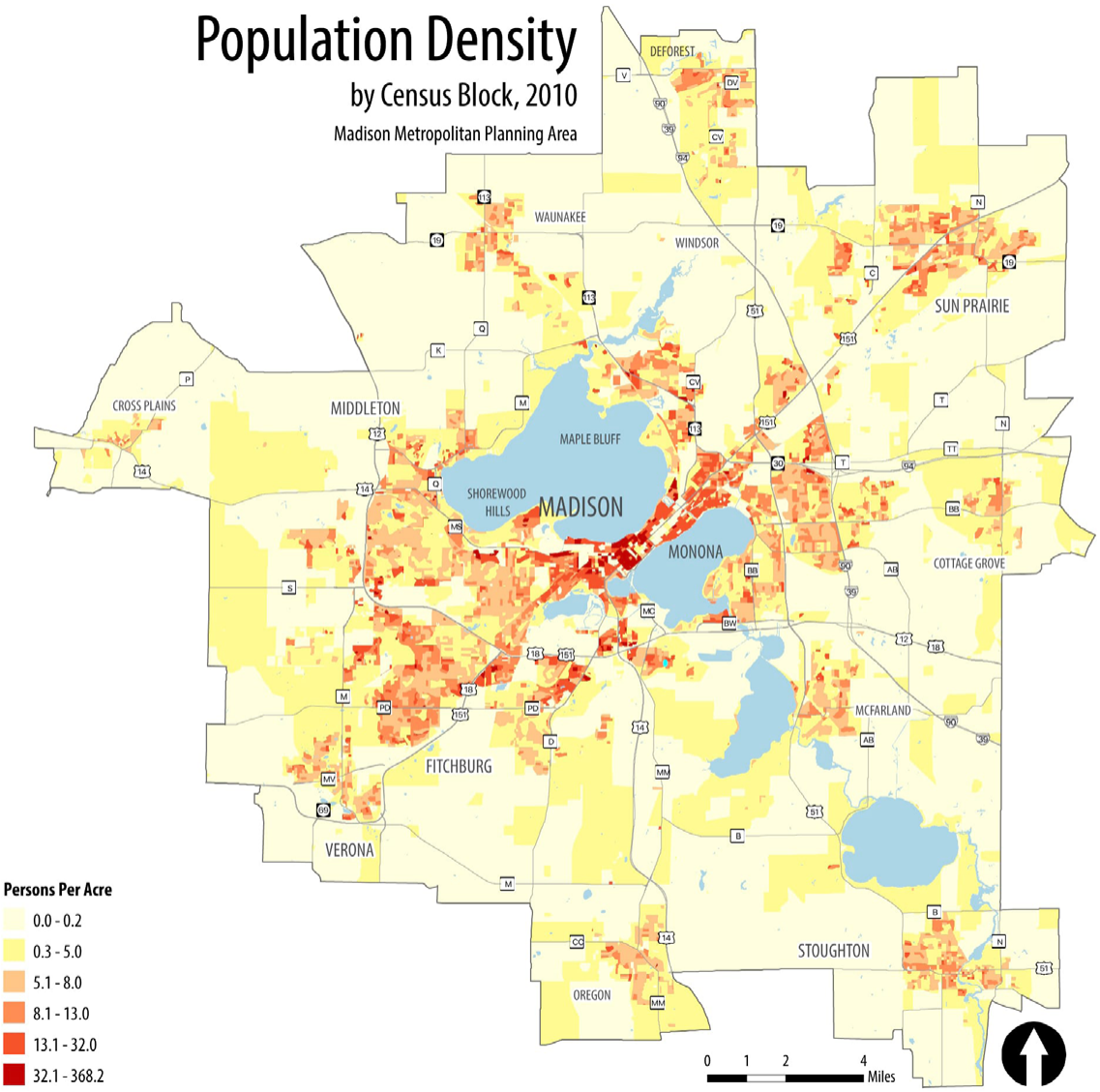


Figure 2-3: Population Density by Census Block, 2010

trend is expected to continue. Suburban cities and villages with the highest percentage growth rates over the past 25 years include Cottage Grove, Waunakee, Verona, and Sun Prairie. Paced by these communities and the DeForest/Windsor area, the larger outer urbanized areas are projected to grow by 59%, adding 55,000 new residents from 2010-2050. The population of the central urbanized area, including Madison, Fitchburg, Middleton, and McFarland, is projected to grow by 25% or 77,000 residents. The projected population growth in smaller urbanized and rural areas outside the Madison Metropolitan Planning Area is only expected to be about 17,000.

Figure 2-4

Madison Metropolitan Area Population

2010 Census and 2050 Forecast

Municipality	2010 Census Population	2010 Census % of County	2050 Forecast Population	2050 Forecast % of County	Change Number	Change Percent
Central Urbanized Area Total	302,224	62%	379,118	60%	76,894	25%
City of Madison	234,618	48%	292,522	46%	57,904	25%
City of Fitchburg	25,413	5%	34,370	5%	8,957	35%
City of Middleton	17,548	4%	24,571	4%	7,023	40%
Village of McFarland	7,855	2%	10,379	2%	2,524	32%
Larger Outer Urbanized Area Total	93,111	19%	148,375	23%	55,264	59%
City of Sun Prairie	29,364	6%	50,883	8%	21,519	73%
City of Stoughton	12,611	3%	14,366	2%	1,755	14%
City of Verona	10,619	2%	18,840	3%	8,221	77%
Village of Cottage Grove	6,192	1%	10,594	2%	4,402	71%
Village of Waunakee	12,097	2%	19,279	3%	7,182	59%
Northern (DeForest/Windsor)	12,997	3%	20,794	3%	7,797	60%
Village of Oregon	9,231	2%	13,619	2%	4,388	48%
Smaller USAs Total	26,740	5%	36,151	5%	9,411	35%
Rural Total	65,998	14%	73,785	12%	7,787	12%
County Total	488,073		637,429		149,356	31%

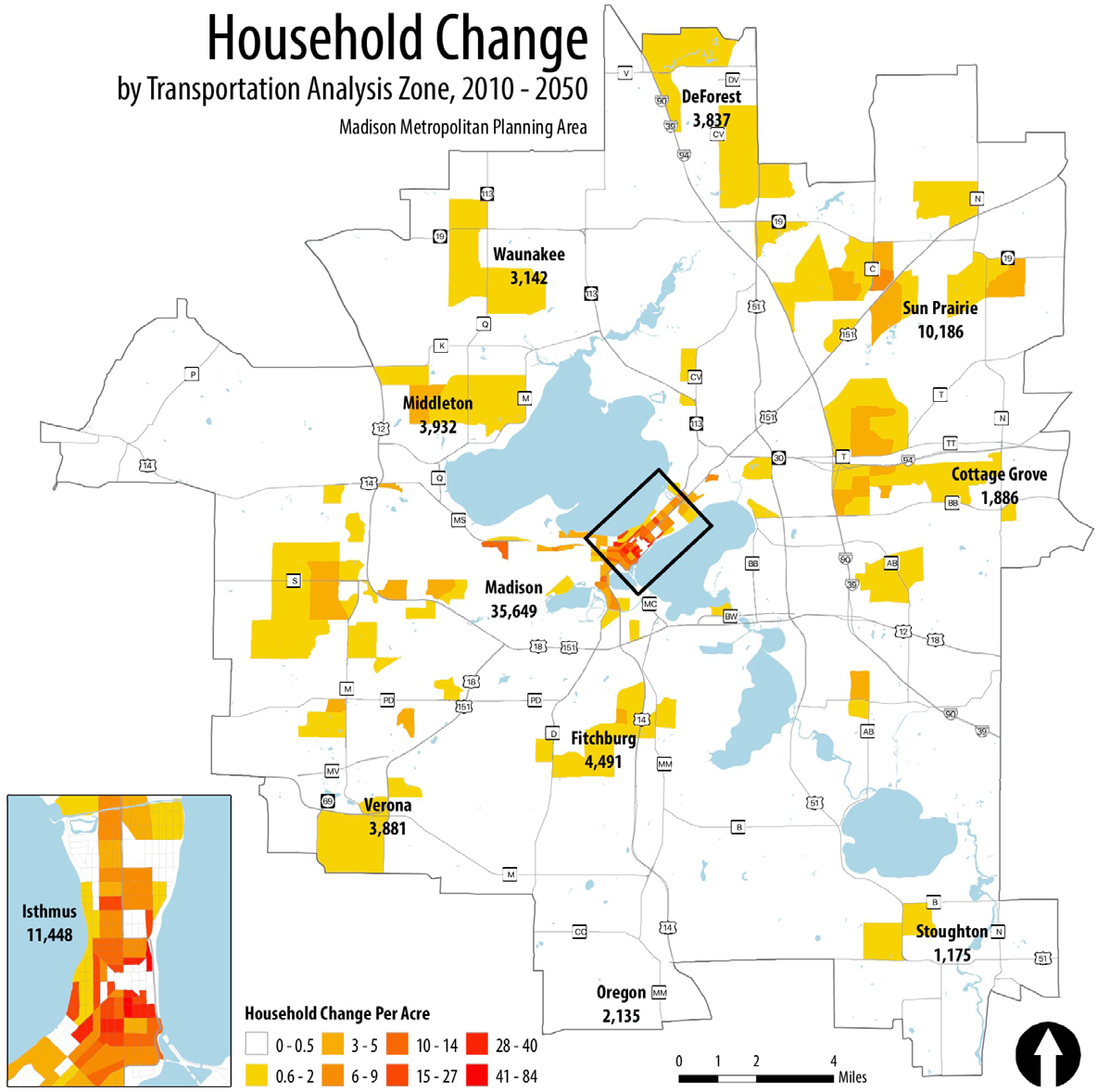


Figure 2-5: Change by Transportation Analysis Zone, 2010-2050

Households

While the population has continued to grow nationally and within the Madison region, the average size of a household has been in a decline. This decline has occurred for a number of reasons, including changing cultural norms, an increase in the percentage of single-person and two-person households, a reduction in the number of children each family is having, and an increase in elderly with the aging of the baby boomers. The US Census Bureau defines a household as "all the persons who occupy a housing unit as their usual place of residence. A housing unit is a house, an apartment, a mobile home, a group

Figure 2-6

Madison Metropolitan Area Households

2010 Census and 2050 Forecast

Municipality	2010 Census Households	2010 Census % of County	2050 Forecast Households	2050 Forecast % of County	Change Number	Change Percent
Central Urbanized Area Total	132,172	65%	177,828	62%	45,656	35%
City of Madison	103,132	51%	138,781	49%	35,649	35%
City of Fitchburg	10,015	5%	14,506	5%	4,491	45%
City of Middleton	8,085	4%	12,017	4%	3,932	49%
Village of McFarland	3,097	2%	4,268	2%	1,171	38%
Larger Outer Urbanized Area Total	36,164	18%	62,406	22%	26,242	73%
City of Sun Prairie	11,636	6%	21,822	8%	10,186	88%
City of Stoughton	5,133	3%	6,308	2%	1,175	23%
City of Verona	4,223	2%	8,104	3%	3,881	92%
Village of Cottage Grove	2,210	1%	4,096	1%	1,886	85%
Village of Waunakee	4,344	2%	7,486	3%	3,142	72%
Northern (DeForest/Windsor)	5,029	2%	8,866	3%	3,837	76%
Village of Oregon	3,589	2%	5,724	2%	2,135	59%
Smaller USAs Total	10,497	5%	15,850	6%	5,353	51%
Rural Total	24,917	12%	29,100	10%	4,183	17%
County Total	203,750		285,184		81,434	40%

of rooms, or a single room that is occupied as separate living quarters. The occupants may be a single family, one person living alone, two or more families living together, or any other group of related or unrelated persons who share living arrangements."

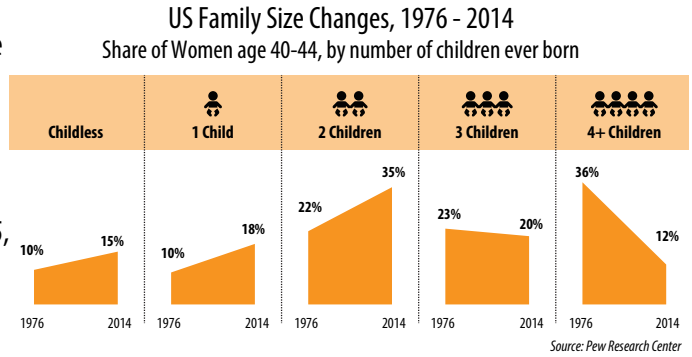


Figure 2-7: US Family Size Changes, 1976 - 2014

In 1970, the average US household size was 3.14. By 2015, the average US household size had fallen to 2.59. Here the trends have been similar – the average Dane County household size was 3.09 in 1970 and had dropped to 2.33 by 2010. Housing and household sizes are correlated with average house and household sizes larger in villages and towns, smaller in suburban cities, and the smallest in the City of Madison. The historic trend of shrinking household sizes is projected to continue in the future, with the City of Madison reaching an average household size of 2.03 by 2040, nearly 1 person less than 1970.

Average Household Size in Dane County Communities
Historical Census Data and Forecasts

	1970	1980	1990	2000	2010	Projections 2020	2030	2040
Towns	3.73	3.01	2.8	2.59	2.57	2.5	2.46	2.43
Villages	3.17	2.85	2.74	2.72	2.61	2.53	2.49	2.46
Small Cities	3.26	2.54	2.29	2.35	2.37	2.31	2.17	2.24
Madison	2.88	2.38	2.3	2.19	2.17	2.11	2.07	2.03
Dane County	3.09	2.56	2.46	2.37	2.33	2.27	2.23	2.2

Source: DOA

Figure 2-8: Average Household Size in Dane County Communities

Understanding trends in average household size along with other household characteristics is important because the makeup of households affects the demand for different types of housing and the location of that housing. For example, if the City of Madison has an average household size of 2.17 in 2010 and a population of 234,618, it can be surmised that over 108,000 housing units are needed to accommodate those residents. One of the ways that the City of Madison plans to accommodate future housing needs is through infill and redevelopment in existing and planning activity centers and in the downtown and Isthmus areas. In fact, infill and redevelopment areas such as the East Washington Avenue corridor are projected to accommodate well over 50% of all new households in the City of Madison between 2010 and 2050. Of those, around 11,500 are forecast to be located within the greater Isthmus area, more than even the City of Sun Prairie, the largest suburb. This is consistent with the trend over the past fifteen years and city policy.

Figure 2-5 on page 2-4 illustrates the areas with a large projected increase in households. While the City of Madison's percentage share of households and population is projected to continue to slowly decline, close to 36,000 or 50% of all future new households within the Metropolitan Planning Area are projected to be located within the central city.

Age

Much like the rest of the state, Dane County has a large elderly population that is projected to grow in the future. The percentage of Dane county's population aged 65 and older is expected to double from 10% to 20% between 2010 and 2040. This growth is partially due to the aging of the Baby Boomers generation as well as advances in medicine that have increased life expectancies. The growth of this population cohort comes at a time in which aging in place – living in one's own home and community, independently regardless of age, income, and ability – has become not only an expected consideration but a norm. A growing

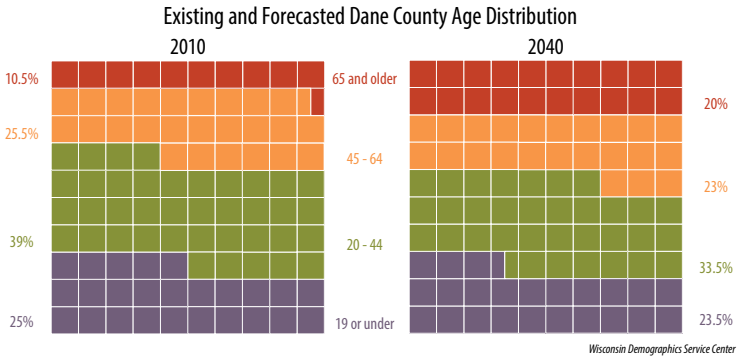


Figure 2-9: Existing and Forecasted Dane County Age Distribution

aging population, some of whom will not have the ability to transport themselves, will require a transportation network that will allow for safe and convenient transportation to grocery stores and other shopping destinations, entertainment, healthcare facilities, places of worship, and other destinations. Existing accommodations will have to be reinforced and future technologies explored to ensure adequate mobility and accessibility for all.

Race and Ethnicity

The United State has become and is projected to continue becoming more diverse. In fact, the Pew Research Center projects that more than 80% of population growth between 2010 and 2050 will be attributable to immigrants and their US-born descendants. This, in combination with higher fertility rates among African American, Hispanic American, and Asian American populations compared to the non-Hispanic white population, is driving the trend of growing diversity.

In the Madison region these trends have been evident as well. Between 2000 and 2010, the white population grew at a rate of 9% while the African American population grew at 49%, Asian American population grew at 56%, mixed races population at 59%, and other minority groups grew at 82%. Further, the Hispanic population grew at a rate of 101% compared to the Non-Hispanic population growth rate of 11%. This is important because of the different travel habits and residence location decisions of the minority versus white population. Of course, these choices may change in the future. See the Environmental Justice Analysis in Appendix B for more detailed information on the distribution of the minority population within the region and an analysis related to the equitable distribution of transportation resources.

Demographics of Dane County, 2010

Race

Race	Number 2010	Percent of Total 2010	Increase 2000 -2010
White	413,631	85%	9%
Black/African American	25,347	5%	49%
Asian	23,035	5%	56%
Other Minority	13,960	3%	82%
Two or More Races	12,100	3%	59%
Total Population	**488,073**	**100%**	**14%**

Ethnicity

Ethnicity	Number 2010	Percent Total 2010	Increase 2000-2010
Hispanic	28,925	6%	101%
Non Hispanic	459,148	94%	11%
Total Population	**488,073**	**100%**	**14%**

Figure 2-10: Demographics of Dane County, 2010

ECONOMICS

The location, density, and distribution of employment in relation to where employees live are some of the primary factors influencing travel demand. Though work trips make up less than 20% of all trips, they are generally the longest trip of the day and most occur during peak use times, driving the capacity needs of the transportation system. Often non-work trips are combined with work trips, contributing to congestion during the peak travel periods.

Dane County is home to the State's flagship university, the seat of state government, and to numerous biotechnology firms. Additionally, the region boasts strong healthcare, health and information technology, agribusiness/food, insurance, financial, and precision manufacturing industries. The regional economy is becoming increasingly private-sector driven. The diversity and concentration of employers within the county has led to the county having one of the lowest unemployment rates in Wisconsin, and being a net importer of employees. Within the County, the cities of Madison and Middleton have more jobs than workers living in the community. According to US Census data estimates, around 40,000 workers travel into Dane County per day from surrounding counties, while around 10,000 travel from Dane County to surrounding counties for work.

In the future, it is anticipated that Dane County will continue to import an increasing number of employees from surrounding counties. Between 2010 and 2050, Dane County's employment is forecast to increase from 314,000 to 398,700, while the

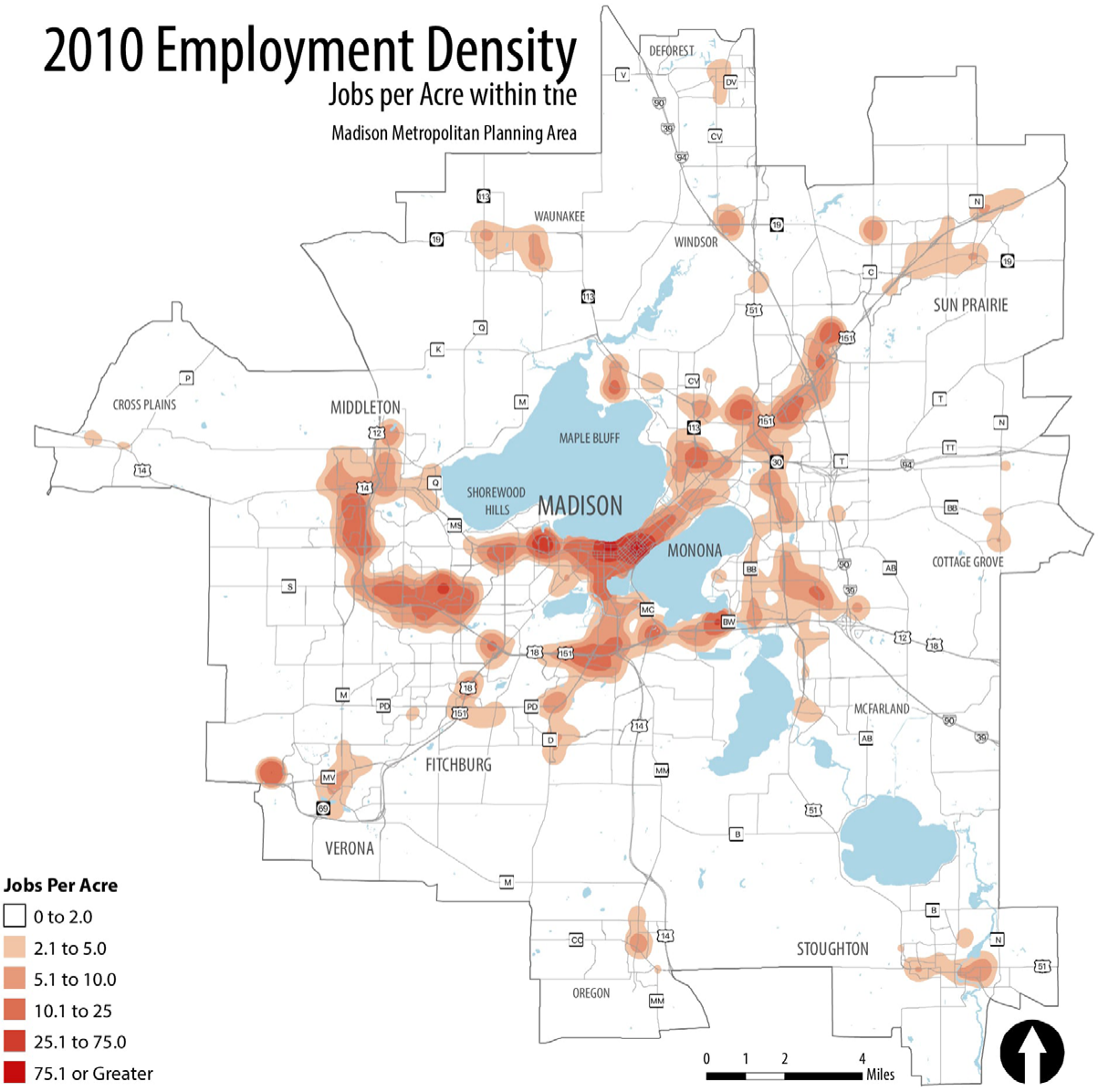


Figure 2-12: 2010 Employment Density

2050 resident employed labor force working in the county is projected to be 316,100. Assuming the percentage of Dane County workers working in other counties remains at 5.3%, the number of workers commuting into the county from other counties would increase to 99,300, a 136% increase from today's numbers.

While the City of Madison's share of employment is forecast to decline somewhat, total employment within the city is projected to grow by 46,000, accounting for over 50% of new employment within the Metropolitan Planning Area. Of that,

Figure 2-13

Madison Metropolitan Area Employment

2010 InfoUSA and 2050 Forecast

Municipality	2010 InfoUSA Employment	2010 InfoUSA % of County	2050 Forecast Employment	2050 Forecast % of County	Change Number	Change Percent
Central Urbanized Area Total	249,579	80%	307,366	77%	57,787	23%
City of Madison	195,888	62%	241,093	60%	45,205	23%
City of Fitchburg	12,165	4%	17,967	5%	5,802	48%
City of Middleton	19,104	6%	22,941	6%	3,837	20%
Village of McFarland	1,943	1%	2,511	1%	568	29%
Larger Outer Urbanized Area Total	45,094	14%	70,545	18%	25,451	56%
City of Sun Prairie	11,362	4%	15,168	4%	3,806	34%
City of Stoughton	6,445	2%	6,625	2%	180	3%
City of Verona	9,315	3%	22,280	6%	12,965	139%
Village of Cottage Grove	2,625	1%	4,287	1%	1,662	63%
Village of Waunakee	5,901	1%	8,406	2%	2,505	42%
Northern (DeForest/Windsor)	6,054	2%	9,737	2%	3,683	61%
Village of Oregon	3,392	1%	4,042	1%	650	19.16%
Smaller USAs Total	9,567	3%	11,267	3%	1,700	18%
Rural Total	9,478	3%	9,480	2%	2	0%
County Total	313,718		398,658		84,940	27%

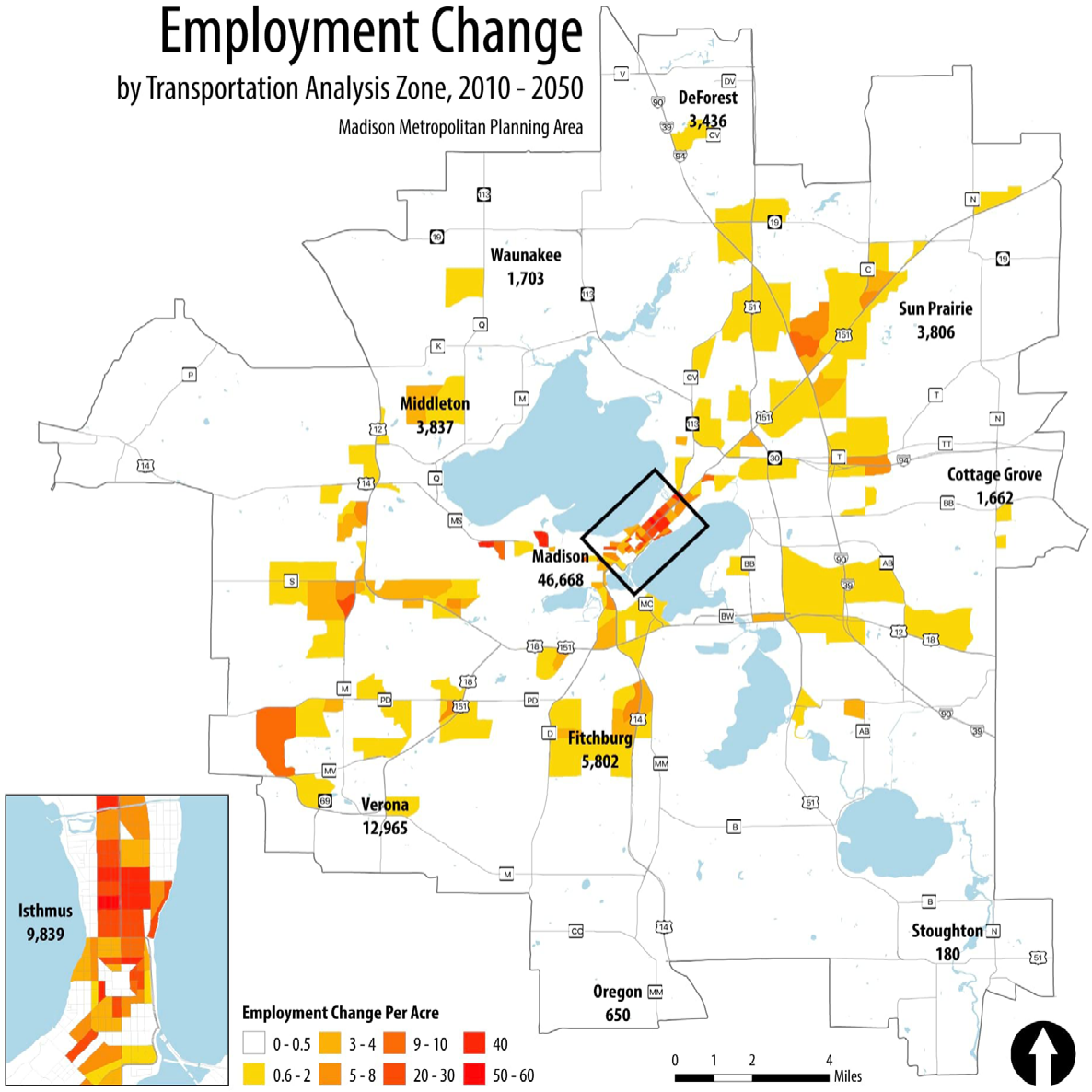
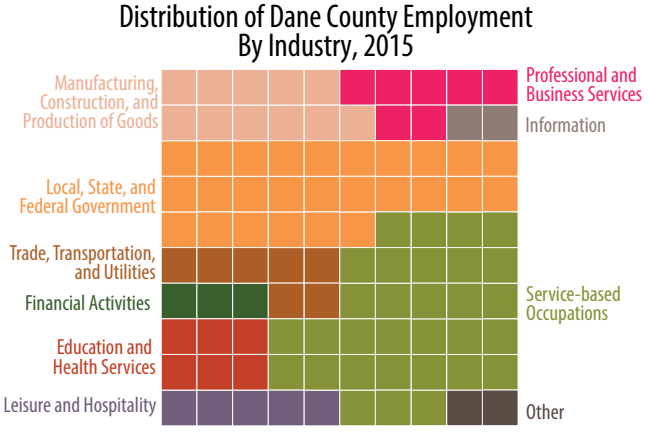


Figure 2-14: Employment Change 2010 - 2050

around 10,000 new jobs are forecast within the Isthmus area. This is largely based on projections for the Capitol East District, developed to assess future parking demand and other necessary improvements. Among suburban communities, the City of Verona's employment is expected to grow by far the most, largely due to Epic Systems, the county's largest private employer. However, Fitchburg, Sun Prairie, Middleton, DeForest, and Cottage Grove are all expected to have a healthy increase in employment.



2015 Annual BLS County-level QCEW Data

Figure 2-15: Distribution of Dane County Employment by Industry, 2015

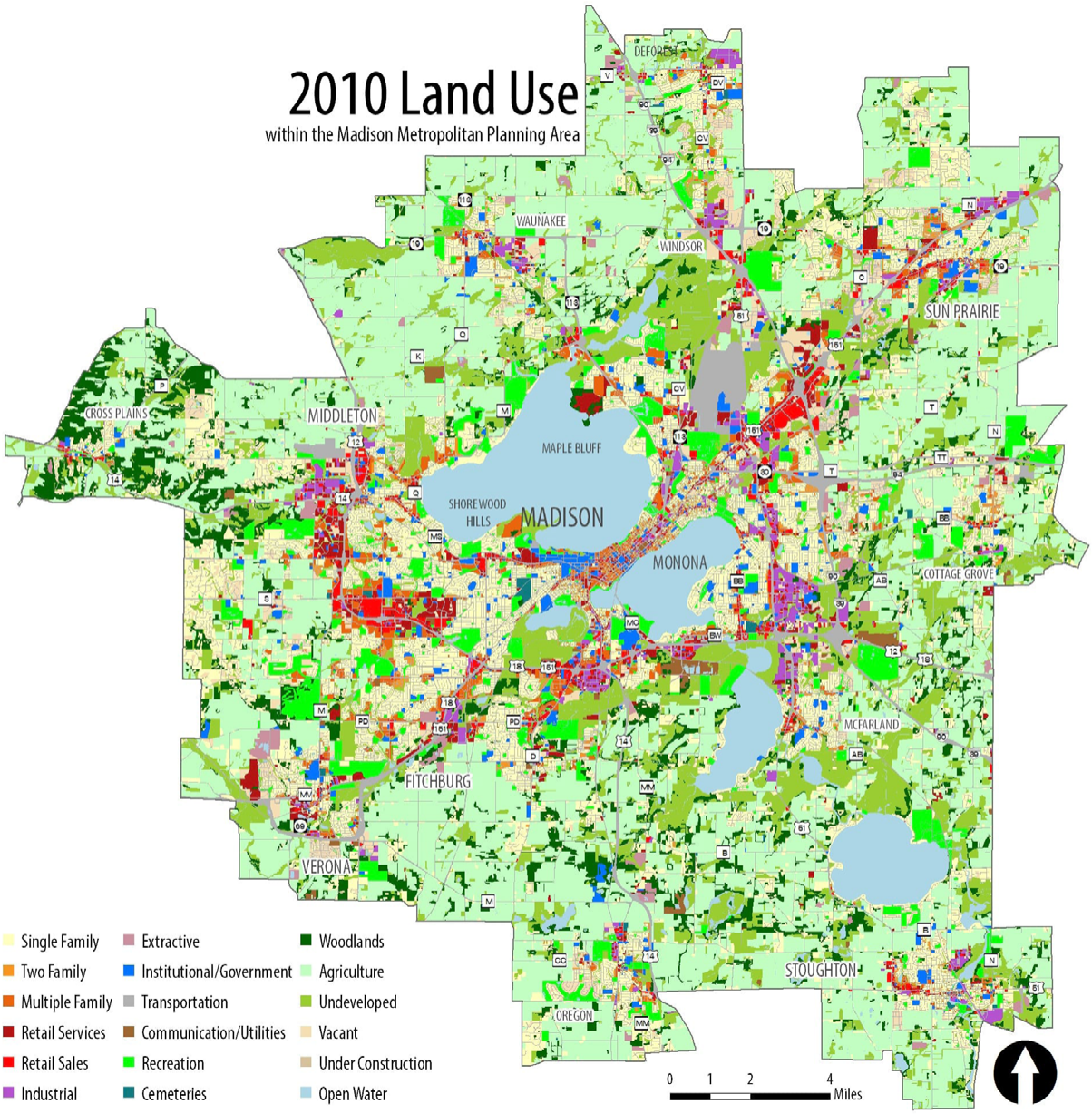


Figure 2-16: 2010 Land Use

LAND USE

The mix, location, and density of land uses determines travel demand. This means that land use and site configuration have a direct impact on the types of transportation facilities and services that are needed in an area. For example, residential land uses must have access to places of employment, stores, schools, and entertainment; therefore, it is imperative that there are roadway, transit, bicycle, and pedestrian connections between land uses. The distance between and density of the land uses influences the type of transportation one may use for a specific trip and whether the trip will be made as an individual trip or in a chain of trips.

Conversely, the availability of transportation facilities may influence whether a development is viable or not. For example, without convenient highway access, large retailers on the urban periphery may not be able to attract customers. Similarly, industrial areas are less likely to succeed without easy access to interstate highways or other major freight corridors. Land use

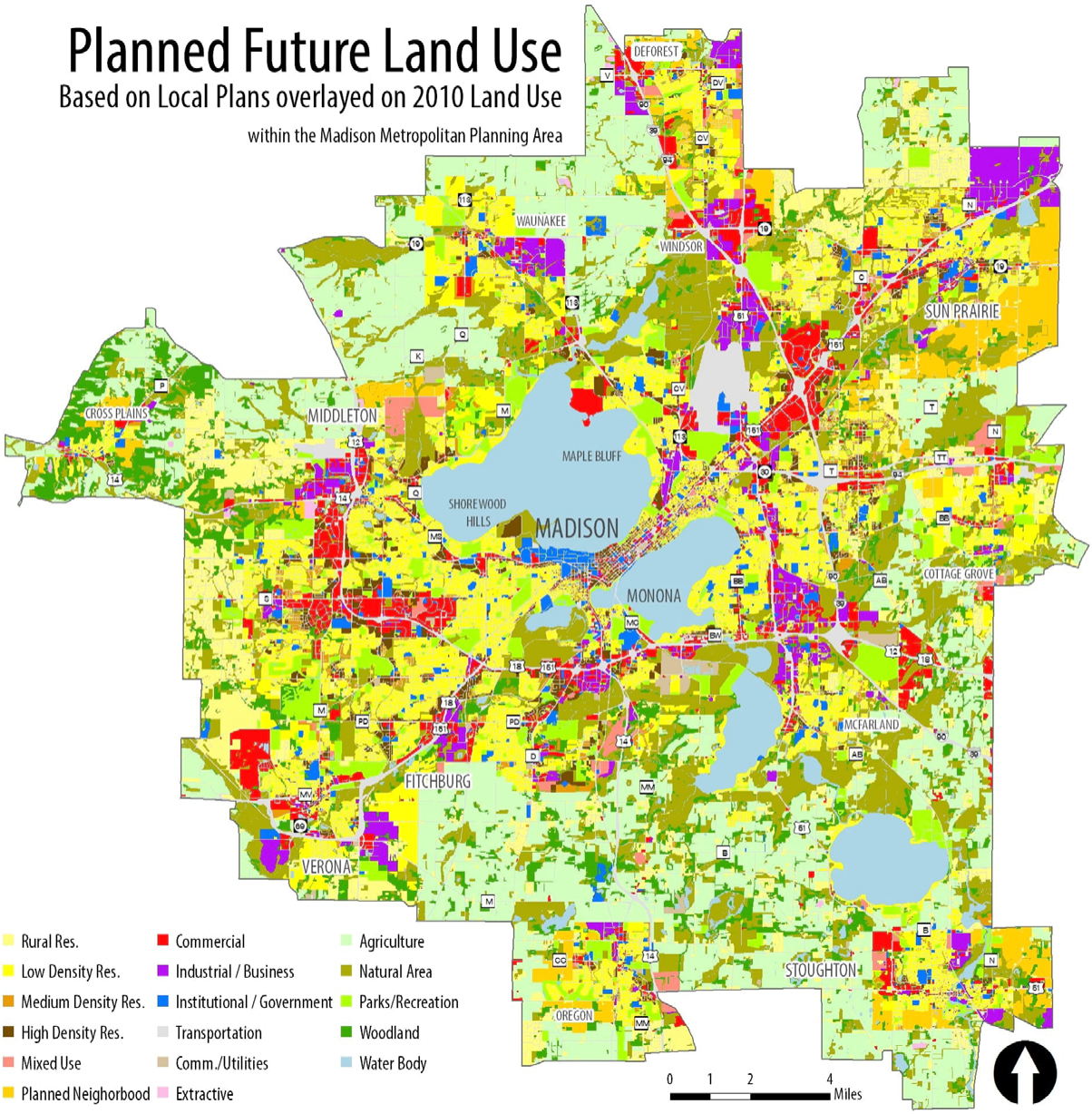


Figure 2-17: Planned Future Land Use

and transportation facilities are inextricably linked.

Figure 2-16 shows the location of existing land uses in the Madison Metropolitan Planning area. Some of the most intense or dense uses include two and multifamily residences, commercial, and institutional/governmental. These uses tend to be concentrated in downtown Madison, the Isthmus, and along major transportation corridors in communities throughout the area. Trip generating uses, such as retail sales/services and industrial uses, agglomerate near one another in areas with strong access to regional or interstate facilities. Less intense uses, such as single family homes, tend to locate within, at a minimum, driving distance to major regional transportation corridors and away from intense or trip generating uses.

A number of urban planning models have been developed to determine how land use, transportation facilities, and density interact. One prominent contemporary model, the Rural-to-Urban Transect, suggests that urbanism occurs in symbiotic

transects. The Transect describes levels of urbanization that range from a natural rural preserve to a dense urban core. Each of these typologies is symbolic of different development patterns and requires different transportation facilities. One of the benefits of this model is that it demonstrates the similarity between zones that may not appear to be similar, but have similar characteristics and require similar transportation treatments.

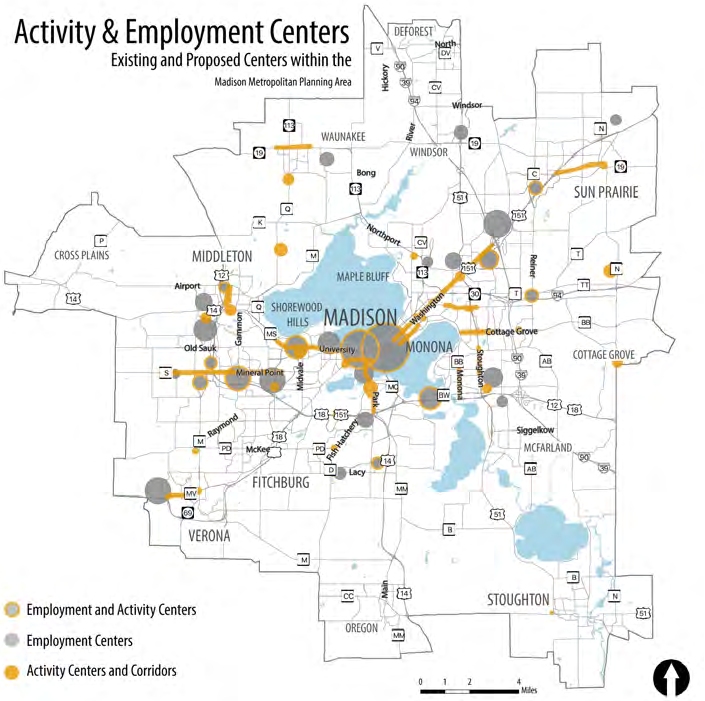


Figure 2-18: Activity and Employment Centers

For instance, the Madison neighborhood of Hill Farms near University Avenue has similar transportation needs to that of the Schenk-Atwood-Starkweather-Yahara (SASY) neighborhood. Though the densest portion of Hill Farms would be viewed a contemporary, transit-oriented development and SASY is an older neighborhood built around a defunct streetcar line, both require high-quality transit service, quality pedestrian and bicycle facilities, and regional transportation for moving residents, workers, shoppers, and freight. The Transect would identify them both as "urban center" zones, and require similar facilities.

In the past, communities did not deviate from the gradient shown in the Transect – an urban core buoyed a community, with urbanity dissipating into suburban and then rural form gradually as one moves away from the core. This configuration encourages driving in the periphery and forces traffic into one dense core. Contemporary configurations retrofit dense activity centers into areas that have been traditionally home to suburban or general urban development or build them as part of new developments. This configuration change increases pedestrian and bicycle activity, while making transit more viable. The development of high-density, mixed-use activity centers, primarily along existing and planned major transit corridors is a central recommendation of the City of Madison's Madison in Motion Transportation Plan and this RTP. The development of these centers, illustrated in Figure 2-18, is reflected in the land use growth forecast for the RTP.

Figure 2-17 on page 2-10 shows planned future land use based on local land use plans. The map, along with input from local planners and officials, served as a guide for the growth forecasts used to estimate future travel demand for the RTP using the regional travel model. It should be noted that the growth forecast for the RTP constituted far less than the complete build out of plans reflected in the map due to differences in the timeframe of local plans, and the need for the RTP growth scenario to adhere to county forecast control totals for households, population, and employment.

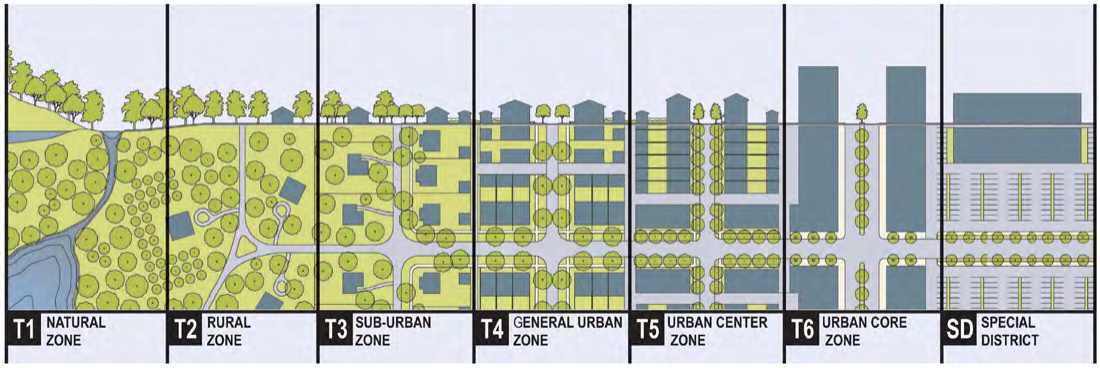
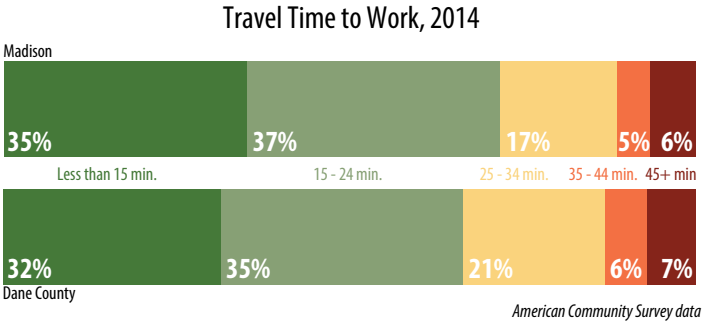


Figure 2-19: Rural to Urban Transect

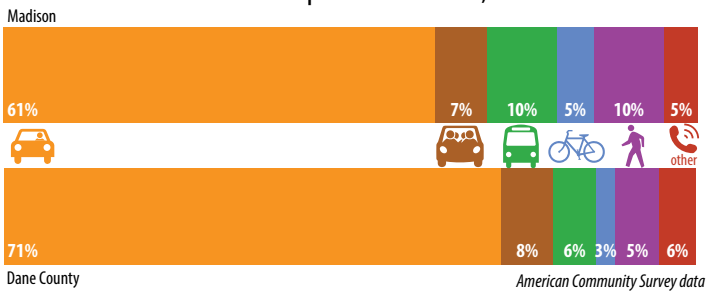
COMMUTING PATTERNS

Commuting describes travel that is made to and from a place of employment. In the Madison area, the most dense concentration of employment is in the downtown Madison/UW Campus area; however, over the last few decades most of the new employment growth has occurred in peripheral Madison and suburban job centers, such as the American Center, Old Sauk Trails, UW Research Park, Middleton Business Park, Fitchburg Center, and Epic campus. As a result, travel patterns are becoming more disbursed throughout the region.



American Community Survey data

Figure 2-20: Travel Time to Work, 2014



American Community Survey data

Figure 2-21: Mode of Transportation to Work, 2014

The mode and time it takes for someone to get to work are directly related to where people live. People who live in urban environments generally have shorter commutes than their rural counterparts and more modal options available for their commute. In Dane County, 71% of all residents drive alone to get to work, compared to 61% in the City of Madison. City residents were also more likely to take transit, walk, and bike to work. County residents were more likely to carpool to work or utilize other commuting methods, such as telecommuting.

Over the last five years, a number of new apartment buildings have been constructed in downtown Madison and on the Isthmus. These new buildings have attracted a residential population of young professionals. While many of these new residents may be moving to downtown to be closer to work, others are doing so in an effort to live a more urban lifestyle while working in the periphery of the region. This results in so called "reverse commuting."

One particularly popular reverse commute is between downtown Madison and the Epic campus on the western edge of the City of Verona. In 2012, Epic employed more than 6,200 employees. Understanding that many Epic employees were commuting from Madison to Verona, Metro Transit, the City of Verona, and Epic worked to add two new bus routes – one connecting the campus to downtown Madison and the other connecting to the West Transfer point. Ridership has been so strong on the routes that buses were added in 2015. As of 2015, Epic had grown to more than 9,000 employees.

As mentioned previously, Dane County is a net importer of workers due to having a surplus of jobs and stronger economy than surrounding counties. Figure 2-21 on page 2-13 shows county-to-county average daily commuter flows based on 2009 - 2013 American Community Survey data. The counties supplying Dane County with the most workers per day (all over 4,000) include

The large Epic Systems corporate campus in western Verona.

Columbia, Rock, Green, Jefferson, and Sauk. More than 1,000 workers per day leave Dane County for work in each of the following counties: Rock, Columbia, Sauk, and Jefferson Counties.

As the major employment hub, the City of Madison experiences a large influx of workers from other communities within the county as well as from outside the county. It is estimated that about 63,000 workers commuted to the city from other communities in Dane County in 2014. Figure 2-23 shows the percentage of residents within each community that are commuting to the City of Madison for work. Incorporated communities with the most workers commuting to Madison were some of its closest neighbors, including the Village of Shorewood Hills (68%), Village of Maple Bluff (62%), Town of Madison (60%), City of Fitchburg (58%), City of Monona (54%), and Village of Brooklyn (51%). Many unincorporated towns had more than 45% of all workers commuting to the City of Madison including the Towns of Dane, Vermont, Vienna, Bristol, Cottage Grove, Madison, Blooming Grove, and Middleton.

One way that the region mitigates the traffic impact of regional commuting is the Wisconsin Department of Administration (DOA) run State of Wisconsin Vanpool Program. The Vanpool Program allows groups of 8 to 15 commuters from various parts of southern Wisconsin ride to work each day together. Vanpools are more formally structured than carpools, due to the cost of operating and insuring the vans. DOA provides this structure, collecting a biweekly fee from all van riders to cover gasoline, vehicle maintenance, and insurance for all participants. Emergency guaranteed rides home are provided through MATPB's Rideshare etc. program up to three times per year.

There are currently over 900 riders utilizing 80 vans originating in communities all across southern Wisconsin. Some vanpool participants come from communities as close to Madison as McFarland, while others travel as far away as Milwaukee and Racine. Some of the more popular vanpools origins include Janesville, Milwaukee, Waukesha, and Portage.

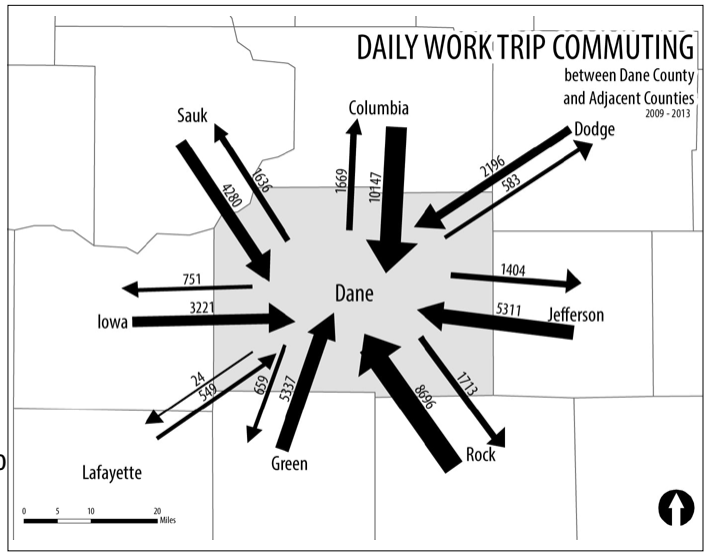


Figure 2-22: Daily Work Trip Commuting between Dane and Adjacent Counties

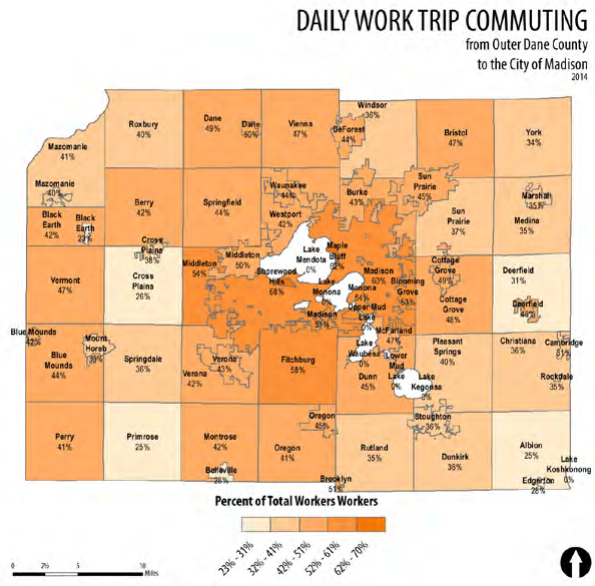


Figure 2-23: Daily Work Trip Commuting from Dane County to the City of Madison

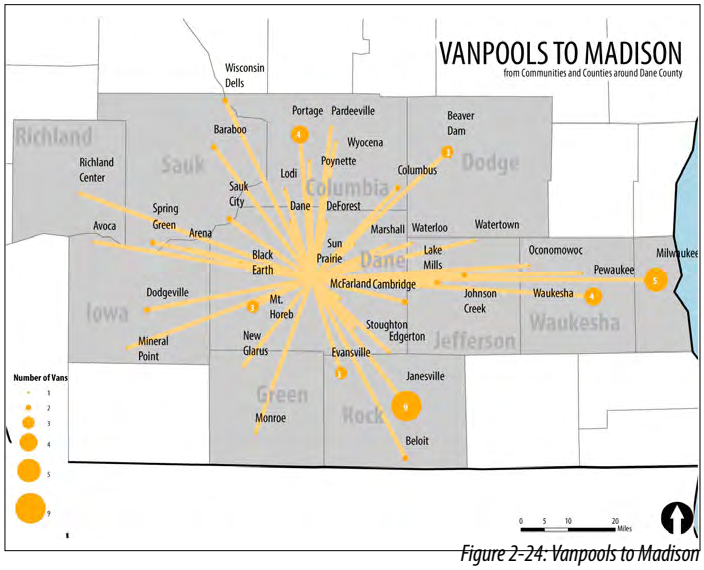


Figure 2-24: Vanpools to Madison

EMERGING TECHNOLOGIES

Transportation is currently experiencing a rapid change not seen since the early 20th century. Some of this change is due to changes in personal preferences, such as the increase in freight going directly to home due to the rise of online shopping, while other changes are due to the advent of new technologies. In the 2015 report Transportation Technology Scan: A Look-Ahead, the US DOT identified 11 technological advances and innovative concepts that could fundamentally alter the transportation landscape and their potential benefits, challenges, and potential issues. These technologies include:

Additive manufacturing (3D printing) is a technology that allows for three-dimensional objects to be created using an extruder or laser layer by layer. This technology has the potential to upend the manufacturing process by replacing the transfer of parts with the transfer of designs over the internet, allowing parts to be printed on-site. This could reduce the need for warehouses and shipping services – lessening the number of heavy vehicles on roadways.

- Benefits of this technology include more localized production of goods, reducing regional roadway infrastructure needs – some of the most expensive roadways in the transportation system. This may reduce the cost of low-volume vehicle parts, including the cost of transit vehicle replacement parts and allow for the purchase of hard to find/procure parts.
- Potential downsides with this technology include an increased need for high-quality local infrastructure due to the nature of more goods being produced locally.

Advanced analytics and machine learning are technologies that provide computers with the ability to learn without explicitly being programmed, particularly when being inputted with "big data."

- Example programs are being created with the capability of using big data to identify patterns that can be used to make well-informed predictions such as traffic models. Some traffic operations centers have automated traffic operations systems that automatically adapt signalization during periods of high traffic or alert operators of potential traffic accidents. An adaptive signal system was installed in the McKee Road and Fish Hatchery Road corridors as part of the Beltline/Verona Road construction project and a similar system is planned for the University Avenue corridor.
- Benefits include increased efficiency of existing roadways through predictive analytics and pre-trip guidance for travelers and increased safety due to automatic dispatching of 911 services through a mixture of this technology and the "internet of things."

Automated vehicles are vehicles in which at least some aspect of safety-critical control functions occurs without driver input. Over time, it is anticipated that vehicles will gradually gain more autonomy. Because of this continuum of automation, "levels of vehicle automation" have been developed to quantify levels of driver reliance. A vehicle with a rating of 0 has no automation and requires the driver to manage all control functions, while a rating of 5 is completely automated and requires not human management during the trip.

- Examples of vehicle automation are becoming more mainstream each year. Many higher-end vehicles

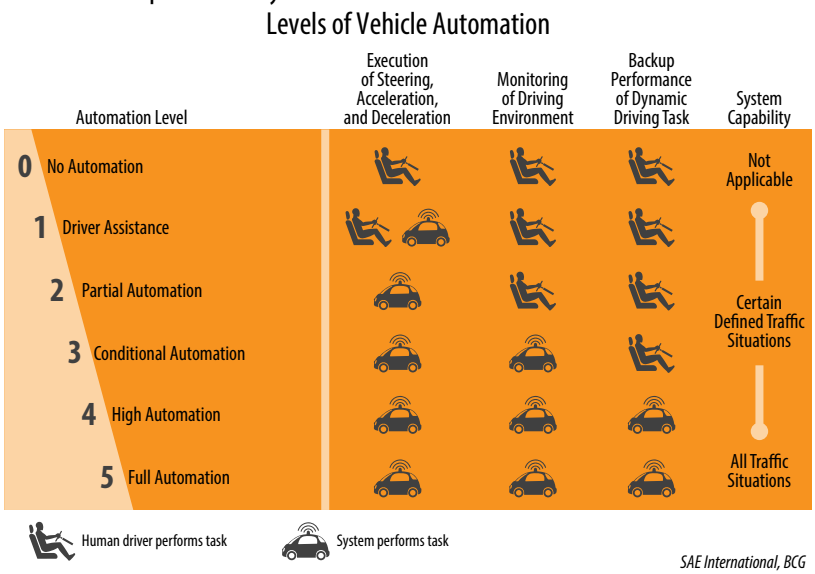


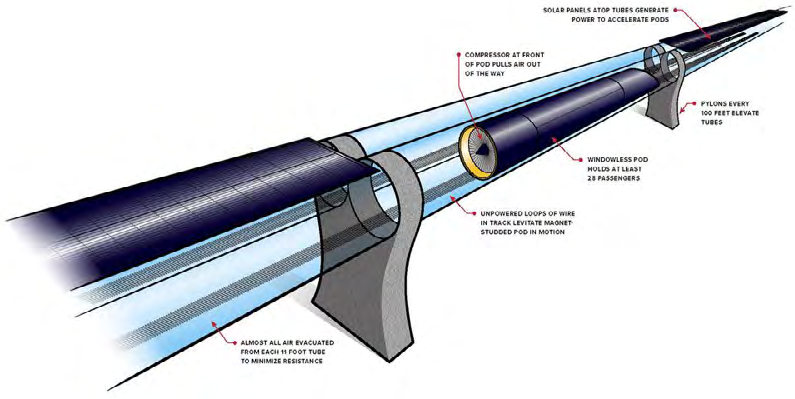
Figure 2-25: Levels of Vehicle Automation

currently come with automated features such as parking assist and crash avoidance. Some automakers, such as Tesla, have released highway autopilot features or are planning on releasing them in the near future.

- Benefits of this technology include improved safety, reduced travel times, reduced energy consumption, reduced vehicle emissions, improved reliability, increased roadway capacity (due to closer vehicle spacing), and increased transit accessibility. Vehicle sharing could become much more attractive since they would be able to provide door-to-door service for all riders. Work zone safety would be greatly improved. Transit service could be delivered at a reasonable cost in lower-density communities.
- Potential Issues of this technology include a dramatic increase in vehicle miles traveled due to "drivers" that would otherwise be unable to use the roadway. A reduction in driving stress may lead to an increase in discretionary travel and increased urban sprawl. The transition period from traditional cars to autonomous vehicles may be difficult due to low public acceptance of the vehicles and cost barriers for low-income or elderly traveler. Further, the unknowns of this technology make it difficult to determine whether capacity expansion is an appropriate treatment for congested or unreliable roadways. Parking lots and related facilities could be rendered obsolete because vehicles will have the ability to drop off passengers and return to their origin or pick up other passengers.

Hyperloop is an intercity travel concept in which patrons travel on a fixed route of paired bi-directional tubes on elevated pylons, traveling in capsules riding on low-friction air bearings within those tubes at speeds of up to 750 miles per hour.

- Benefits of this technology include the ability to reach far away destinations in a fraction of the time it would take to use conventional options – such as regional buses or airplanes. The technology could lead to economic



Hyperloop concept, CNET.com

development benefits for regions and cities it serves. It has the potential to save a great deal of energy, emissions, and time over existing transportation modes.


Advanced robotic inspection equipment—the "concrete crawler"—in a demonstration at the New York Power Authority's Niagara Hydroelectric Power Plant.

US DOT

Infrastructure inspection robots can be used to assess the structural integrity of a variety of infrastructure using sensors and 3D imaging.

- Benefits of this technology include the ability for governmental agencies to examine and assess more infrastructure due to the speed of robots in comparison to humans; improved and more comprehensive inspections that result in improved reliability, safety, and infrastructure longevity; better assessment of infrastructure at disaster sites; and a reduction in inspection-related traffic disruptions.

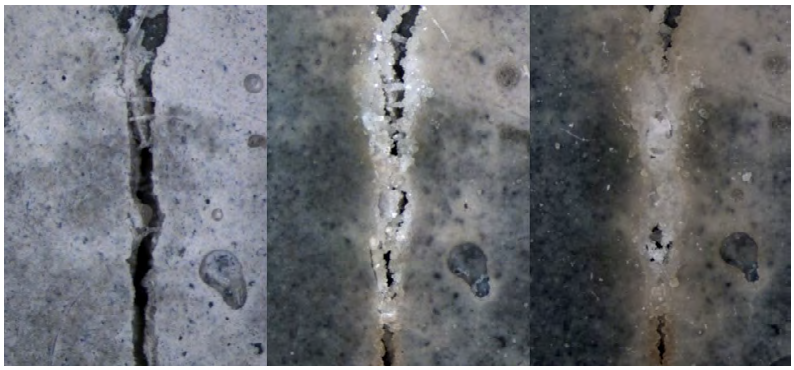
Innovative concepts for protecting pedestrians, bicyclists, and motorcyclists are improvements in traffic safety for "vulnerable road users." These improvements range from vehicle safety mechanisms such as sensor-based detection systems to pedestrian guards on freight trucks.

- Examples of this type of technology include advanced driver assistance systems (ADAD) that alert drivers of objects or people nearby using radar, sonar, or infrared signals; technologies that apply breaks to avoid crashes; and technologies that avoid collisions by cooperative communication between cell-phone signals of vulnerable users and vehicles to notify both parties of potential issues.
- Benefits of this technology include increased safety for all roadway users. Additionally, this could lead to an increase in multimodal activity (and thus lower VMT) due to increased confidence in safety by vulnerable users.

The **Internet of Things** is the network of interconnected, uniquely identifiable devices embedded in physical objects or "things."

- Examples of this technology include applications that monitor and control energy use, cloud-connected wearable devices that track physical conditions, and vehicle-to-infrastructure technology that is currently in development.
- Benefits of this technology include a better understanding of infrastructure utilization (more accurate tracking of usage patterns), safety improvements (tracking mental alertness for professional transportation operators and real-time monitoring of environmental hazards), and improved operations for freight (robotic loading and unloading) .

Materials science in infrastructure is technological advancements in the materials used to produce and repair physical infrastructures, such as roads and bridges. New materials such as self-healing roads have been shown to extend asphalt life by more than 50%. These pavements work by mixing organic matter into the pavement to produce limestone or other filling materials when exposed to water and heat, filling and seal cracks as they occur.



Bioconcrete though the healing process. Delft University.

- Benefits of this technology include increasing the lifespan, resilience, and safety of infrastructure while reducing maintenance needs, costs and environmental impact. Increased roadway lifespan will reduce traffic disruptions caused by roadway reconditioning and reconstruction. Improved roadway conditions will reduce driver and cyclist maintenance cost and improve the quality of travel. Reductions in road repair need will reduce CO_2 emissions from cement production and construction.
- Potential challenges associated with this technology include a need to train workers in new construction and maintenance techniques.

On-demand ride services (sometimes called ridesharing or transportation network companies) are services that use smartphone applications to connect passengers to drivers. In many ways this is not very different than traditional taxi service; however, the increased price transparency and availability of travel information (such as arrival times and GPS locations) have caused these services to increase in popularity.

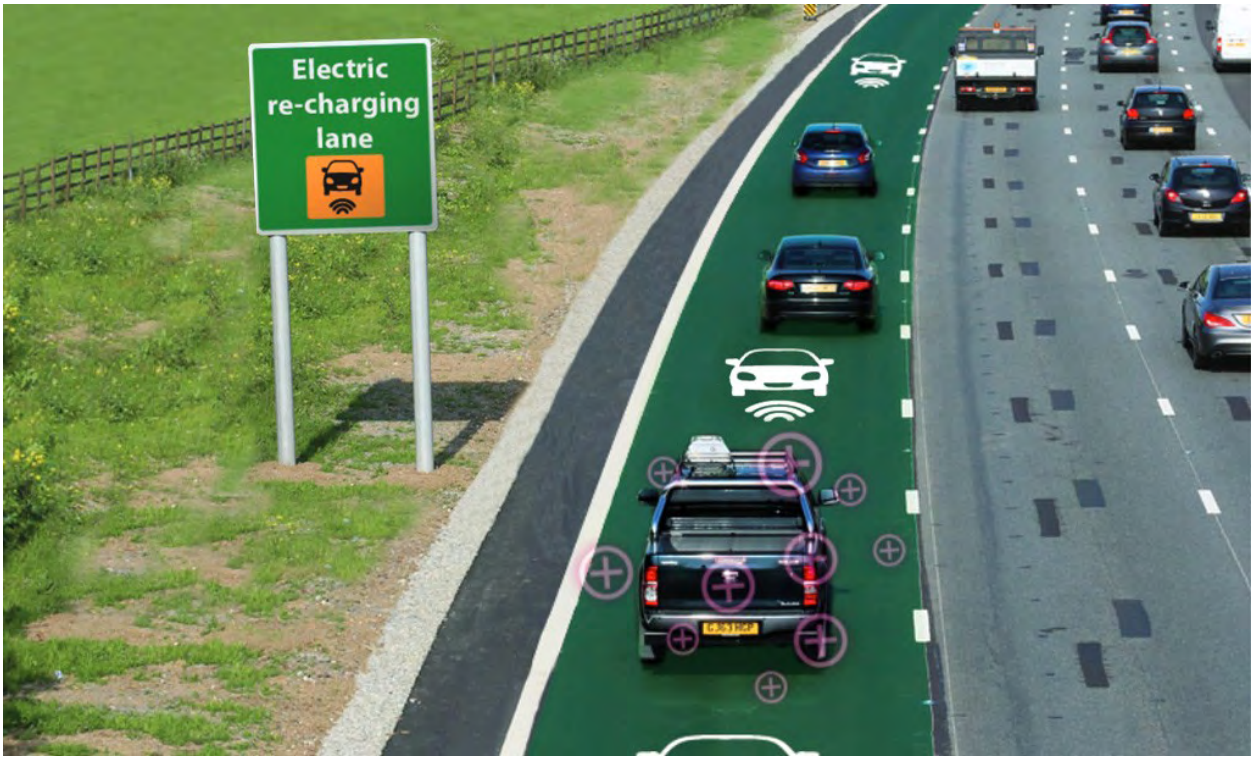
Self-Driving Uber in Pittsburgh, PA. Businessinsider.com

- Examples of this type of service include Lyft and Uber. Local services, such as Green Cab, also utilize similar functionality.
- Benefits of this technology include encouraging multimodal travel by making it possible to move away from automobile ownership when combined with other transportation options such as walking, bike sharing, and transit. If applied to transit, the technology could help agencies discover new fixed-routes that may not have otherwise been apparent and also address "first mile, last mile" connection problems. This technology could improve acceptance of autonomous vehicles by increasing the availability of automated vehicles and lowering entrance costs by allowing rental.
- Issues with this type of service include displacement of transit trips and/or active transportation trips if the services are too inexpensive or convenient, resulting in increased VMT and negative environmental impacts.

Unmanned aircraft systems (UAS) (also commonly called drones or unmanned aerial vehicles (UAV)) are aircraft without a human pilot aboard. While these vehicles are currently controlled by operators on the ground, future vehicles will have the ability to operate without a human operator. In fact, the US DOT estimated that the total number of UAS in operation could surpass the number of manned aircraft by 2035.


Delivery Drone Concept, Amazon.com

- This technology is currently used in military situations, law enforcement, firefighting, border patrol, disaster release, search and rescue, construction management, transportation facility inspection, and roadway condition inspection.
- Benefits of this technology include "find and deliver" capabilities that could find people or objects that are lost, reduction of roadway congestion due to drone-based package delivery, increased speed of package delivery, and the ability to solve first-and-last mile freight issues in congested urban environments.
- Potential challenges include reduced quality-of-life due to noise and visual intrusion, safety concerns due to recreational drones, and privacy concerns.



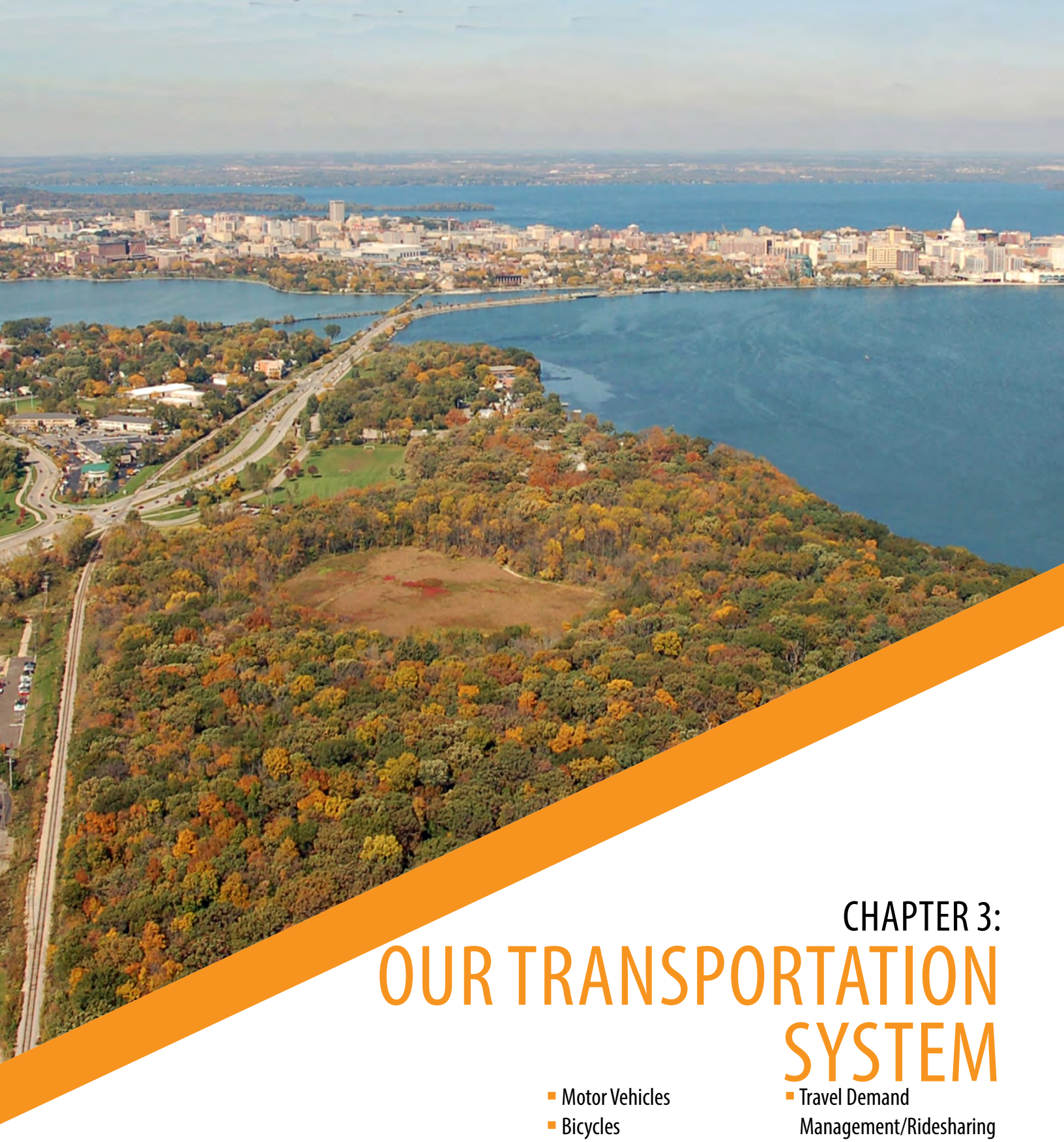
Wireless charging Concept, Intel Corporation

Wireless power transfer is a technology that allows for the recharging of electronic devices with chargers and cables. Initially, it is likely that electric buses and other vehicles traveling on high traffic corridors could be the first adopters of this technology to justify the capital investment cost. Once the technology becomes less expensive, light-duty and consumer vehicles are likely to follow. In addition to wireless power transfer, distributed fast charging has the potential to change the entire transit system. Developers of this technology claim that electric powered buses can be charged in as little as five minutes. This could allow for charging at places where transit vehicles taxi throughout the area, such as the Capitol Square and at transfer points.

- This technology is currently being used with some smartphones and has been used in pilot projects by transit providers in Utah, Texas, and Calfornia.[2]
- Benefits of this technology include limiting the need for individual consumers to have reliable access to charging stations. It would also extend the driving range of electric vehicles by providing charging capability on major roadways, a potential boon for automated vehicles. The technology also allows vehicles to have smaller batteries – reducing weight and improving efficiency. Further, the environmental benefits would be substantial. Smaller batteries reduce the environmental impact of electric vehicle batteries cannot currently be discarded in an environmentally cost-neutral way.

While many of these technologies on their own would be transformational, the confluence of a number of them into the transportation system at once poses more questions than answers for manufacturers, consumers, and planners. It will be important to determine quantifiable ways that the new technologies will impact planning – be it newfound capacity, cost savings, or a complete reimagining of the transportation system. It will be important, now more than ever, to recalibrate planning efforts based on these, and other, emerging technologies and remain flexible, nimble, and adaptable in the coming years.

[2] http://wave-ipt.com/projects



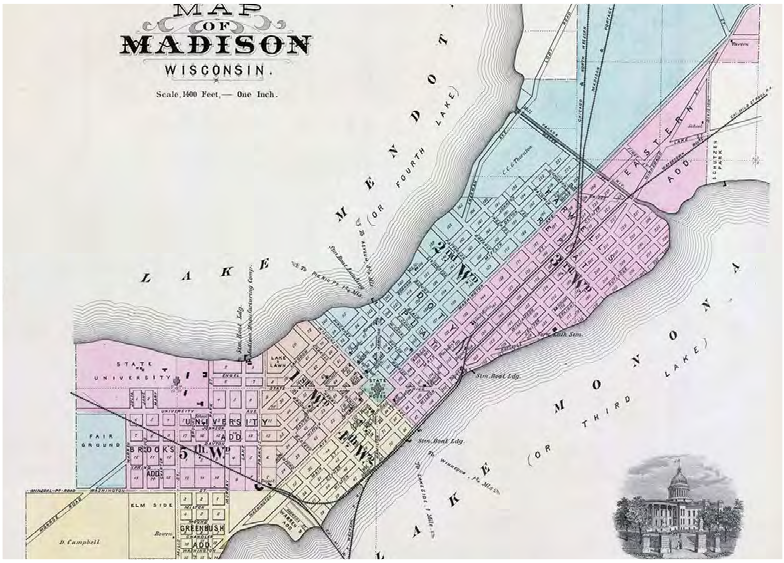
CHAPTER 3:
OUR TRANSPORTATION SYSTEM

- Motor Vehicles
- Bicycles
- Pedestrians
- Public Transit
- Travel Demand Management/Ridesharing
- Inter-Regional Travel
- Freight/Goods Movement

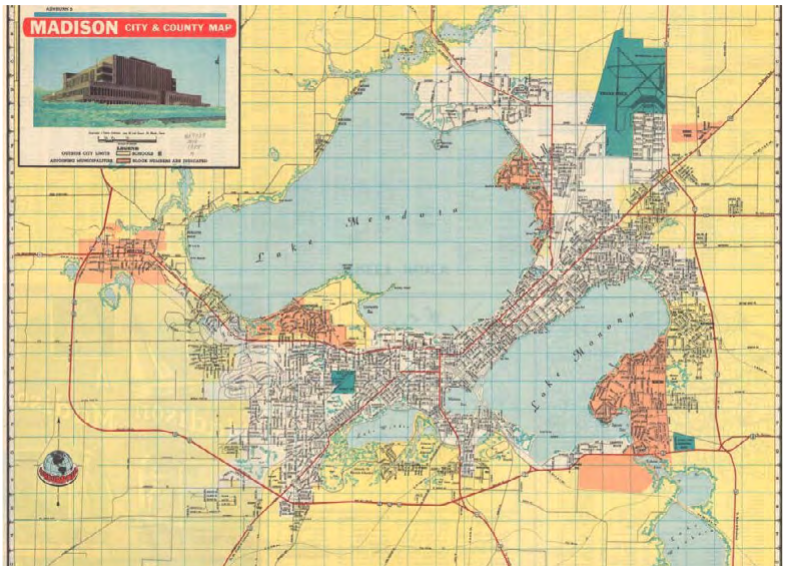
MOTOR VEHICLES

Introduction

Streets and highways form the foundation of the transportation system. They are used by and must be designed to accommodate safe, convenient travel by buses, bicyclists, and pedestrians, as well as motorists. There are over 2,800 miles of public roadways in the Madison Metropolitan Area and close to 550 bridges. Roads are critical to virtually all freight moving to and from locations in Dane County. 98% of Dane County's freight tonnage and 92% of its freight value moves exclusively by truck. The remainder, which moves by other modes for part of its trip, needs to travel by truck on the first or last legs of its journey. Countywide, the roadway system carries an estimated 13.6 million vehicle miles of travel each day. Roadways also have both direct and indirect impacts on the natural environment that must be considered in planning efforts and facility design.



Madison, 1878 Credit DaveRumsey.com.



Madison, 1950s after the construction of the Beltline. Credit University of Texas at Austin University of Texas Libraries

Streets and highways provide connectivity to jobs, homes, shops, parks, and other opportunities. The physical design characteristics of each roadway play a significant role in its safety, operational performance, and accommodation of different transportation modes. As an infrastructure asset, the roadway system requires maintenance to remain in acceptable condition.

The Madison area has a uniquely constrained roadway system due to the natural geography of the area, with the City of Madison's downtown sitting on an isthmus. The City of Madison, founded in 1848, is a master planned community built on a tight grid of streets around what we now know as the Capitol Square. High volume arterial streets radiate from the square and connect to a number of State and Interstate Highways including the Beltline (US Highways 12, 14, 18, and 151), Stoughton Road (US Highway 51), and I-39/90/94. Unlike many urban areas, downtown Madison is located off the freeway and expressway network. This has greatly contributed to the livability of the downtown, but also made traffic circulation more challenging, increasing the importance of travel demand management and operational strategies for mitigating congestion. Many suburban communities surrounding Madison were founded in the late 1800s, and contain a similarly dense street grid in their historic cores.

Roadway development patterns changed across the United States after World War II. America built most of its early highway and freeway infrastructure during this time, leading to the rise of suburbanization. Terms like roadway hierarchy became part of the planning lexicon, and curvilinear streets and cul-de-sacs became the norm for new neighborhood design. The Madison area was no exception to national trends. The construction of the Beltline Highway facilitated growth in areas further from the urban core, including the suburbs. Conceived and approved in 1944, the Beltline opened as a 2-lane highway in 1949.

In the 1950s, intersections with the Beltline were steadily converted into interchanges and portions of the road widened to four lanes. In the 1970s, portions of the roadway were expanded to six lanes. Currently, WisDOT is studying the roadway to determine ways to further improve the efficiency, reliability, and safety of this highly traveled freeway, which provides the only east-west connection south of the urban core between the Interstate and the west side.

The region is facing a number of challenges related to the roadway network. Limited options exist for increasing vehicular capacity through the isthmus, with no possibilities for adding general purpose travel lanes. There are also limited options for enhancing the connectivity of the street network in areas developed in the postwar period. One potential opportunity currently being studied is the addition of one or more non-interchange crossings of the Beltline. However, arterial roadway network congestion is still, with the exception of the Beltline, generally reliable and occurs over a short duration.

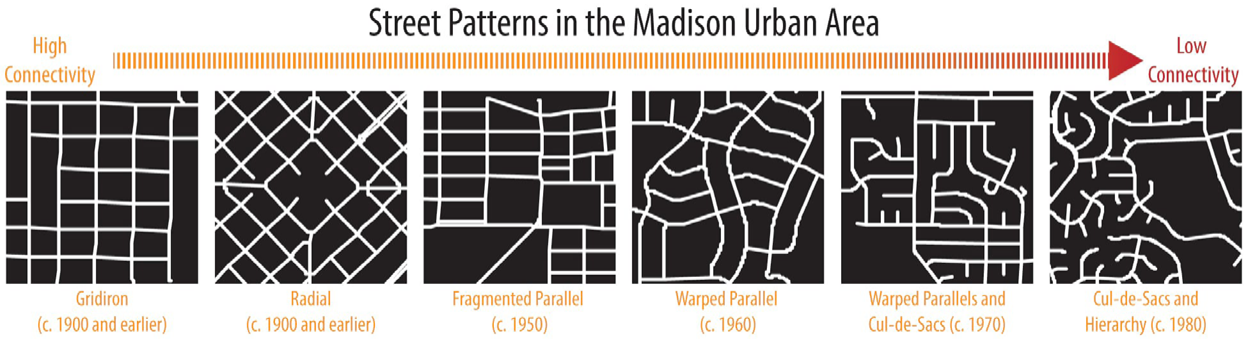
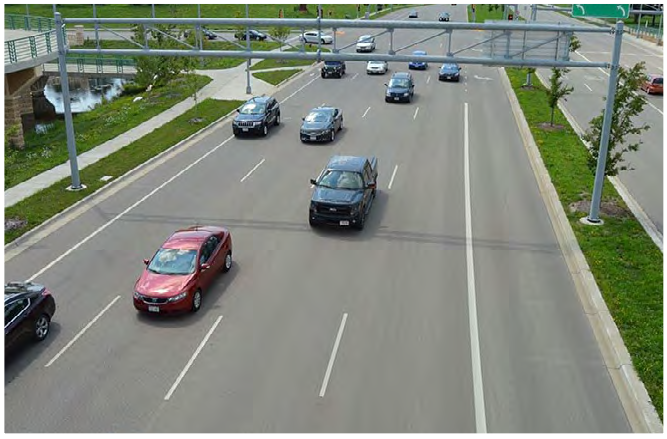


Figure 3-1: Street Patterns in the Madison Urban Area

Roadway Functional Classification System

The Federal-Aid Highway Act of 1973 requires the use of functional highway classification to update and modify the Federal-aid highway system, which includes all regionally significant roadways eligible for federal funding. The functional classification system categorizes highways, roads and streets by the character of service they provide for transportation planning and funding purposes. It defines the role roadways play (mobility, connectivity, accessibility) in serving travel needs and carries expectations about roadway design, including speed, capacity, and relationship to existing and future land use. MATPB and other transportation agencies describe roadway system performance, benchmarks, and targets by functional classification.



Mineral Point Road is an example of an urban principal arterial.

The functional classification system divides roadways into two groups – urban and rural – based upon whether the roadway is located within an urban area. The urban area is defined by the U.S. Census Bureau, and is based upon total population, population density, and large impervious

areas where there is urban non-residential development. The roadway functional classification system makes a distinction between urban and rural roadways because of their differing road network densities and travel patterns.

MATPB coordinates with WisDOT to assign functional classifications to roadways in the urban area, while WisDOT assigns functional classes to roadways in the rural area. Roadways in rural areas must meet certain criteria to be entered into the functional classification system. They must adequately serve the needs of the area population and land uses, be a minimum distance from other classified parallel routes, and must meet several supplemental criteria as well. Roadways within urban areas must meet criteria from these same categories. In addition, the functional classification of roads that cross the urban-rural boundary is generally maintained, to ensure route connectivity.

Figure 3-2, shows the functionally classified roadway system in Dane County as approved in 2015. The map is updated every ten years.

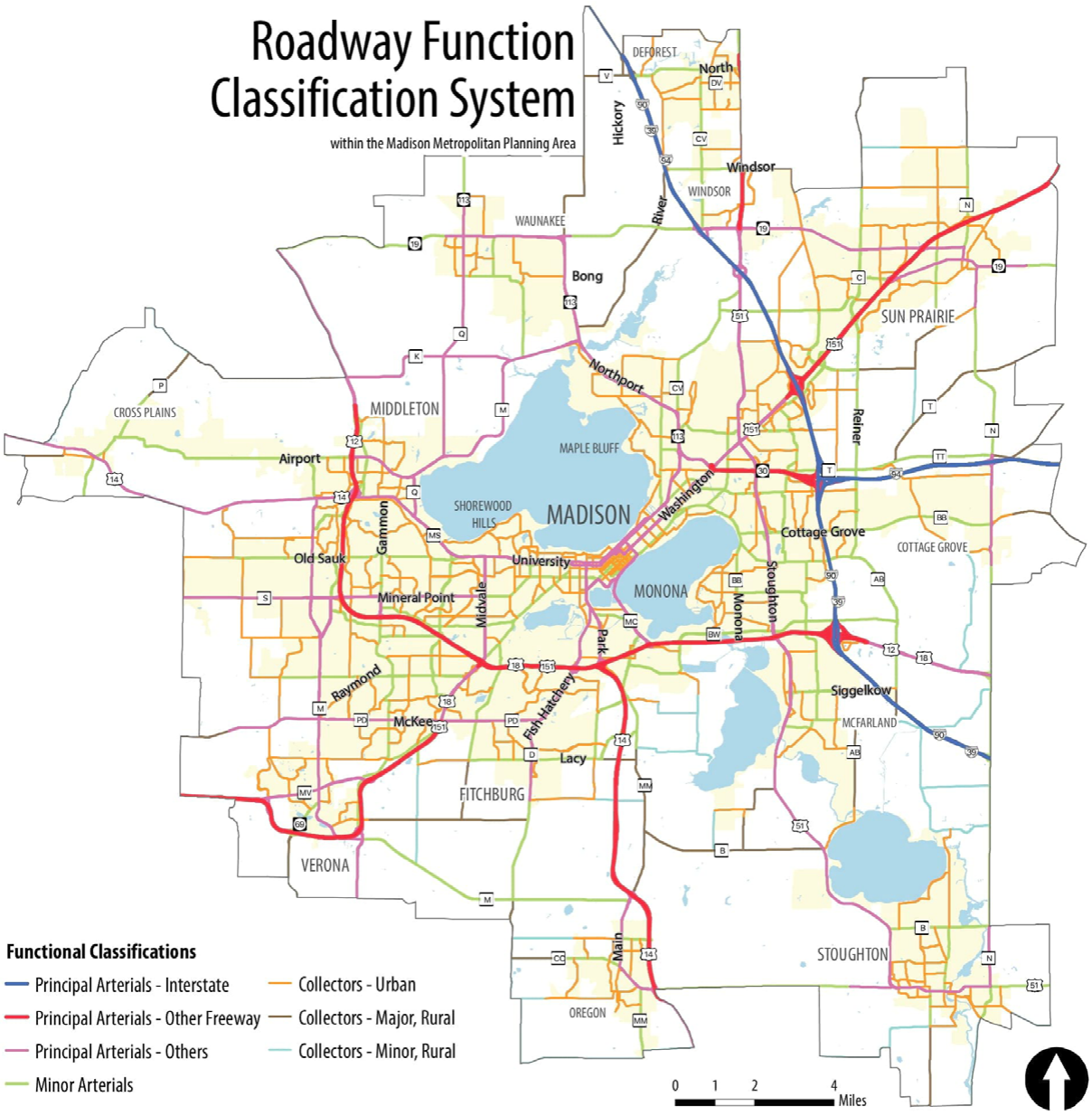


Figure 3-2: Roadway Functional Classification System

Figure 3-3

The Relationship between Functional Classification, Land Uses Served, and Traffic Volumes

Functional Class	Function	Land Use	Volume	Facility Type
Principal Arterials --Interstate	Link major urban areas of the United States. Move inter- and intra regional traffic, particularly long trips in the high traffic volume corridors.	Abutting land uses not directly served. Access and egress points are served by on-and off-ramps.	35,000 to 130,000+	High speed, divided highway with full control of access and grade separated interchanges.
Principal Arterials -Other Freeways	Move inter- and intra regional traffic, particularly long trips in the high traffic volume corridors.	Abutting land uses not directly served. Access and egress points are served by on-and off-ramps.	20,000 to 75,000+	High speed, divided highway with full control of access and grade separated interchanges. May have a very limited number of at-grade intersections.
Principal Arterials - Others	Serve longest trip demands and highest traffic volume corridors, where not served by freeways.	Serve major economic activity centers.	15,000 to 50,000	Typically a divided road with limited or no driveways to specific parcels and at-grade intersections with other roadways.
Minor Arterials	Interconnect with and augment the principal arterial system and provide service for trips of moderate length.	Serve important economic activity centers. Distribute traffic to smaller geographic areas than those served by higher-level arterials, with more emphasis on service to abutting land uses.	6,000 to 20,000	Number of lanes and type of median directly related to traffic volumes and abutting land uses.
Collectors	Connect local streets to the arterial street system.	Serve both residential neighborhoods and commercial/industrial areas; provide access to abutting land uses.	3,000 to 9,000	Typically two-lane streets with more frequent intersections.
Locals	Serve the ends of most trips.	Provide direct access to adjacent land.	100 to 7,500	Typically two-lane streets.

The Federal Functional Classification System divides roadways into four major classes: principal arterials, minor arterials, collectors, and local roadways. Principal arterials are further subdivided into the Interstate system, other freeway, and other (including expressways and signalized local arterial streets), while collectors are subdivided into major and minor in rural areas.

Urban Roadway Functional Classifications[1]

- *Principal Arterial:* Principal arterials serve major economic activity centers of an urban area, the highest average daily traffic (ADT) corridors, and regional and longer intra-urban trips. In every urban area, the longest trips and highest ADT are characteristic of the main entrance and exit routes. Because these routes are generally extensions of the highest rural functional routes, they should be principal arterials. Principal arterial trip lengths are indicative of the rural-oriented traffic entering and exiting the urban area on the rural arterial system, as well as the longest trans-urban area travel demands.

- *Minor Arterial*: Urban minor arterials serve important economic activity centers, have moderate ADT, and serve intercommunity trips interconnecting and augmenting the principal arterial system. Trip lengths are characteristic of the

[1] Highway Functional Classification Concepts, Criteria, and Procedures (FHWA, 2013) and Functional Classification Criteria (WisDOT, April 2013).

rural-oriented traffic entering and exiting the urban area on the rural collector system. In conjunction with principal arterials, minor arterials provide an urban extension of the rural collector system to the primary central business district (CBD) and critical links to satellite community CBDs.

Although the predominant function of minor arterials is traffic mobility, minor arterials serve some local traffic while, providing greater land access than principal arterials. As such, minor arterials may end abruptly at major traffic generators.

- *Collector*: Collectors provide direct access to residential neighborhoods, commercial, and industrial areas, and serve inter-neighborhood trips. As the name implies, these routes collect and distribute traffic between local streets and arterials. In the CBD and similar areas, the collector system may be a part of the street grid.

  Collectors may end abruptly where they penetrate residential neighborhoods and serve isolated traffic generators, but should generally be linked to other collectors and arterials for traffic circulation. The travel mobility and land access functions of collectors are similar, as shown in Figure 3-4.

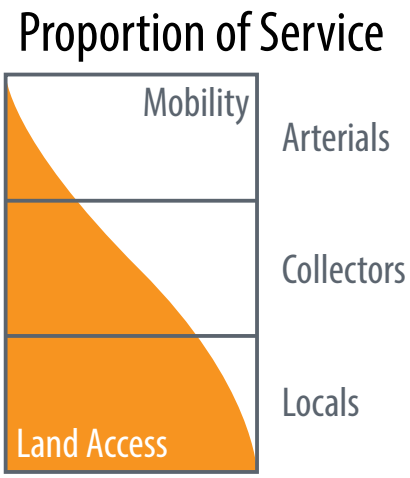


Figure 3-4: Proportion of Service Provided by Roadway Facilities.
Mobility and land accessibility vary according to the three primary functional classes. Arterial roadways provide mostly mobility; locals provide mostly land access; and collectors generally provide an equal amount of travel mobility and land access. (FHWA)

- *Local*: Local streets predominantly serve to provide access adjacent land uses. They serve the ends of most trips. All streets not classified as arterials or collectors are local streets.

Figure 3-5

Characteristics of Roadway Functional Classes

Functional Class	Distance Served and Route Length	Access Points	Speed Limit	Distance Between Routes	Usage	Significance	Number of Lanes
Arterial	Longest	Few	Highest	Longest	Highest	Statewide	More
Collector	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Local	Shortest	Many	Lowest	Shortest	Lowest	Local	Fewer

As state departments of transportation and MPOs continue to move towards a more performance-based management approach, functional classification will be an increasingly important consideration in setting expectations and measuring outcomes for preservation, mobility and safety.

Pavement Condition

Pavement condition management extends the useful life of a roadway and saves money by ensuring roadway preservation work occurs during the most efficient time in the pavement's lifecycle. Extreme pavement degradation can be minimized by performing preservation treatments early in the life-cycle of a roadway mentioned on the next page.

The Pavement Surface Evaluation and Rating (PASER) system is used to assist local communities in evaluating the condition of municipal roadways. The PASER rating system was developed by researchers at the University of Wisconsin-Madison to be a

quick, comparable way to evaluate surface conditions of pavement. The system rates pavements along a scale from 1-10 and prescribes treatment options accordingly, as is described in Figure 3-6.

Figure 3-6

PASER Ratings and Corresponding Treatments

Quality	Rating	Treatment for Pavement	Treatment for Concrete
Excellent	9-10	No maintenance required	No maintenance required
Good	7-8	Crack sealing and minor patching	Routine maintenance
Fair	5-6	Preservation treatments (non-structural)	Surface repairs, partial-depth patching
Poor	3-4	Structural renewal (overlay)	Extensive slab or joint rehabilitation
Very Poor	1-2	Reconstruction	Reconstruction

For state roadways, WisDOT uses the more sophisticated Pavement Condition Index (PCI) to evaluate pavement condition. PCI was developed by the United States Army Corps of Engineers, and uses a visual survey to measure the distress of pavement. This widely utilized method of pavement condition measurement factors in a number of pavement distress types:

- ride quality
- alligator cracking
- bleeding
- block cracking
- bumps and sags
- corrugation
- depression
- edge cracking
- joint reflection cracking
- lane/shoulder drop-off
- longitudinal and transverse cracking
- patching and utility cut patching
- polished aggregate
- potholes
- railroad crossing
- rutting
- shoving
- slippage cracking
- swell
- weathering and raveling

In addition to these pavement distress types, PCI rates distress in jointed concrete pavements. The system rates pavements along a scale of 0-100 in which 0 is the worst possible roadway condition and 100 is a new roadway. For simplicity, this scale has been converted to the PASER scale where used in the RTP.

In general, roadways with a pavement condition of "fair" or worse are nearing the end of their repairable life. Lower volume roads routinely fall into this category, while high-volume, regional mobility corridors rarely do. In 2015, the Madison metropolitan area pavement condition varied by facility type:

- 96% of the interstate highway system is in good condition
- 89% of the US highway system is in fair or better condition
- Roughly 16% of the state highway system is in poor or worse condition
- About 60% of local facilities (arterials, collectors, and local roads) are in good condition and roughly 30% are in fair condition.

Some of the regional roadways in the poorest condition in 2015 include:

- WIS 113 from Kennedy Road to the WIS 19 (fair)
- WIS 113 north of Waunakee to CTH V (very poor to fair)
- WIS 19 from US 12 to Waunakee(very poor to poor)
- US 14 from the Beltline to Cross Plains (very poor to poor)
- The Beltline from the Broadway ramp to the Yahara River Bridge (very poor)
- Park Street from the Beltline north to West Washington Avenue (poor to fair) - *scheduled for concrete and joint repairs in*

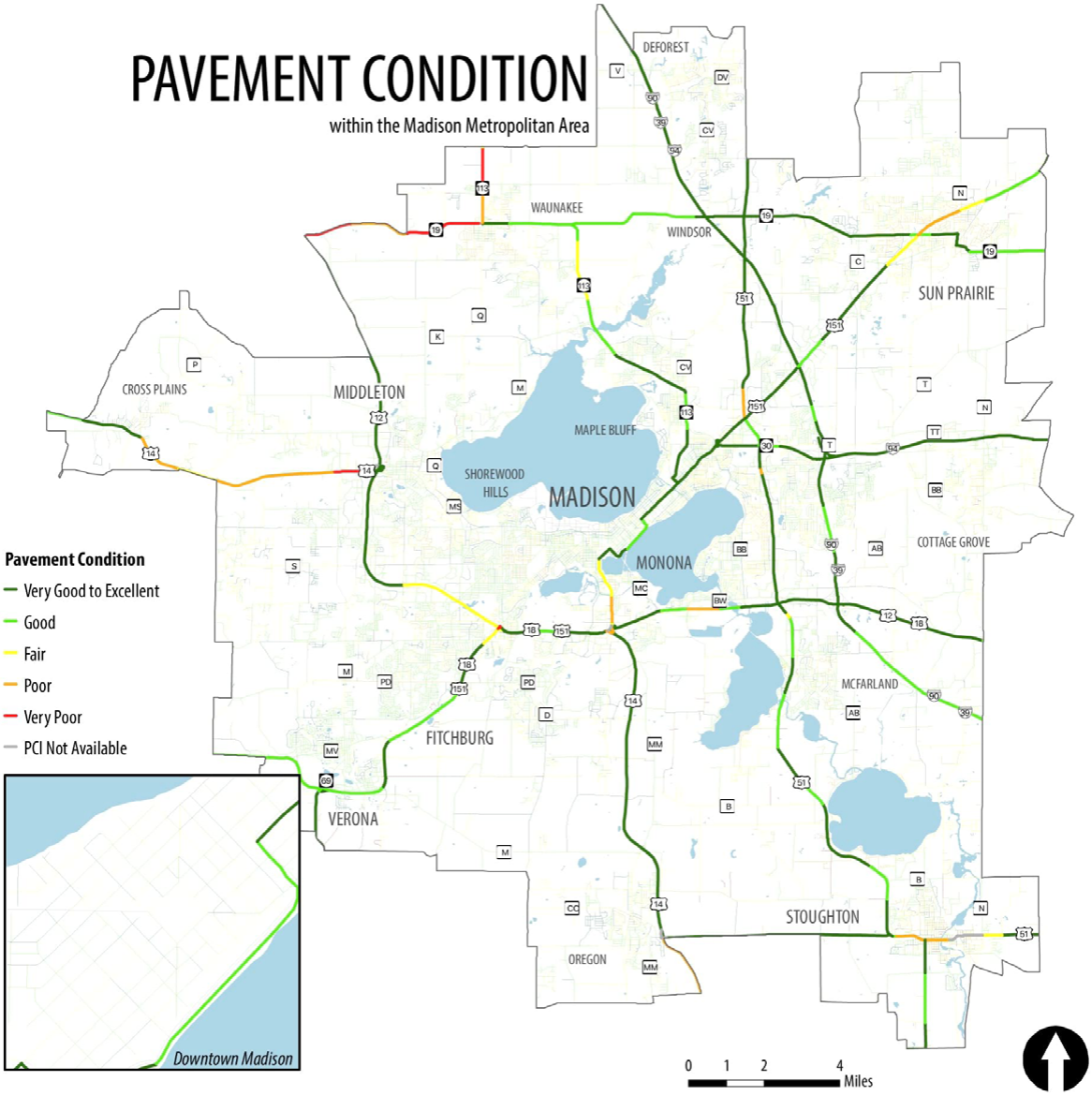


Figure 3-7: Pavement Condition

2019-2020

- US 51 from East Washington Avenue to Pierstorff Street (very poor)
- US 151 in Sun Prairie from the Main Street ramp to the Columbus Street bridge (very poor to poor) - *scheduled for resurfacing in 2018*
- US 14 from WIS 138 to County Highway A (very poor)
- US 51 in Stoughton from WIS 138 to Fourth Street (very poor) - *portion scheduled for resurfacing in 2018*

Some of these regional facilities, such as US 151 and Park Street, are programmed for improvements. Recent trends in roadway condition demonstrate a reduction in the pavement quality of local facilities and an improvement in overall quality of state facilities. Much of this change can be attributed to changes in state-level priorities and funding levels. In recent years, reductions in local roadway funding have led to reductions in local pavement ratings statewide.

Bridge Condition

The Federal Highway Administration (FHWA) compiles the National Bridge Inventory (NBI), a database with information about every bridge and tunnel in the US. As part of this inventory, bridges are given a "sufficiency rating" based on over twenty categories that surmise a bridge's structural condition, obsolescence of its design, and essentialness to the public. A low rating can be earned not only for poor structural conditions, but also for a design that is not adequate for current traffic conditions. Approximately 55% of the rating is derived from the structural evaluation of the bridge, 30% from the obsolescence of its design, and 15% the essentialness to the public.

Bridge sufficiency ratings are a key factor for funding. A sufficiency rating of 80 or less qualifies a bridge for federal repair funding, while a score of 50 or less qualifies a bridge for federal replacement funding. Federally funded bridge projects require a 20% local funding match.

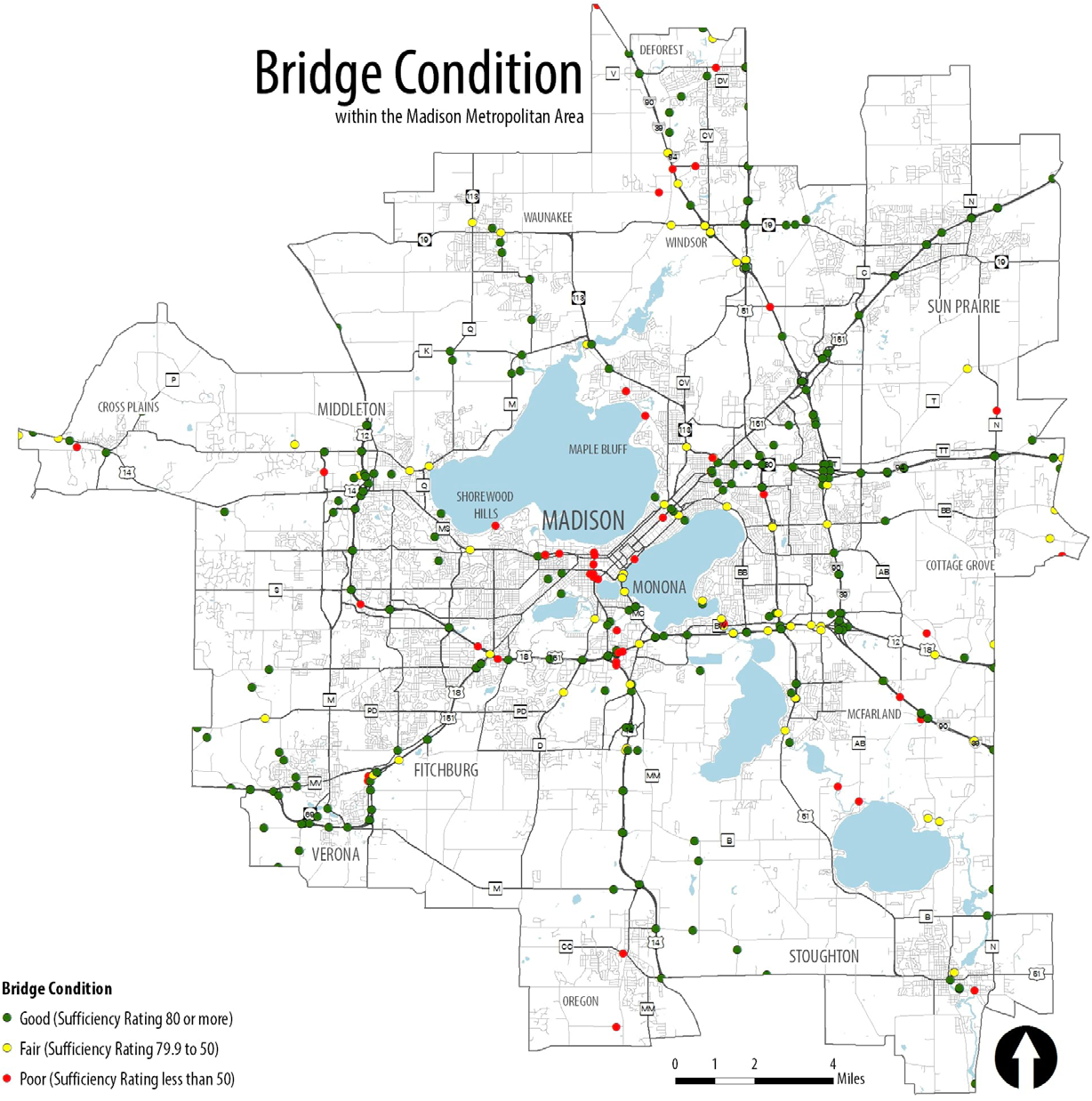


Figure 3-8: Bridge Condition

In the Madison area, 95% of all bridges are in fair or better condition. In fact, 75% of all bridges are in good condition. There are 17 bridges in the region in poor condition including:

- County Highway PB (Badger Mill Creek) - *Scheduled for replacement in 2017*
- County Highway AB (Yahara River)- *Scheduled for replacement in 2019*
- County Highway MN (Door Creek)
- County Highway PD (Badger Mill Creek)
- Windsor Road (Yahara River)
- County Highway N (Koshkonong Creek)
- River Road (I-90/94)- *Scheduled for replacement in 2017*
- WIS 30 westbound (Fair Oaks Avenue)
- Femrite Drive (Door Creek)
- High Point Road (Beltline Highway)- *bridge replacement underway*
- County Highway AB (I-90)
- County Highway KP (Black Earth Creek)

Replacement of the County Road V bridge in DeForest.

Motor Vehicle Safety and Crash Data

The Wisconsin Traffic Operations and Safety (TOPS) lab maintains a database of all reported crashes in the state. Between 2010 and 2014, Dane County experienced an average of 6,817 crashes per year, resulting in a 5-year average crash rate of 140 crashes per 100 million vehicle miles traveled (VMT). During this period there were 154 total crash fatalities (0.63 fatal crashes per 100 million VMT) and 699 crashes resulting in serious injury (3.54 serious injury crashes per 100 million VMT). The number of fatalities remained relatively stable from year to year during the period, while the number of serious injury crashes declined from 195 in 2010 to 145 in 2014. The remaining 96% of crashes resulted in property damage only. In early 2016, the FHWA released rules establishing how to measure the number and rate of fatal and serious injury crashes on the transportation network. MATPB now tracks these measures annually in its Performance Measures Report (Appendix I).

Figure 3-9 shows the location of intersections with high severe crash frequencies. As expected, the highest volume arterials including the Beltline, East Washington Avenue, Stoughton Road (US Highway 51), Mineral Point Road, Verona Road, and Gammon Road have the highest crash frequencies. The 10 intersections with the highest number of severe crashes include:

- Verona Road (US 18/151) and CTH PD
- East Washington Avenue and Thierer Road
- Stoughton Road (US 51) and North Broadway
- East Washington Avenue and 1st Street
- Park Street and Badger Road
- US 12/18 and Millpond Road
- John Nolen Drive and North Shore Drive
- Beltline and the north Whitney Way ramps
- Fish Hatchery Road and Greenway Cross
- University Avenue and Midvale Boulevard

WisDOT identifies road segments on the state system with crash rates that exceed the statewide average for similar roadway types, shown in Figure 3-10. Further analysis is warranted for these segments to determine if there are any potential short-term and/or long-term engineering or traffic control solutions to enhance safety. The West Beltline expansion and Verona Road Interchange reconstruction is expected to improve the safety issues in that area. WisDOT completed a Safety and Operations Study for WIS 19 in 2016, and will be reconstructing the WIS 19/WIS 113 intersection in 2018, and will add two lanes on WIS 19 between River Road and Interstate 39/90/94 in 2020. The Beltline corridor and US 51 are the subject of ongoing major corridor studies which include safety issues as project needs.

The City of Madison Traffic Engineering Division prepares an annual crash report with statistics, maps, charts, and tables summarizing common factors for crashes, high crash locations, historical trends, and other information. This information,

including detailed crash diagrams, is used to assist engineers in planning strategies to reduce crashes and identify possible engineering solutions.

The Dane County Traffic Safety Commission; comprised of staff from the Dane County Highway and Transportation Department, the Dane County Sheriff Department, WisDOT Central and Region Offices, and the State Patrol; meet quarterly to review crash data – particularly fatalities, and to discuss safety issues such as planned projects, research, grant programs, and proposed legislation.

WisDOT's 2014-2016 Strategic Highway Safety Plan is a statewide comprehensive plan that provides a unified framework to reduce traffic fatalities, injuries and crashes over a three year period. The plan examines various highway safety issues in Wisconsin. Additionally, each year WisDOT prepares a report on the programs, grants and activities planned for the next federal fiscal year, which also serves as the state's application for federal safety funds, and submits the plan to the National Highway Transportation Safety Administration. WisDOT administers the federal Highway Safety Improvement Program (HSIP) funds, which can be used for projects that reduce the number and severity of crashes on public roads. This program focuses on infrastructure improvements selected through a data-driven approach, with an emphasis on low-cost treatments that can be implemented quickly.

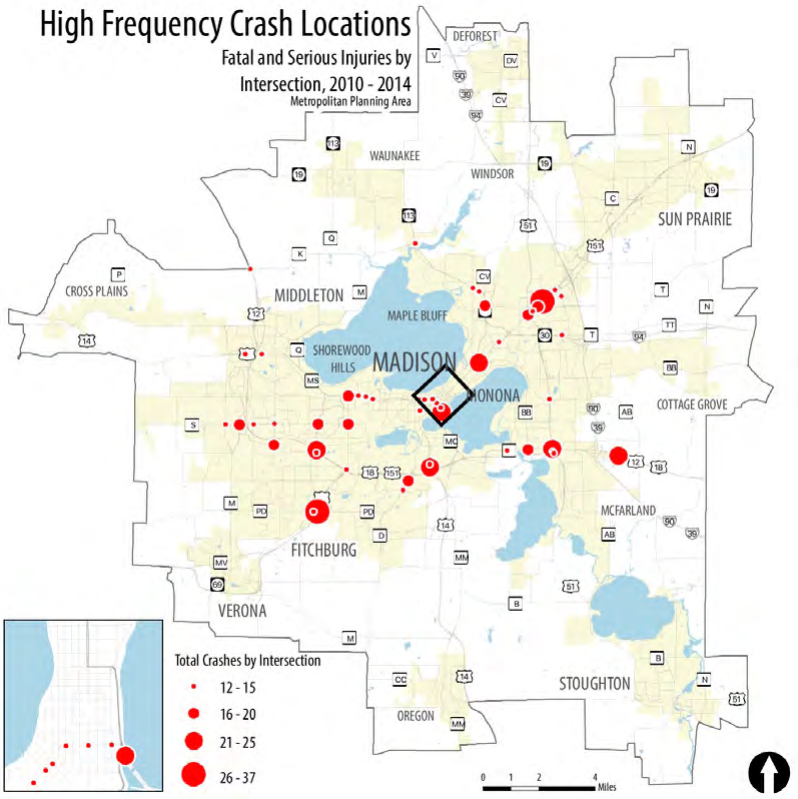


Figure 3-9: High Frequency Crash Locations

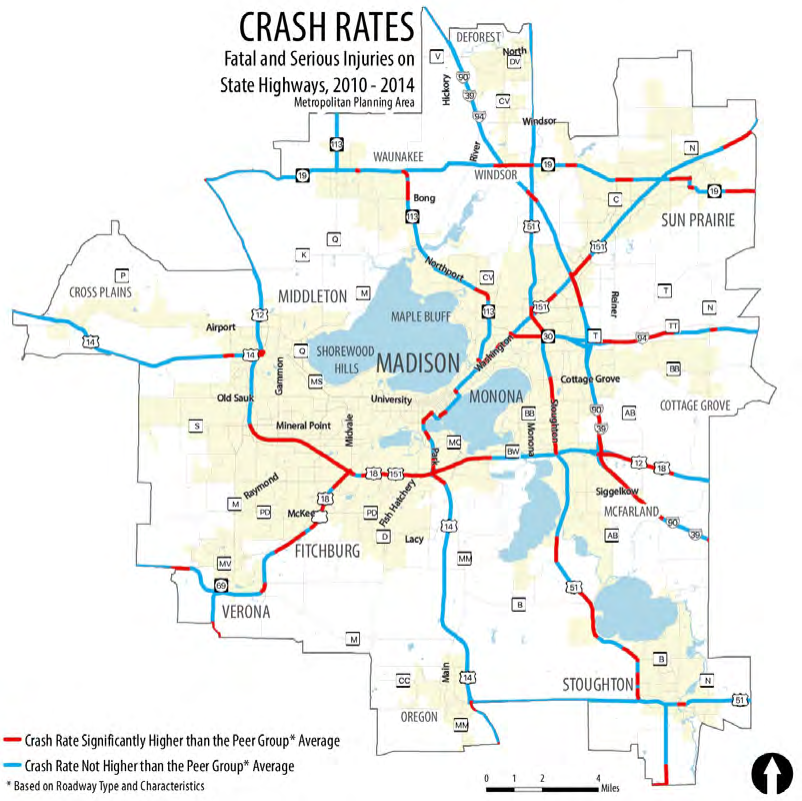


Figure 3-10: Crash Rates on State Highways

Traffic Growth and Congestion

The growth in population and employment in the metro area, combined with an increasing number of commuters from outside the area has led to increasing traffic volumes on the regional roadway system. Following a dip in VMT during the Great Recession starting in 2008, VMT has begun to increase again the past three years. Figure 3-11 provides daily VMT estimates for Dane County from 2000 to 2015. VMT increased on average 0.6% per year during this time period. Average daily car travel per person declined by about 10 percent during this period, falling from 29 to 26 VMT per day. National data shows per capita VMT beginning to rise again since 2014 with miles traveled among those 16 and older about where it was in 1998.

Figure 3-11

Estimated Daily VMT for Dane County

Year	VMT	Change from Previous Year
2000	12,497,100	-
2001	12,636,700	1.1%
2002	13,202,000	4.5%
2003	13,256,000	0.4%
2004	13,450,000	1.5%
2005	13,346,300	-0.8%
2006	13,621,900	2.1%
2007	13,561,000	-0.4%
2008	12,993,400	-4.2%
2009	13,214,200	1.7%
2010	13,258,300	0.3%
2011	13,116,500	-1.1%
2012	13,724,431	4.6%
2013	13,291,000	-3.2%
2014	13,481,513	1.4%
2015	13,637,621	1.2%

Figure 3-12 shows average weekday traffic (AWT) volume on the arterial roadway network in 2013, while Figure 3-13 shows the AWT volume change from 1992 to 2013.

The most significant traffic growth over this time period occurred on the Beltline between Verona Road and I-39/90 and on I-39/90 between the Beltline and US 151. AWT volumes on these roadways increased more than 30,000 per day. The Beltline is the only centrally-located roadway that directly connects the west and east sides of the metropolitan area. According to data collected for WisDOT's Beltline study, over one-half of all vehicles that use the Beltline, exit after passing four interchanges or less.

Traffic volumes also grew significantly on radial arterials outside of the Beltline and Interstate system. This includes US 18/151 (Verona Road), US 14, CTH S (Mineral Point Road), and CTH M (S.

Pleasant View Road). CTH K and WIS 19, circumferential routes on the north side, also saw significant traffic growth. Recently completed and programmed projects have or will be addressing capacity issues on US 18/151, including its interchange with the Beltline, CTH S (Mineral Point Road), and CTH M (S. Pleasant View Road). An existing bottleneck at the US 12/CTH K intersection was addressed in 2015. The intersection of CTH M and CTH K also experiences significant peak hour traffic congestion and needs improvement.

Traffic growth has also occurred on some of the radial arterials inside the Beltline, including WIS 30, East Washington Avenue, University Avenue, and Park Street. Volumes on other radial arterials in the central area, such as Monroe Street, Regent Street, and Johnson/Gorham have remained fairly consistent over the 1992 to 2013 time period, but can fluctuate from year-to-year. Traffic has remained steady in part because the downtown/ isthmus area has not seen much growth in employment compared to peripheral employment centers. Additionally, these arterial roadways through the downtown/ isthmus area are near capacity during peak commute times. Therefore, drivers are choosing alternative routes either south or north around the lakes for cross town trips.

According to travel data collected for the Beltline Study, during the weekday a.m. peak period only 10-20% of traffic traveling in the downtown/isthmus does not have an origin or destination there.

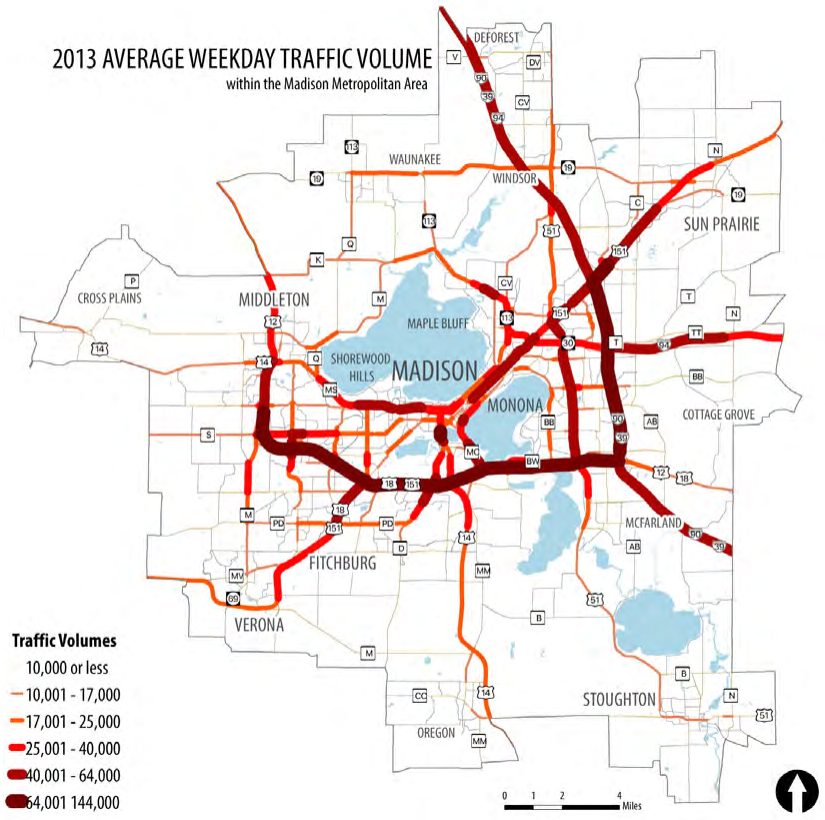


Figure 3-12: 2013 Average Weekday Traffic Volume

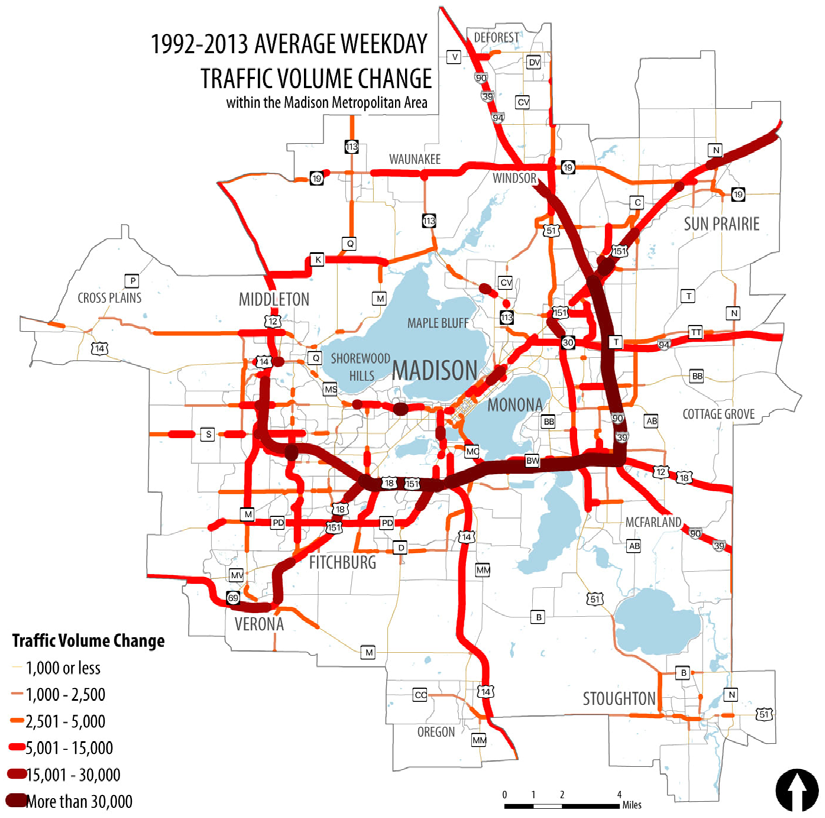


Figure 3-13: 1992-2013 Average Weekday Traffic Volume Change

Congestion Mitigation Strategies

Dane County's roads are busier than ever before. In fact, according to WisDOT's estimate average daily vehicle miles of traveled, or VMT, in the county reached a new high in 2015 of 13.6 million miles. This extra traffic means that the potential for congestion, unreliable commute times, and unsafe roadway conditions is higher than ever.

Roadway congestion is common during the morning and afternoon rush hour periods on heavily traveled regional roadways. Related to congestion is travel time reliability – the variability in travel times that can occur from one day to the next. For most commuters, recurring peak period congestion is understood, anticipated, and planned for.

Drivers generally budget extra time to allow for routine 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 late deliveries, and can disrupt the just-in-time delivery process. In many cases, rush hour congestion is difficult or impossible to solve due to physical constraints, costs, and the negative impacts of roadway expansion; however, reliability can be improved through a variety of operational enhancements and incident response management techniques.

The following are the seven commonly accepted sources of congestion that can lead to travel time reliability issues. Capacity limitations of roadways, or physical bottlenecks, only account for, on average, about 40% of the delay.[2]

1. Physical Bottlenecks (40%) – Capacity limitations due to design of motorway
2. Traffic Incidents (25%) – Crashes and accidents that impeding travel lanes
3. Work Zones (10%) – Construction activities that result in physical changes to motorway
4. Weather (15%) - Snow, rain, or other events that change driver behavior and impact flow
5. Traffic Control Devices (5%) – Poorly timed signals, rail crossings, etc.
6. Special Events (5%)– Sporting events, concerts, etc. that cause surges in traffic demand
7. Fluctuations in Normal Traffic – Day-to-day variations that lead to high-demand days

Complicating things, many of these sources of congestion can trigger another source to occur (a weather event causing a crash, a special event making a work zone bottleneck worse, etc.). This means that significant payoffs can be expected by implementing a comprehensive congestion management process (CMP) that includes travel demand management (TDM) and transportation system management (TSM) and operations strategies such as transit and ride-sharing incentives, traffic signal coordination, traveler information, and enhanced incident response, along with physical bottleneck relief through targeted capacity expansion.

[2] https://ops.fhwa.dot.gov/congestion_report/executive_summary.htm

Congestion Management Process for the Madison Area

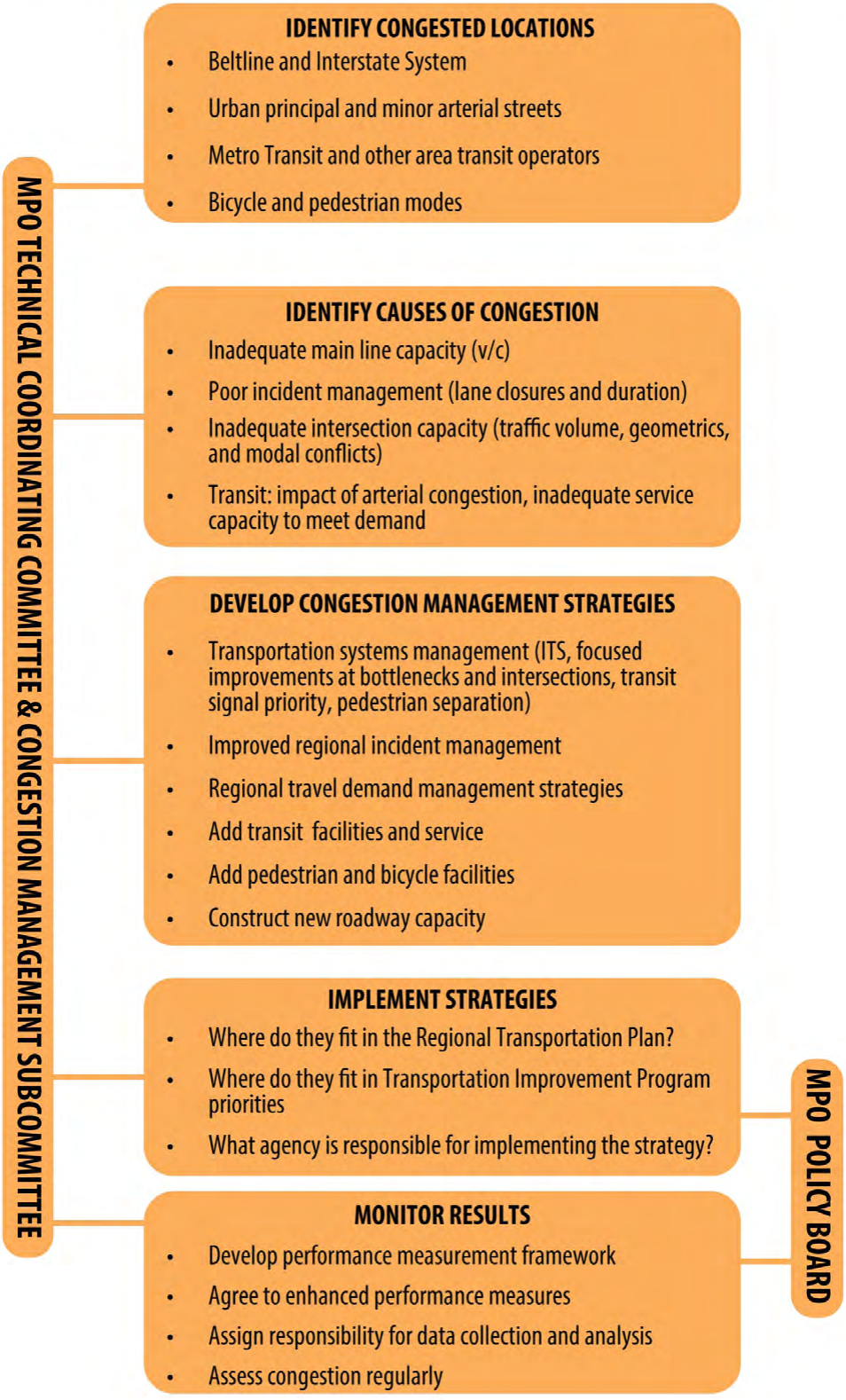


Figure 3-9: Congestion Management Process for the Madison Area

Congestion Management Process

A Congestion Management Process, or CMP, is a systematic process that provides information on transportation system performance and provides alternative strategies to alleviate congestion and enhance the mobility of people and goods. In short, it is a way to get the most out of the existing transportation system. Metropolitan planning organizations are required to maintain a CMP if planning for an area with a population of over 200,000. MATPB adopted its most recent CMP in November 2011.

FHWA says that CMPs must include:

- Methods to monitor and evaluate the performance of the multimodal transportation system, identify the causes of recurring and non-recurring congestion, and identify and evaluate alternative strategies
- Objectives and performance measures to assess the extent of congestion and support the evaluation of the effectiveness of congestion reduction and mobility enhancement strategies for the movement of people and goods that have been deemed acceptable by local transportation officials, the MPO, State DOT
- Establishment of a coordinated program for data collection and system performance monitoring to define the extent and duration of congestion, to contribute in determining the causes of congestion, and evaluate the efficiency and effectiveness of implemented actions
- Identification and evaluation of the anticipated performance and expected benefits of appropriate congestion management strategies that will contribute to the more effective use and improved safety of existing and future transportation systems based on the established performance measures
- Identification of an implementation schedule, implementation responsibilities, and possible funding sources for each strategy (or combination of strategies) proposed for implementation
- Implementation of a process for periodic assessment of the effectiveness of implemented strategies, in terms of the area's established performance measures

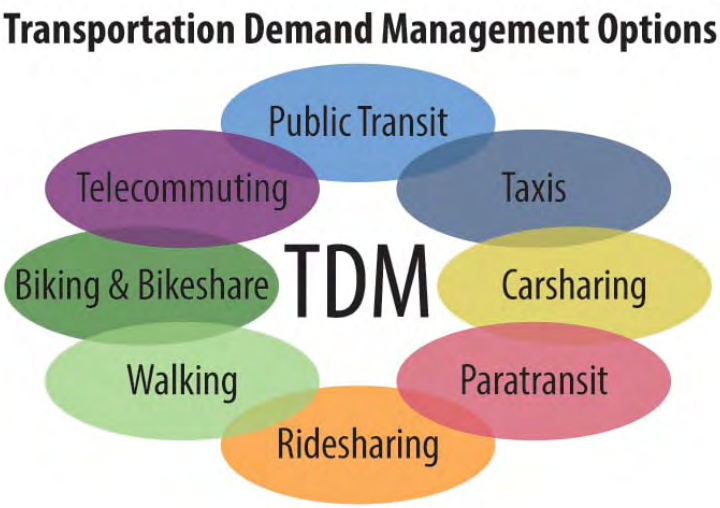
Depending upon the need, recommendations for congested corridors can range from implementing better incident management to strategic capacity enhancement. Recommendations will fall into one of three categories: TSM, TDM, or capacity enhancement. The type of recommendation will depend on need, available right of way, land use context, cost, and other considerations. Per MATPB policy, roadway capacity enhancements are generally considered only after implementing both TDM and TSM strategies and not achieving anticipated or desired congestion reduction. A Level of Service (LOS) of D is generally considered acceptable, and service levels lower than that must sometimes be tolerated in certain areas such as downtowns due to right of way constraints and the negative impacts of expanded roadway capacity such as impacts to other roadway users and removal of parking.

Transportation System Management (TSM)

TSM is a planning tool that focuses on increasing the efficiency of the transportation system by active management of facility operations using technology to minimize the effects of incidents or recurring vehicle congestion. This strategic approach places emphasis on improving existing system efficiency by utilizing intelligent transportation system (ITS) technology to ensure that drivers are aware of incidents, that incidents are attended to rapidly, and that the network responds to sudden fluctuations in driving conditions. This approach also examines and implements future technologies that can improve system efficiency such as connected vehicle technology, coordinated, staged, or adaptive traffic signals, and dynamic message signs. ITS is increasingly becoming a key component of TSM.

Transportation Demand Management (TDM)

TDM is a planning tool that focuses on increasing the number of options for people utilizing the transportation system and incentivizing the use of those options. TDM strategies include increasing awareness and utilization of public transportation, taxis (including app-based services), car sharing, paratransit, ridesharing, vanpooling, carpooling, walking, bike sharing, and telecommuting. Additionally, transportation demand can be managed by adopting land use policies that encourage more compact development with mixed uses and well-connected street networks that can reduce trip length and frequency while providing an environment that is supportive of non-auto modes of travel. More information about TDM, including strategies being implemented by MATPB, can be found on page 3-31.



BICYCLES

Existing Bikeway System

The Madison metropolitan area is served by an interconnected bikeway network, consisting of off-street shared-use paths, on-street bike lanes, and local streets. Bikeway construction began in earnest in the 1990s and most major roadway projects now feature provisions for bicyclists as well as pedestrians. Several rail and other corridors have been utilized to build high quality shared-use paths.

The 2015 Bicycle Transportation Plan organized components of the bikeway system into a regional network of primary and secondary bicycle routes consisting on-street and off-street segments (see Figure 3-14). This network helps planners visualize the bikeway network as it is used by cyclists, identify gaps, and prioritize improvements. The Bicycle Transportation Plan identifies regional bicycle infrastructure needs and outlines recommended regional priority path segments to improve the connectivity of the system and build a truly regional network.

Most communities in Dane County also engage in bikeway planning. The City of Madison has worked cooperatively with MATPB staff to develop and adopt the regional bicycle plan. The Cities of Fitchburg (2017) and Middleton (2009) regularly update their local plans. Other communities including Sun Prairie, Stoughton, McFarland, and Verona have undertaken updated bicycle route mapping and studies to identify and prioritize planned facilities. Local comprehensive and/or recreation and open space plans typically include a bicycle transportation component. The City of Madison also plans for bicycle infrastructure as part of preparation of neighborhood development plans.

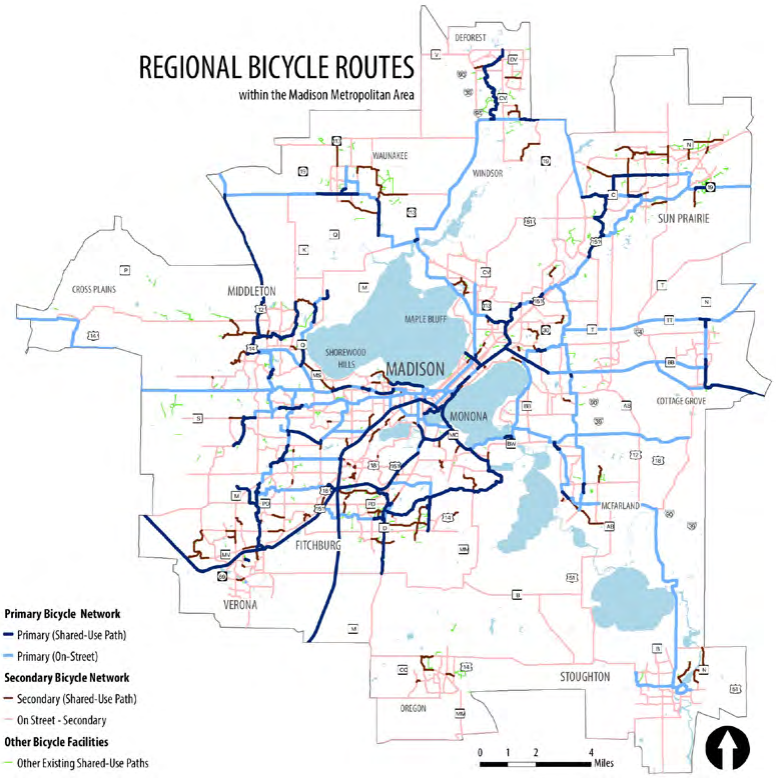


Figure 3-14: Regional Bicycle Routes

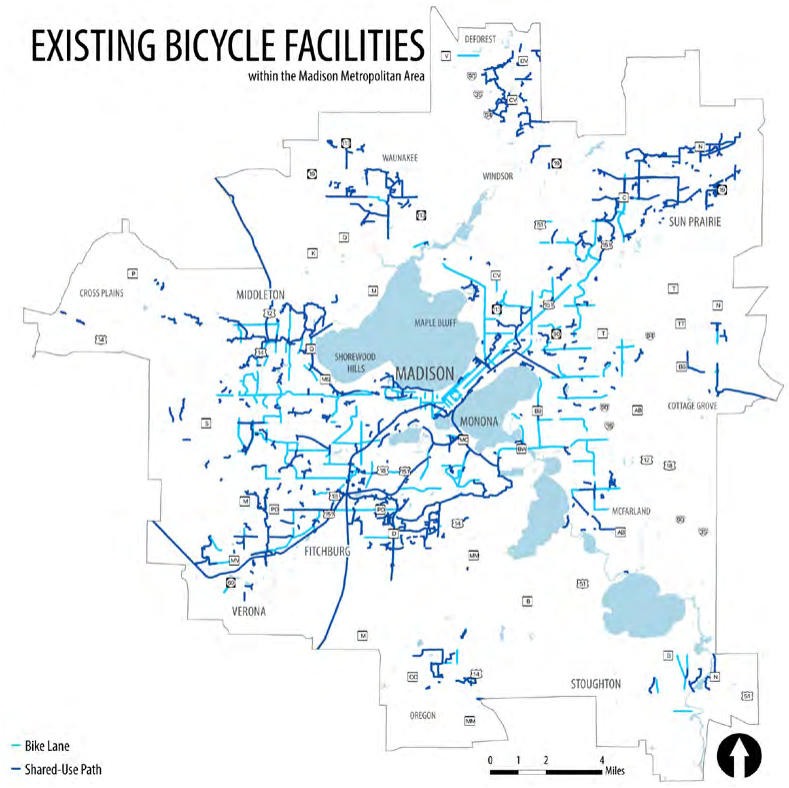


Figure 3-15: Existing Bicycle Facilities

Bicycle Facilities

Bicycle facilities consist of a combination of shared-use paths and on-street facilities such as bike lanes and paved shoulders (in rural areas) and bike boxes and other intersection improvements. Appropriate bicycle facilities are generally included on street corridors as they are reconstructed, if possible. Newer innovative features are now beginning to be added such as separated bicycle lanes and bike signals. Still, gaps in the network persist that make it difficult for cyclists to operate safely and comfortably and access destinations. The 2015 Bicycle Transportation Plan identified several types of bicycle facilities used in the Madison area and around the U.S. Bicycle facilities are chosen based on many factors, including the projected usage, safety design, cost, and available space. Figure 3-15 on page 3-19 shows existing bicycle facilities.

Well-connected street networks are important for bicyclists to navigate within neighborhoods. Most of these streets have no specific bicycle treatments – they are unnecessary because of the low traffic speeds and volumes. In some cases, where continuous low-volume streets are used by high volumes of bicyclists and for longer journeys, they may have bicycle priority features like traffic calming, wayfinding signage, and sharrows.

Dedicated bike lanes are used on arterial and collector streets to separate bicyclists from traffic. They may be separated from traffic with a buffer space or vertical element like a curb or row of parked cars. Counter-flow bike lanes are used on one-way streets to allow two-way bicycle traffic.

Shared-use paths are the most comfortable bicycle facilities because they eliminate the need for a bicyclist to interact with traffic outside of street crossings. Shared-use paths are typically built along existing transportation corridors, through parks, and in other locations where land can be secured. However, they often do not provide direct access to homes and businesses.

Paved shoulders wide enough for bicycle use are used in rural areas where bicycle traffic is relatively low. They operate similarly to bike lanes but also serve as emergency stopping lanes for drivers.

Madison is served by a popular and successful bike-share system operated by BCycle. The system currently operates 350 bikes and 40 docking stations (see Figure 3-16). Stations are centered around central Madison but extend out to University Row (University Avenue at Midvale Boulevard), Monroe Street, the Alliant Energy Center, Olbrich Botanical Gardens, and Madison College's Truax Campus. The service attracted about 101,000 bike trips in 2016.

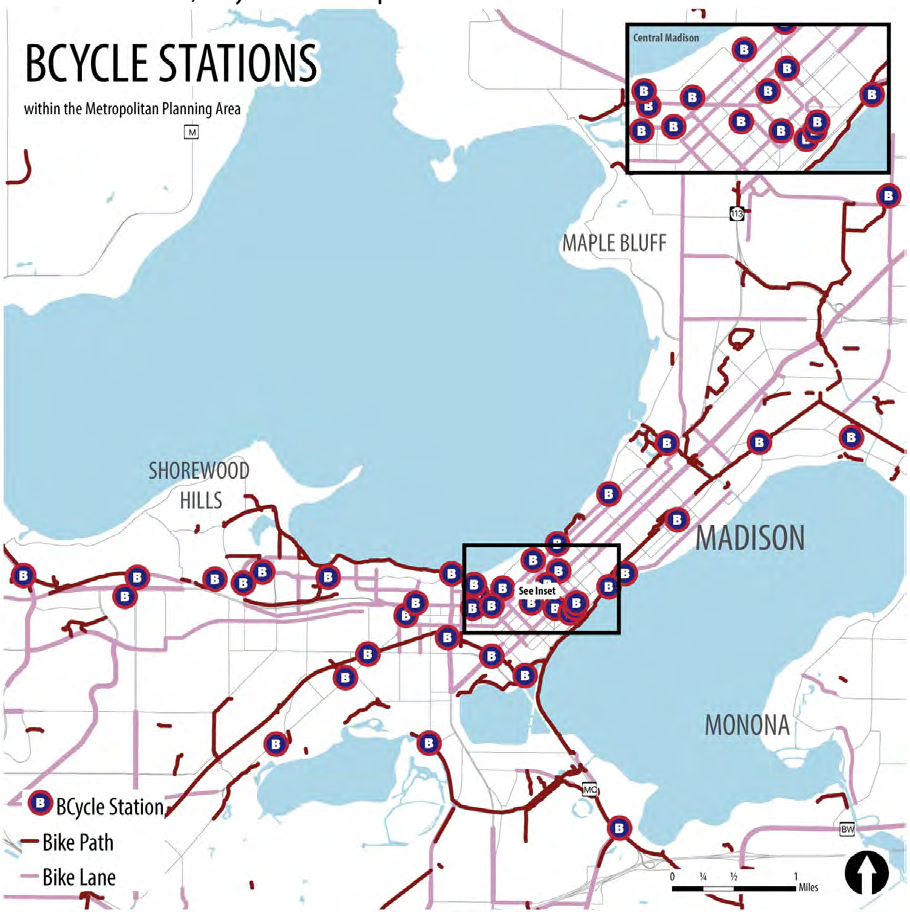


Figure 3-16: BCycle Stations

Education and Encouragement Programs

Education and encouragement programs help people of all ages, backgrounds, and abilities make use of bicycling infrastructure. These programs help people learn to use the roads and paths safely, and help those who are new to bicycling start riding. Other programs help educate motorists about how to safely interact with bicyclists.

Maps and Wayfinding

The Cities of Madison, Fitchburg, Middleton, and other communities publish local bike maps. MATPB, in partnership with Dane County, publishes the Dane County Bicycle Map, which shows the level of bicycle suitability on rural roadways and highlights suitable through routes connecting communities and major destinations in the county. The Wisconsin Department of Transportation provides bike maps for all counties in Wisconsin.

Historically, shared-use paths and bike routes were named and signed by their controlling jurisdictions. The Dane County Bicycle Wayfinding project established standards for marking bicycle routes to provide consistency across jurisdictions, making it easier and more convenient for cyclists to navigate the system.

Bicycle Usage

Bicycle usage has increased dramatically in the last 15 years or so. The U.S. Census provides reliable commute-to-work bicycle counts that show that about 3.6% of commuters in the Madison Urban Area bike to work. The number rises to 5.5% for commuters residing in the City of Madison and exceeds 10% in some central Madison Census Tracts as shown in Figure 3-17. The increases are largely associated with improved bicycle infrastructure, changing attitudes about transportation and the environment, and the cost and availability of parking in central Madison.

Estimating bicycle usage for non-commute trips is extremely difficult. The City of Madison has several bicycle-counting devices at various locations spread throughout the city that show high usage particularly near the UW-Madison campus and on the Southwest and Capital City Paths. A household travel survey is being conducted in 2016-'17, which will provide data on travel by bicycle and other modes for all trip purposes. The survey will also provide information on factors that prevent people from choosing to make more of their trips by bike, foot, and transit.

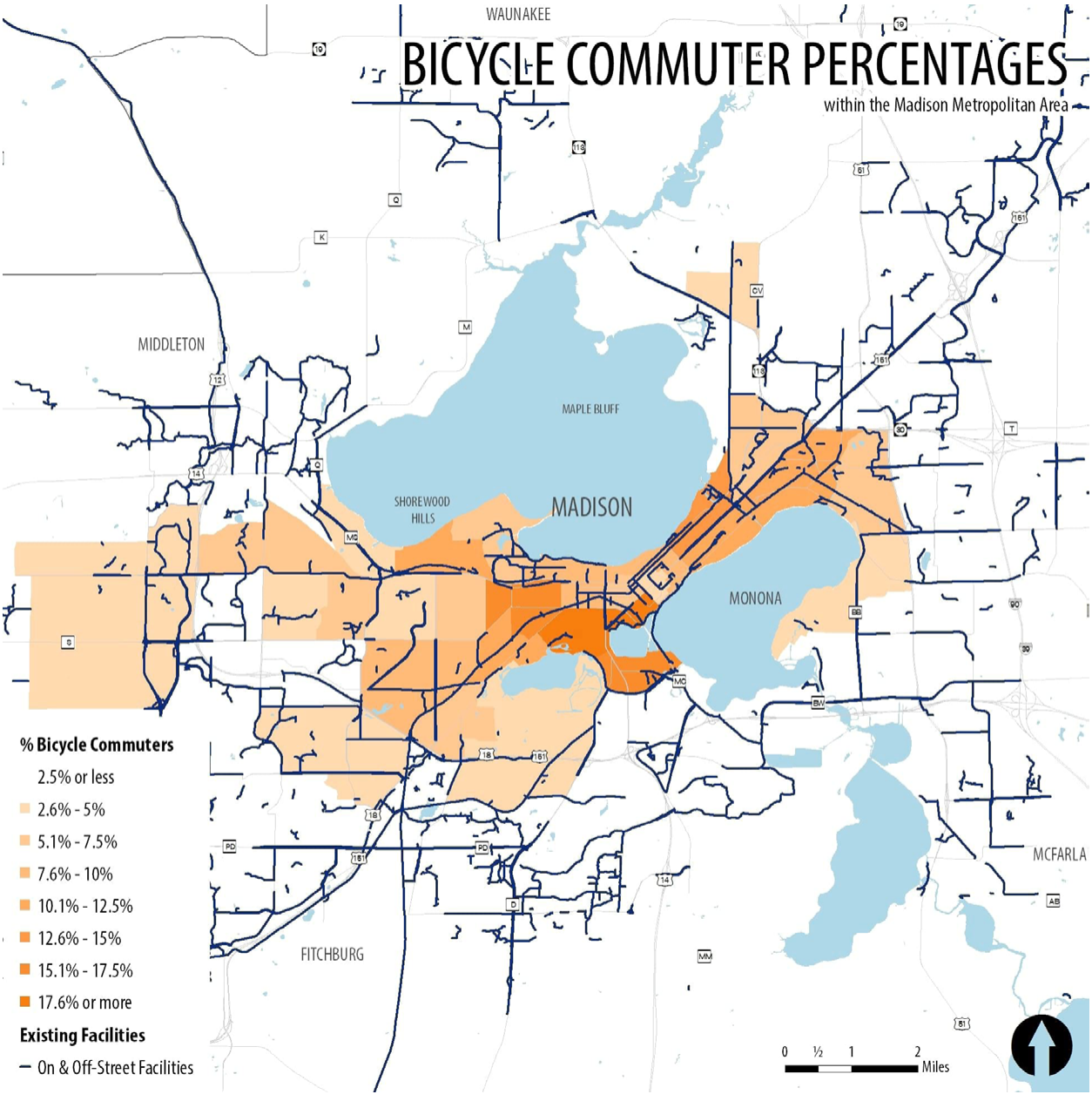


Figure 3-17: Percentage of Commuters Traveling by Bicycle

PEDESTRIANS

Existing Pedestrian System

Pedestrian facilities are important for a safe transportation system that accommodates all users. Sidewalks make walking safer and more pleasant for pedestrians, including the disabled, and provide access to public transit, increasing transportation options for those who may not be able to drive. Having sidewalks on both sides of the street makes walking easier and safer by reducing the number of times pedestrians must cross the street and be exposed to traffic. The City of Madison and other communities have programs that routinely retrofit sidewalks and crosswalks with curb ramps on streets that do not have them and repair sidewalks that are damaged or do not meet modern standards.

All streets benefit from sidewalks. They create a healthier community, as research has shown people will walk more often for recreational purposes if one is provided. Sidewalks, however, are most crucial on urban arterial and collector streets which have higher traffic speeds and volumes and serve more destinations. Sidewalks on these streets provide the most safety benefits and increase the number of transportation trips made by walking. In addition, shared-use paths are also used by pedestrians as an alternative to walking along streets or because they provide shorter routes to destinations.

Intersections represent a special barrier for pedestrians because of the dangers pedestrians face navigating across streets where turning traffic may be passing through the crosswalk and drivers may be focusing on several things at once. Motor vehicle traffic is required to yield to pedestrians at most unsignalized intersections, but compliance is limited.

Sidewalk Coverage

MATPB maintains a county-wide sidewalk database in order to track sidewalk coverage. The database contains information on whether each public street has a sidewalk or shared-use path on both sides, one side, or no sidewalk at all (Figure 3-18). It further tracks whether streets are primarily urban or rural (sidewalks are not normally installed on rural roads) and whether or not a sidewalk is expected, due to existing development and other circumstances. Sidewalks are not normally built on frontage roads, freeways and ramps, and in similar locations.

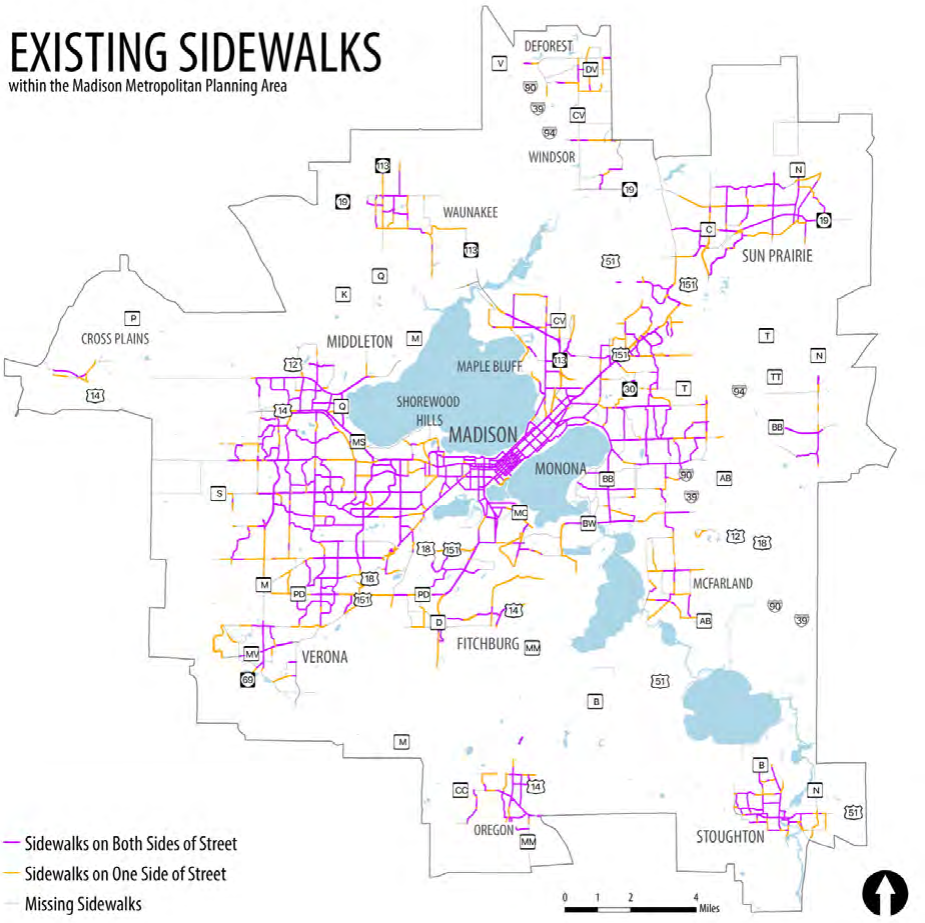


Figure 3-18: Existing Sidewalks

The sidewalk analysis and recommendations in this regional transportation plan focus on collector and arterial streets. In the planning area, about 55% of urban collector and arterial streets by length are estimated to have sidewalks on both sides where they are expected; about 21% have sidewalk on one side, and the remaining 24% have no sidewalk. Many of the urban streets that are missing sidewalk are in peripheral neighborhoods – in some cases sidewalk will be added systematically as the neighborhoods develop.

The Challenges and Trade-Offs with Sidewalks

Although sidewalks are normally included in new construction in most jurisdictions, installing sidewalks along streets in established neighborhoods is sometimes met with local opposition. Residents may be concerned about several issues, including being assessed for the cost of sidewalk installation, the need to clear snow and ice in the winter, and the perceived loss of yard area.

City of Madison residents are charged a special assessment for sidewalk installation and repair. A pilot program was used in 2015 in order to reduce this burden for low-income residents. While it is common for residents or developers to pay a special assessment for the construction of new sidewalks, some municipalities, such as the City of Sun Prairie, do not.

Intersection Treatments

A variety of intersection treatments are used in the Madison area to make intersections safer for pedestrians. Some examples are shown below (see Appendix F for more information on pedestrian facilities and safety treatments).

Marked Crosswalks

Legal crosswalks can be either marked or unmarked. But well marked crosswalks are easier for drivers and pedestrians to see.

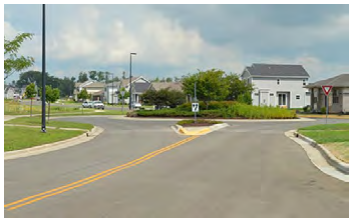
Pedestrian hybrid beacons

Special traffic signals at an intersection that does not warrant full signalization. The signals are only activated when a pedestrian is present and presses the button.

Rectangular Rapid flashing beacons

Yellow LED lights can, in some cases, be associated with signs at crosswalks to alert drivers at a crosswalk. The lights are activated by a pedestrian.

Median refuge islands



Refuges can shorten distance needed to cross an intersection and allow a pedestrian to make a multi-stage crossing. Refuges should be wide enough to safely accommodate several pedestrians.

Curb extensions

Intersection treatments designed to shorten the effective crossing distance for pedestrians.

Wayfinding signage

In dense commercial areas like downtowns and campuses, wayfinding tools like maps can be valuable for people who are unfamiliar with the area.

Pedestrian Walk Access Analysis

High quality pedestrian facilities are most needed in areas with high population density and a mix of pedestrian-generating land uses like stores, schools, parks, and employment. The pedestrian walk access analysis estimates pedestrian demand using these principles. The analysis counts the number of destinations within walking distance of each Census Block, using a distance-decay function, and assigns each block a destination accessibility score. It then weights the score by Census Block population density, to estimate potential pedestrian demand. Neighborhoods with a high population density and dense mix of walking destinations recieve higher scores. The analysis tool has some limitations as it does not directly account for the attractiveness of the pedestrian environment, such as building orientation, proximity to the street, and other factors. However, it is a useful aid in prioritizing gaps and deficiencies in the pedestrian network. Destinations included in the walk access analysis include:

- Coffee shops, banks, and retail outlets
- Child care centers, schools, and colleges and universities
- Grocery stores
- Restaurants
- Community centers, libraries, and places of worship
- Medical facilities
- Parks

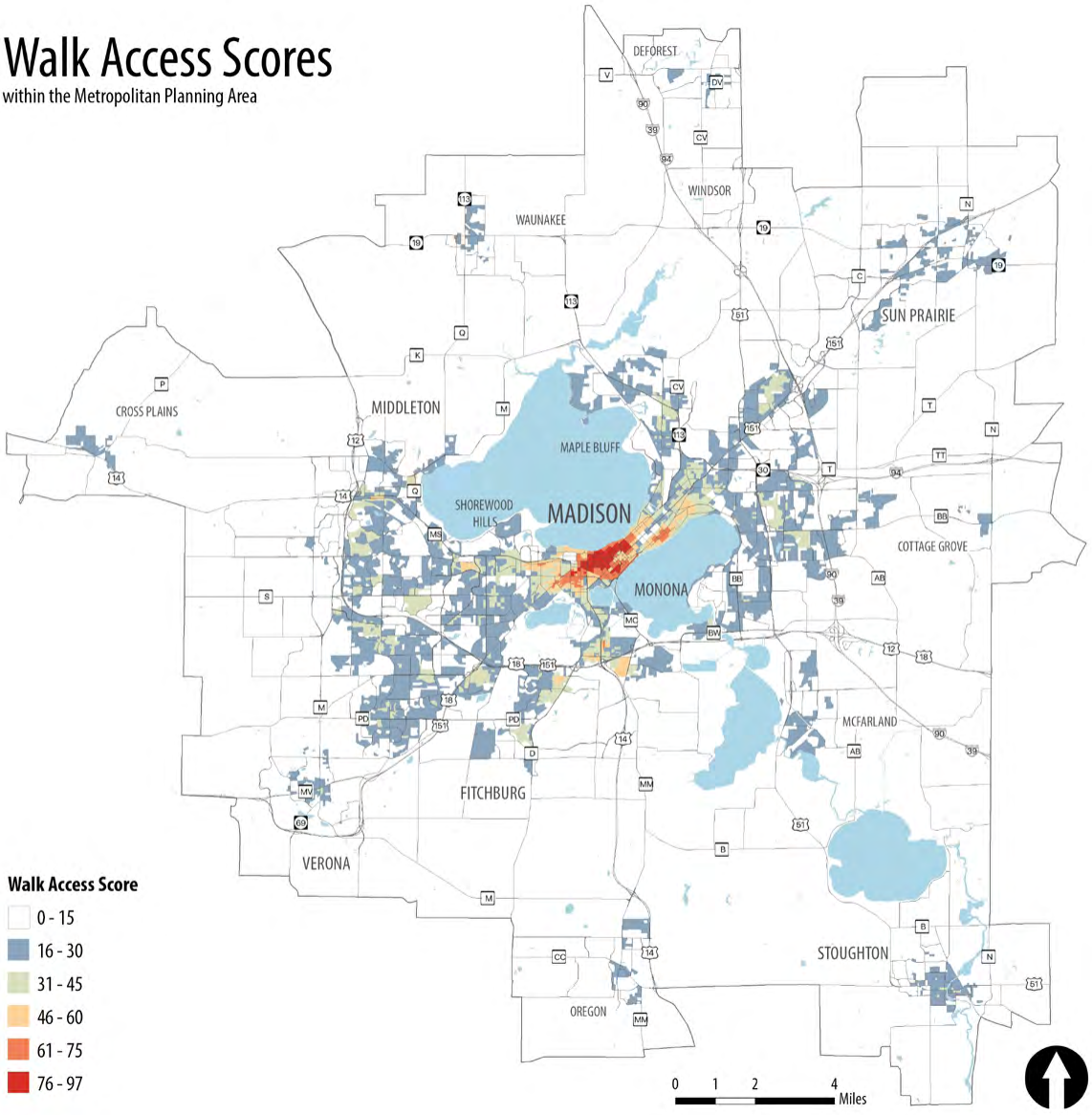


Figure 3-19: Walk Access Scores

Not surprisingly, the central Madison area, including the UW-Madison campus, generates the highest walk access scores. Other mixed-use neighborhoods like Schenk-Atwood, Dudgeon-Monroe, Regent, South Park Street, and suburban downtowns also receive fairly high scores. Many urban neighborhoods have moderate walk access scores, and these areas have regular pedestrian traffic and may have missing connections or substandard facilities.

Street Network Connectivity

Besides high quality pedestrian facilities, pedestrians need a dense network of streets. Since people only walk at a speed of a few miles per hour, any out-of-direction travel is an impediment to walking. Downtown and older neighborhood grid systems with short blocks and dense street networks are ideal for walking.

Intersection density is a key indicator of pedestrian network connectivity. Generally, a higher number of intersections is correlated with shorter blocks and easier navigation. Linear barriers, such as water features, freeways, and railroads also present impediments to walking. Intersection density and linear barriers are shown in Figure 3-20.

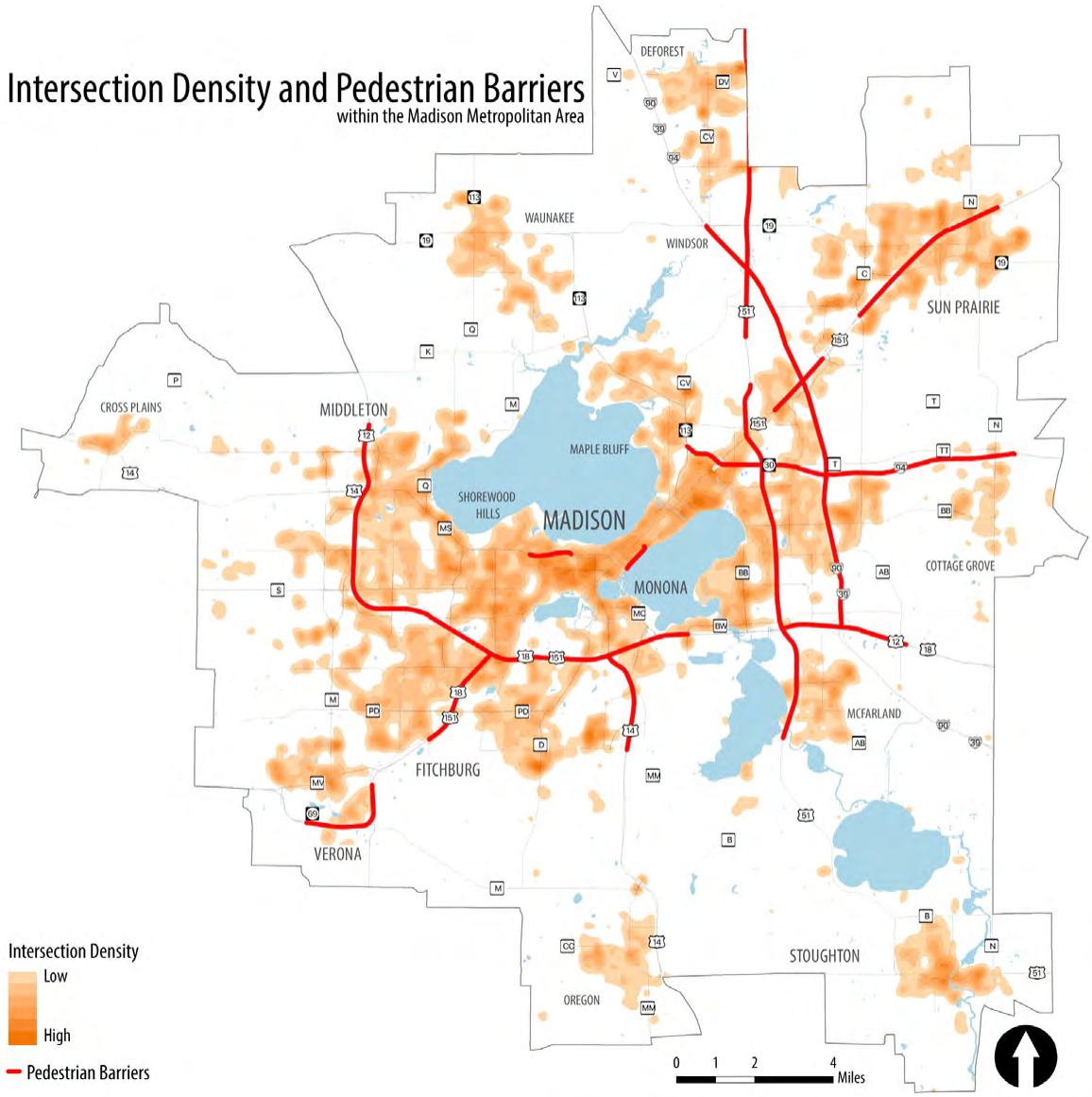


Figure 3-20: Intersection Density and Pedestrian Barriers

The Beltline Highway and Interstate 39/90/94 present significant challenges for connecting neighborhoods. New pedestrian connections across these regional roadways, like new non-interchange crossings, are needed and existing connections may be improved by adding or widening sidewalks and improving intersection crossings at ramp terminals.

All rail lines in the urban area are low volume,low speed lines with relatively frequent crossings. Several rivers and creeks cross the urban area but numerous bridges help to reduce their impact on pedestrian connectivity. For example, the Yahara River contains nine pedestrian crossings in its one-mile stretch between Lakes Mendota and Monona. The City of Madison has identified the need to connect the Capitol Square with Lake Monona with a better crossing of John Nolen Drive and the railroad.

PUBLIC TRANSIT

Service Providers

Metro Transit is operated by the City of Madison and provides the majority of public transportation service in the Madison metropolitan area. Metro operates a fleet of about 215 fixed-route buses as well as point-to-point paratransit service for qualifying people with disabilities. Metro partners with the Cities of Middleton and Fitchburg as well as the University of Wisconsin and other municipalities and entities to provide service outside the City of Madison.

Metro Transit has had an overall trend of increasing ridership since the City of Madison acquired the Madison Bus Company in 1970 as shown in Figure 3-22. The US Oil Crisis of the 1970s caused transit ridership to spike across the nation. Throughout the 1980s ridership declined before reaching a period of moderate growth in the 1990s and fast growth in 2000s. Annual ridership first exceeded 14 million in 2011 and increased further in 2014. Ridership declined in 2015 and 2016. The causes of this recent decline are not entirely clear but may be linked to declining gasoline prices.

In addition to Metro Transit, the City of Monona provides fixed-route commuter service during the morning and afternoon peak periods, called Monona Express, and specialized transportation for seniors and people with disabilities in the mid-day called Monona Lift. Monona Express operates in a counter-clockwise loop around Lake Monona in the morning and a clockwise loop in the evening. Service is only provided to passengers travelling within Monona or between Monona and Madison. Publicly subsidized shared-ride taxi service is available in Sun Prairie and Stoughton.

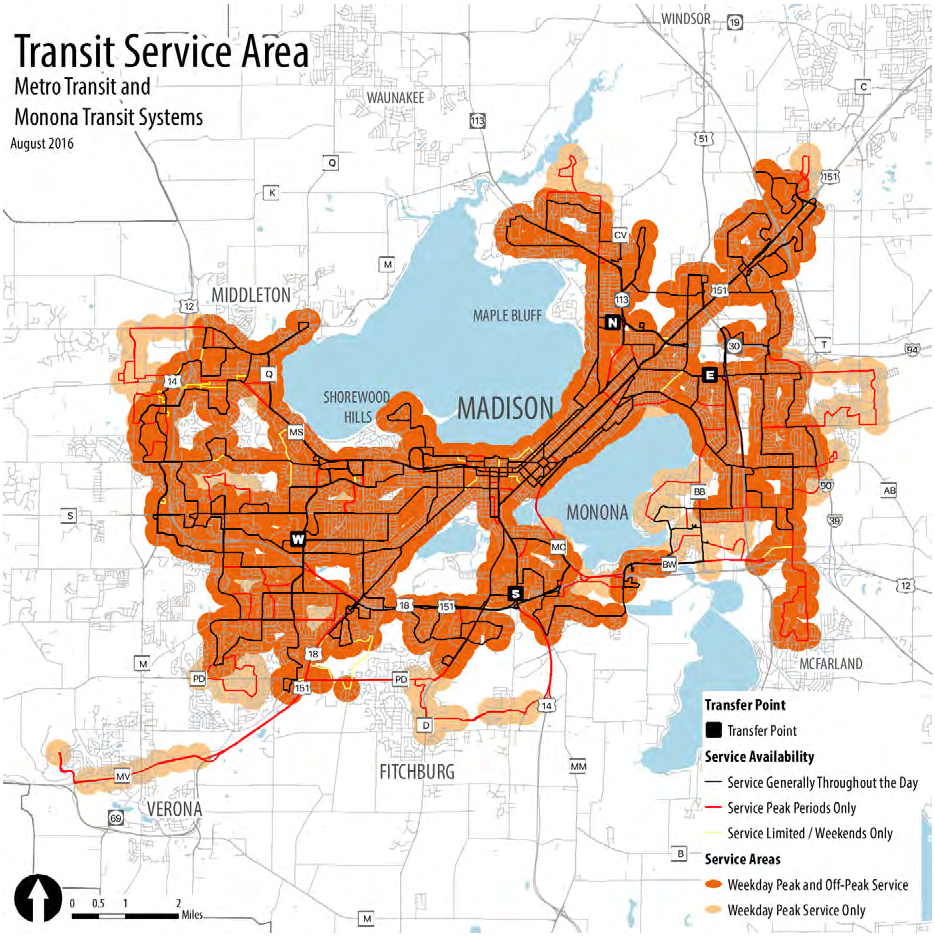


Figure 3-21: Transit Service Areas

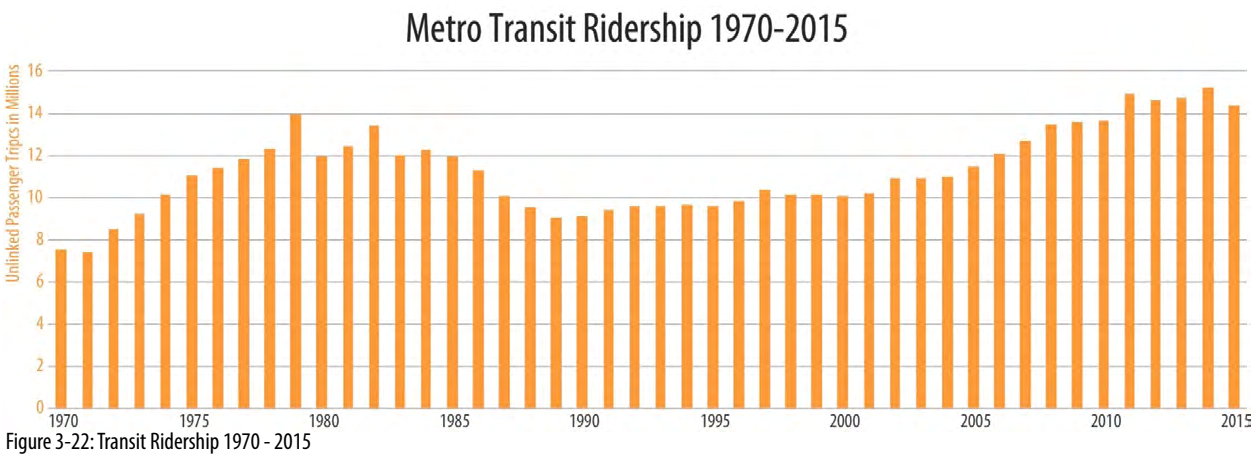


Figure 3-22: Transit Ridership 1970 - 2015

Service Levels

Metro Transit operates 62 mainline fixed routes and several supplemental school day routes based out of Madison's four public high schools. Service is designed around four transfer points with most routes operating every 30 minutes during weekday peak periods and every 30 to 60 minutes off peak if service is offered during those times. Timed transfers at the transfer points allow for efficient connections throughout Metro's service area. Many routes overlap in central Madison to provide service every 15 minutes or better.

Metro Transit's service is concentrated in the morning and afternoon peak periods with about 180 buses in operation during those times. Fleet utilization drops to about 60 buses during the weekday mid day and 35 on weekends. The added service during peak periods consists of increased frequency on all-day routes, commuter routes that provide faster, more direct service and supplemental school day routes targeting middle school and high school students.

Bus Operations

Metro Transit dispatches its fleet of about 215 buses and 17 paratransit vans from a single bus storage and operations facility on East Washington Avenue at Ingersoll Street. The facility was renovated in 1981 with the intent of housing a fleet of about 160 buses and is currently operating beyond capacity. Buses are parked in drive aisles and maintenance bays overnight and Metro leases a small lot in Middleton. Service expansion during peak periods is currently not possible because of the lack of available buses during peak periods.

Metro Transit applied unsuccessfully for a Federal TIGER grant in 2015 and 2016 for funding assistance for a new satellite bus storage and maintenance facility in northeast Madison on Nakoosa Trail. The

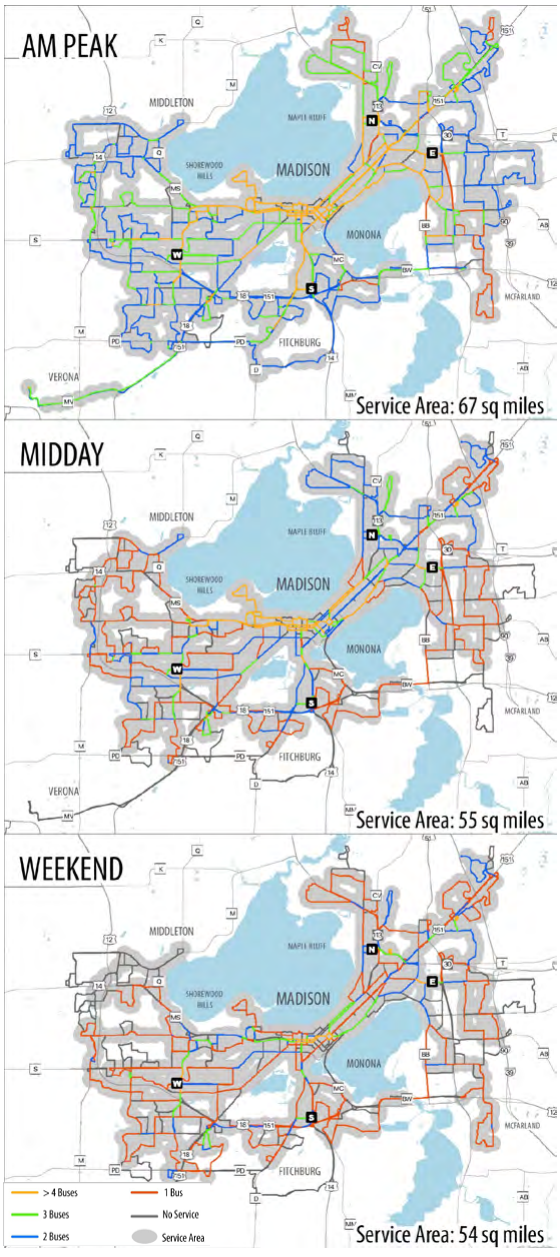


Figure 3-23: Transit Service Areas

new facility would reduce bus crowding at the existing facility and provide space for expansion, allowing Metro to provide new service including bus rapid transit. The Nakoosa Trail facility is planned to be LEED-certified and include a fitness room intended to reduce healthcare costs for bus operators and other employees.

Metro Transit's fixed-route fleet consists entirely of standard-length 40-foot diesel transit buses, about 10% of which are hybrid diesel-electric. Metro Transit, in coordination with MATPB, conducted a Bus Size Study in 2014, reviewing the fleet make-up. The study concluded that although the uniform fleet cost-effectively serves the area, the overcrowding problems encountered on several routes could be solved with larger 60-foot long articulated buses. Further, a few buses could be replaced with shorter 30-foot buses, although the small number of 30-foot buses combined with similar operating costs would not result in large cost savings.

Funding

Funding for public transportation in the Madison area is derived primarily from four sources – fares, property taxes, federal grants, and state operating grants. As Metro Transit is a City of Madison utility, some service, particularly service provided outside the city limits, is funded through partner agreements where other municipalities or institutions cover the local share of the service.

Metro Transit's funding and governance structure as a city-owned utility is fairly uncommon. A Regional Transit Authority which would raise revenue in the transit service area has been explored but is not currently allowed by state law. Enabling legislation was granted in 2009 and rescinded in 2010.

For more information on transit service in the Madison area, see the 2013-2017 Transit Development Plan for the Madison Urban Area prepared by MATPB in cooperation with Metro Transit and other transit providers.

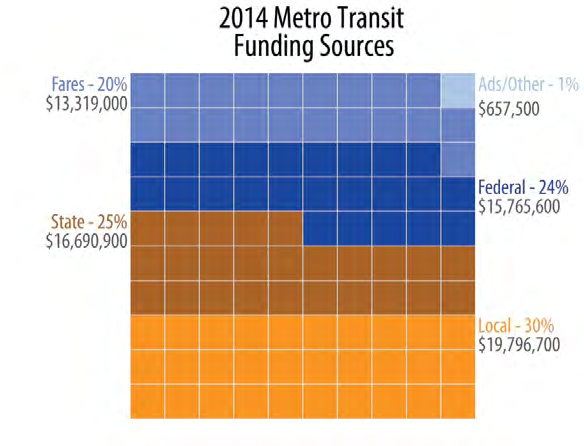


Figure 3-24: 2014 Metro Transit Funding Sources

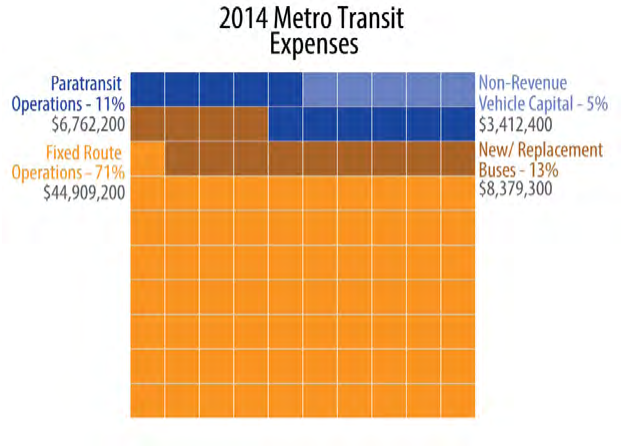


Figure 3-25: 2014 Metro Transit Expenses

Specialized Transit Service Providers

The majority of specialized transit open to the public is supported by Metro Transit and Dane County. A variety of private organizations and service providers help bring the service to the public.

Metro Transit provides its paratransit service, Metro+Plus, in accordance with the Americans with Disabilities Act (ADA). The paratransit network shadows the all-day fixed-route bus system, excluding peak-period commute-oriented service. Paratransit service is provided on a demand-responsive, advance-reservation basis for people who are unable to use Metro's regular fixed-route service.

Metro operates its own paratransit service on weekdays. Late-night and weekend service, as well as weekday service beyond the limitations of the directly operated service, is contracted to private providers. Metro coordinated about 274,000 paratransit trips in 2015 (52,000 directly operated and 222,000 contracted).

The Adult Community Services Division of the Dane County Department of Human Services (DCDHS) administers wheelchair-accessible fixed-route group ride and demand-responsive services for seniors and people with physical or developmental disabilities. The services are provided entirely through contracts with private service providers. DCDHS operates an on-call center to help coordinate these services as well as external resources and to help riders easily connect with the correct service.

The group ride services are divided into Group Access Service, in urban neighborhoods, and the Rural Senior Group Transportation Program, which operates outside of the Madison contiguous area. The services provide regularly scheduled weekday routed group trips for seniors (age 60 and older) and people with disabilities who live at home in Dane County. The service is neighborhood-based, connecting residential areas to nearby nutrition sites, grocery/general shopping areas, and other destinations.

The public shared-ride taxi systems in Sun Prairie and Stoughton offer accessible service that is generally door-to-door. Several private taxi companies operate in the contiguous Madison area; however, only Union Cab offers wheelchair-accessible service.

Other specialized transportation services fill various needs. The Retired Senior Volunteer Driver Escort Program (RSVP) provides individual door-through-door rides primarily to medical appointments for adults aged 60 and over, and for people with disabilities, with volunteer drivers in their own vehicles. The Veterans Helping Veterans program provides veterans and their family members with rides to appointments and services.

For more information on specialized transit services and service needs and coordination issues, see the Dane County Coordinated Public Transit – Human Services Transportation Plan (2013), prepared by MATPB in cooperation with Metro Transit, DCDHS, and other service providers.

TRAVEL DEMAND MANAGEMENT AND RIDESHARING

Travel Demand Management

Travel Demand Management (TDM) is generally defined as a set of strategies designed to reduce roadway congestion and demand for single-occupancy vehicle (SOV) travel by redistributing travel demand to alternative travel modes, times, and routes. TDM programs have typically focused on commuter-based programs such as carpooling, van-pooling, transit, telework, and employer-focused incentive and marketing efforts aimed at reducing SOV trips. TDM programs are now also focusing on active transportation and trips beyond work commutes.

In the Madison metro area, a number of programs and strategies are employed to offer options to commuters. These include the Rideshare, Etc. program, the state-run vanpool program, park and ride lots, public transportation services such as buses, vans and shared-ride taxis, shared vehicles, bicycling, and walking. In addition, strategies to encourage the use of these programs such as the Guaranteed Ride Home program, employer transit pass programs, and promotion programs are also in place.

Rideshare, Etc Program

MATPB administers the Rideshare, Etc program in partnership with WisDOT. The program serves commuters in all of Wisconsin along with the counties in neighboring states. The goal of the program is to reduce congestion and pollution, to provide commuters with more travel options, and to improve quality of life in the communities served. The program includes a website (www.rideshareetc.org) where commuters set up a profile and then can tailor a search to their needs, including a search of potential carpool partners, vanpools, transit routes, and biking partners.

Year	New Commuters Registered
2012	907
2013	919
2014	792
2015	703
2016	676

Figure 3-22: Rideshare Etc. Registrations

As shown in Figure 3-22 in 2016, 676 new commuters registered with Rideshare, Etc for the Dane County area. The number fluctuates each year and the number of registrations is often impacted by the addition of new incentives as well as by rising or decreasing gas prices. However, the total number of commuters in the Madison Metro Area active in the Rideshare, Etc. program is much larger, as many people remain in the system after their initial registration. In 2016 there were 1,866 active participants. In addition, ridesharing arrangements are often formed outside the formal Rideshare, Etc. program and are not captured in these statistics. According to recent Census data, around 8.4% of Dane County residents carpool to work.

State Vanpool Program

Madison is served by a number of vanpools operated by the Wisconsin Department of Administration. The State Vanpool Program serves both state and non-state employees commuting to Madison from outside communities, although each vanpool must have at least one state employee. The vanpools are groups of 7 to 15 commuters traveling together in a passenger van owned and insured by the State Vanpool Program. Passengers share the cost of the trip and pay a fare based on the costs to operate the van. The fare covers gas, insurance and van maintenance. Currently the state operates 70 vanpools commuting to Madison with 920 passengers.

Park and Ride Lots

Currently there are twelve formal park and ride lots in Dane County. Nine are operated by WisDOT, one is jointly operated by WisDOT, Wisconsin Department of Natural Resources and Dane County and two are operated by Metro Transit. Of the park and ride lots, five have transit service:

- North Transfer Point at 1213 Huxley Street
- Dutch Mill Park and Ride on US Highway 51 at US Highway 12/18
- Northside Town Center at Sherman Avenue and Northport Drive
- Verona at 2565 Old County Highway PB
- American Center on East Park Boulevard

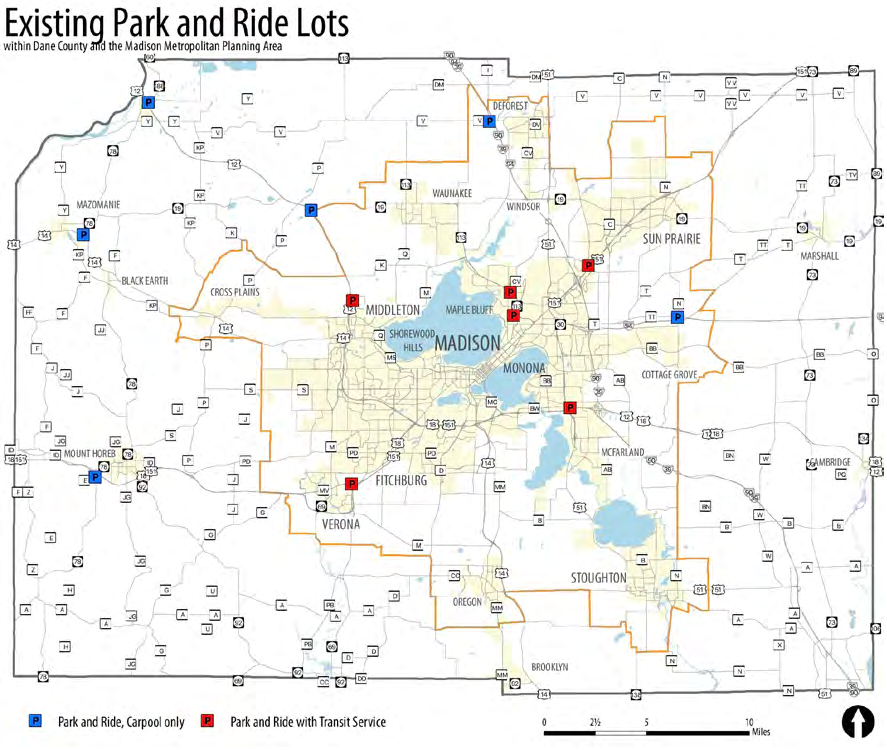


Figure 3-26: Park and Rides

YW Transit & Job Ride Program

YW Transit is a transportation program run by the YWCA that serves Dane County. The three primary goals of the service are as follows:

- Provide rides for low-income people going to/from work
- Provide a safe ride at night for potential victims of sexual assault
- Provide rides to community agency programs for individuals isolated by poverty, age, disability, and language barriers who have no viable transportation options

Source: YWCA

Car Share

Car sharing allows people to access a car for short periods of time, often by the hour. Car sharing makes it easier for people to get by with fewer cars or go car-free, helping members save money while still having access to a car when they need one. Car sharing also provides members with flexibility, since they can access different types of vehicles depending on need. In Madison, car sharing is currently provided by Zip Car. Currently there are 22 Zip Car locations with 32 vehicles which are located on the UW-Madison campus and in the central part of Madison. In the last 12 months the UW-Madison averaged 3,084 members and members used the vehicles for 24,172 hours.

zipcar wheels when you want them

Bike Share

Users of bike share are able to check out a bike at any station, ride to where they need to go, and park the bicycle at the closest station to their destination. People use the bikes to run errands, grab lunch, travel from the bus stop to their office, or just explore the city. The goal is to make it easier for people to make short trips by bicycle.

The City of Madison partners with Trek Bicycles to operate bicycle-sharing through the BCycle program. Currently BCycle operates 40 stations throughout the city with more than 350 bikes. BCycle started with stations primarily on the UW campus and downtown but has been expanding to new areas including stations at Hilldale Shopping Center and Madison College. Many local businesses also partner with BCycle to offer free or low-cost memberships for employees and customers. In 2016 riders took around 101,000 trips covering nearly 308,000 miles and the system averaged just under 300 bike checkouts per day of operation between March 17 and December 31.

Incentive Programs

The Madison area has programs to incentivize commuters to travel by non-SOV modes that are available to all employees. In addition, some businesses have their own incentive systems.

The Guaranteed Ride Home Program supports commuters that do not drive alone to work by providing them with a taxi voucher so they are not stranded at work if an emergency arises. Participants receive up to six vouchers per year good for up to $75 per ride. The program is administered by MATPB and funded by Dane County Highway and Transportation Department. Currently 1,027 people are registered for the Guaranteed Ride Home program.

Metro Transit offers a Commute Card program that is open to employers of any size and offers a reduced price per ride to encourage commuting by bus. The employer can choose to pay the entire cost, share the cost, or have each employee pay for their own rides. Currently 121 employers participate in the program. Large employers such as UW-Madison, City of Madison, Dane County, Edgewood College UW Hospital, Meriter Hospital and St. Mary's Hospital subsidize all or most of the expenses of the Commute Card program for their employees. In addition, a few smaller employers such as Filament Game and the Edgewater Hotel cover the cost of their employees' passes.

Encouragement Programs

To ensure that people are aware of their transportation options and to increase the use of new walking and cycling infrastructure, transit and other services, TDM programs rely on encouragement and education campaigns.

Each year MATPB collaborates with Metro Transit, UW-Madison Transportation Services, and Dane County to run an advertising campaign aimed at raising awareness of commuter options. The campaign usually includes a mix of bus tail ads, online ads, print ads and occasional radio ads.

In addition, Rideshare, Etc. partners with businesses to do outreach through participation in resource fairs and other workplace events as well as providing maps, brochures and other information for businesses to share. Rideshare, Etc. also works with

Sustain Dane to support businesses enrolled in the MPower sustainability program to include TDM projects as a part of their sustainability efforts.

A number of efforts in the Madison area are also focused specifically on promoting bicycling. Many communities participate in the Wisconsin Bicycle Federation-sponsored Bike Week which is held annually in June, and is an expansion of the traditional Bike to Work Day.

One of the newest bicycle promotion programs is the Love to Ride Madison bicycle challenge. This month-long challenge provides messaging tailored to a person's riding experience and encourages experienced bicyclists to get their co-workers and friends out on rides. The ultimate goal of the month-long challenge is to get more people to bike to work and school. The behavior change model recognizes that people are not likely to go straight from never riding a bike to riding one to work. Instead, they are likely to begin with a recreational trip on the weekend and then, once they get comfortable on a bike, move on to cycling on an easy errand before they try commuting to work.

In addition, the Safe Routes to School movement focuses on getting parents and children to walk and bike to school, as children being driven to school creates congestion and safety concerns. Safe Routes to School programs exist in schools throughout Dane County to promote walking and bicycling to and from school. Starting in 2017 a coordinated county-wide program will begin with Federal Transportation Alternatives Program funding provided by MATPB.

UW-Madison Commuter Solutions Program

UW-Madison has a comprehensive TDM program, with a staff that includes a Program Manager, a Ped/Bike Coordinator, and a Flex Parking/Transit Coordinator. The UW Commuter Solutions program UW-Madison TDM activities include:

- Promoting Transit: UW-Madison provides free campus bus service and contracts with Metro Transit to provide a Commute Card for both faculty/staff and students.
- Supporting Carpooling: The UW offers 6 daily parking passes at no cost for registered carpool members as an added incentive.
- Park and Ride: The UW offers park and ride lots for faculty and staff including one at Wingra Dr. and one at University Crossing that have a shuttle to campus. The UW also has a park and ride lot at University Research Park that is served by Metro Transit.
- Occasional Parking for non-SOV commuters: The Flex Parking program provides occasional parking to people who normally commute by alternate modes.
- Supporting Bicycling: The UW provides bicycle parking throughout campus, with bike lockers and cages for more secure parking. The UW also runs a Bicycle Resource Center that offers free use of tools and classes on maintenance and repair for students and employees.

INTER-REGIONAL TRAVEL

Inter-City Bus Service

A handful of private inter-city bus companies provide regularly-scheduled bus service between Madison and Milwaukee, Chicago, and other cities, as well as points in between. Badger Bus provides eight round trips per day to Milwaukee with stops in Johnson Creek and Waukesha, and Van Galder provides more than 12 round trips daily to Chicago with stops in Janesville, Beloit, and Rockford. Megabus and Greyhound provide several daily express trips to Chicago and the Twin Cities.

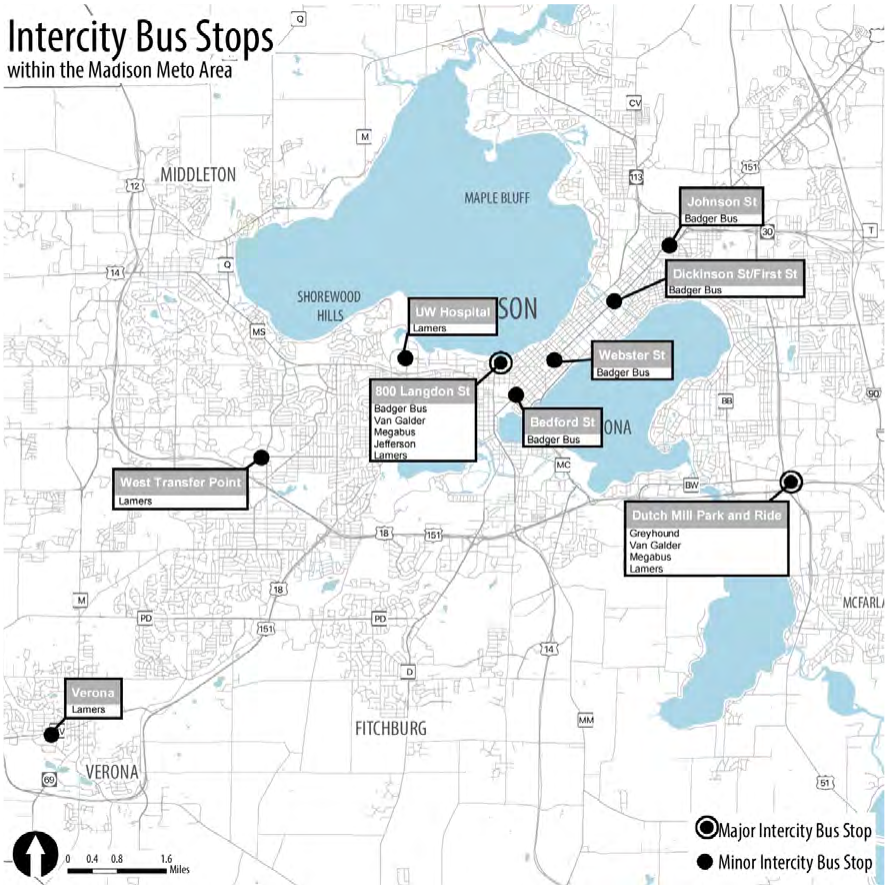


Figure 3-27: Intercity Bus Stops

Lower-volume routes connect Madison to smaller cities. Lamers Bus Lines runs three daily routes between Madison and Dubuque, Green Bay, and Wisconsin Rapids. Jefferson Lines also links Madison to La Crosse on its Milwaukee to Minneapolis route. This service is partially supported by Wisconsin state intercity bus grants. In addition, seasonal limited service between Madison and Whitewater, Eau Claire, and La Crosse/Minneapolis operated by Badger Bus supports college and university student weekend travel.

Passenger Rail Service

The nearest passenger rail station with regular public service is in Columbus, Wisconsin, about 26 miles northeast of downtown Madison. This station serves Amtrak's daily Empire Builder route serving Chicago, Milwaukee, Minneapolis/St Paul, Seattle, Portland, and other cities.

Amtrak also coordinates with inter-regional bus companies to sell integrated tickets on their thruway bus service. Thruway bus service allows passengers to buy a single ticket that includes travel on Amtrak's rail service and connecting bus routes. Amtrak's national network includes a central hub in Chicago which, along

with Van Galder's Madison-to-Chicago bus service, allows convenient rail travel between Madison and many major destinations around the U.S.

Besides its long-distance service, with trains generally running daily on routes longer than 750 miles, Amtrak offers more frequent service on shorter state-supported lines. The Hiawatha Service between Chicago and Milwaukee is one of Amtrak's more successful state-supported routes with about seven daily round trips and about 800,000 passenger boardings per year. Planned improvements to the Hiawatha Service include improving frequency to ten round trips per day and increasing train speeds to 90 miles per hour. In the 2000s, the Wisconsin Department of Transportation led an effort to extend the Hiawatha Service line to Madison with improved tracks and a station near the Monona Terrace. The project was canceled in 2010.

Inter-City Bus Terminal

Inter-city buses stop in a variety of places in Madison but most serve a stop on Langdon Street on the UW campus (See Figure 3-27). Greyhound is an exception, only serving the Dutch Mill park-and-ride on Madison's southeast side. No terminal serves inter-city bus passengers – leaving them without access to bathrooms, information, or shelter. The lack of an inter-city transit terminal is inconsistent with the level of inter-city bus service in Madison. The need for a new terminal has been felt at least since Badger Bus closed their terminal on Bedford Street in 2009, and was exacerbated when inter-regional buses could no longer stop on Langdon Street due to a renovation of the Memorial Union. The stop has since moved back to Langdon Street; however, the stop is now near Lake Street, rather than in front of the UW Memorial Union.

Various sites for an inter-city terminal have been investigated, including a rail terminal near the Monona Terrace, a parcel on Bedford Street, and a terminal integrated into the Lake Street parking garage when it is reconstructed. There is general agreement on the need to provide a high quality facility that serves all the inter-city bus lines with information, ticket sales, and other amenities in a location with convenient pedestrian access to the UW, Capitol Square, and Metro Transit bus service.

Airport Access

Metro Transit provides public transit service to the Dane County airport, with Route 20 operating every 30-60 minutes between the North Transfer Point and East Towne Mall. Transfers at either location allow passengers to travel to central Madison, the UW, and other destinations in the Metro Transit service area. A trip between the Capitol Square and the airport, a five-mile trip, is scheduled to take about 31 minutes, including a five- to ten-minute wait at the North Transfer Point.

Direct limited-stop service between central Madison and the Dane County Airport has been investigated intermittently. The region's hesitancy to introduce the service is due to several factors. First, transit ridership from the airport is currently estimated at only 15 to 20 passengers per day. Although it is unclear what the demand potential would be with faster, simpler service, it is unlikely that a fixed-route service designed specifically to serve the airport could be operated with sufficient frequency to draw enough ridership and be a cost-effective use of funds. Second, the service would be duplicative of parallel service in the corridor, particularly routes 20 and 2 and/or 4.

The planned Bus Rapid Transit system includes a line along Sherman Avenue serving the North Transfer Point and Northside Town Center with some trips continuing east to the airport. This service would provide a fast trip between the airport and central Madison without a transfer.

FREIGHT

Freight Movement

The region's economic prosperity depends on the efficient movement of goods. Freight plays an important role in business efficiency, productivity, and profitability. In fact, reports show there is a strong correlation between an increase in the movement of freight and growth in gross domestic product.

In recent years, a shift towards online shopping from traditional brick-and-motor stores has had a major impact on the amount and types of freight shipments entering the community and fundamentally changed the "last mile" of freight movements. In the past, the "last mile" movement of a freight delivery was to a retail store, whereas now a number of these movements terminate at an individual address in a residential neighborhood.

Over the last few years in Dane County, freight volumes have been increasing, with trucks carrying more of these shipments. In 2007, Dane County received over 8 million tons of freight, about 1 million tons of which was carried by rail, with nearly all of the remainder carried by truck. Air and other modes (such as pipelines) carried only a very small portion of total inbound freight. At the same time over 8 million tons of freight left the region, with virtually all of it leaving via trucks. By 2014, inbound shipments had increased by over 45 percent and outbound shipments by about 9 percent. Of the nearly 12 million tons of inbound freight, nearly 11.5 million tons arrived by truck, while only 400,000 arrived by rail.

Figure 3-28

Dane County Freight Flows (2014)

	Rail Tons	Truck Tons	Air Tons	Other Tons	Total Tons	Rail Value	Truck Value	Air Value	Other Value	Total Value
Outbound	93,808	8,950,409	12,953	78	9,057,248	$57,318,279	$8,598,129,851	$844,223,852	$3,284,361	$9,502,956,343
Inbound	402,772	11,494,628	13,013	83	11,910,497	$240,770,009	$11,828,391,105	$804,907,825	$1,314,921	$12,875,383,860
Internal	3,600	2,689,808	0	0	2,693,408	$2,067,151	$1,712,152,252	$0	$0	$1,714,219,403
Totals	500,180	23,134,845	25,966	161	23,661,153	$300,155,438	$22,138,673,208	$1,649,131,677	$4,599,282	$24,092,559,606

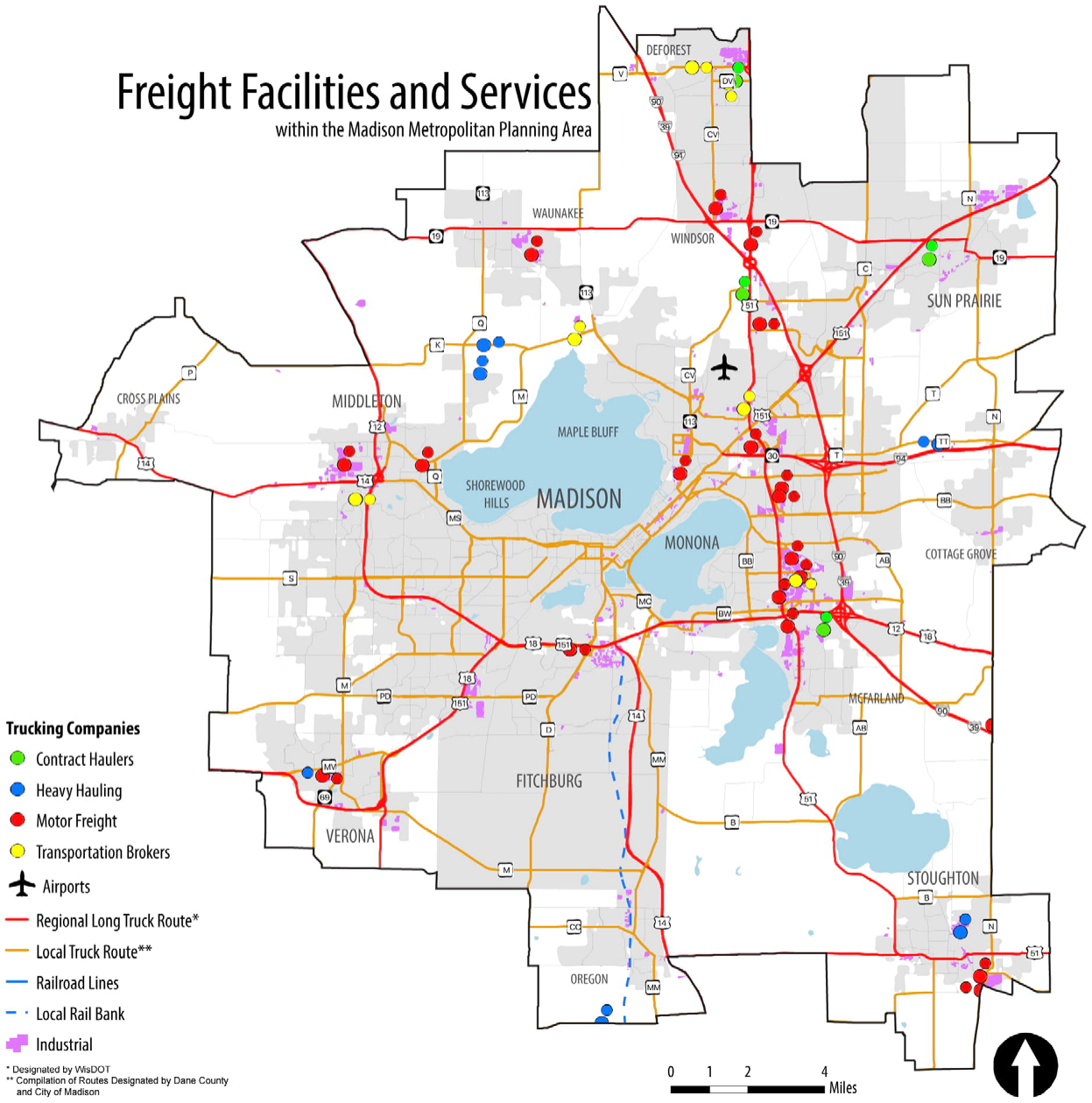


Figure 3-29: Freight Facilities and Services

Between 2007 and 2014 there was a marked increase in the amount of freight arriving by air. This is significant because air freight is dominated by high-value materials, as shown by the very high value of these shipments relative to their weight (Figure 3-28).

The total value of freight shipments, both inbound and outbound, was over $24 billion dollars in 2014. Inbound shipments had a total value of nearly $13 billion, outbound $9.5 billion, and the remainder were internal shipments. Over 90% of the total value of freight shipments was transported by truck.

Figure 3-30

Weight and Value by Mode (2014)

Mode	Tons	% of Total	Value	% of Total
Truck	23,134,845	97.8%	$22,138,673,208	91.9%
Rail	500,180	2.1%	$300,155,438	1.2%
Air	25,966	0.1%	$1,649,131,677	6.8%
Unknown	161	0.0%	$4,599,282	0.0%
Total	23,661,153	100.0%	$24,092,559,606	100.0%

Figure 3-31

Dane County Freight Tonnage by Mode (2014)

	Outbound Freight					Inbound Freight					Internal Freight	
Mode	Within WI	Outside WI	Total	% Within WI	% Outside WI	Within WI	Outside WI	Total	% Within WI	% Outside WI	Total	% of Total
Truck	5,362,444	3,542,398	8,904,841	60.2%	40%	5,888,514	5,606,114	11,494,628	51.2%	48.8%	2,689,808	99.9%
Rail	16,072	77,736	93,808	17.1%	83%	91,320	311,452	402,772	22.7%	77.3%	3,600	0.1%
Air	3,961	8,993	12,953	30.6%	69%	3,924	9,090	13,013	30.2%	69.8%	0	0.0%
Unknown	0	78	77	0.0%	100%	0	83	83	0.0%	100.0%	0	0.0%
Total	5,382,476	3,629,204	9,011,680	59.7%	40%	5,983,758	5,926,739	11,910,497	50.2%	49.8%	2,693,408	100.%

A slight majority of the freight shipped into Dane County comes from within the state of Wisconsin. Unsurprisingly, most of the rail and air freight shipped into the county comes from outside of the state, while truck freight is evenly distributed between shipments that come from Wisconsin and those coming from outside of the state. Nearly 60 percent of the outbound freight is bound for a destination within the state. Interestingly, Dane County receives four times more inbound than outbound rail tonange, while inbound and outbound air shipment tonnage is nearly identical. Intra-county freight shipments amount to 2.6 million tons, nearly all of which are carried by truck.

The county exports and receives a wide variety of commodities. The top inbound commodities by weight are broken stone or riprap (18%), gravel or sand (10%), and warehouse and distribution center goods (9%). The top outbound commodities by weight are gravel or sand (26%), grain (15%), and broken stone or riprap (10%). Internal freight largely consisted of the same commodities – broken stone or rip rap (37%), gravel or sand (19%), and petroleum refining products (18%).

Freight Facilities

Trucking

As mentioned earlier, a majority of the freight bound for and coming from Dane County is carried by trucks. The Interstate and U.S. highways that pass through the county are statutorally designated as Long Truck Routes – routes that can accommodate vehicles up to 75 feet long. These routes connect the metropolitan area to surrounding cities including La Crosse, Eau Claire, Wausau, the Twin Cities, the Fox Valley Cities, Janesville, Dubuque, Rockford, Milwaukee, and Chicago.

Local truck routes include many major local arterials and business highways within the region such as East Washington Avenue, University Avenue, McKee Road (CTH PD), Milwaukee Street, Reiner/Sprecher Roads, and Monona Drive. These routes are integral for moving freight around the region as well as to and from their local destinations. Local routes are defined by local

Figure 3-32

Dane County Inbound, Outbound, and Internal Commodities, by Tonnage (2014)

Commodity	Inbound		Outbound		Internal		Total	
	Tonnage	%	Tonnage	%	Tonnage	%	Tonnage	%
Gravel or Sand	1,232,524	10.3%	2,325,472	25.7%	521,242	19.4%	4,079,238	17.2%
Broken Stone or Riprap	2,142,057	18.0%	886,314	9.8%	1,004,541	37.3%	4,032,912	17.0%
Grain	587,880	4.9%	1,369,294	15.1%	20,704	0.8%	1,977,878	8.4%
Warehouse & Distribution Center	1,083,034	9.1%	562,369	6.2%	53,009	2.0%	1,698,411	7.2%
Petroleum Refining Products	395,170	3.3%	628,041	6.9%	490,869	18.2%	1,514,080	6.4%
Misc Waste or Scrap	527,726	4.4%	270,043	3.0%	120,199	4.5%	917,968	3.9%
Dairy Farm Products	121,181	1.0%	571,323	6.3%	10,753	0.4%	703,258	3.0%
Ready-mix Concrete, Wet	429,090	3.6%	91,843	1.0%	123,094	4.6%	644,027	2.7%
Misc. Field Crops	346,597	2.9%	120,828	1.3%	9,836	0.4%	477,260	2.0%
Asphalt Paving Blocks or Mix	379,740	3.2%	-	0.0%		0.0%	379,740	1.6%
Concrete Products	269,007	2.3%	33,091	0.4%	16,046	0.6%	318,145	1.3%
Prepared or Canned Feed	86,514	0.7%	204,642	2.3%	8,654	0.3%	299,811	1.3%
Liquefied Gases, Coal or Petroleum	139,806	1.2%	81,558	0.9%	19,362	0.7%	240,725	1.0%
Cut Stone or Stone Products	80,625	0.7%	106,459	1.2%	37,650	1.4%	224,734	0.9%
Bread or Other Bakery Prod	54,128	0.5%	119,521	1.3%	25,459	0.9%	199,108	0.8%
Livestock	147,116	1.2%	28,788	0.3%	1,212	0.0%	177,116	0.7%
Misc Plastic Products	64,879	0.5%	100,122	1.1%	5,192	0.2%	170,193	0.7%
Oil Kernels, Nuts or Seeds	42,059	0.4%	116,061	1.3%	2,057	0.1%	160,177	0.7%
Soft Drinks or Mineral Water	155,238	1.3%	-	0.0%	-	0.0%	155,238	0.7%
Misc Food Preparations, Nec	65,356	0.5%	63,593	0.7%	13,861	0.5%	142,810	0.6%
Primary Iron or Steel Products	139,034	1.2%	-	0.0%	-	0.0%	139,034	0.6%
Truck Trailers	18,855	0.2%	85,278	0.9%	21,978	0.8%	126,111	0.5%
Misc Industrial Organic Chemicals	120,172	1.0%	-	0.0%	-	0.0%	120,172	0.5%
Fertilizers	37,042	0.3%	62,630	0.7%	14,040	0.5%	113,711	0.5%
Misc Metal Work	44,187	0.4%	60,685	0.7%	7,434	0.3%	112,306	0.5%
Lumber or Dimension Stock	111,693	0.9%	-	0.0%	-	0.0%	111,693	0.5%
Portland Cement	86,772	0.7%	8,694	0.1%	15,850	0.6%	111,315	0.5%
Meat Products	17,408	0.1%	77,680	0.9%	8,586	0.3%	103,674	0.4%
Metal Scrap or Tailings	-	0.0%	102,528	1.1%	-	0.0%	102,528	0.4%
Paper Waste or Scrap	978	0.0%	97,512	1.1%	1,022	0.0%	99,512	0.4%
Flour or Other Grain Mill Products	98,680	0.8%	-	0.0%	-	0.0%	98,680	0.4%
OTHER	2,885,948	24.2%	882,881	9.7%	140,759	5.2%	3,909,588	16.5%
Total	11,910,497	100%	9,057,248	100%	2,693,408	100.0%	23,661,153	100%

municipalities and Dane County and are shown in orange on the map to the right.

The metropolitan area is home to numerous trucking companies including contract haulers, heavy hauling companies, motor freight companies, and transportation brokers. Most of these companies cluster in industrial areas and near long truck routes. Many truck companies are located along the US Highway 51 corridor due to the corridor's relatively easy access to the Interstate System.

Rail

The Wisconsin and Southern Railroad Company (WSOR) is the principal or sole operator on all of the rail lines in the area except for a segment that runs between Madison and DeForest that is owned by Canadian Pacific. WSOR connects the region with over 21 counties in southern Wisconsin and northern Illinois on its more than 700 miles of track.

Air

The Dane County Regional Airport (MSN) on the north side of Madison provides air cargo service to the region. The most recent major change in cargo operations at the airport occurred in 2010, when FedEx increased service to meet the demands

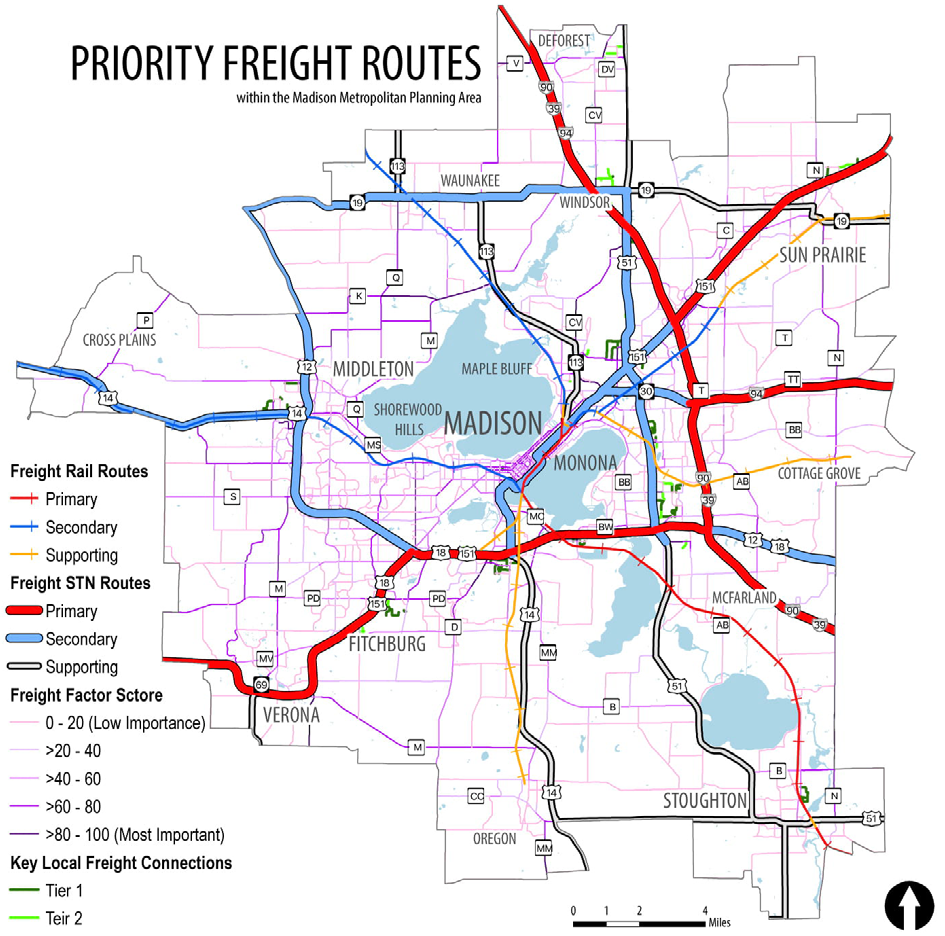


Figure 3-33: Priority Freight Routes

of the recovering economy, following the departure of a competing air cargo operator. Goods shipped by air tend to be high value, low weight, and perishable or otherwise time sensitive. Examples include medical equipment, farm and food products, and medical samples.

Intermodal

Intermodal facilities provide access and service to multiple modes of transportation without any handling of the freight itself while changing modes. There are no intermodal facilities in Dane County.

Priority Freight Routes

WisDOT is finishing up work on the first State Freight Plan. As part of the planning effort, WisDOT examined all freight routes within the state and identified of the most important regional routes, rail lines, and local routes. For local routes, state highways, railroads, ports, and airports WisDOT developed a "freight factor" based on the freight tonnage, value, and connection between modes that a particular route provides. The freight factor of a roadway signifies the importance of a route to the freight network.

The map on the previous page identifies primary, secondary, and supporting rail and state highway network routes. Additionally, it highlights the freight factor of local routes, and key local freight connections.

National Highway Freight Program

Section 1116 of the FAST Act established a new National Highway Freight Program (NHFP) to increase the efficiency of freight movement on the National Highway Freight Network (NHFN), replacing the National Freight Network and Primary Freight Network created under MAP-21. The NHFN is composed of the following road systems:

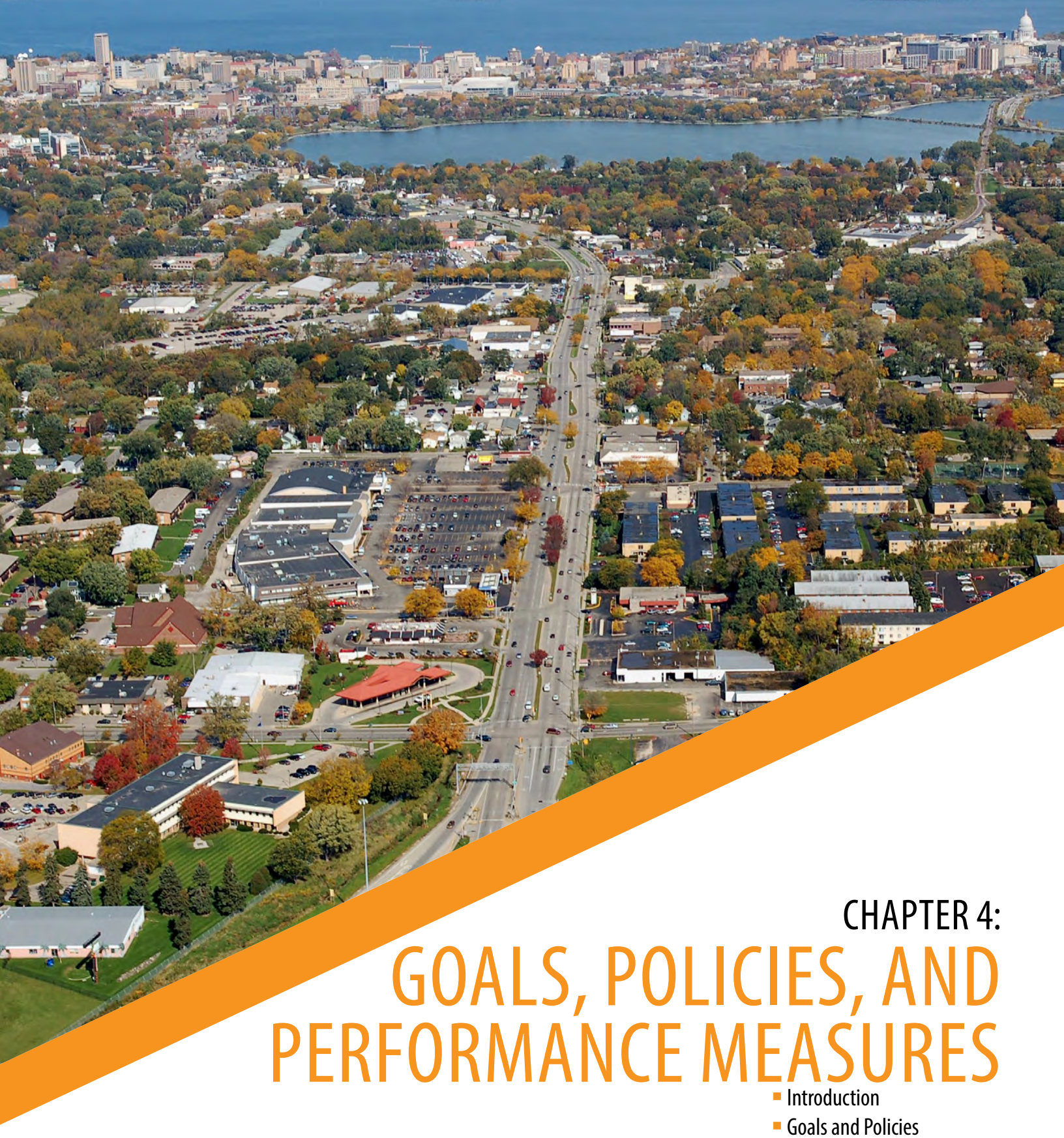
- Primary Highway Freight System (PHFS)- The most critical highway portions of the US freight transportation system.
- Interstate routes not on the PHFS.
- Critical Urban Freight Corridors (CUFC)- Roads in urbanized areas which provide access and connect the PHFS and interstates with ports, public transportation facilities, or other intermodal transportation facilities. Each state, in consultation with MPOs, may designate up to 75 miles of highway as CUFCs.
- Critical Rural Freight Corridors (CRFC)- Roads not in an urbanized area which provide access and connect the PHFS and interstates with ports, public transportation facilities, or intermodal transportation facilities. Each state may designate up to 150 miles of highway as CRFCs.

The FAST Act requires FHWA to re-designate the PHFS every 5 years to reflect changes in freight flows; states can designate CUFCs and CRFCs on a rolling basis. National Highway Freight Program funds may only be used for projects on the NHFN.

As shown in Figure 3-34, in Dane County Interstates 39, 90, and 94 are included in the PHFS of the NHFN, in addition to approximately 12 miles of the Beltline from Gammon Road to I-39/90.

As part of the draft National Freight Strategic Plan, the U.S. DOT has proposed a draft National Multimodal Freight Network (NMFN) that includes railways, waterways, ports and harbors, pipelines, airports, and intermodal facilities, in addition to highway facilities, that is a more comprehensive collection of the facilities that are critical to the safe and efficient movement of freight throughout the country.

Figure 3-34: National Highway Freight Network in Wisconsin



CHAPTER 4:
GOALS, POLICIES, AND PERFORMANCE MEASURES

- Introduction
- Goals and Policies
- Performance Measures

INTRODUCTION

The Regional Transportation Plan (RTP) goals and policies are based upon the principles of sustainability. Sustainability is defined generally as meeting our current economic, community, and environmental needs without sacrificing the ability of future generations to do the same. Social equity, a healthy environment, and a prosperous economy are described as the "three Es" of sustainability.

Social Equity: The transportation system should be designed to provide an equitable level of services to all segments of the population across all modes.

Environment: The transportation system should be designed and operated within the context of its environment, minimizing negative impacts and fostering efficient development patterns that optimize travel, housing, and employment choices. The system should support existing and planned development and discourage growth in rural areas.

Economy: The transportation system should ensure that businesses have maximum opportunities to serve customers, reach clients, export goods, and obtain workers. The system should play a significant role in raising the region's standard of living and quality of life.

These principles of sustainability are prominently featured and interwoven into a number of the RTP goals and the policies that support those goals.

The RTP goals and policies also build upon the vision and goals developed and approved by the Capital Region Sustainable Communities (CRSC) Consortium, of which MATPB is a member. The CRSC consortium was formed in 2011 to carry out the work of a federal Sustainable Communities Regional Planning Grant. The grant funded a number of projects, including a Bus Rapid Transit feasibility study. In addition to these projects, the Consortium forged agreement on a vision for the region of a "healthy and flourishing place for all" and a related series of broad goals:

- Healthy Ecosystems
- Economic Competitiveness
- Housing Choice
- Efficient, Effective Transportation
- Healthy Food and Farms
- Efficient Utilities and Service
- Vibrant Culture
- Regional Collaboration

Livability

There is no singular definition of the term "livability," as everyone values different aspects of urban living differently. We are using the term to refer to neighborhoods and communities that are walkable and provide transportation choices, good access to jobs and services, affordable housing, quality schools, parks and other public spaces, and safe streets. By design, they are more compact and pedestrian-oriented with a mix of uses in close proximity. They support people of all ages and invest in existing neighborhoods and amenities such as art, cultural heritage, and street and development designs that create a sense of place.

Downtown Waunakee.

Complete Streets

Complete streets are streets that are designed, built, and operated to accommodate safe access for all users including pedestrians, bicyclists, transit riders, and motorists. Complete streets vary between communities because their design is based on their unique context and needs. A complete street in a highly urban environment may include bus lanes, wide sidewalks, bike lanes, median islands, and curb extensions whereas a complete street in a rural environment may have a separated path parallel to a roadway or a wide shoulder.

Downtown Madison.

GOALS AND POLICIES

The development of the Regional Transportation Plan (RTP) 2050 began by developing a set of goals that represent overarching aspirational statements about desired outcomes that the region will work towards achieving. A set of policies was then developed that support each goal. The goals and policies serve as the foundation for the plan. They will guide the selection of the projects included in the plan and the identification of the strategies and recommendations. The goals and policies will also be used by MATPB as the basis for criteria used to select projects identified in the plan for funding with federal transportation funds MATPB receives.

As part of continuing efforts to ensure coordination of regional land use and transportation planning, MATPB has made certain that the policies developed for the RTP, particularly those related to land use development and environmental protection, are consistent with the amended goals and objectives adopted by the Capital Area Regional Planning Commission (CARPC) in 2008 for the regional land use plan.

Goal 1: 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 public transit.

<u>Policies supporting this goal:</u>

1. Coordinate land use, housing, and transportation planning and decision making to foster compact development patterns that provide transportation and affordable, accessible location-efficient housing choices.
2. Promote walkable, mixed-use neighborhoods.
3. Encourage growth in areas of existing development that place jobs, housing, and services closer together.
4. Encourage the concentration of higher density and mixed-use development in activity centers and along major transit corridors.
5. Enhance existing retail and employment centers in transit corridors by adding residential and other complementary land uses and making them more pedestrian friendly.
6. Encourage street oriented, human-scaled development designs that create accessible, vibrant neighborhoods.
7. Build Complete Streets that are safe, convenient, and attractive for everyone, regardless of age, ability, or mode of transportation.
8. Provide a well-connected street network and facilities for walking and bicycling that provide transportation choices and convenient

access to daily activities.

9. Encourage transit-supportive land uses along existing and planned transit routes and use of transit-compatible site and street designs, where appropriate.
10. Utilize context sensitive transportation facility design that is a product of integrated land use and transportation planning and supports community character.

Goal 2: 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.

Policies supporting this goal:

1. Address the safety and security of all users in planning, designing, building, operating, and maintaining the transportation system.
2. Retrofit existing transportation facilities that pose safety risks with safer, modern designs.
3. Seek to minimize conflicts between motorized and non-motorized traffic through lower roadway speeds where appropriate, provision of safe and convenient street crossings, and other means.
4. Support education and research programs and law enforcement efforts to improve safety for all transportation users, focusing on behaviors resulting in the greatest risk of serious crashes, including driving while impaired, distracted driving (in particular texting), and aggressive driving.
5. Encourage mixed-use development and street designs with vibrant public spaces that support a culture of walking, bicycling, use of transit, and social interaction.
6. Prioritize active transportation facility improvements that will improve access to jobs, schools, healthy food, and other destinations that meet daily needs and those located in areas with health disparities and under-served populations.
7. Promote and facilitate active transportation for short trips, including maintenance of active transportation facilities to ensure year-round availability.
8. Manage access to the regional roadway system to preserve and improve safety as well as operational efficiency.
9. Employ intelligent transportation technologies to improve safety as well as system efficiency and reliability.
10. Design, build, and operate the regional transportation system to support timely and safe response to emergencies.
11. Reduce vulnerability of the public and the region's transportation infrastructure to crime and natural hazards.

Transit Compatible Site and Street Designs

Transit compatible site designs are development configurations that enable convenient access to and from bus routes by minimizing walking distances, providing appropriate densities to support transit ridership, and providing a safe and comfortable boarding and alighting experience. Walkability is key because most transit trips begin and end with walking.

Transit compatible street designs use urban design coupled with street features that encourage safe traffic speeds and prioritize space for pedestrians, bicyclists, and transit. This could include adding bus-only lanes or installing bus bulbs for boarding and alighting as well as providing facilities that make walking or biking to or from stops easier, safer, and more enjoyable. This includes provision of frequent crossing opportunities.

Transit compatible streets and features.

Intelligent Transportation Systems (ITS)

There is no single commonly accepted definition of ITS because the discipline is still in its infancy. ITS encompasses a broad range of technologies that make transportation safer, more efficient, and more convenient by integrating communications technology into infrastructure, vehicles, and other devices. A few examples of ITS include:

- Intelligent traffic control systems that improve traffic flow by changing timing in response to traffic flows
- Traveler information systems that provide current travel time and incident information
- Advanced transit systems that provide real-time vehicle information
- Vehicle-to-vehicle communications that can prevent crashes by alerting drivers or slowing vehicles before crashes occur
- Automated at-grade railroad crossing safety gates

Vehicular travel information on the Beltline. (Channel 3000)

Context Sensitive Solutions (CSS)

Context sensitive solutions take into consideration the built and natural environment ("the context") through which transportation facilities pass, attempting to fit the facility to the physical setting and preserve or complement scenic, aesthetic, historic, and environmental resources, while maintaining safety and mobility for users. The application of CSS principles recognizes that transportation is about more than just getting from Point A to Point B. Transportation facilities help shape the character of places and how we experience our daily lives.

Bridge with Madison branding within an urban context.

Goal 3: 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.

Policies supporting this goal:

1. Provide for efficient, reliable travel on regional roadways serving major employment centers and those critical to freight movement, reducing excessive delays where possible.
2. Support downtown Madison as the region's largest, most important activity center through improvements to its accessibility by transit as well as other transportation modes.
3. Invest in transportation improvements that foster a quality of life that retains and attracts businesses and employees.
4. Invest in transportation improvements that support the region's role as a major tourist destination.
5. Provide convenient, inexpensive transportation options that allow households to go car-light or car-free, allowing more money to be spent on housing or in the local economy.
6. Encourage redevelopment of established employment/activity centers and major transit corridors to make efficient use of existing transportation infrastructure.
7. Support agricultural activities in rural areas by designing roadways that safely accommodate implements of husbandry.
8. Provide efficient freight access to regional roadways, railroads, and the airport.
9. Promote investments that enhance inter-regional transportation options.
10. Integrate local public transit with intercity service and facilities such as the airport.

Goal 4: 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.

Policies supporting this goal:

1. Provide convenient, affordable transportation options that enable people of all ages and abilities to access jobs, services, and other destinations to meet their daily needs. Also support private sector efforts to provide complementary transportation options.
2. Improve transit accessibility to jobs in areas with concentrations of transit-dependent populations and support provision of affordable housing in areas with high transit accessibility to jobs.

3. Ensure that the interests of underrepresented groups (low-income, minority, seniors, disabled, etc.) are considered in the transportation planning process.
4. Ensure that the benefits of regional transportation system investments, in terms of improved accessibility, mobility, and quality of life, are fairly distributed and that adverse public health and environmental impacts from transportation facilities do not disproportionately impact minority and low-income populations.
5. Retrofit existing transportation facilities to make them ADA compliant.

Goal 5: 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.

Policies supporting this goal:

1. Design and build sustainable transportation infrastructure and implement operations programs that avoid or mitigate negative environmental impacts and augment positive changes.
2. Incorporate Green Streets elements into street construction and reconstruction, where feasible. Projects should, at a minimum, meet Dane County stormwater standards, but strive to maintain pre-development hydrology.
3. Pursue intelligent transportation technologies that improve traffic flow, encourage eco-driving, make transit and bicycling easier and more convenient, create new mobility services, provide traveler information, and better integrate the different modes. Projects implementing these technologies should encourage and facilitate private sector transportation innovation and integration of public and private transportation options.
4. Incentivize alternatives to single-occupant vehicle driving through strategic investments in alternative transportation, public and employer-based commute options programs, TDM/vehicle trip reduction ordinances, and parking policies.
5. Develop a transportation system that is resilient in the face of climate change and rising fuel prices in the future.
6. Promote the transition to low and no emission fuels for vehicles.
7. Consider land use impacts of transportation investments, ensuring they meet regional goals.
8. Promote the movement of long-distance freight by railroads, which use less fuel per ton-mile than trucks.

Green Streets

Green Streets refers to best management practices that minimize the environmental impact of the transportation system. The streets are designed in a way in which they mimic local hydrology prior to development. A number of treatments can be considered including:

- Narrower street pavements to minimize impervious surfaces
- Swales or vegetated open channels for stormwater storage and runoff
- Bioretention curb extensions, planters, and tree boxes to incorporate stormwater management within the right of way
- Permeable pavement, asphalt, and pavers that can reduce pollutant runoff through built-in filtering to decrease the volume of water diversion into neighboring streams, rivers, and lakes
- Street trees to reduce heat island effects, increase the aesthetic quality of streets, improve air quality, and provide shade for cooling on warm days

Permeable pavement (top), prairie swale (middle), street trees (bottom).

Activity Centers

Activity centers are areas in which there is a concentrated mix of land uses (residential, retail, office, institutional). They are generally bicycle and pedestrian friendly and transit supportive. They serve as a hub of daily activity, allowing those who live there and in surrounding neighborhoods to accomplish multiple activities in a single trip. Activity centers come in different types and sizes from a regional center serving as a center of commerce, to suburban downtown districts, to small neighborhood centers with shopping and restaurants. Activity centers can serve new peripheral development or be created through infill or redevelopment of existing areas. A unique sense of place should be created by attention to the scale, placement, and design of buildings and ensuring adequate public spaces.

Mixed-use activity center concepts in Madison, Waunkee, and Sun Prairie.

Goal 6: Advance System-wide Efficiency, Reliability, and Integration Across Modes

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

Policies supporting this goal:

1. Encourage compact, mixed-use development patterns, which reduce reliance on the automobile, improving the efficiency and safety of the transportation system.
2. Encourage development in identified transportation and transit corridors and activity centers where adequate transportation facilities and efficient transit service can be provided.
3. Utilize transportation systems management and operations strategies, such as incident, special event, and work zone management, traffic signal coordination, and transit priority treatments, to maximize efficiency and reliability for all transportation modes.
4. Manage access to the regional roadway system to preserve and improve operational efficiency.
5. Provide for a well-connected roadway system with proper roadway spacing that efficiently distributes traffic.
6. Implement policies and programs to manage travel demand on congested corridors in order to maximize system capacity and multi-modal system performance.
7. Promote parking management strategies that make efficient use of facilities and encourage alternative transportation modes while meeting user needs and supporting retail/service businesses.
8. Seek to provide and maintain an acceptable level of service for all travel modes, considering the land use context of the facility and environmental impacts of potential improvements.
9. Utilize intelligent transportation technologies to make travel by all modes more reliable and convenient.
10. Prioritize capacity investments on critical bottlenecks and corridors that serve regional employment centers, particularly those where alternative modes cannot effectively and cost-efficiently serve travel needs.

Goal 7: 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.

Policies supporting this goal:

1. Make the most efficient use of limited public resources through cost-benefit analyses and consideration of the life cycle costs of projects, including operations and maintenance.
2. Utilize designs, construction techniques, and materials that minimize maintenance costs over time.
3. Promote asset management practices that minimize maintenance costs over time.
4. Prioritize maintenance of existing transportation facilities, strategies to manage travel demand, and improvements to transportation operations over new facilities and capacity expansion projects.
5. Support compact, transportation-efficient development that makes use of existing transportation system capacity.
6. Preserve transportation corridors and other needed land for future travel uses.
7. Support inter-jurisdictional coordination in planning and project delivery.
8. Leverage federal and state funding for large-scale projects that will provide significant benefits to the regional transportation system.
9. Support sustainable funding options beyond the state gas tax and local property tax, and a regional transit governance structure such as a regional transit authority.
10. Foster innovative financing and public-private partnerships for projects.

PERFORMANCE MEASURES

The *Moving Ahead for Progress in the 21st Century Act* (MAP-21) transformed the way that MPOs develop transportation policies and plans and changed the way that they make funding decisions and program new projects. MAP-21 required that a performance-based approach be taken to transportation planning and programming to achieve local, state, and national performance goals. The current transportation bill, the Fixing America's Surface Transportation (FAST) Act, continues this approach. MPOs are now required to:

- incorporate performance management systematically into regular ongoing processes;
- provide key information to help decision makers understand the consequences of investment decisions across multiple markets;
- improve communications between decision makers, stakeholders, and the traveling public; and
- ensure that targets and measures are developed in cooperative partnerships based on data and objective information.

The national performance goals included in FAST Act did not change:

- Safety - To achieve a significant reduction in traffic fatalities and serious injuries on all public roads
- Infrastructure Condition - To maintain the highway infrastructure asset system in a state of good repair
- Congestion Reduction - To achieve a significant reduction in congestion on the National Highway System, which includes all major or principal arterial roadways
- System Reliability - To improve the efficiency of the surface transportation system
- Freight Movement and Economic Vitality - To improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development
- Environmental Sustainability - To enhance the performance of the transportation system while protecting and enhancing the natural environment
- Reduced Project Delivery Delays - To reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project development and delivery process, including reducing regulatory burdens and improving agencies' work practices

National Performance Goals are set in a variety of transportation topic areas.

MATPB has demonstrated its commitment to performance-based planning by releasing its first annual Performance Management Report in 2016. Based upon the goals of RTP 2050, the Performance Measures Report links measures to goals in an effort to quantify outcomes. For the first year of the report the following measures, organized around the goals, were selected:

Create Connected Livable Neighborhoods and Communities

- Miles of Pedestrian Facilities
- Miles of Bicycle Facilities
- B-Cycle Utilization
- Active Living Index Scores

Improve Public Health, Safety, and Security

- Number and Rate of Motor Vehicle Crash Fatalities and Serious Injuries
- Number and Rate of Non-Motorized Fatalities and Serious Injuries
- County-wide Five-year Rolling Average Rates of Crashes, Injuries, and Fatalities

Support Personal Prosperity and Enhance the Regional Economy

- Airline Passenger Traffic
- Freight Exports and Imports
- Housing + Transportation Costs
- Transit Access to Jobs

Improve Equity for Users of the Transportation System Transit Ridership

- Fixed-Route Transit Service Area
- Transit Access to Employment
- Transit Coverage for Underrepresented Groups

Reduce the Environmental Impact of the Transportation System

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

Ensure System-Wide Efficiency, Reliability, and Integration Across Modes

- Transit On-time Performance
- Percent of Key Destinations Served by Transit
- Roadway Congestion and Reliability

Ensure Financial Viability of the Transportation System

- Bridge Condition
- Roadway Pavement Condition
- Metro Vehicle On-Road Service Calls
- Buses At or Past Replacement Age

The performance measures selected were not intended to be exhaustive. Rather, the list includes key measures that allow annual tracking of meaningful progress towards achieving plan goals and for which accurate, easily obtainable data is available. 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, incomplete, or inaccurate data. It is anticipated that the list of performance measures will evolve over time as new data and measurement techniques become available. Targets for the measures will be set in concert with WisDOT, following the release of final federal rules for some of these measures.

To learn more about performance management requirements and how they fit into the overall planning process, refer to Chapter 1.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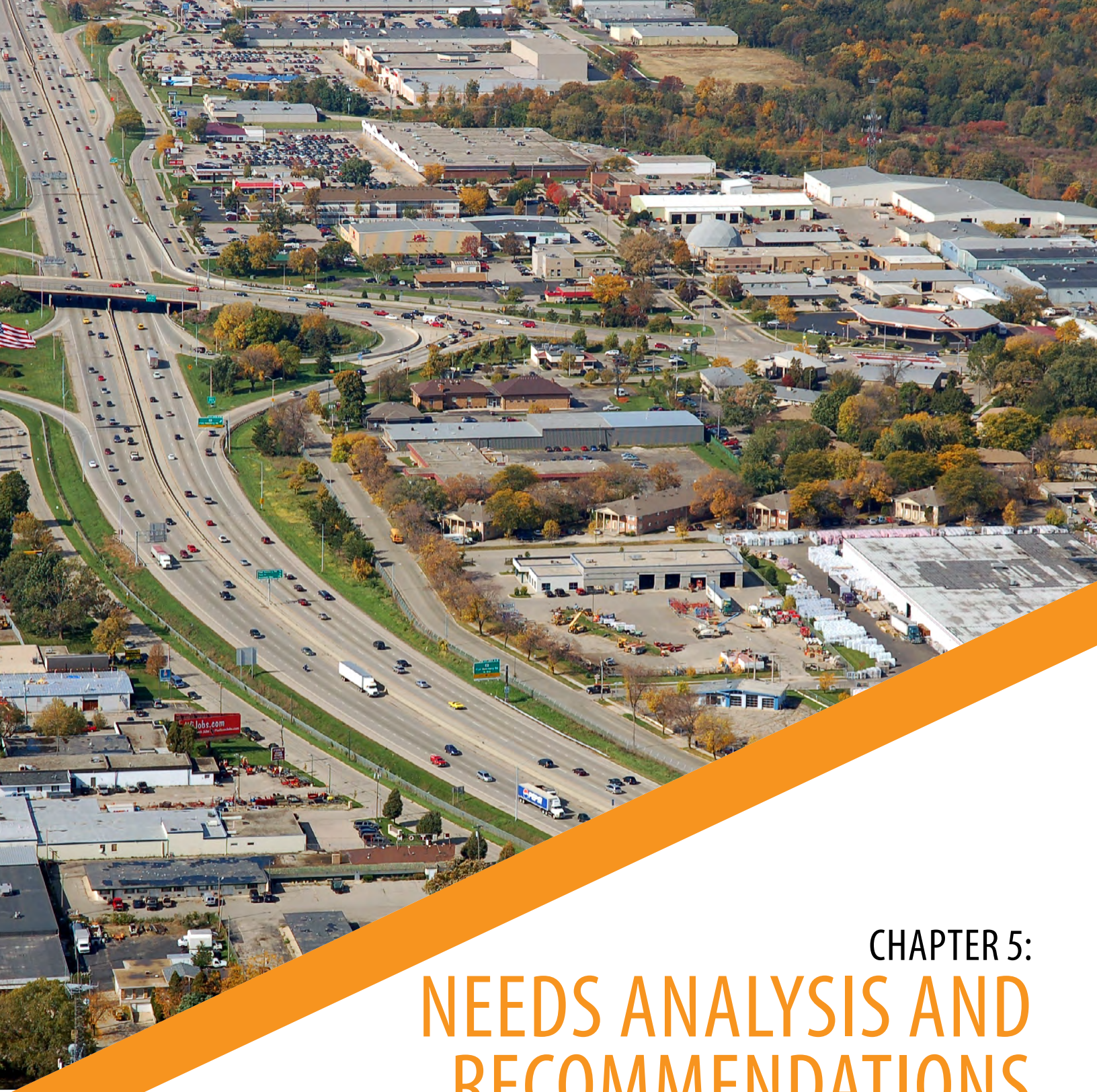


CHAPTER 5:
NEEDS ANALYSIS AND RECOMMENDATIONS

- Introduction
- Land Use and Transportation Integration
- Streets and Roadways
- Public Transit
- Bicycles
- Pedestrians
- Specialized Transit
- Transportation Demand Management
- TSM, Operations, and ITS
- Freight, Air, and Rail
- Parking

INTRODUCTION

MATPB undertook an exhaustive analysis of the existing transportation network, prior and ongoing planning efforts, and input received from stakeholders and the public. MPO staff then synthesized the transportation system needs and developed a series of recommendations with supporting actions for each mode of transportation, TDM and TSM strategies to optimize use and capacity of existing facilities, and general recommendations for land use and transportation integration.

Implementing agencies, including WisDOT and local governments, are encouraged to use the following recommendations when undertaking planning efforts and implementing transportation projects to ensure regional continuity and consistency of the transportation system and support regional transportation goals and policies. The discussion of needs and the recommendations is organized by topic area and mode with the recommendations and supporting actions/strategies or implementation steps highlighted in the tables.

Needs and Recommendations are organized as follows:

- Land Use and Transportation Integration
- Streets and Roadways
- Public Transit
- Bicycles
- Pedestrians
- Inter-Regional Travel
- Specialized Transit
- Travel Demand Management (TDM)
- Transportation System Management (TSM), Operations and Intelligent Transportation Systems (ITS)
- Freight, Air, and Rail
- Parking

Appendix A contains a complete table of the recommendations and supporting actions.

LAND USE AND TRANSPORTATION INTEGRATION

Land use and transportation are inextricably related. The ultimate role of transportation is to connect people with opportunities, services, goods, and other resources. In order for transportation policies and investments to be successful in achieving this, they must be coupled with supportive land use policies. Spread out land use patterns and single use developments increase automobile dependency for accessing economic opportunities and needs, thereby placing other travel modes at a disadvantage. Pedestrian-friendly neighborhoods, with a variety of land uses in close proximity, improve access to destinations and promote affordability by making alternative travel modes more convenient.

Coordinate land use and transportation. Coordinating land use and transportation requires that local communities evaluate how land use decisions affect the transportation system and travel options for people to access jobs, services, and other destinations. It requires that transportation agencies and providers consider the effects of transportation investments on land use development demand, travel choices, and regional land use patterns. This also means that transportation agencies and local communities must communicate to craft coordinated strategies, plans, and programs.

The following recommendations can help ensure the compatibility and integration of local land use plans with the regional transportation plan.

Recommendations and Supporting Actions		Timeframe	Implementing Party
1	Adopt local land use plans and policies that support RTP goals and policies.		
A	Update land use ordinances, street design, and parking standards to remove barriers to mixed-use, pedestrian-friendly development, where appropriate.	Ongoing	Local governments
B	Prepare detailed neighborhood development plans in areas slated for growth prior to development in order to ensure good street connectivity, adequate bicycle accommodations, and efficient transit routes (where appropriate).	Ongoing	Local governments
C	Require or provide incentives for including pedestrian, bicycle, and transit facilities (where appropriate) in (re)developments.	Ongoing	Local governments
D	Plan, zone for, and encourage transit-supportive development in planned transit corridors.	Ongoing	Local governments
2	Develop urban areas with a mix of housing types and land uses to provide walkable, affordable neighborhoods.		
A	Plan for mixed-use centers of varying scales and types to provide housing in proximity to a mix of uses.	Ongoing	Local governments
B	Develop new employment centers and government/institutional developments in mixed-use settings, where compatible, to provide for housing near jobs and schools.	Ongoing	Local governments
C	Support the revitalization of downtown areas and walkable neighborhoods with infrastructure investments and incentives.	Ongoing	Local governments
D	Promote new development in multi-modal mobility corridors to maximize the efficiency of transportation system and the accessibility of jobs and services.	Ongoing	Local governments

STREETS AND ROADWAYS

Streets and roadways provide mobility for the vast majority of the residents in the region, regardless of whether they drive, take transit, or ride a bicycle. Streets can also be considered the "living rooms" of neighborhoods throughout the community, providing an outdoor space to congregate, recreate, and socialize. It is important to preserve this infrastructure and make targeted enhancements, when appropriate. The following highlights the major needs and recommendations to ensure the efficiency, safety, and cost effectiveness of the roadway network.

Preserve existing regional roadway infrastructure. Preserving the regional roadway system—including pavement, bridges, and associated infrastructure such as signals, lighting, and storm water facilities—is critical for safe and efficient travel. Well-maintained roads also help to reduce vehicle operating costs, retain and attract businesses, and improve quality of life for the region's residents.

Roadways and bridges can last a long time before they need to be reconstructed or replaced (typically 50+ years for roads and 50-75 years for bridges). However, routine small-scale maintenance and periodic rehabilitation are necessary to combat the steady deterioration that results from roadway use and weathering, and avoid the need for premature pavement reconstruction.

Figure A-1 in Appendix A lists programmed, planned, and other potential cost-high preservation projects that may be needed during the planning period. This includes both peripheral area arterial roadways that will need to be reconstructed to urban standards to accommodate planned development and arterial streets within developed areas that will require reconstruction due to their age and condition.

Recommendations and Supporting Actions		Timeframe	Implementing Party
1	Preserve and maintain the region's street and highway system in a manner that minimizes life cycle cost, maintains safety, and minimizes driver costs while reducing their impact on the environment.		
A	Monitor regional roadway system pavement and bridge condition and coordinate with WisDOT to establish performance targets.	1-5 years	MPO, WisDOT
B	Develop and implement asset management plans to facilitate cost-effective decision-making concerning the maintenance and rehabilitation of roadways, bridges, and associated infrastructure.	Ongoing	WisDOT, Dane County, local governments
C	Provide for ongoing maintenance activities in major state and local arterial corridors planned for future potential expansion until capacity is needed and major project funding can be secured.	Ongoing	WisDOT, Dane County, local governments
D	Continue enforcement of truck weight regulations to reduce premature deterioration of roadways and bridges.	Ongoing	WisDOT
E	Support additional research and demonstration projects, including use of emerging technologies, to provide safe roadways in the winter while minimizing the use of road salt.	1-5 years	WisDOT, Dane County, local governments

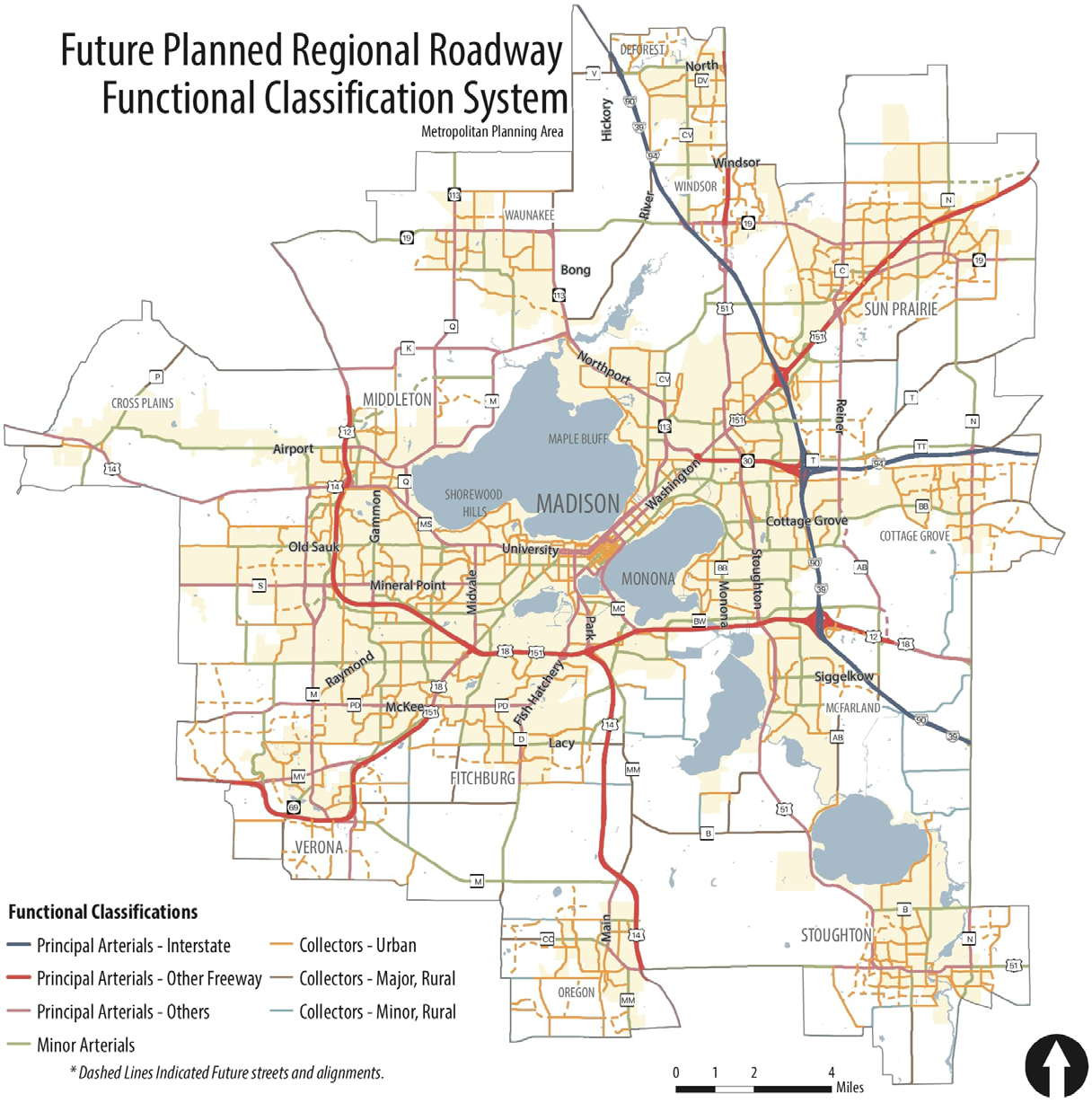


Figure 5-1: Future Planned Roadway Functional Classification System.

Construct new roadways to efficiently accommodate future growth. Planning for and building a well-connected roadway network to serve developing areas is crucial for efficiently distributing traffic on the regional system. As connectivity of the system increases, travel distances decrease and route options increase, creating a more efficient and resilient system. Dispersing traffic over a larger number of routes benefits traffic circulation and better supports alternative travel modes by providing more route options and limiting the need for overly wide arterials and intersections that serve as barriers to pedestrians. Other benefits of a well-connected network include improved emergency response and increased efficiency and safety of services such as garbage collection and street sweeping.

The traditional roadway functional classification system described on pages 3-3 to 3-5 provides a good starting point for planning and managing our roadway system to provide mobility for moving passenger and freight traffic while also providing property access, parking, and safe, convenient, and comfortable travel for non-motorists. Traffic speeds, access, and level of street connectivity should vary depending on the function of the street. The design of streets and the level of traffic congestion

tolerated must also consider the land use context, community development goals, and all modes of travel.

Figure 5-1 illustrates the planned future roadway functional classification system, including important planned collector streets and existing collectors that are likely to transition into minor arterials in the future to serve new development. Examples include the Pioneer/Meadow/Woods/Nine Mound Road corridor on Madison's west side, the planned Belle Fontaine Boulevard in Middleton, Portage Road on the north side, and Egre Road (including planning extension to US 151) in Sun Prairie. The Grand Avenue/Reiner Road/Sprecher Road/CTH AB corridor on the east side is anticipated to function as a principal arterial in the future.

Recommendations and Supporting Actions		Timeframe	Implementing Party
2	Build a well-connected network of regional roadways to accommodate future growth and avoid the need for overly wide streets and intersections that create barriers for pedestrians and bicyclists.		
A	Conduct detailed planning for new collector streets and utilize official mapping, right-of-way dedications, and other methods to preserve existing and planned regional roadway corridors for potential expansion.	Ongoing	Local governments
3	Incorporate complete streets and green streets concepts for regional and local roadways.		
A	Utilize evaluation criteria and scoring guidelines for selecting MPO funded projects that encourage the inclusion of complete and green streets elements.	Ongoing	MPO
B	Adopt and implement a formal complete streets policy.	1-5 years	WisDOT, Dane County, Local governments

<u>Expand the regional roadway system strategically to address critical bottlenecks and accommodate future growth.</u>
Household and employment growth and development and travel trends, such as increased suburb-to-suburb travel, have led to increasing traffic volumes and congestion levels on the regional roadway system. If conditions continue to get worse, delays caused by congestion will negatively affect the region's economic competitiveness and quality of life.

Traffic volumes have increased the most on the Beltline, the Interstate, and other circumferential arterials such as CTH K, WIS 19, and Stoughton Road (US 51). Volumes have also spiked on radial arterials leading to the Beltline and Interstate system, including Verona Road (US 18/151), Fish Hatchery Road, and US 151. The Beltline exhibits by far the highest congestion levels. Other arterial roadway corridors with high congestion levels include: University Avenue, Johnson/Gorham Streets, East Washington Avenue, Fish Hatchery Road, Verona Road, and CTH M. Projects are underway to provide needed capacity in the Verona Road and CTH M corridors, while studies are underway to develop long-term solutions in the Beltline and Stoughton Road corridors.

In addition to addressing existing traffic congestion, future projected traffic from planned growth must also be accommodated. A regional travel demand model is used to forecast future travel based on forecast growth and assumed changes to the roadway and transit system. An iterative process was used whereby the planned future transportation system - including Bus Rapid Transit, planned new two-lane collector streets, and street extensions - was modeled first to determine its ability to accommodate expected traffic prior to consideration of new capacity expansion projects on the periphery.

Major local arterial expansion projects identified as needed to serve developing or planned new development areas include: Pleasant View Road; CTH PD west of CTH M; Reiner/Sprecher/CTH AB corridor; CTH T (N. Thompson Drive to Reiner Rd.), and the extension of Lien Road. It is recommended that new arterial streets with more than two travel lanes generally include medians, where possible, with appropriate openings for turning movements and turn lanes. Access management strategies, such as restricting driveway access, should also be used for arterial streets. These and other design strategies provide for more efficient travel and improve safety.

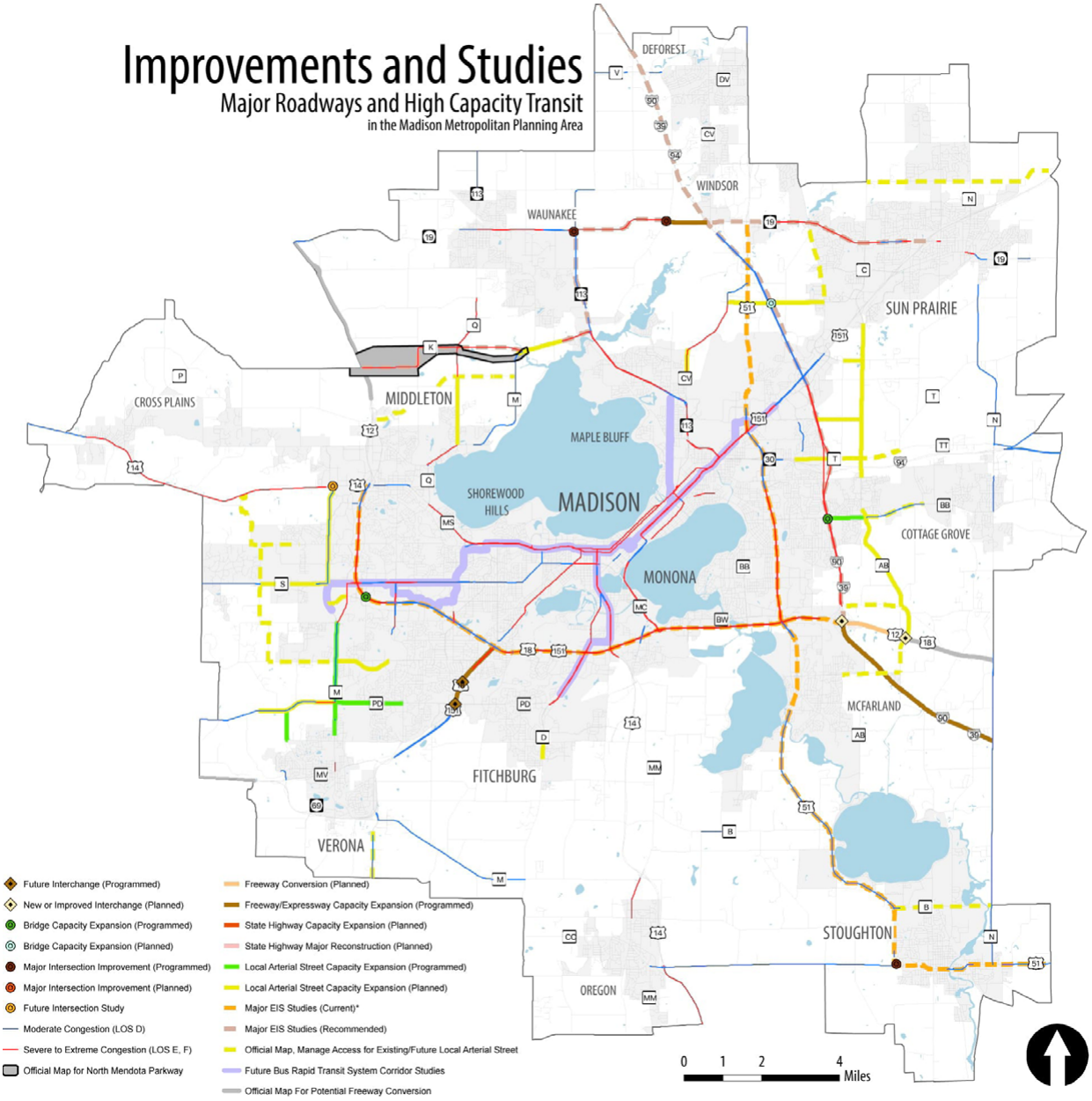


Figure 5-2: Major Roadway and High Capacity Transit Improvements and Studies.

Other than the programmed Verona Road (US 18/151) and Interstate 39/90 projects, the only other state highway capacity expansion projects included in the plan at this time are: Beltline/Interstate interchange, which is technically part of the Interstate expansion project; and US 12/18 freeway conversion with new CTH AB interchange, which is Phase 3 of the Beltline/ Interstate interchange project. Additional state highway capacity expansion project recommendations are expected to come out of the ongoing major corridor studies of Stoughton Road (US 51) and the Beltline (US 12/14/18/151). A future study is recommended for both the WIS 19/WIS 113/CTH M (North Mendota Parkway) and I-39/90/94 Interstate corridors. Because the scope of improvements in these corridors is unknown and funding has not been identified, the corridors are listed as studies. Once the studies are completed, the scope of improvements identified, regional agreement reached on them, and funding determined to be available in the future, the projects will be amended into the plan.

Figure 5-2 illustrates and Figure A-1 in Appendix A lists recommended major capacity expansion, intersection, interchange,

and bridge widening projects as well as major state highway corridor studies. Section 1 of Figure A-1 in Appendix A lists programmed projects for 2017-2020 and Section 2 lists additional planned projects grouped into two 15-year time periods (2021-2035, 2036-2050). The actual timing of the planned projects will depend on future development and traffic growth, impacts of congestion management strategies, system preservation needs, available funding, and other factors. Figure 5-2 highlights remaining areas of high peak period traffic congestion on the arterial roadway system that will need to be addressed with congestion management strategies as part of the regional Congestion Management Process.

Section 5 of the Figure A-1 in Appendix A includes a short list of "illustrative" major capacity expansion projects that are not part of the fiscally constrained, federally recognized plan. These include the two ongoing major state highway corridor studies of the Beltline and Stoughton Road, the environmental assessment study of the US 51 corridor study, which includes a segment west of Stoughton proposed for expansion, and the western segment of the North Mendota Parkway project on new alignment between CTH M and US 12 along with CTH CV and Q. Inclusion of these projects in the federally recognized plan is dependent upon completion of the environmental studies and demonstration that funding is likely to be available for them.

Recommendations and Supporting Actions		Timeframe	Implementing Party
4	Expand regional roadway system capacity to address critical bottlenecks and accommodate future planned growth consistent with RTP goals and policies.		
A	Continue or initiate detailed planning, design, and construction of state and local arterial capacity roadway, bridge, and interchange projects shown in Figure 5-2 and listed in Figure A-1 as needed with consideration given to project phasing where appropriate.	Ongoing	WisDOT, Dane County, Local governments
B	Complete study of the Beltline/Interstate interchange. Upon completion of accepted EIS, advance recommended alternative, with consideration given to phasing, compatibility of the design with potential Beltline/Stoughton Road interchange improvements, and planned US 12/18 freeway conversion east to CTH AB.	1-10 years	WisDOT
C	Complete major corridor studies of the Beltline and Stoughton Road/US 51. Upon completion of accepted EISs, seek enumeration as Majors projects and advance recommended alternatives using a phased approach. Continue to implement short-term TSM, safety, and multi-modal improvements in the corridors in the interim until Majors program funding is secured.	1-10 years	WisDOT
D	Complete environmental assessment and refine the design for the preferred alternative for the US 51 (McFarland to Stoughton) corridor, which includes reconstruction of most of the roadway, intersection improvements, and expansion to 4 lanes between WIS 138 and CTH B. Upon completion, seek enumeration as Majors project or alternative funding and advance project using a phased approach. Implement safety and TSM improvements and maintenance work in corridor in the interim if Majors program or other funding is not secured.	1-10 years	WisDOT
E	Initiate major study of the WIS 19/WIS 113/CTH M corridor to identify the long term solution to existing and future congestion and safety issues in the east-west corridor north of Lake Mendota. Officially map the corridor and initiate detailed planning of the recommended alternative, including appropriate phasing and funding strategies. Continue in the meantime to implement TSM, safety, and multi-modal improvements.	1-10 years	WisDOT, Dane County, MPO
F	Identify the appropriate limits and initiate study of the I-39/90/94 corridor north of the Beltline to address safety, operations, and congestion issues and in the meantime implement TSM and safety improvements.	1-10 years	WisDOT, MPO

Continue to pursue safety improvements. Traffic safety affects the metro area on many levels. Crashes cause personal tragedy, lost productivity, rising insurance costs, increased costs for police, emergency medical, and other social services, and also disrupt the movement of people and goods in the region. Safety concerns can also prevent people from choosing to walk or bicycle.

User behavior is a contributing factor in nearly every crash. For example, alcohol and drugs were a contributing factor in 57% of the county's fatal crashes between January 2010 and December 2015. Excessive speed, aggressive driving, and driver inattention are other common contributors to serious crashes. Other factors contributing to crashes are roadway and environmental conditions and in some cases vehicle failure. The types and designs of roadways can help minimize the potential for crashes and the likelihood of serious injury in the event of a crash.

Motor vehicles today are the safest they have ever been, with many features to protect the occupants in the event of a crash. The advent of connected vehicle technology is now shifting the focus of efforts to crash avoidance. Connected vehicle applications allow vehicles to "talk" to each other (V2V) and to roadway infrastructure (V2I) such as traffic lights, stop signs, and work zones. Using this information, vehicles can identify risks and provide warnings to drivers to avoid imminent crashes or even automatically take over driving functions such as braking. The National Highway Traffic Safety Administration (NHTSA) estimates that safety applications enabled by V2V and V2I technology could eliminate or mitigate the severity of up to 80 percent of non-impaired crashes at intersections and while changing lanes.

Source: Madison Fire Department

Recommendations and Supporting Actions		Timeframe	Implementing Party
5	Address safety needs on the regional roadway system through a comprehensive "3-E" approach that includes implementation of cost-effective engineering counter measures (i.e., roadway reconfiguration, new or modified traffic control devices, etc.), education, and enforcement.		
A	Implement WisDOT's 2014-2016 Wisconsin Strategic Highway Safety Plan (SHSP) and future updates to the plan.	Ongoing	WisDOT, Dane County, local governments, state agencies, law enforcement agencies, private organizations
B	Undertake planning process to identify regional roadway corridors and intersections with the highest crash rates and conduct further detailed study of these locations to identify countermeasures and prioritize projects for federal and state Highway Safety Improvement program funding.	1-5 years	MPO, Dane County, local governments
C	Continue efforts to implement short-term safety-related and TSM improvement recommendations from preservation/safety studies in state highway corridors, including US 14 (West), WIS 19, and WIS 138.	Ongoing	WisDOT
D	Develop and implement access management plans and standards for existing and future arterial roadways as development and street reconstruction occur.	Ongoing	WisDOT, Dane County, Local governments
E	Continue to implement cost-effective changes to traffic signals and signs that have been found to reduce crashes (e.g., use of light emitting diode (LED) lighting, overhead street signs on arterials, etc.).	Ongoing	WisDOT, Local public works/traffic engineering agencies
F	Officially map the US 12 (Parmenter St. to WIS 19 West), US 12/18 (Interstate to CTH N), and US 18/151 corridors for potential future freeway conversion based on recommended study alternatives. Continue to implement interim access management improvements, with future conversion dependent upon ongoing needs assessment and available funding.	Ongoing	WisDOT
G	Continue to expand state and local safety education efforts, including neighborhood-based initiatives.	Ongoing	WisDOT, local governments, non-profit organizations
H	Continue to support and expand local traffic enforcement activities such as use of local traffic teams and undertaking special enforcement initiatives.	Ongoing	Dane County and local law enforcement agencies
6	Address security needs related to the regional roadway system.		
A	Update the vulnerability assessment of critical transportation infrastructure in the state as part of development of the State Highway Investment Plan. Monitor identified facilities and make improvements as needed.	Ongoing	WisDOT
B	Complete current update and update as necessary Dane County Hazard Mitigation Plan to reduce risk of disruptions to the regional roadway system due to severe weather conditions, flooding, terrorism, hazardous material spills, civil disorder, climate change, and other events.	1-5 years	Dane County, Local governments
C	Initiate study to identify transportation facilities that are susceptible to flooding, identify alternate routes when flooding occurs, and identify improvements to make the facilities more resilient to flooding.	1-5 years	MPO, Dane County, Local governments
D	Update the county's Emergency Evacuation Plan, as necessary.	1-5 years	Dane County

Simplify navigation of the regional roadway system. There are numerous instances on the regional roadway system where the name of a roadway changes due to crossing jurisdictional boundaries or due to another historic anomaly. Instances such as the one illustrated below should be rectified to ensure that wayfinding is simple for residents, tourists, and freight carriers alike.

This roadway's name changes from Portage Road to Rattman Road to American Parkway and finally to Nelson Road within a 4 mile stretch. Source: Google Maps.

Recommendations and Supporting Actions		Timeframe	Implementing Party
7	Address roadway naming inconsistency along corridors.		
A	Initiate a study of regional roadway naming conventions to simplify wayfinding in the region.	1-5 years	MPO

PUBLIC TRANSIT

The short- and medium-term needs of the Madison area transit system are identified and well documented in the current *Transit Development Plan for the Madison Urban Area* and *Madison Transit Corridor Study – Investigating Bus Rapid Transit in the Madison Area*. The transit element of the Regional Transportation Plan builds upon these planning efforts to identify a long-term vision for the regional transit system.

Figure 5-5 on page 5-13 illustrates this future planned transit network. With implementation of the planned transit network, the number of average weekday boardings on the system is projected to more than double from around 41,000 to 91,000 by 2050 with assumed growth, while the number of trips (excluding transfers) is projected to grow 80% to 74,000. This excludes supplemental school

service ridership. The larger increase in boardings compared to trips is due to the increased transfer rate with the BRT system and additional peripheral routes. BRT system ridership is projected at 26,300, 29% of the system total.

Implementation of the planned transit system would greatly increase job accessibility by transit. Figure 5-3 and 5-4 illustrate the percent of existing jobs that can be reached within 45 minutes (including walking and waiting time) using the existing and planned transit system.

While Figure 5-5 is the transit system vision, a significant new infusion of funding—most likely through creation of a regional transit authority providing a dedicated funding source—will be needed to achieve it. For more information, see Financial Analysis in Chapter 6.
The following describes the identified transit facility and service needs and recommendations with supporting actions to address them.

Implement a Bus Rapid Transit System and restructure routes accordingly.
MATPB and Metro Transit led the *Madison Transit Corridor Study* in 2013 using funding secured by the Capital Area Regional Planning Commission through a Sustainable Communities grant. The study identified four corridors that are suitable for BRT. BRT elements identified in the plan include frequent, direct, limited-stop service, branded buses, stations with level boarding, and off-board fare collection, and transit priority measures like bus lanes and transit signal priority. These corridor improvements will increase capacity and reduce travel times for transit riders throughout the Madison area, allowing Metro to reverse the recent downward

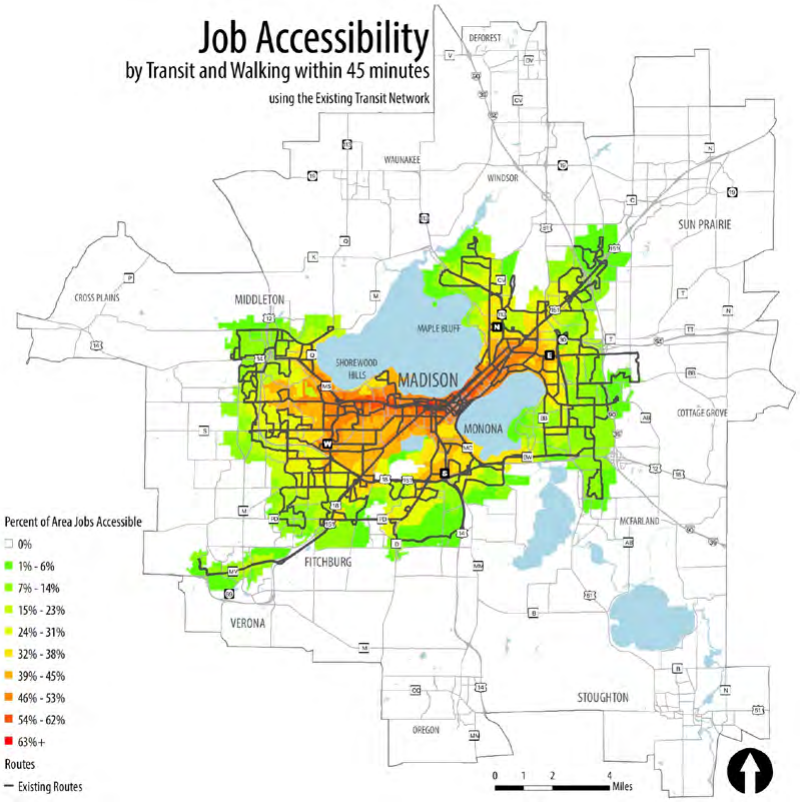


Figure 5-3: Job accessibility within 45 minutes by using existing transit system and walking.

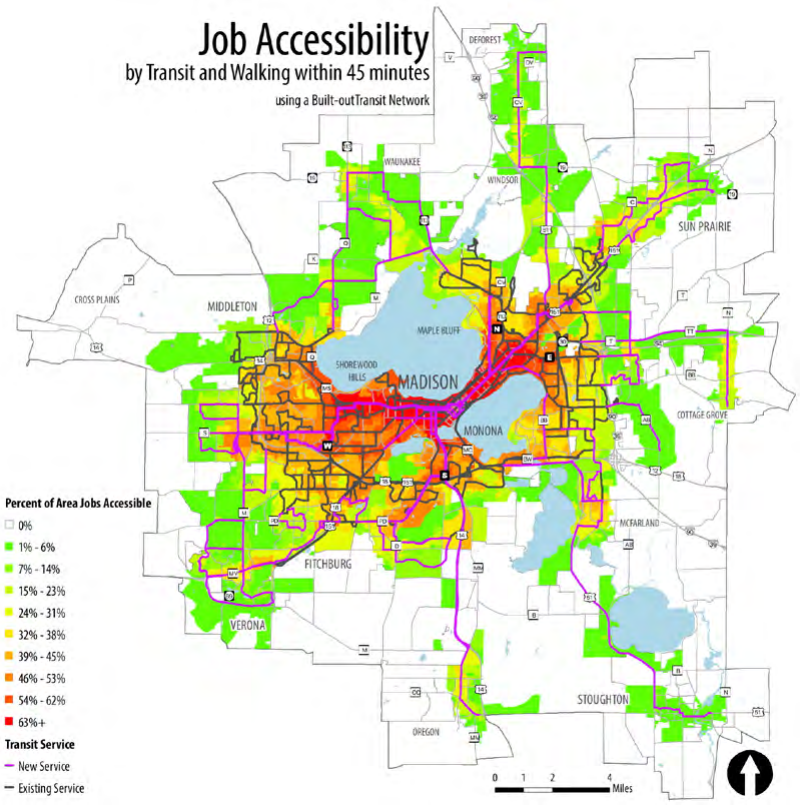


Figure 5-4: Job accessibility within 45 minutes by using planned transit system and walking.

trend in bus ridership over the past two years. Capital costs could be funded in large part through a federal Small Starts grant.

Policy-makers and planners in the Madison area have recognized the need for a large-scale investment in public transportation like light rail, commuter rail, and bus rapid transit for several decades. Planning documents in the 1980s showed a combination of light rail and bus rapid transit. In the 1990s and 2000s the focus shifted to commuter rail using underused and abandoned rail corridors. The Transport 2020

Example BRT configuration. Source: CDOT

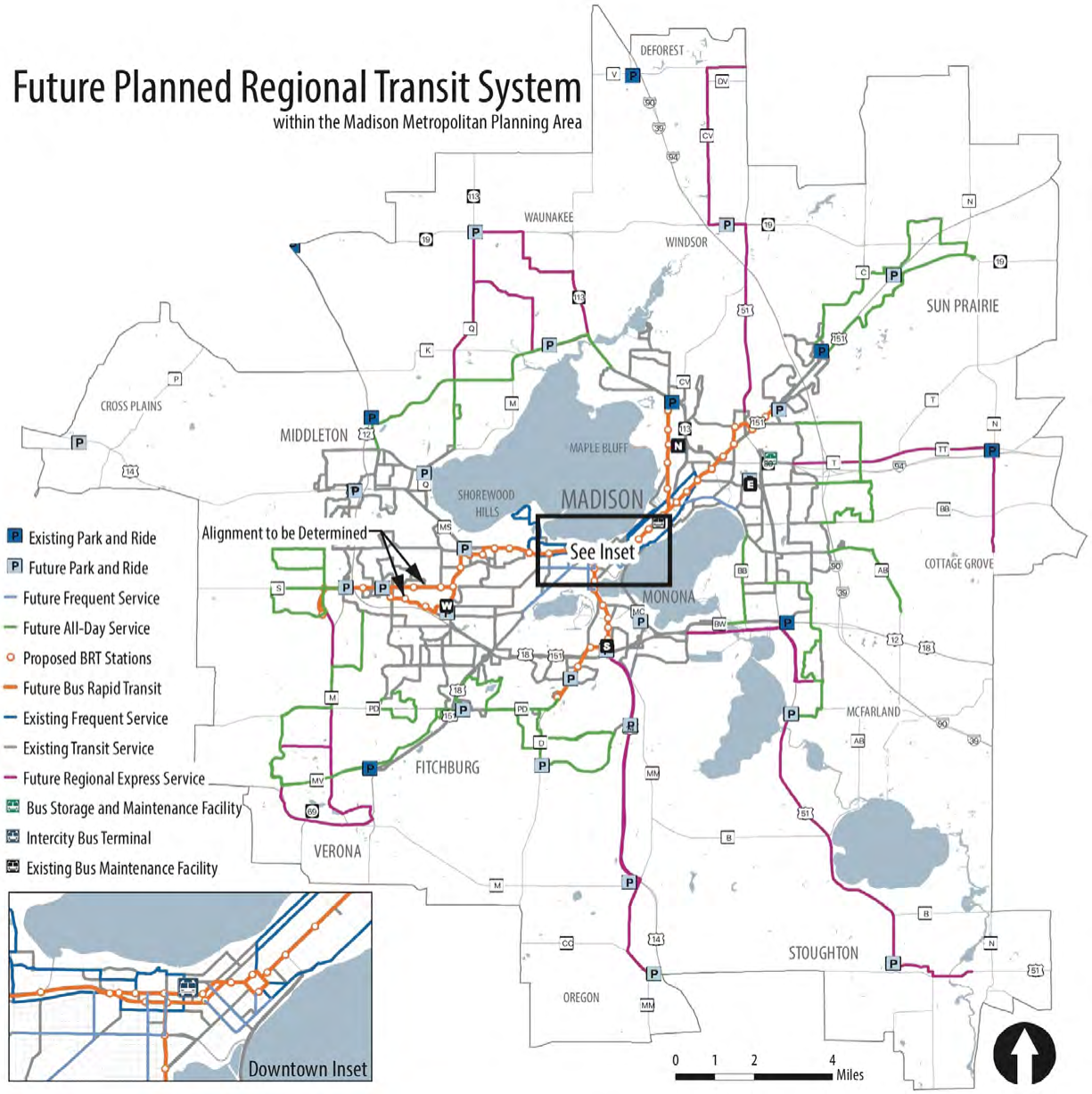


Figure 5-5: Future Planned Regional Transit System

study culminated in a locally preferred alternative in 2008 including a hybrid light rail / commuter rail line in the east-west corridor between Middleton and northeast Madison. The project was put on hold due to lack of funding.

BRT is essentially rail-like bus service, with many of the advantages of rail at a small fraction of the cost. The introduction of a BRT system will necessitate a restructuring of the bus routes on a scale similar to the 1998 restructuring when the transfer point system was adopted. Local routes will be adjusted to reduce duplication with BRT and provide better connections to the new high quality service. Besides better integration with BRT, restructuring routes will address other local transit needs, such as making the system easier to understand by replacing many overlapping low-frequency routes with fewer high-frequency routes.

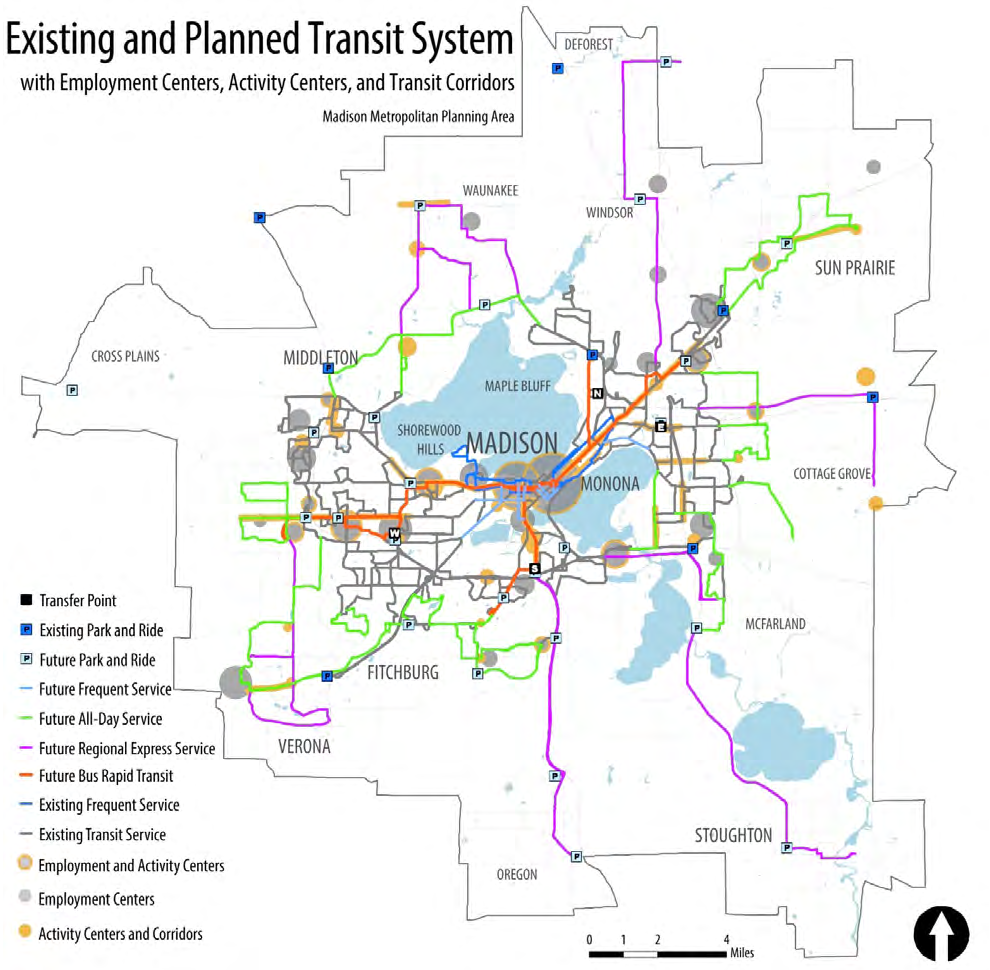


Figure 5-6 Existing and Planned Transit System with Employment Centers and Activity Centers and Corridors

Recommendations and Supporting Actions		Timeframe	Implementing Party
1	**Implement a Bus Rapid Transit System.**		
A	Complete an alternatives analysis and project planning, leading to an initial BRT Project.	1-5 years	City of Madison and other Local Governments, Metro, MPO
B	Expand the BRT network to fulfill the BRT Vision in the Madison area.	5-15+ years	Cities of Madison and Fitchburg, Metro, MPO
C	Plan for the expansion of BRT into other corridors, including Middleton, southwest Madison, Fitchburg, southeast Madison, and Sun Prairie.	15+ years	Metro, MPO, Local Governments
D	Expand the use of transit priority treatments, focusing on the BRT corridors.	Ongoing	Metro, MPO, Local Governments

Improve the existing local bus network by reducing travel times, increasing frequency, increasing capacity, providing service to new neighborhoods, and enhancing first and last mile connections. With a growing service area and limited service outside peak periods and on weekends, transit travel times for longer distance trips are far greater than driving. Many cross-town trips take an hour or longer due to routing through neighborhoods and transfers. Travel times must be shortened and more direct service added throughout the day.

Related to the need for reduced travel times is a need increase service frequency in some parts of the network in the greater Isthmus area. High-frequency routes are generally defined as those in which a rider does not have to check a schedule before traveling to a transit stop – generally 15 minute service or better. Currently, a limited number of neighborhoods in the region are served with high-frequency service and are predominantly located in central Madison. High density corridors need consistent, frequent local all-day service. Such corridors include Monroe Street, Regent Street, Mills Street, Broom and Bassett Streets, and Atwood Avenue.

Along with frequency improvements, capacity improvements must be made on heavily traveled routes. Metro operates a fixed-route fleet of 40-foot transit coaches that seat about 35 and allow for about 20 standees. Several routes routinely suffer from overcrowded conditions, including instances where passengers are passed by because the bus is full. Constructing the Nakoosa Trail bus storage and maintenance facility will allow Metro to increase its fleet and introduce larger articulated buses which will be required to accommodate future high-capacity transit, new all-day service, and regional routes.

When new neighborhoods are fully developed, full transit service should be provided. Some neighborhoods in peripheral Madison, Middleton, Fitchburg, and Verona currently only have service during weekday peak periods and require service throughout the day to provide access to jobs with nontraditional schedules as well as trips serving other purposes. Sun Prairie arguably has the most urgent need for all-day fixed-route bus service. With a population of about 30,000, Sun Prairie is now served by a publicly subsidized shared-ride taxi system. While popular, this system is strained by capacity limitations and does not provide convenient and affordable service to Madison.

Finally, the transit system must be accessible for those that live and work near transit stops, but outside of reasonable walking distance. Connecting transit routes provide a good option, but their typical low frequencies and circuitous routes, combined with transfers, drive up travel times. Further, they sometimes have low usage and can be expensive to operate, providing relatively low utility to the community.

Alternative first mile/last mile strategies are emerging that may be a viable alternative to new fixed-route service in low-density, peripheral areas. Improving pedestrian and bicycle access to transit stops may provide riders with increased access to the transit network. Bike-share programs like BCycle are an option but they require a high density of docking stations to be successful and are not an option for everybody, especially during cold and rainy weather. Public shared-ride taxi systems and other rideshare schemes may be effective in very low demand areas.

Point-deviation routes have not historically been widely deployed in the Madison area, but with Madison's peripheral neighborhoods growing and stretching Metro Transit's resources, they may fill a limited niche. Point-deviation routes typically follow a route with a conventional schedule, but are allowed to deviate slightly in order to serve riders. In low-density areas, point-deviation routes have the potential to serve larger areas within a fixed budget compared to fixed routes. They also have

the potential to reduce the number of transfers for long cross-town trips, which are more likely to be relied upon by low-income and minority riders, according to the 2015 Metro Transit Onboard Passenger Survey.

In the example route shown in figure 5-7, a bus would travel between the South Transfer Point and West Towne Mall along the dark blue line, but could make reasonable deviations to serve the light blue shaded area. Such a route may provide cost-effective all-day service to neighborhoods that currently have no all-day service, with reasonable travel times.

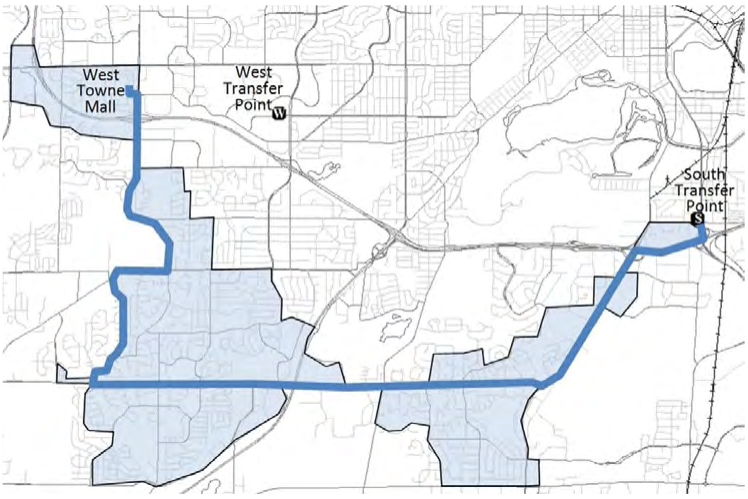


Figure 5-7: An example of route deviation.

Recommendations and Supporting Actions		Timeframe	Implementing Party
2	**Improve the local bus network.**		
A	Continue to optimize the local bus network to maximize its utility with available resources.	Ongoing	Metro, MPO
B	Measure and monitor the effects of service changes on low-income and minority populations.	Ongoing	Metro, MPO
C	Improve integration with bordering transit systems in Monona and Sun Prairie.	Ongoing	Metro, MPO
D	Reduce travel times and simplify service.	Ongoing	Metro
E	Expand and enhance the network of frequent local service in central Madison.	5-15 years	Metro
F	Make changes to local routes when BRT is opened in order to reduce duplication and enhance connections.	5-15+ years	Metro, MPO
G	Improve and expand data collection and analysis to support service planning.	Ongoing	Metro, MPO
3	**Add service in developing neighborhoods.**		
A	As developing neighborhoods are built out, enhance limited-service routes so that they provide regular service throughout the day.	Ongoing	Metro, Local governments
B	Add new all-day service in unserved peripheral neighborhoods and suburban communities such as Sun Prairie, McFarland, and Verona.	5-15+ years	Metro, Local governments
4	**Enhance transit stops with improved pedestrian/bicycle access and amenities.**		
A	Coordinate with municipalities, businesses, and neighborhood associations to plan and provide funding for stop improvements.	Ongoing	Metro, MPO, Local governments
B	Utilize TID funding and other alternative financing mechanisms to fund stop improvements.	Ongoing	Local governments
C	Plan and reserve space for transit stops/stations as part of new developments where appropriate.	Ongoing	Local governments
5	**Utilize alternative service delivery models to serve low-demand areas.**		
A	Analyze bus route productivity and identify service with low use and high travel times that may better serve neighborhoods with alternative transit models.	1-5 years	Metro, MPO
B	Develop peripheral routes with small vehicles that can deviate from their route with the goal of providing service in low density areas at a lower cost and reducing multiple-transfer trips.	1-5 years	Metro, MPO, Private Providers, Non-Profits
C	Investigate using transportation network companies and shared-ride taxi service to connect to transfer points, BRT, and regional express service.	1-5 years	Metro, MPO, Private Providers, Non-Profits
D	Plan for the use of driverless shuttles in low-density transit markets and niche areas like business parks and campuses.	1-5 years	Madison Traffic Eng, UW, Metro, MPO

Manage and improve the quality of transit capital assets. Aging infrastructure needs to be maintained and updated. Transit buses last 12 to 15 years and need to be regularly replaced. Metro's four transfer points were constructed in 1998 and will need to be replaced or in some cases relocated and/or expanded by 2050. Metro currently uses a diesel-powered fleet, about 10% of which is hybrid diesel-electric. Transitioning to a low-emission or emission-free fleet will reduce Metro's dependency on petroleum fuel, improve public health, air quality, and the pedestrian environment in bus route corridors. Metro is in the process of developing a comprehensive transit asset management plan in accordance with new federal rules. The plan must cover all transit agency assets, including vehicles, facilities, equipment, and other infrastructure.

Recommendations and Supporting Actions		Timeframe	Implementing Party
6	Maintain, expand, and enhance bus rolling stock and supporting facilities.		
A	Renovate and remodel the existing Metro maintenance/bus storage facility and address maintenance issues.	1-5 years	Metro
B	Build a new satellite bus facility on Nakoosa Trail to accommodate a larger fleet, including articulated buses and electric buses.	1-5 years	Metro
C	Replace buses on a regular cycle to ensure reliability and comfort.	Ongoing	Metro
D	Expand the use of alternative fuel vehicles with a goal of having a fully emission-free electric fleet by 2050.	Ongoing	Metro
E	Introduce articulated 60-foot buses to the fleet to reduce overcrowding and accommodate BRT.	5-15 years	Metro

Improve regional access to the transit network. Regional transit service in the Madison area is extremely limited with bus service confined to some of the contiguous municipalities bordering Madison and Verona. Workers living in DeForest, Windsor, Waunakee, Sun Prairie, Cottage Grove, McFarland, Stoughton, Oregon, and Cross Plains that work in the Madison area have effectively no public transit options outside of commuting to a park-and-ride lot or transfer point within Madison.

A new regional express service network will address the needs of people in these communities to commute to many jobs, particularly in central Madison. It will also provide access to people living within the existing transit service area to jobs in suburban employment centers. Employers in some of the communities have indicated they have difficulty filling entry level, lower wage jobs because of the lack of transit service. With direct, limited-stop service within Madison, the regional service will be time-competitive with driving and carpooling.

New park-and-ride lots will help supply passenger demand for the new regional express service. Many suburban communities are not well laid out for one route to serve all neighborhoods – many commuters will be best served if they have the option of making a short trip by auto or bicycle and using transit for the majority of their trip. Park-and-ride lots may be newly constructed, publicly owned lots, or private lots (e.g., at a shopping center) with lease agreements.

Recommendations and Supporting Actions		Timeframe	Implementing Party
7	Implement a regional express bus network.		
A	Expand and optimize the existing regional express service to Middleton and Verona.	5+ years	Metro, Local governments, MPO
B	Operate new routes primarily during the morning and afternoon peak periods to suburban Madison communities.	5-15 years	Metro, Local governments
C	Optimize the regional express transit service to provide service from Madison to suburban job centers as well as from residential areas to central Madison.	5-15 years	Metro, MPO, local governments
D	Provide limited stop service within City of Madison to provide fast service within Madison and connections to BRT and local service.	5-15 years	Metro, Local governments

Recommendations and Supporting Actions		Timeframe	Implementing Party
8	Expand park-and-ride facilities in conjunction with BRT and express services.		
A	Investigate opportunities to share space at shopping centers, churches, and other private facilities as well as public facilities such as parks, where appropriate. See Fig. 5-5, Planned transit System.	1-5 years	Metro, MPO, Local governments
B	Explore partnerships with local communities and agencies to maintain park-and-ride facilities.	1-5 years	Metro, Local governments

Implement a regional transportation entity to ensure financial solvency of the transit agency. A regional funding mechanism such as a regional transit authority with taxing authority is necessary to implement the vision of expanded transit service in the Madison region, including construction and operation of a bus rapid transit system and expansion of bus storage and maintenance facilities. A regional governance structure would also improve service efficiency and allow for more equitable decision-making.

Recommendations and Supporting Actions		Timeframe	Implementing Party
9	Implement a regional transit entity with stable funding and representative governance.		
A	Ensure that funding for transit remains equitable and that decisions are made fairly, with communities represented appropriately.	Ongoing	Metro, Local governments
B	Explore alternatives to supplement or replace the property tax for local public funding, including a vehicle registration fee and sales tax (if state enabling legislation passed).	1-5+ years	Local governments
C	Implement a new regional transit authority or district with the mission of providing regional transit service if state enabling legislation is passed.	1-5+ years	Metro, Local governments

BICYCLES

Although the region's bikeway network is well developed compared to peer communities, gaps in the network persist. Bicycle planners need to consider the needs of bicyclists of all abilities, including young and old people, and people who are not comfortable biking in traffic.

The 2015 Bicycle Transportation Plan identified streets that do not have bicycle accommodations or have insufficient bicycle accommodations. However, as these facilities are generally evaluated when opportunities arise, such as street reconstruction, they were not prioritized. This plan goes one step further and identifies missing facilities that represent major gaps and barriers in the bikeway network.

Expand the regional shared-use path network and retrofit and expand on-street accommodations. The Bicycle Transportation Plan describes a network of major regional shared-use paths that will connect communities with high quality biking infrastructure. Examples of regional paths include the popular Capital City Trail and Southwest Path. Although they are long and continuous, they also serve as high-volume bike arterials in the central city.

The Lower Yahara River Trail will open to the public in 2017 with a new bridge and boardwalk over Lake Waubesa, substantially shortening and easing a bicycle trip between Fitchburg or central Madison and McFarland. This new facility is planned to be extended about 10 miles south to Stoughton. The City of Madison and Dane County are working to close the gap between the Capital City Trail in Madison and the Glacial Drumlin Trail in Cottage Grove, creating a complete route between Madison and Milwaukee.

Other major recommended regional paths include the Good Neighbor Trail to Middleton and to the west, a path around the north side of Lake Mendota, a path between Fitchburg and Oregon with a connection to the Capital City Trail, a path between Madison and Sun Prairie along the rail corridor, and paths serving the north side connecting to Waunakee and DeForest. These paths will address the major regional deficiencies in the bike network, connecting neighborhoods and municipalities that are isolated for people traveling by bike.

On-street accommodations for bicycles are found on a number of regional roadways that serve high-volumes of motor vehicle traffic. In many instances, these facilities provide the most direct route to and from a variety of destinations. Providing safe on-street bicycle facilities ensure that more riders are able to comfortably ride on these regional roadways. The network should be expanded as roadway reconstruction projects occur and facilities should be considered whenever new arterial or collector streets are constructed.

Figure 5-8 illustrates and Figure A-2 in Appendix A lists the major regional priority shared-use path projects that will help complete the planned regional network and fill some important gaps in the network in the urban area. See page D-23 for a map of the complete bicycle network plan.

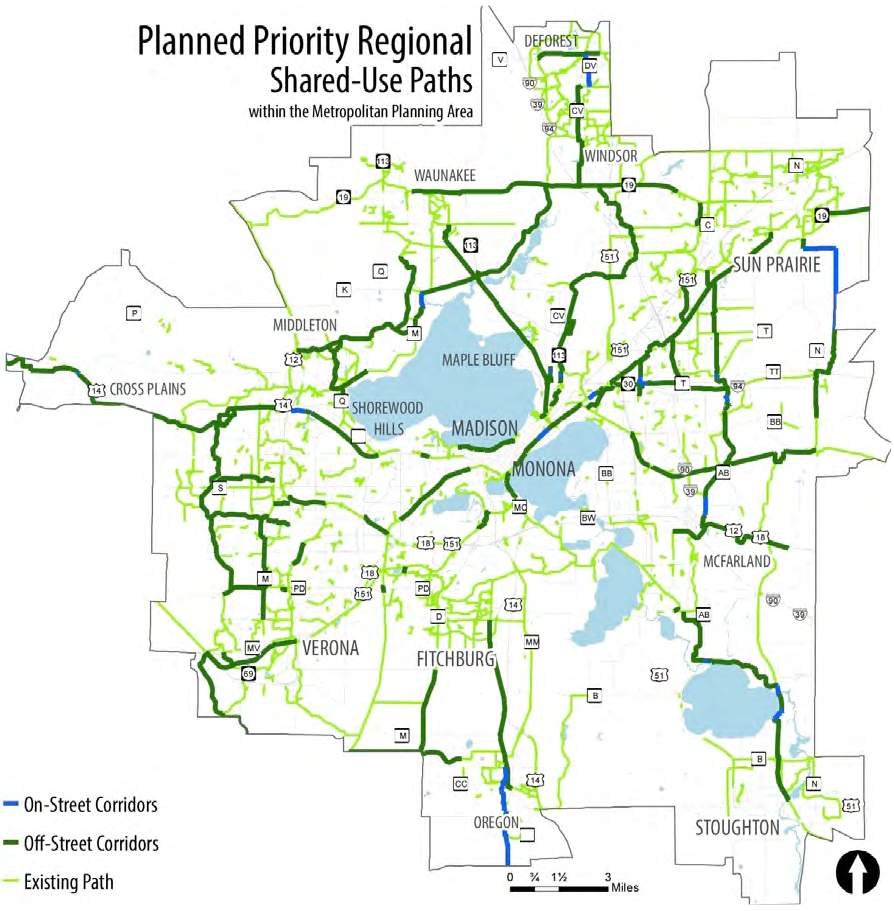


Figure 5-8: Planned Priority Regional Shared-Use Paths

Recommendations and Supporting Actions		Timeframe	Implementing Party
1	Expand the bikeway network with new shared-use paths and on-street facilities.		
A	Construct new off-street shared-use paths to complete the bikeway network envisioned in the Bicycle Transportation Plan.	Ongoing	Dane County, Local governments
B	Construct new shared-use paths in developing neighborhoods so that facilities are available as soon as new residents move in.	Ongoing	Dane County, Local governments
C	Retrofit existing corridors like railroad and utility rights-of-way with bicycle facilities as appropriate.	Ongoing	Local governments
D	Provide enhanced or premium bicycle facilities in key urban arterial corridors within right-of-way where feasible.	Ongoing	Local governments
E	Expand the use of bicycle boulevards, bicycle priority streets, and priority treatments at intersections.	Ongoing	Local governments
F	Prepare and implement local bicycle plans.	Ongoing	Local governments
G	Include paved shoulders of at least 4 feet in width on rural highways where appropriate and economically feasible.	Ongoing	WisDOT, Dane County
2	Maintain and modernize existing bicycle facilities.		
A	Repave and repair bicycle facilities with similar standards as collector streets.	Ongoing	WisDOT, Dane County, local governments
B	Include bicycle facilities on all new bridges and highway crossings.	Ongoing	WisDOT, Dane County, local governments
C	Use innovative bike facility designs that meet or exceed state and national guidelines.	Ongoing	Local governments
D	Develop and implement local policies and practices to clear snow, ice, and debris from bike facilities.	Ongoing	Dane County, Local governments

<u>Eliminate gaps and barriers in the bicycle network.</u>
Major facilities needed to complete the urban bikeway network are shown in Figure 5-9. The gaps and barriers analysis focused on urban areas that are fully developed and on identifying street and path corridors with existing demand for bicycling that can feasibly accommodate bicycle facilities when the opportunity arises. The analysis is intended to serve as an initial screening based on the existing and planned bikeway network.

A more detailed engineering evaluation is needed to determine how best to facilitate bicycles within the street corridors identified.

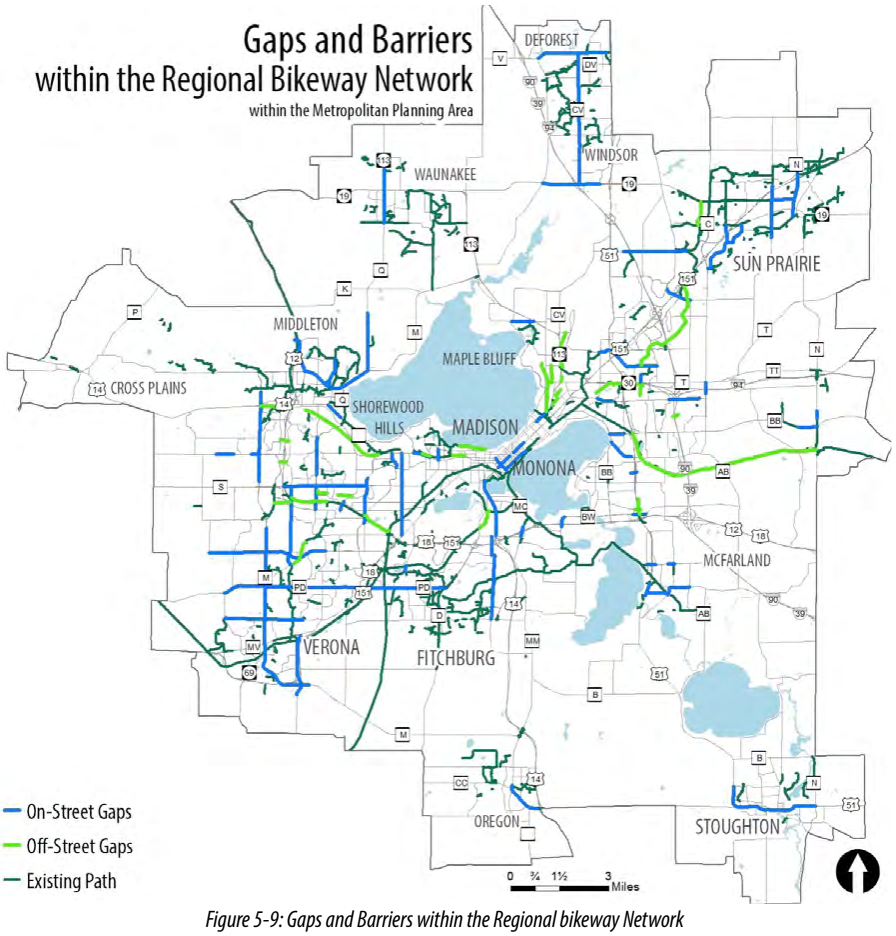


Figure 5-9: Gaps and Barriers within the Regional bikeway Network

While a detailed feasibility analysis of the identified corridors was not conducted, constrained street corridors with no available right-of-way and/or recently reconstructed streets are excluded.

The gaps and barriers are a occur in both on-street and off-street facilities. Fixing these gaps and barriers will help complete the bicycle route system envisioned in the Bicycle Transportation Plan. Figure 5-10 illustrates the planned primary regional route system.

Most of the on-street needs shown in the gaps and barrier map will likely be satisfied with bike lanes where none currently exist. Where feasible, these lanes may be buffered or protected.

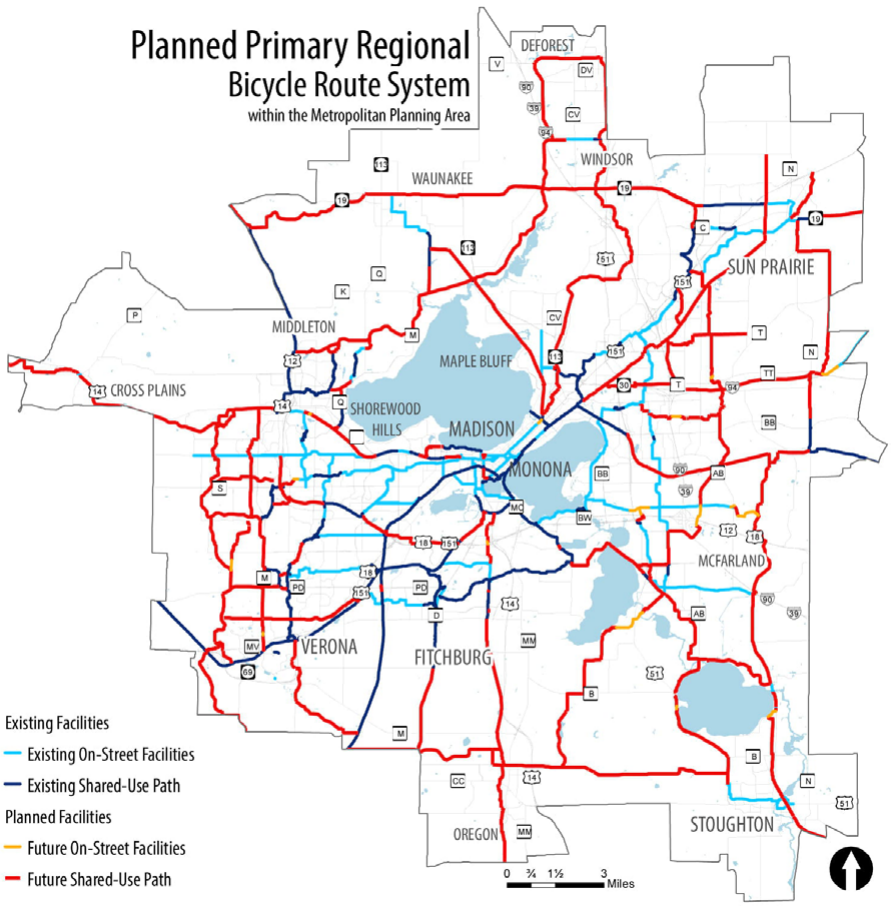


Figure 5-10: Planned Primary Regional Bicycle Route System

Recommendations and Supporting Actions		Timeframe	Implementing Party
3	Eliminate bicycling barriers and hazards in the bikeway network.		
A	Close regional bikeway network gaps and address barriers (see Figure 5-9).	Ongoing	Dane County, Local governments
B	Evaluate intersections with a history of safety concerns or complaints, and plan and implement improvements.	Ongoing	WisDOT, Dane County, local governments
C	Complete the local street network where barriers prevent direct travel.	Ongoing	Local governments
D	Ameliorate conflicts between bikes and buses, delivery trucks, and pedestrians.	Ongoing	Local governments

Encourage bicycling by enacting bicyclist-supportive policies and ensuring bicyclist safety. To ensure that users of all abilities are comfortable using the bicycle network, appropriate facilities must be provided, but we must also ensure that both bicyclists and motorists are provided with ample education and encouragement. Also, intersections and corridors with high bicycle crash rates need to be studied to identify effective counter measures. These types of studies can also identify common patterns for crashes, which can be used to develop targeted education campaigns. Other user needs include adequate bicycle storage opportunities, access to bike sharing services, and adequate wayfinding.

Recommendations and Supporting Actions		Timeframe	Implementing Party
4	Provide adequate bicycle parking.		
A	Require bicycle parking as a condition of new development.	Ongoing	Local governments
B	Provide public bicycle parking in business districts, on campuses, and at high-use transit stations.	Ongoing	Local governments
5	Improve bicyclist safety through a "3E" approach .		
A	Conduct studies of intersections and other areas with high crash rates or documented safety issues to identify appropriate countermeasures.	Ongoing	Local governments, MPO
B	Update 1991 City of Madison study of vehicular crashes involving pedestrians and bicyclists, expanding it to the metro area, to obtain up-to-date information on common patterns for crashes. Utilize the information in crash prevention efforts.	1-5 years	MPO, City of Madison Traffic Engineering
6	Continue bike share, education, and bicyclist supportive policies.		
A	Continue supportive policies like producing bicycle maps and accommodating bicycle-themed events.	Ongoing	MPO, Local governments, NGOs
B	Implement wayfinding system for bicyclists using the recently developed Bicycle Wayfinding Design Guidelines for Dane County.	Ongoing	Dane County, Local governments
C	Expand the bike share program, working with the provider, by expanding the coverage and increasing the density of stations.	Ongoing	BCycle, Local governments
D	Support and expand education and encouragement programs that promote safety and encourage all residents to bicycle for commuting and other trips.	Ongoing	MPO, Local governments

PEDESTRIANS

Sidewalks are the preferred accommodation for pedestrians and provide many benefits, including safety, mobility, and healthier communities. Therefore, the pedestrian needs analysis started with identifying urban arterial and collector streets where sidewalks are missing from one or both sides, but are needed to serve existing development . This provided a starting point for prioritizing the most pressing needs. These street segments were then split into "Tier 1" and "Tier 2" categories.

Tier 1 sidewalk needs typically have a higher demand for walking based on the pedestrian walk access analysis (see Chapter 3) and are on streets with higher traffic speeds and volumes. Other qualitative factors were also considered. For instance, recently reconstructed streets and streets where a sidewalk is on one side, but most of the destinations are on the other side were generally put in the Tier 2 category. Figure 5-11 illustrates the Tier 1 and Tier 2 regional pedestrian network needs.

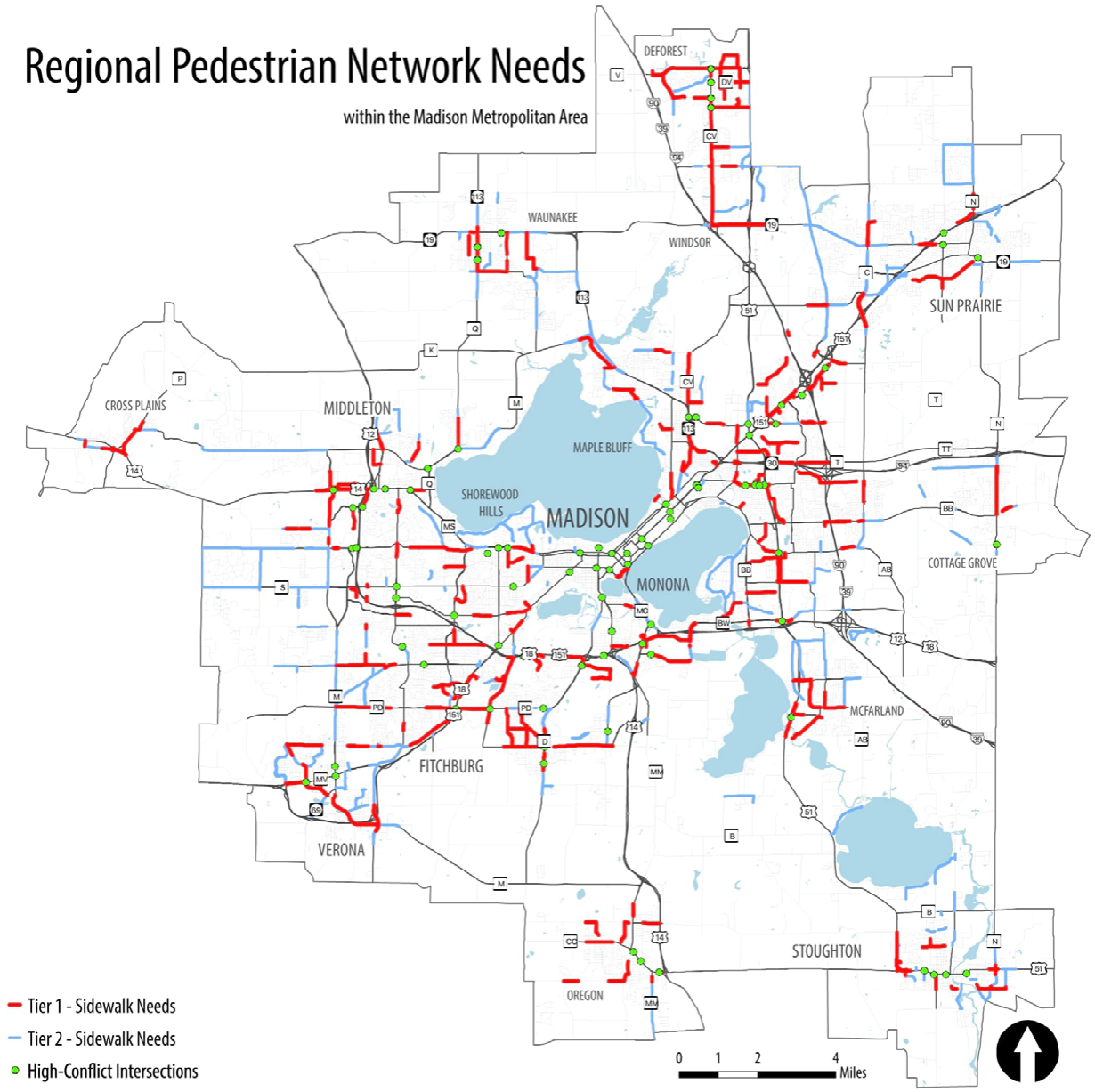


Figure 5-11: Regional Pedestrian Network Needs

Street crossing facilities such as curb ramps, crosswalks, and signals are the other major type of facility for pedestrians. Designing safe and convenient street crossings is extremely important for creating a pedestrian friendly environment. Appendix E includes a pedestrian toolbox that illustrates the different types of pedestrian facilities and treatments that can be used to encourage walking and provide for the safety of pedestrians. Of course, good facilities alone are insufficient without destinations within walking distance. Streetscape design is also an important part of creating walkable communities. Pedestrian-supportive land use is addressed above under Land Use and Transportation Integration. The following recommendations and supporting actions address the region's major pedestrian facility needs.

Construct sidewalks along all new urban streets and retrofit regional roadways with sidewalk accommodations. All urban streets that attract pedestrians normally benefit from having sidewalks.

Recommendations and Supporting Actions		Timeframe	Implementing Party
1	Provide sidewalks and appropriate pedestrian amenities in developing neighborhoods.		
A	Require sidewalks on both sides of all streets in new urban developments.	Ongoing	Local governments
B	Adopt land use ordinances to ensure new developments provide for adequate pedestrian circulation and are integrated with adjacent land uses.	Ongoing	Local governments
C	Connect bordering, developing neighborhoods with sidewalks and shared-use paths.	Ongoing	Local governments
D	Prepare and implement local pedestrian plans.	Ongoing	Local governments
2	Retrofit regional streets with modern, safe pedestrian accommodations .		
A	Prioritize the addition of missing sidewalks on arterial and collector streets with higher demand for walking (See Fig. 5-11).	Ongoing	WisDOT, Local governments
B	Identify pedestrian needs and gaps, as well as safety problems, and implement solutions.	Ongoing	WisDOT, Local governments
C	Reduce cost share required of property owners to retrofit in sidewalks in existing neighborhoods.	Ongoing	Local governments
D	Prepare and implement ADA compliance plans to retrofit non-conforming facilities to ADA standards.	Ongoing	Local governments
E	Identify and install accessible pedestrian signal systems and other ADA accessibility treatments where necessary.	Ongoing	WisDOT, Local governments
F	Provide for a more comfortable pedestrian experience with wider sidewalks and appropriate separation on high-volume regional roads with pedestrian traffic.	Ongoing	WisDOT, Local governments

Improve the safety and usability of the pedestrian network. At the beginning and end of every trip, users of all modes are pedestrians. Thus, it is important to ensure a safe and usable pedestrian network. High conflict intersections should be examined to determine their need for pedestrian crossing improvements. The sidewalks should be maintained for year-round use, similar to roadways. In areas where roadway geometry and street designs cause unsafe pedestrian conditions, traffic calming devices should be installed to ensure pedestrian safety.

Recommendations and Supporting Actions		Timeframe	Implementing Party
3	Improve safety and usability for pedestrians at intersections and crossings.		
A	Evaluate pedestrian improvements at major street crossings and implement as opportunities are available. See Fig. 5-11 identifying many of these high conflict locations.	Ongoing	Local governments, MPO
B	As intersections are designed and reconstructed, consider pedestrian safety improvements.	Ongoing	WisDOT, Local Governments
C	Use pedestrian design tools to improve crossings such as enhanced crosswalks, refuge islands, and rapid flashing beacons. See Pedestrian Facilities Toolbox in Appendix F.	Ongoing	WisDOT, Local Governments
D	Identify and prioritize new grade-separated crossings where streets and shared-use paths with substantial pedestrian traffic intersect with highways and other barriers.	Ongoing	WisDOT, Local Governments
4	Maintain sidewalks and pedestrian facilities for year-round use.		
A	Provide and enforce snow removal policies, particularly around intersections and bus stops.	Ongoing	Local Governments
B	Implement program to identify and repair broken and substandard sidewalks.	1-5 years	Local Governments
5	Design new streets and retrofit existing streets to reduce speeding.		
A	Ensure that local street standards do not require unnecessarily wide streets.	Ongoing	Local Governments
B	Retrofit existing overly wide streets to reallocate space for other uses as part of reconstruction.	Ongoing	WisDOT, Dane County, Local Governments
C	Incorporate traffic calming features into new local streets where appropriate.	Ongoing	Dane County, Local Governments
D	Implement traffic management programs to address speeding and cut-through traffic problems on existing streets.	Ongoing	Dane County, Local Governments

INTER-REGIONAL TRAVEL

In an increasingly connected world, inter-regional travel must be maintained and expanded. While intercity-bus options are currently available, buses lack a common terminus and often lack good connections to local bus routes. Further, inter-city passenger rail service is unavailable.

Construct an inter-city transit hub. The lack of a centralized inter-city bus terminal is the most immediate need for inter-regional travel by bus. A new facility needs to be centrally located with convenient access to the University of Wisconsin campus as well as downtown Madison. A modern, attractive facility would feature ticket sales and other amenities for passengers. Several of our nearby cities - Milwaukee, Saint Paul, La Crosse, Grand Rapids, and Champaign-Urbana - have terminals that are well located and designed to maximize rider access and comfort.

While a new inter-city bus terminal would initially only serve buses, consideration should be given to future rail service to ensure convenient integration with existing and future services. Inter-city bus operators should be able to reliably access the new terminal without regular interference from traffic and other delays. Further, convenient connections to local transit service should be available.

Recommendations and Supporting Actions		Timeframe	Implementing Party
1	Build an inter-city bus terminal.		
A	Construct a new high-quality inter-city bus terminal in central Madison.	5-15 years	City of Madison
B	Ensure the new facility has convenient access to downtown Madison and the UW.	5-15 years	City of Madison, UW
C	Ensure that passengers can conveniently transfer to BRT and local buses.	5-15 years	City of Madison, Metro

Support improved inter-city transit. Madison is well-served by inter-city bus service, still, several gaps remain. Demand for travel to the Twin Cities will likely support far more service than is currently provided by the several daily round trips provided by Megabus, Greyhound, and Jefferson. More frequent buses, particularly on the express routes, would make the bus a more attractive alternative to driving. Increased frequency to northeastern Wisconsin is also needed. Only one daily round trip links Madison to Fond du Lac, Oshkosh, Appleton, and Green Bay. The population served by this route would be better served by several daily round trips. Additionally, bus service to Iowa (Dubuque, Davenport, Des Moines, etc.), Omaha, St. Louis, and Kansas City are inconvenient. Improved service could consist of new, longer routes with direct service to these cities, increased frequency, and better connections.

Until passenger rail service is available in Madison, increased access to Amtrak must be provided by increasing the frequency of inter-city service and connectivity to Amtrak stations. Thruway bus service currently provides an extension of Amtrak rail service to Madison. Connections to south and east coast trains in Chicago are convenient with frequent service to Chicago Union Station, but connections to west coast trains like the Empire Builder, California Zephyr, and Southwest Chief may require out-of-direction travel or long waits.

Recommendations and Supporting Actions		Timeframe	Implementing Party
2	Support new and improved inter-city bus service.		
A	Improve service frequency to Minneapolis / St Paul and Appleton / Green Bay.	1-5 years	WisDOT, Private Providers
B	Improve connections to Amtrak services.	1-5 years	WisDOT, Private Providers
C	Provide direct service to Davenport, Des Moines, Omaha, and other cities to the west.	1-5 years	WisDOT, Private Providers

Implement inter-city high-speed passenger rail service. Prior to 2010, an expansion of the popular Amtrak Hiawatha Service was planned to downtown Madison. The service would have had seven trains per day departing Madison, arriving in Chicago with stops in Milwaukee and other cities in between. This project was awarded federal stimulus funds, however, the funds were returned prior to construction.

Planning for inter-city high-speed passenger rail service should not be abandoned. Corridor acquisition and preservation will ensure viability of the service if and when the service becomes politically viable. The project should be as close to "shovel-ready" as possible, with planning efforts finalized and local political support maintained. When rail improvements are needed along previously identified corridors, considerations should be made for the types of improvements that will be compatible with future passenger service.

Recommendations and Supporting Actions		Timeframe	Implementing Party
3	Maintain and preserve the rail network for future passenger rail service.		
A	Identify inter-city passenger rail routes to Milwaukee, Chicago, and Minneapolis / St Paul.	15+ years	WisDOT
B	Identify station locations for passenger rail service.	15+ years	Local Governments, Metro MPO, Dane County, WisDOT

SPECIALIZED TRANSIT

Specialized transit service is coordinated through a variety of services that aim to meet the transportation needs of seniors and disabled individuals. The Dane County Coordinated Public Transit – Human Services Transportation Plan, updated in 2013, provides details on existing services and service and coordination needs. The following highlights some of these needs and recommendations to address them.

Expand the coverage of accessible fixed-route, paratransit, and on-demand taxi services. The expansion of public all-day fixed-route bus service into unserved neighborhoods in peripheral parts of Madison and neighboring communities like Verona, Monona, and Sun Prairie will substantially increase mobility for people with special needs. The new routes utilize accessible buses and automatically increase the paratransit service area. For those without access or the ability to use fixed-route service, paratransit service must continue to expand. Wheelchair accessible taxi service is currently only provided by one taxi company and the cost to provide the service is high, particularly given the intense competitive pressure facing traditional taxi companies with the rapid growth of Uber and other transportation network companies. In order to maintain this service in the future, costs will need to be spread across providers.

Recommendations and Supporting Actions		Timeframe	Implementing Party
1	Expand the coverage of accessible fixed-route bus and paratransit service and address other identified service related needs.		
A	Implement the recommendations in the Transit Development Plan and address needs identified in the Dane County Coordinated Public Transit - Human Services Transportation Plan	Ongoing	Metro, MPO
B	Explore opportunities to expand paratransit and accessible shared-ride taxi service in urban areas beyond the fixed-route bus service area	5-15 years	Metro, MPO, Dane County
2	Work collaboratively with private taxi operators to ensure accessible taxi service is available and costs for the service are shared equitably.		
A	Work collaboratively with private taxi operators to ensure accessible taxi service is available and costs for the service are shared equitably	Ongoing	MPO, City of Madison, Private Taxi Operators, Non Profits

Continue and expand work-based transportation for low-income workers. Low-income workers will continue to struggle to find reliable ways to get to work and help drive the economy. The YWCA's JobRide program plays a crucial role in filling this niche when public transit options are not available or practical. However, demand for the service exceeds budgetary and physical capacity of the system, and as outlying communities grow, demand will as well.

Recommendations and Supporting Actions		Timeframe	Implementing Party
3	Continue and expand specialized work-based transportation for low-income people.		
A	Work with the non-profit organizations to ensure funding remains available for people to get to work who don't have traditional options.	Ongoing	MPO, City of Madison, non-profit organizations
B	Continue to maximize efficiency by optimizing vehicles and timetables.	Ongoing	Non-profit organizations

Leverage emerging technologies to lower specialized transit operating costs while expanding service availability. Emerging technologies, such as ridesharing services and autonomous vehicles, provide both challenges to existing service delivery methods and opportunities for the future. New technologies that offer proven benefits should be incorporated into the transportation system, and accompanied by supportive policies.

Recommendations and Supporting Actions		Timeframe	Implementing Party
4	Utilize emerging technologies to lower operating costs and expand travel options.		
A	Modify policies as needed to ensure that autonomous vehicles can adequately serve seniors and people with disabilities.	5-15 years	MPO, City of Madison, WisDOT

Continue efforts to better coordinate specialized transit service. The City of Madison and Dane County coordinate successfully, minimizing service duplication. However, with the numerous public and private agencies and programs providing service there are still major coordination needs as documented in the Dane County Coordinated Public Transit – Human Services Transportation Plan. This includes coordinating transit services as well as job training, eligibility requirements, and funding. In addition, local communities should consider transit service availability when sighting senior housing, medical facilities, and other services.

Recommendations and Supporting Actions		Timeframe	Implementing Party
5	Improve interagency coordination of the various specialized transit services and private services.		
A	Plan for the advent of Family Care in Dane County, including for IRIS (self-directed services) members to prevent cost-shifting to Metro Transit.	Ongoing	MPO, City of Madison, Metro Transit
B	Improve coordination of medical trips, including inter- and intra-community trips and from surrounding counties.	Ongoing	City of Madison, WisDOT

TRANSPORTATION DEMAND MANAGEMENT

Maximizing the use of alternative modes and reducing the number of people driving alone can improve air quality, congestion, and the quality of neighborhoods. Transportation Demand Management (TDM) strategies make alternatives to driving more appealing and increase awareness of the available options. TDM programs rely upon a robust transit, bicycle and pedestrian network, and support for ridesharing. Land use decisions and parking strategies also impact the viability of these alternatives.

Expand the regional network of park-and-ride lots to encourage carpooling, transit use, and bicycling. For commuters traveling between communities facilities and services such as park-and-ride lots and vanpools offer options for trips that are not able to be fully served by transit and bicycle infrastructure. Dane County currently has twelve park-and-ride lots but only five offer transit service. Park-and-ride usage could be expanded by increasing the number of lots with that have transit service, preferably limited-stop service, and are located on the bikeway network. To create more park-and-ride lots that serve a variety of transportation modes will require the cooperation of multiple government agencies to ensure the lots are in easily accessible locations and meet the needs of different commuters. Figure 5-12 shows existing and planned park-and-ride lots.

Expand the vanpool program. Currently, the vanpool program primarily serves commuters traveling into downtown Madison and the UW from communities outside of Madison. The State of Wisconsin Vanpool Program is limited by both the destinations it serves and by the hours it travels. In addition, only a limited number of vans are available and all vanpools must include a state employee. Another van service operated by the YWCA called the YW Transit JobRide offers service in the Madison area. The JobRide service provides rides to areas that aren't served by transit and to those that are inaccessible during non-peak transit hours, including nights, weekends, and holidays. The service provides an important complement to the public transit system, but funding it continues to be a challenge and it currently has a waitlist. Expansion of these services will increase options for travel that is hard to serve with transit, bicycling or walking.

Recommendations and Supporting Actions		Timeframe	Implementing Party
1	Expand the regional network of park-and-ride lots to encourage carpooling, transit use, and bicycling.		
A	Explore partnerships with local communities and agencies to develop park-and-ride facilities.	1-5 years	WisDOT, Dane County, Local governments
2	Expand the state vanpool program and support development of additional vanpool programs.		
A	Support expansion of WisDOA vanpool program and development of additional vanpool programs.	5-15 years	WisDOA, WisDOT, Local Governments, Non-Profits, Private Providers

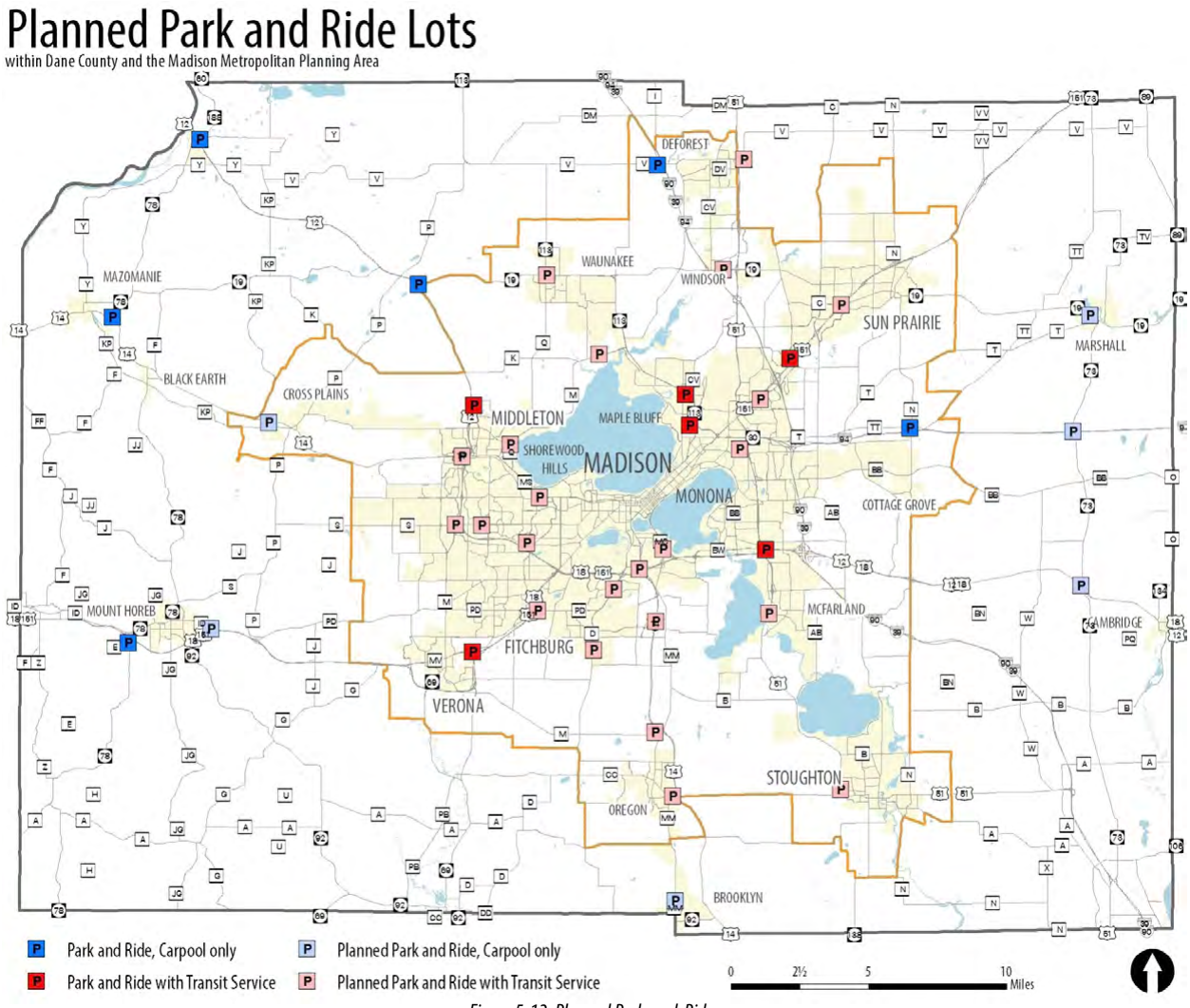


Figure 5-12: Planned Park-and-Rides

Continue to encourage and provide support to large employers, institutions, and municipalities to develop and promote strategies to reduce single-occupant motor vehicle trips. The Madison area has a well-established TDM program, Rideshare Etc., which supports businesses and other institutions to encourage reduced driving. One aspect of the program is the online Rideshare Etc. website, which provides a way for anyone to search online for options, including potential carpool partners. The Rideshare Etc. website is just one resource of the current program, which also includes a Guaranteed Ride Home program and a small marketing program. These current programs form a foundation for the expansion of TDM efforts in the region.

To foster the development of TDM initiatives in the region, local municipalities should develop clear requirements for a TDM plan as a condition of approval for large commercial developments. These requirements should include specific criteria and standards to be met, and provide support for their development and implementation. The establishment of Transportation Management Associations (TMA) in larger employment centers can help businesses meet these requirements. TMAs serve the needs of employers and employees within a business district, industrial park or other area by providing support, promotion, and advocacy for improved transportation policies and opportunities. These efforts will also support strategies such as telecommuting and alternative work schedules that can also help manage congestion.

Recommendations and Supporting Actions		Timeframe	Implementing Party
3	Continue to encourage and provide support to large employers, institutions, and municipalities to develop and promote strategies to reduce single occupant motor vehicle trips.		
A	Support establishment of Transportation Management Associations in major employment centers.	1-5 years	MPO, Local governments
B	Encourage and provide assistance to local communities interested in requiring TDM plans as a condition of approval for large commercial developments, with specific criteria and standards for such plans.	1-5 years	Local governments, MPO
C	Continue to encourage telecommuting and alternative work schedules.	Ongoing	Local governments, MPO

Provide financial incentives for people to use alternative transportation, and increase funding for marketing programs. Financial incentives are among the most effective TDM strategies. The cost and limited availability of parking in the downtown/UW areas is a significant factor in limiting single-occupancy vehicle (SOV) commuting. The advent of unlimited ride pass programs at UW and Madison College have also contributed greatly to increased transit ridership in the past 10+ years. Metro's Commute Card program continues to expand, and a number of businesses track employee commute modes to offer rewards for biking, walking,

taking transit or ridesharing. To continue progress in reducing SOV commuting, it will be important to expand employer participation in Metro's Commute Card program, parking cash-out programs, and other incentive programs. In addition, users of alternative modes will need support programs such as the Guaranteed Ride Home program and occasional parking programs to ease the transition from driving alone. In addition, encouragement programming and marketing efforts will need to be undertaken to ensure that people are aware of their options, especially individualized marketing programs such as a the Love to Ride and Smart Trips programs. These individualized marketing programs are designed to work with people to find solutions that work for their situations and to provide them with the support and resources they need to make incremental changes in their travel behavior.

Recommendations and Supporting Actions		Timeframe	Implementing Party
4	Provide financial incentives for people to use alternative transportation and increase funding for marketing programs.		
A	Continue efforts to expand employer participation in alternative transportation incentive programs such as Metro's Commute Card program, parking cash-out programs, or other financial reward programs.	Ongoing	MPO, Metro, Local Governments
B	Increase funding for support services such as Guaranteed Ride Home, occasional parking programs, and marketing of the programs.	1-5 years	MPO, Dane County, Local Governments
C	Increase funding for advertising and marketing programs, including individualized marketing programs such as Love to Ride and SmartTrips.	1-5 years	MPO, Dane County, WisDOT, Metro

Support transportation options at schools through Safe Routes to School (SRTS) programs. Auto congestion around schools affects traffic flow, air quality, and safety for bicyclists and pedestrians. Safe Routes to School programs encourage more families to walk and bike to school, and work to ensure everyone's safety near schools, particularly in student drop off/pick up areas. SRTS programs also help to increase physical activity in children and support healthy habits for the future. Since the inception of the federal SRTS program many communities in the region have undertaken SRTS projects to improve bicycling

and walking conditions at and around their schools. However, sustainable funding for these efforts is needed to ensure the continued survival and expansion of these programs. Sustainable funding, along with a regional approach to SRTS, will help establish walking and bicycling to school as a safe and efficient way for families to travel to school and help improve students' health.

Recommendations and Supporting Actions		Timeframe	Implementing Party
5	Support transportation options at schools through Safe Routes to School programs.		
A	Secure sustainable funding for a regional Safe Routes to School program, utilizing resources such as mini-grants, CIP funding, local operating budget funding, private funding, and/or federal funding.	1-5 years	MPO, Non-Profits, School Districts, Local Governments
B	Develop and implement a regional Safe Routes to School program.	1-5 years	MPO, Non-Profits, School Districts, Local Governments

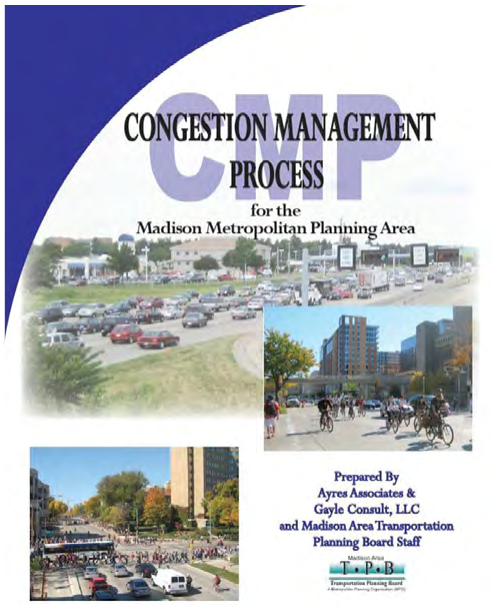
TSM, OPERATIONS, AND ITS

Congestion is caused when the demand for a transportation facility approaches or exceeds the capacity of the roadway. The result of a roadway reaching this condition is slower travel speeds, longer trip lengths, and the potential for vehicle queuing when entering or exiting the roadway. Typically, recurring congestion is common during the morning and afternoon rush hour periods on heavily traveled regional roadways. This type of congestion is generally predictable, understood, and accepted by motorists. However, non-recurring congestion caused by construction, crashes, bad weather, and other incidents can lead to unexpected delays and unanticipated travel-time variability. Complicating things, these sources of congestion can trigger secondary events, such as a weather event causing a crash or a special event near a construction zone causing extreme delay. Research has shown that these non-recurring causes contribute to close to half of all congestion. Reliability issues are often more frustrating than congestion, causing commuters to be late for work, buses to run late, and freight to miss delivery windows.

Major capacity expansion projects, such as adding additional lanes, are often not feasible or desirable because of the cost and negative impacts to the environment, residents' quality of life, and other roadway users. However, actively managing the transportation system to improve traffic operations can increase the capacity of a roadway without constructing new lanes. Transportation system management (TSM) includes strategies such as improved traffic signal operations, management of roadway incidents, traveler information, and focused roadway modifications to provide bottleneck relief. Intelligent Transportation Systems (ITS) – sensors, computers, communications systems that allow multiple agencies to work together – can aid these TSM strategies. Even for roadways that will eventually need additional travel lanes, TSM can delay the need for

capacity expansion. After expansion, TSM strategies can help to maximize the value of new capacity. In short, TSM, including ITS, is about maximizing the value of transportation infrastructure.

<u>Update and Implement the Congestion Management Process</u>.
To minimize congestion for all transportation modes and reduce unexpected delay, MATPB has adopted a comprehensive congestion management process (CMP). The CMP prescribes comprehensive transportation system management and operations strategies to ensure the most efficient use of resources and minimum environmental impact. The efficacy of this process is determined in part by an annual performance measurement and monitoring process. The first performance measure report was published in 2016.



In the future, MATPB will refine the CMP to ensure that the process is serving its intended purpose. This includes refining data collection techniques for CMP-recommended performance measures, and ensuring that CMP processes are contemporary compared to that of peer cities. While still legally valid, the process should be updated to reflect changing regional needs, trends, and technologies.

Recommendations and Supporting Actions		Timeframe	Implementing Party
1	Implement and periodically update the adopted Congestion Management Process.		
A	Continue and improve monitoring of system performance, including post-construction project impact evaluation, utilizing the methodology outlined in the plan.	Ongoing	MPO, Dane County, Local goverments, WisDOT
B	Identify, prioritize, and implement corridor and intersection TSM projects to improve traffic and transit operations and safety on the arterial roadway system.	Ongoing	MPO, WisDOT, Dane County, Local Governments
C	Investigate the feasibility, benefits, and costs of an expanded incident detection and response program for additional state roadways (e.g., Verona Road) and selected local arterials.	1-5 years	WisDOT, Dane County, Local Goverments, MPO
D	Update the CMP to account for new federal rules, data sources, and MPO resources.	1-5 years	MPO

Improve the operation of the transportation network by improving roadway access. Access to and from a roadway is valuable to landowners on adjacent parcels – be it retail establishments, industrial uses, or residential properties. Access points can have a major impact on roadway operations. Land use adjacent to regional roadways should be planned in a way that is consistent with roadway function and geometry. Access should be examined on existing facilities and consolidated, when appropriate.

Recommendations and Supporting Actions		Timeframe	Implementing Party
2	Implement access management plans and standards for existing and planned future arterial roadways as development and street (re)construction occur.		
A	Initiate access management plans on congested corridors as development and street reconstruction occur	1-5 years	MPO
B	Develop a regional access management plan that identifies standards for future arterials roadways, best practices, and safety considerations	1-5 years	MPO

Modernize the transportation network through the use of technologies that improve the operations of existing infrastructure. The operation of the transportation system can be impacted not only by roadway design, but by technologies that modify traffic flow and provide information to influence traveler behavior. In terms of importance, neither method can be understated. To plan for and coordinate future operational improvements, MATPB adopted the first Regional Intelligent Transportation Systems Strategic Plan in early 2016. This plan contains a prioritized list of recommended projects, as well as strategies to guide plan implementation. The plan should be implemented and updated as needed.

Recommendations and Supporting Actions		Timeframe	Implementing Party
3	Modernize the multimodal transportation network using technology.		
A	Include as part of new urban roadway projects infrastructure for connected and autonomous technologies, where appropriate.	Ongoing	WisDOT, Dane County, Local governments
B	Replace obsolete traffic signal controllers with “smart" controllers when replacing traffic signals or constructing new signalized intersections.	Ongoing	WisDOT, Local governments
C	Implement adopted process to identify and integrate ITS infrastructure into planning and design of major state roadway projects.	Ongoing	WisDOT
4	Implement and periodically update the Regional Intelligent Transportation Systems Strategic Plan.		
A	Continue planning efforts to advance the recommendations listed in the ITS plan .	Ongoing	WisDOT, Dane County, Metro, Local governments
B	Continue to engage with the ITS Plan Implementation Subcommittee to facilitate cooperation and coordination among state and local agencies.	Ongoing	MPO
C	Continue efforts to provide comprehensive real-time traveler information to people and businesses.	Ongoing	WisDOT, City of Madison
D	Implement a smart card payment system that can be expanded to include a common fare media for other civic uses, as well as an open payment system that accepts fares using personal electronic devices.	1-5 years	Metro

FREIGHT, AIR, AND RAIL

Freight, air, and rail access improve the financial condition of area residents and businesses alike. Policies related to these modes should be designed to enhance the financial interests of all in the region.

Increase the local focus on freight planning. Freight interests should be incorporated into local planning efforts to ensure promotion and preservation of freight uses along freight corridors and targeted expansion of freight-related infrastructure.

Recommendations and Supporting Actions		Timeframe	Implementing Party
1	Maintain and promote new industrial uses along freight corridors.		
A	Work with stakeholders to determine significant transportation issues that negatively impact freight focused businesses within the region.	1-5 years	MPO, WisDOT
B	Work to cluster similar industrial uses to promote efficiency of the freight network.	Ongoing	Local governments
2	Maintain and expand infrastructure on the multimodal freight network, prioritizing projects that improve safety and efficiency, and minimize lifetime costs.		
A	Investigate and implement vehicle-to-infrastructure technologies to increase safety along freight corridors.	1-5 years	WisDOT, Dane County, Local governments
B	Investigate and implement vehicle-to-infrastructure technologies that reduce delay for passenger and freight vehicles in freight corridors.	1-5 years	WisDOT, Dane County, Local governments
C	Investigate ways in which new technologies, such as 3D printing, may impact the demand for future transportation facilities when planning improvements to the network.	1-5 years	WisDOT, Dane County, Local governments
D	Continue enforcement of truck weight regulations to reduce premature deterioration of roadways and bridges.	Ongoing	WisDOT
3	Increase focus on freight planning for regional and local transportation facilities.		
A	Continue to incorporate freight considerations into corridor and planning studies.	Ongoing	WisDOT, Dane County, Local governments
B	Plan for and implement recommendations from the Wisconsin State Freight Plan.	Ongoing	WisDOT, Local governments
C	Ensure local and regional freight-centric projects are listed in Wisconsin State Freight Plan to maintain eligibility for enhanced federal matching funds.	1-5 years	WisDOT, Dane County, MPO, Local governments
D	Consider first and last mile(s) implications for freight when approving site plans for freight focused facilities.	Ongoing	Local governments

Mitigate rail conflicts while maintaining the viability of rail service. Safety concerns at rail crossings should be studied and remedied with the help of private rail operators. Land use conflicts, such as rail crossings in residential areas, should be mitigated through the use of improvements that allow designation of "quiet zones." Rail corridors should be acquired when abandoned to preserve the corridors for future freight and passenger rail service, and other transportation uses. Further, governmental agencies should work with private operators to accommodate heavier loads at higher speeds.

Recommendations and Supporting Actions		Timeframe	Implementing Party
4	Maintain the availability of rail facilities for current and future uses.		
A	Preserve rail corridors for freight uses, acquiring excess land when available to ensure availability for future transportation uses.	Ongoing	WisDOT, Rail Transit Commissions
B	Replace ties, ballast, and jointed rail with modern materials to accommodate heavier loads and higher speeds.	Ongoing	WisDOT, Rail Transit Commissions, Private Operators
C	Plan for improvements to accommodate high speed, high volume passenger service on routes to Milwaukee, Chicago, and St Paul, such as positive train control, double-tracking, and electrification.	15+ years	WisDOT
5	Mitigate conflicts between rail and other uses		
A	Identify high-conflict rail crossings and mitigate conflicts, when possible.	Ongoing	WisDOT, Dane County, Local Governments
B	Continue to implement quite zones in residential neighborhoods within urbanized areas.	Ongoing	Local Governments
C	Work with rail companies to grade-separate high-use rail crossings.	Ongoing	WisDOT, Dane County, Local Governments

Ensure compatibility of land use planning near airports. The area in which an airport operates is often subject to a number of negative externalities such as increased noise, light, and air pollution. Care should be taken to ensure compatibility of land uses by accounting for existing and future airport master plans in development of local comprehensive plans. Further, the airport master plan should account for future land use plans encapsulated in local comprehensive plans.

Recommendations and Supporting Actions		Timeframe	Implementing Party
6	Ensure compatibility of uses near airports.		
A	Ensure land use plans within airport influence areas are compatible with existing and planned airport plans.	Ongoing	Local Governments
B	Ensure Airport Master Plans consider existing and future uses identified in community comprehensive plans.	Ongoing	Dane County
C	Continue to implement the Airport Master Plan.	Ongoing	Dane County
7	Improve airport facilities to enhance usability and convenience for passenger traffic.		
A	Improve connections to the airport for all modes of transportation, including increasing frequency and speed of transit connections between Dane County Airport, downtown Madison, and the UW campus.	Ongoing	WisDOT, Dane County, Metro, Local Governments
B	Consider how future transportation technologies may influence the way that passengers travel to and from airports when building new parking lots and passenger pickup/drop off facilities.	1-5 years	MPO, Dane County, Local governments

Improve airport accessibility for passenger flights and freight. Accessibility to Dane County Regional airport should be improved by all modes, specifically transit. Consideration of future technologies, such as autonomous vehicles, should be made before embarking on major parking enhancement projects. Freight-related facility accessibility should be improved as needed for local businesses.

Recommendations and Supporting Actions		Timeframe	Implementing Party
8	Improve airport facilities freight accommodations and connections		
A	Survey businesses to determine if Dane County Airport is adequately serving their needs and determine what could be done to improve service.	1-5 years	Dane County
B	Contact freight shippers operating out of Dane County Airport to determine if needs are being met with current facilities and identify improvements that must be made for future success.	1-5 years	MPO, Dane County, Local governments
C	Survey local businesses to determine if air freight needs are being met and what types of improvements would improve business viability.	1-5 years	MPO, Dane County, Local governments

PARKING

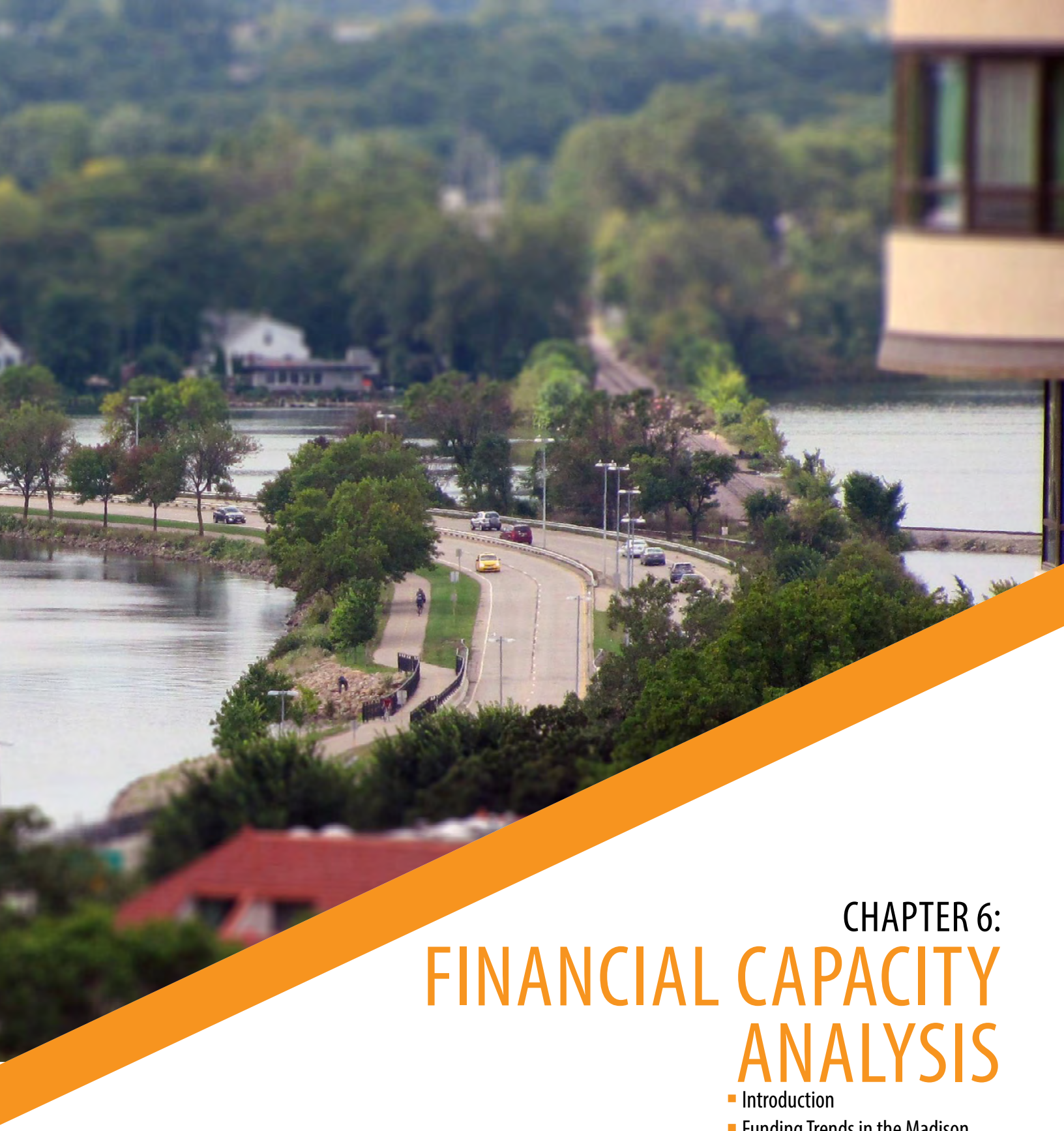
Adequate parking is necessary for the vibrancy and vitality of urban areas. It fosters economic activity in retail shopping and entertainment districts and ensures the success of business and office areas. However, over-constructing parking can lessen these advantages while discouraging users to rideshare, take transit, walk, or bike to their destinations. This modal diversion can lead to increases in congestion in already congested parts of the region. Further, emerging technologies may impact the need for parking facilities.

Use parking management strategies to reduce congestion and encourage multi-modalism. Strategically managing parking availability will ensure vibrancy of areas while encouraging multi-modalism. Such strategies may include demand-responsive pricing, where parking fees are higher when parking is most in demand. Local governments should also consider revising parking requirements to allow developers to determine the need for parking based on market demand, while avoiding shortages that may result in parking spillover in surrounding areas. Parking requirements and policies that reduce excessive parking are particularly important in downtowns and other mixed-use activity centers. In a recent update to its zoning code, the City of Madison removed nearly all parking minimums in non-residential districts, and for some residential areas only requires site plans showing where parking could be provided if needed in the future. Parking minimums had not been applied in the downtown for quite some time.

Recommendations and Supporting Actions		Timeframe	Implementing Party
1	Use parking management strategies to reduce congestion within downtown areas and major activity centers.		
A	Develop and implement a downtown Madison parking management plan.	1-5 years	City of Madison
B	Implement technologies and associated policies, such as demand responsive pricing, that increase access and convenience to parking, and reduce vehicle idling and circling to find parking.	5-15 years	Local governments
C	Encourage ridesharing by developing and implementing policies that reduce parking rates and/or provide preferential parking spots to carpools and vanpools.	1-5 years	Local governments
2	Modify parking requirements to encourage multi-modalism, using a more market-based approach while addressing potential spillover impacts.		
A	Review minimum parking requirements to ensure an appropriate balance between parking needs and continuity of the built environment.	1-5 years	Local governments
B	Allow deviation from parking minimums, particularly in dense urban areas, to accommodate innovative project designs that maximize access to alternative modes of transportation and incorporate TDM strategies.	1-5 years	Local governments

Ensure the flexibility of existing and future parking facilities to accommodate future technologies. Emerging technologies, such as ridesharing and autonomous vehicles, have the potential to reduce and/or change the demand of parking facilities. New facilities should be constructed in a way that allows their conversion to other uses, and existing facilities should be evaluated for other uses when reaching the end of their viability.

Recommendations and Supporting Actions		Timeframe	Implementing Party
3	Ensure flexibility of parking facilities to accommodate future technologies.		
A	Ensure that streets are designed with future flexibility in mind and that parking policies allow for conversion to loading zones if/when autonomous vehicle technologies are implemented.	1-5 years	Local governments
B	Ensure new parking structures are designed to allow for conversion to other uses if/when autonomous vehicle technologies are implemented.	5-15 years	Local governments



CHAPTER 6: FINANCIAL CAPACITY ANALYSIS

- Introduction
- Funding Trends in the Madison Metro Area
- Projected Revenues Through 2050
- Projected Expenses Through 2050
- Conclusion

INTRODUCTION

Federal transportation planning rules require that regional transportation plans include a financial capacity analysis to demonstrate that the plan is fiscally constrained. That is, it must be demonstrated that the estimated costs of recommended projects in the fiscally constrained plan and maintenance of the existing transportation system can be covered using available and projected revenue sources. If projected funding shortfalls exist, new sources of revenue must be identified. In other words, the plan cannot simply be a wish list of projects. This requires prioritizing potential projects, realistically assessing the ability of transportation providers in the metropolitan area to fund particular projects, and balancing the needs of new facilities or capacity expansion projects with system preservation needs.

The plan can identify recommended or needed projects, but if it cannot be demonstrated that funding is reasonably likely to be available for the projects, they cannot be included in the federally recognized plan. Examples of projects and services identified as needed but not included in the fiscally constrained plan are the Bus Rapid Transit (BRT) system and some of the other transit service improvements, and construction of the North Mendota Parkway between CTH M and US 12. While the BRT system is not included in the fiscally constrained plan, planning is underway to identify and design the first segment. The City of Madison (Metro Transit) will then apply for federal Small Starts funding for the project. The City of Madison has included funding for the project in its multi-year capital budget. It is anticipated that the project will be amended into the plan once an initial route and station locations have been identified.

The financial capacity analysis takes into account recent trends in sources and uses of funds, and estimates the ability of existing funding sources to meet the maintenance, preservation, and capacity expansion needs of the transportation system. Estimated project costs and funding must be in year-of-expenditure dollars, reflecting an assumed inflationary factor. An inflationary factor of 2.0% for both project costs and program funding has been assumed in accordance with WisDOT and FHWA guidance.

The current federal surface transportation legislation, the Fixing America's Surface Transportation (FAST) Act, passed in December 2015, provides the federal transportation funding program and planning framework for the next few years. The legislation provides for about a 2% annual increase in funding through 2020. While there have been some relatively minor

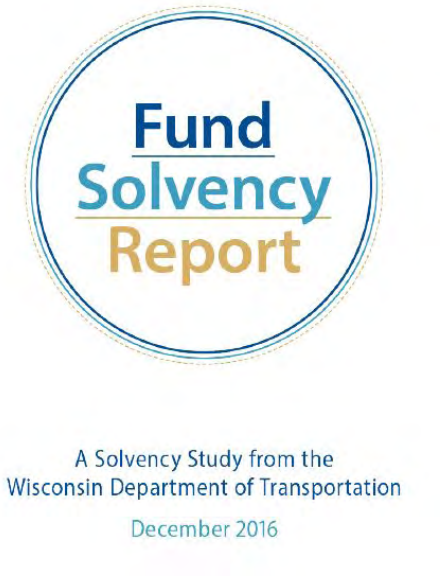
changes in programs, the current basic framework has been in place since 1991 when the landmark ISTEA legislation was passed. Therefore, it is safe to assume that this basic framework and recent funding levels will continue. While some short-term funding methods were employed to provide the necessary funding for the FAST Act, it is expected that a long-term solution will be developed to maintain funding levels. Any changes in programs or funding levels provided in the next reauthorization legislation will be incorporated into an updated financial analysis as part of the next major plan update in five years.

The financial capacity analysis assumes that state funding will also increase around 2% annually. Unlike the case with federal funding, this has not been the recent trend. According to a recent WisDOT report (see below), since 2006 the state motor vehicle fuel tax rate has remained the same and annual revenue from the tax has grown only 7.2% - a compound annual growth rate of 0.6%. Adjusted for inflation, gas tax revenue has actually declined during this period. As a result, WisDOT has in recent years relied on transfers from the General Fund and Petroleum Inspection Fund, along with increased bonding. This plan assumes that in the long term, the state transportation fund situation will be addressed and that inflationary increases to recent spending levels in the Madison metro area will be provided.

State Transportation Fund Solvency Report – A Solvency Study from the Wisconsin Department of Transportation (Dec. 2016)

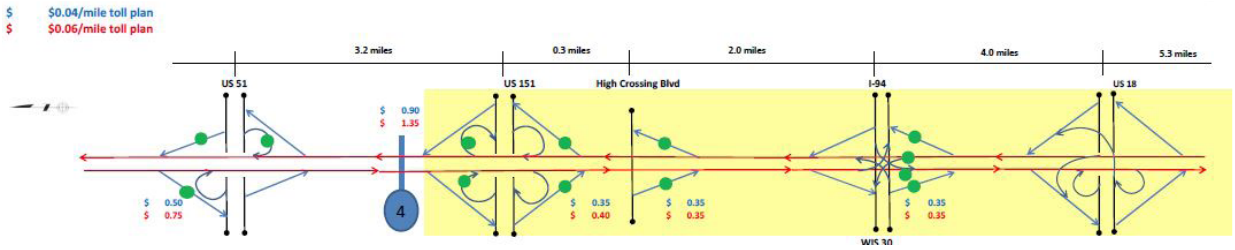
The 2015-17 biennial budget required WisDOT to conduct a study of the solvency of the state transportation fund. The study relied in part on a 2013 study by the Wisconsin Commission on Transportation Finance & Policy that examined and made recommendations regarding new revenue sources. The 2016 study analysis included five main components:

- Results from a related study focused on recent efficiency improvements at WisDOT;
- Description of current revenue sources for transportation;
- Description of current transportation expenditures by program area;
- Analysis of scenarios for future expenditures compared to projected revenues; and
- Potential options for new revenue, including a detailed feasibility study of tolling the Interstate highways in the state.



Tolling was not fully evaluated in the 2013 study, so the latest study included an examination of the feasibility of tolling on the Interstate highways in the state. This feasibility study evaluated current and best practices from tolling in other states, legal and policy issues that would need to be addressed, and revenue and traffic forecasting for tolling (including an estimate of infrastructure and operating costs and potential traffic diversion from tolled routes).

The fund solvency study projected revenues over the next 10-year period and then examined three different expenditure scenarios, and their impacts on the resulting condition of the transportation system. In terms of revenues, motor vehicle fuel



Tolling example for the I-39/90/94 corridor through the metropolitan planning area. Source: WisDOT Solvency Report, Appendix B.

taxes are expected to decrease due to greater vehicle fuel efficiency while vehicle registration fees are expected to grow a small amount. The three expenditure scenarios for 2018-2027 were: (1) spending less than the current 2015-17 budget; (2) spending at same level as current budget; and (3) a modest increase in spending above the current budget levels. A funding shortfall was projected for all scenarios – from $852 million over the decade in one to $7.94 billion in three.

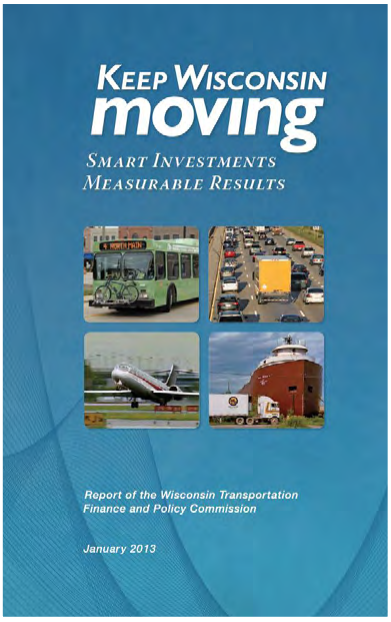
Under scenario one, the number of state highway system miles rated in poor or worse condition would increase 109% from 21% to 44% by Fiscal Year (FY) 2027. The second phase of the Verona Road (US 18/151) project, which involves expansion of Verona Road south to CTH PD and new interchanges at Williamsburg Way and CTH PD, would be delayed a year to 2019-2021 and the Interstate 39/90 (Madison Beltline to Ill. State Line) expansion project delayed three years with the Beltline/Interstate interchange project funded in FYs 2025-27 following completion of the Interstate expansion project. No new Majors program projects, such as the Beltline and Stoughton Road/US 51 currently being studied, could be enumerated (approved for funding) by the state Transportation Projects Commission until FY 2026-30. Other estimated impacts include a cumulative loss in purchasing power (given inflationary cost increases) of $798 million in local General Transportation Aids (GTA) – the largest source of state funding for local roadways – and a cumulative funding gap in Metro Transit operating assistance of $25 million.

Under scenario two, the number of state highway system miles rated in poor or worse condition would increase 93% while the number rated at fair or better would decrease by 25%. The Verona Road and Interstate expansion projects would not be delayed. New Majors program projects could be approved in 2020 (the list includes Stoughton Road/US 51 and US 51, McFarland to Stoughton) and 2026 (Beltline). GTA and Metro Transit impacts would be the same as in scenario one.

Under scenario three, the number of state highway system miles rated in poor or worse condition would increase 72% while the number rated at fair or better would decrease by 19%. The Verona Road project could be constructed a year ahead of schedule (2017-2019). The Interstate/Beltline interchange project could be funded in FY 2021-2023 at the completion of the Interstate expansion project. Enumeration of the Stoughton Road/US 51 and US 51, McFarland to Stoughton projects would still occur in 2020, but the Beltline project could be enumerated in FY 2022. GTA impacts are assumed to remain the same, while the scenario assumes approval of enabling legislation for local transit authorities, the increased revenue from which could offset the loss of state transit operating funding and address unmet capital needs. For Metro Transit, these capital needs include a planned new satellite bus garage/maintenance facility that is needed to accommodate a larger bus fleet required to expand weekday peak period service, add larger, articulated buses, and ease severe over-crowding at the current facility.

The fund solvency study considered potential additional revenue sources and estimated their potential revenue. These include increases to current fuel-based taxes and vehicle registration and license fees and three completely revenue sources: registration fee based on number of miles a vehicle is driven; new highway use fee of 2.5% on the price of new vehicle registered in state for the first time; and tolling on the Interstate system. Federal restrictions would likely limit the use of tolling revenue to investments in the facility or the broader interstate highway from which it was collected.

The study did not make any recommendations about transportation revenue and expenditure options, including tolling. The report simply provided the scenarios and potential revenue options for consideration. In 2013, the Wisconsin Commission on Transportation Finance and Policy, which was created in the 2011-2013 biennial state budget and charged with examining issues related to the future of transportation finance in Wisconsin, recommended strategies for additional funding.



The Commission issued a report, Keep Wisconsin Moving – Smart Investments, Measurable Results, which recommended additional annual funding of around $480 million over the following ten years for all modes of transportation. That level of investment was determined to be needed to maintain existing road and bridge conditions, make safety improvements, provide limited major highway modernization, and provide some other multi-modal facility and service improvements. In order to provide the additional revenue, the Commission recommended the following:

- Raise the state gas tax by 5 cents, to 23 cents per gallon;
- Adopt a new mileage-based registration fee for cars and light trucks that would amount to one cent for each mile traveled;
- Increase the annual registration fees for commercial vehicles by 73 percent;
- Increase the fee for an 8-year drivers license by $20; and
- Eliminate the sales tax exemption on the trade-in value of a vehicle.

The Commission also recommended the following:

- Enactment of legislation to allow for regional or local transportation or transit authorities supported by county or local sales taxes;
- Increase bonding while keeping debt service payments at a manageable level;
- Indexing the state fuel tax and vehicle registration fees to the inflation rate as had been the case for many years;
- Support federal legislation to allow states more flexibility to enact tolls on the Interstate system and other highways designated as part of the National Highway System; and
- Support a state constitutional amendment to protect the state transportation fund - passed in a November 2014 ballot measure.

FUNDING TRENDS IN THE MADISON METRO AREA

County and Municipal Streets/Roadways

Municipal streets are mostly financed by local funding sources. These include general revenues and bonds and, in the case of municipalities, also special assessments, impact fees, and tax increment financing. Counties cost share with municipalities on some projects. WisDOT distributes state funding to counties and municipalities through the state's General Transportation Aids and Connecting Highway Aids programs, and through other local programs such as the Local Road Improvement Program.

Figure 6-1, Historical County and Local Street/Roadway Expenses, shows the expenditures for operations and maintenance, construction, and other street related facilities (e.g., lighting, sidewalks, storm sewers) by municipalities in the Madison

Figure 6-1

Historical County and Municipal Street/Roadway Expenses ($000's)

within the Madison Metropolitan Planning Area

	2010				2011				2012				2013				2014			
County/ Municipality	**O & M [1]**	**Const. [2]**	**Other [3]**	**Total**	**O & M [1]**	**Const. [2]**	**Other [3]**	**Total**	**O & M [1]**	**Const. [2]**	**Other [3]**	**Total**	**O & M [1]**	**Const. [2]**	**Other [3]**	**Total**	**O & M [1]**	**Const. [2]**	**Other [3]**	**Total**
Dane County [4]	6,955.8	3,053.5	363.4	10,372.7	7,762.8	1,684.0	1,025.6	10,472.4	8,096.3	7,610.1	717.3	16,423.7	7,800.9	6,794.7	452.4	15,048.0	7,824.2	4,906.5	381.8	13,112.5
C. Fitchburg	1,541.6	2,803.9	159.6	4,505.1	1,552.8	3,416.9	140.2	5,109.9	1,543.3	16,629.9	134.6	18,307.8	3,416.2	2,020.5	133.3	5,570.0	1,870.3	8,287.8	182.6	10,340.7
C. Madison	24,201.6	17,177.5	4,687.9	46,067.0	18,597.8	25,050.9	7,272.9	50,921.6	17,767.1	26,463.0	5,793.1	50,023.2	19,519.6	17,360.1	6,371.6	43,251.3	20,900.8	18,097.0	10,235.7	49,233.4
C. Middleton	2,015.5	1,899.5	271.6	4,186.6	2,118.7	1,129.1	322.7	3,570.5	1,862.0	1,064.2	463.5	3,389.7	2,406.0	2,682.9	370.8	5,459.7	2,186.0	1,136.4	8,602.3	11,924.7
C. Monona	710.6	2,751.6	71.2	3,533.4	763.4	3,599.2	95.3	4,457.9	749.0	3,100.2	116.8	3,966.0	736.3	3,135.2	105.1	3,976.7	890.7	615.4	161.9	1,668.0
C. Stoughton	1,336.4	317.6	1,322.7	2,976.7	1,365.0	914.4	928.4	3,207.8	1,246.0	577.9	762.6	2,586.5	1,132.8	486.8	202.7	1,822.4	1,202.8	2193.9	287.9	3,684.6
C. Sun Prairie	3,083.3	2,199.0	651.8	5,934.1	2,783.0	2,400.3	662.5	5,845.8	2,688.1	1,518.7	445.4	4,652.2	3,163.5	2,221.7	390.9	5,776.1	2,985.0	3,118.6	973.1	7,076.6
C. Verona	914.0	1,180.1	183.5	2,277.6	1,284.3	1,057.0	208.0	2,549.3	1,532.9	1,138.3	721.5	3,392.7	1,111.8	2,362.9	203.8	3,678.4	1,047.8	1,608.6	222.2	2,878.6
Cities Total	**33,803.0**	**28,329.2**	**7,348.3**	**69,480.5**	**28,465.0**	**37,567.8**	**9,630.0**	**75,662.8**	**27,388.4**	**50,492.2**	**8,437.5**	**86,318.1**	**31,486.3**	**30,270.1**	**7,778.2**	**69,534.5**	**31,083.3**	**35,057.7**	**20,665.7**	**86,806.7**
V. Cottage Grove	572.1	406.4	120.3	1,098.8	447.2	337.8	94.6	879.6	522.7	1,173.7	93.1	1,789.5	718.4	359.2	148.2	1,225.8	1,291.1	2.3	93.6	1,386.9
V. Cross Plains	392.0	220.7	69.7	682.4	344.2	314.5	71.4	730.1	341.0	175.6	73.4	590.0	429.8	891.3	76.6	1,397.7	419.8	1,631.8	76.1	2,127.6
V. DeForest	424.6	857.7	372.2	1,654.5	530.7	888.2	155.4	1,574.3	413.8	2,344.5	259.6	3,017.9	457.9	2,226.4	216.6	2,900.9	466.8	1,235.4	371.2	2,073.4
V. Maple Bluff	105.7	2,956.9	427.9	3,490.5	133.3	62.4	62.4	258.1	248.7	71.7	52.2	372.6	237.4	216.2	34.9	488.6	223.4	3,840.5	51.3	4,115.2
V. McFarland	1,113.8	21.7	95.5	1,231.0	1,050.1	-	119.4	1,169.5	984.8	-	104.9	1,089.7	912.4	239.3	109.7	1,261.5	967.2	212.3	97.5	1,277.0
V. Oregon	812.8	520.7	384.0	1,717.5	906.2	93.5	206.9	1,206.6	458.5	125.5	222.7	806.7	707.1	199.6	171.0	1,077.7	706.1	449.4	158.7	1,314.2
V. Shorewood Hills	275.5	1,011.2	25.2	1,311.9	201.2	1,233.7	23.5	1,458.4	273.0	1,061.2	26.9	1,361.1	218.8	1,163.3	30.9	1,413.0	334.5	619.9	176.1	1,130.5
V. Waunakee	1,764.7	2,420.1	291.8	4,476.6	1,275.6	1,659.8	472.0	3,407.4	977.5	1,471.0	366.5	2,815.0	967.0	2,230.9	317.6	3,515.5	1,253.5	1,824.8	943.5	4,021.8
V. Windsor 5	257.2	131.4	27.6	416.3	287.5	84.8	28.5	400.8	265.6	203.7	27.8	497.0	285.3	212.7	28.6	526.6	302.2	211.2	32.4	545.8
Villages Total	**5,718.4**	**8,546.8**	**1,814.2**	**16,079.5**	**5,176.0**	**4,674.7**	**1,234.1**	**11,084.8**	**4,485.6**	**6,626.9**	**1,227.1**	**12,339.5**	**4,934.0**	**7,739.1**	**1,134.2**	**13,807.2**	**5,964.5**	**10,027.6**	**2,000.5**	**17,992.5**
T. Berry [6]	38.1	65.6	0.0	103.8	51.4	89.1	0.0	140.6	65.6	35.4	0.0	101.0	56.4	20.8	0.1	77.3	50.2	30.6	0.1	80.8
T. Blooming Grove	232.4	93.7	16.2	342.3	111.2	152.7	19.9	283.8	190.4	204.1	17.3	411.8	150.6	140.6	24.8	316.0	164.8	203.9	24.5	393.3
T. Bristol [7]	259.5	29.3	8.3	297.1	387.1	2.1	9.1	398.3	280.1	-	9.9	290.1	420.9	-	8.4	429.3	244.6	-	10.0	254.6
T. Burke	303.1	24.9	13.7	341.7	229.2	366.9	8.5	604.6	256.1	467.4	9.0	732.5	257.3	202.4	9.7	469.4	251.3	483.1	10.2	744.6
T. Cottage Grove [8]	430.5	129.7	-	560.2	377.7	134.6	-	512.3	371.5	218.7	-	590.2	388.1	255.0	1.4	644.6	353.9	341.4	1.3	696.7
T. Cross Plains [9]	61.7	54.1	0.4	116.2	60.3	1.3	0.5	62.1	54.0	1.3	0.5	55.9	71.2	-	0.5	71.7	83.8	-	0.5	84.4
T. Dunkirk [10]	261.9	-	4.2	266.2	336.6	-	7.2	343.7	195.6	82.2	18.0	295.8	229.1	101.2	4.7	335.0	287.1	43.5	5.0	335.6
T. Dunn	411.6	151.8	11.5	574.9	405.8	117.7	11.8	535.3	447.6	177.6	12.0	637.2	584.4	168.7	12.6	765.7	481.5	299.4	12.6	793.4
T. Madison	333.6	852.9	30.1	1,216.6	347.3	874.7	35.6	1,257.6	369.2	132.8	33.0	535.0	348.1	0.8	36.2	385.1	689.5	85.3	34.4	809.3
T. Middleton	404.4	809.9	235.0	1,449.3	447.3	1,573.2	70.0	2,090.5	446.9	429.6	199.3	1,075.8	539.9	381.1	63.5	984.5	1,147.2	514.0	126.7	1,787.9
T. Oregon [11]	110.3	107.3	-	217.5	184.7	100.5	-	285.2	95.9	113.2	-	209.1	144.2	141.6	-	285.8	166.2	94.6	-	260.8
T. Pleasant Springs [12]	258.8	-	0.5	259.3	359.5	-	0.5	360.0	302.5	-	0.5	303.1	332.6	-	0.6	333.2	400.3	-	0.6	400.9
T. Rutland [13]	68.9	28.1	1.5	98.4	76.8	78.6	0.9	156.3	68.2	86.9	0.8	155.9	96.8	134.6	0.9	232.2	78.9	81.8	1.5	162.1
T. Springfield [14]	201.4	2.3	1.0	204.6	237.4	2.3	1.1	240.7	378.6	1.7	1.2	381.5	245.2	1.2	1.3	247.7	301.3	1.5	1.3	304.0
T. Sun Prairie [15]	181.8	-	-	181.8	652.7	-	-	652.7	298.0	-	-	298.0	227.7	-	-	227.7	217.5	-	-	217.5
T. Verona [16]	284.1	116.8	2.3	403.3	217.9	254.4	2.4	474.7	231.8	181.2	2.4	415.5	414.2	51.7	2.2	468.1	244.6	428.6	2.5	675.7
T. Vienna [17]	244.9	46.6	1.7	293.1	206.2	106.7	1.8	314.6	157.0	131.8	1.5	290.3	213.8	93.3	1.4	308.5	231.8	240.7	1.6	474.2
T. Westport	1,040.9	-	3.2	1,044.1	940.7	-	3.4	944.1	461.2	-	3.4	464.6	561.8	-	3.9	565.7	1,299.9	-	4.1	1,303.9
Towns Total	5,127.8	2,512.9	329.8	7,970.5	5,629.7	3,854.8	172.7	9,657.2	4,670.4	2,264.0	308.9	7,243.3	5,282.4	1,692.9	0,172.1	7,147.5	6,694.5	2,848.4	0,236.8	9,779.7
MPO PL Area Total	**51,605.1**	**42,442.4**	**9,855.7**	**103,903.2**	**47,033.5**	**47,781.3**	**12,062.3**	**106,877.2**	**44,640.7**	**66,993.3**	**10,690.8**	**122,324.7**	**49,503.5**	**46,496.8**	**9,536.9**	**105,537.2**	**51,566.4**	**52,840.2**	**23,284.7**	**127,691.4**

[1] Roadway operations and maintenance costs, including costs for engineering, highway equipment, and buildings. For county, includes depreciation for equipment and buildings.

[2] Includes operating expenditures and capital costs for constructing roadways.

[3] Includes operating expenditures and capital costs for road related facilities costs, including limited purpose roads, street lighting, sidewalks, storm sewers, and parking facilities.

[4] Estimated at 89.19%.
[5] Estimated at 76.49%.
[6] Estimated at 24.93%.
[7] Estimated at 72.35%.
[8] Estimated at 81.88%.
[9] Estimated at 30.86%.
[10] Estimated at 65.09%.
[11] Estimated at 45.16%.
[12] Estimated at 65.12%.
[13] Estimated at 36.22%.
[14] Estimated at 50.48%.
[15] Estimated at 66.90%.
[16] Estimated at 80.75%.
[17] Estimated at 67.68%.

Note: Costs rounded to nearest $1,000. "-" indicates zero or no data available, while 0.0 indicates less than $500.

Source: Wisconsin Dept. of Revenue, County and Municipal Revenues and Expenditures Reports.

Metropolitan Planning Area from 2010 to 2014, the last year for which data was available. The expenses include those from local revenues as well as state and federal programs. The source of the information are the *County and Municipal Revenues and Expenditures by Wisconsin Cities, Villages & Towns* reports published by the Wisconsin Department of Revenue. Total annual costs for Dane County and all municipalities within the Madison Metropolitan Area during this 5-year period ranged from $103.9 million in 2010 to $127.7 million in 2014 with an annual average of $113.3 million.

Federal and State Funding for Streets/Roadways

Federal and state funding accounted for 24% and 56% of revenues, respectively, in the WisDOT 2015-17 biennial budget with bond funds (13%) and other funds (7%) accounting for the remainder.

Federal funding is derived from the federal motor fuel tax and then allocated to the states and large urban areas. Federal program funding sources under the current surface transportation legislation, the FAST Act, that are used for roadway improvements include the following:

- National Highway Performance Program (NHPP);
- Surface Transportation Program Block Grant (STBG) Program (formerly Surface Transportation Program), which includes several categories of funding (Urban, Rural/Small Urban, State Flexibility, and Bridge Replacement and Rehabilitation); and
- Highway Safety Improvement Program (HSIP) (includes three categories).

The NHPP and STBG – State Flexibility programs have been used exclusively for state highway projects, while the HSIP and STBG – Bridge programs are available for funding both state and local projects. The STBG – Urban and Rural/Small Urban programs are for county and local roadway projects. For the Madison Metropolitan Area, the STBG Urban Program is the most significant of these federal programs. Most of the funding has been used for county and local road projects, but the program has also been used for other capital projects such Metro Transit bus purchases and a programmed ITS project. MATPB receives an allocation of STBG Urban Program funding and selects county and local projects for funding based on approved policies and project evaluation criteria. MATPB's allocation for 2016-2020 is an average of $6.86 million per year. Based on the FAST Act, the current federal transportation bill, funding for the upcoming 2018-2022 program cycle is expected to increase to an annual average of $7.07 million. This funding level is assumed to continue with inflationary adjustments as with other programs.

State transportation funding is derived primarily from the state motor fuel tax, driver license fees, and vehicle registration fees. Funding for state

highways is distributed through several programs, including the following:

- State Highway Rehabilitation (SHR) program, which funds maintenance work on existing state highways along with safety and minor capacity improvements;
- Highway System Management and Operations (HSMO) program, which funds activities to ensure the proper functioning and safety of the state highway system, including traffic operations and management of the State Traffic Operations Center; and
- Majors program, which funds the most complex and costly projects, often involving capacity expansion, to address the most serious deficiencies on the most important state highways.

Figure 6-2

Annual Roadway Revenue Estimates ($000's)

for the Madison Metropolitan Planning Area

Roadway Construction	Funding Program	Avg. Annual Funding ($000s)
State Highways		
Federal/State Funding	Combined Backbone and non-Backbone and Majors	$ 69,876
Local Roadways		
Federal/State Funding	STBG, Local Roads Improvement Program (LRIP), Federal Safety Programs, Local Bridges, 70% General Transportation Aids , 70% Connecting Highway Aids	$ 24,035
Local Funding	Total County/Local Revenue (from State Department of Revenue) less Federal/State Funding Estimate	$ 45,001
Subtotal of Local Roadways		***$69,035***
Subtotal		**$ 138,912**
Roadway Maintenance and Operations	**Funding Program**	**Avg. Annual Funding ($000s)**
State Highways		
Federal/State Funding	State Highway Maintenance and Operations, State Highway Rehabilitation (SHR) Bridges, SHR Large Bridges	$ 7,964
Local Roadways		
Federal/State Funding	30% General Transportation Aids, 30% Connecting Highway Aids	$ 6,012
Local Funding	Total County/Local Revenues (from State Department of Revenue) less Federal/State Funding Estimate	$ 52,390
Subtotal of Local Roadways		***$58,402***
Subtotal		**$ 66,365**
Total		**$205,277**

Figure 6-2 shows the annual federal and state funding program revenue estimates (in current dollars) based on recent funding levels over the past 5-6 years. The federal and state funding estimates were provided by WisDOT. Estimated annual funding for Major state highway projects and state highway and bridge preservation and TSM/safety construction projects is $69.9 million, while estimated funding for state highway maintenance and operations is $7.9 million, for a total of $77.8 million. Estimated federal and state funding for local roadway and bridge preservation and TSM/safety construction projects is $24.0 million, while estimated funding for maintenance and operations is $6.0 million, for a total of $30.0 million. This amounts to about 20% of total funding for local roadways. Local funding for local roadways was estimated by subtracting federal/state funding from total revenues.

Public Transit Funding

The major transit operator in the Madison area is Metro Transit, which is owned by the City of Madison and operates within the oversight of the Mayor, Common Council, and the City's Transit & Parking Commission. Metro contracts with other municipalities and public institutions (including UW-Madison, Madison College, and the Madison Metropolitan School District) to provide service for their constituents.

Metro 's capital and operating costs are funded through a combination of federal funding, state operating assistance, passenger fares, and local funds primarily derived from the property tax. Federal funding may be used for capital project expenses, preventive maintenance costs, and a portion may be used for complementary paratransit service for persons unable to use the regular fixed-routes.

The majority of Metro's federal funding comes from the Section 5307 Urbanized Area Formula Program (UAFP), which is apportioned based on revenue vehicle-miles, population, and population density. Metro's FY 2016 apportionment of Section 5307 UAFP funding was $7.7 million. Metro also receives Federal Section 5337 State of Good Repair and Section 5339 Bus and Bus Facilities formula programs. Funding for the Section 5337 program is based on the miles of bus lanes and other dedicated transit facilities, such as the State Street pedestrian and transit mall, while funding for the Section 5339 program is based on urbanized area population and bus passenger-miles traveled divided by operating costs. Metro's FY 2016 apportionment for these two programs combined was $1.6 million. Two discretionary components to the Section 5339 program were added under the recently approved FAST Act: a bus and bus facilities program based on asset age and condition and a low or no emissions bus deployment program.

Funding, in particular operating funds, has been and continues to be a major challenge for Metro. State operating assistance in 2015 was actually slightly lower than in 2010, dropping the percentage of Metro's operating expenses covered by the state from 35.6% to 31.6%. At one time in the mid-1990s state operating assistance covered 45% of Metro's operating budget. Figure 6-3 shows the distribution of Metro's operating revenue from 2011-2015. The percent covered by local funding has increased from 28.9% to 32.4% and the percent covered by fares has increased from 23.7% to 24.1%.

Because Metro must now use the majority of its federal funding for eligible operating expenses, this has put a squeeze on its capital budget, making it difficult to keep up with its bus fleet replacement schedule let alone address other capital needs.

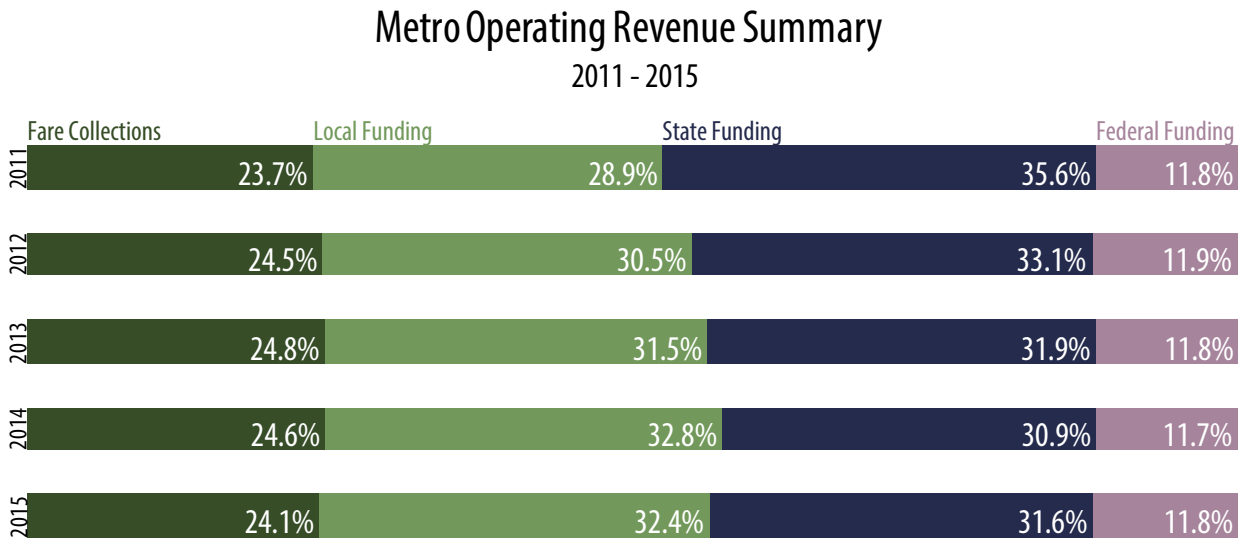


Figure 6-3: Metro Operation Revenue Summary

Given flat state funding and tight local budgets, in part due to the state expenditure restraint program, and the many other competing demands for property taxes, it will become increasingly difficult for Metro to cover inflationary operating cost increases in the future let alone meet the service improvement and expansion needs of the growing metro area and address its capital needs. A regional transit governance structure with a dedicated local source of transit funding will be needed in order to make major regional service improvements such as building out the full BRT system, initiating express commuter service to outlying communities, and increasing service frequency in the core area.

The state legislature adopted legislation in 2009 authorizing the creation of the Dane County Regional Transit Authority (DCRTA) with the authority to implement a local sales tax of up to ½ percent. The DCRTA was formed in 2010 and, with the help of City of Madison, Metro, and MPO staff, developed a draft short-term plan for improved transit service to support a referendum on a ¼ percent sales tax. However, Assembly Bill 40 (Act 32) was passed in 2011, eliminating the RTA authorizing legislation and dissolving the DCRTA.

Figure 6-4 shows Metro Transit's average capital and operating revenues from 2011-2015 based on the agency's National Transit Database (NTD) reports. Capital expenses fluctuated considerably, ranging from a low of $1.1 million in 2013 to $12.1 million in 2014, averaging $6 million annually. Operating expenses increased each year from $49.5 million in 2011 to $55.0 million in 2015, with a 5-year average of $52.4 million. The five-year average for capital and operating expenses combined was $58.4 million.

Figure 6-4

Annual Transit Revenue Estimates ($000's)

for the Madison Metropolitan Planning Area

Metro Transit	Funding Program	Avg. Funding ($000s)
Capital		
Federal Funding	Urbanized Area Formula Program (5307), State of Good Repair Formula Program (5337),Bus & Bus Facilities Formula Program (5339)	$ 4,830
Local Funding	City of Madison Property Taxes and Cooperative Agreements with Neighboring Municipalities	$ 1,208
Subtotal		**$6038**
Operating		
Federal Funding	Urbanized Area Formula Program (5307),Special Needs/ADA (5310)	$ 6,189
State Funding	State Operating Assistance	$ 17,063
Local Funding	City of Madison Property Taxes and Cooperative Agreements with Neighboring Municipalities, Advertising and Other Revenues	$ 15,674
Passenger and other General Revenue	Collections on Buses, Transit Passes, Advertising, etc.	$ 13,467
Subtotal		**$ 52,393**
Total		**$58,431**

Bicycle and Pedestrian Funding

Local sources provide most of the funding used for off-street bicycle and pedestrian facilities. This includes Dane County's relatively new PARC & Ride Bicycle Grant Program, which has provided over $750,000 in the past two years for grants to local communities for bicycle trail projects. Federal funding for off-street bicycle and pedestrian facilities is provided primarily through the Transportation Alternatives Program (TAP). MATPB receives an allocation of TAP funds, which it directs towards projects it selects. WisDOT also receives a TAP funding allocation, which it uses to fund projects throughout the state. Madison area projects are also eligible for this statewide pool of funds, and two projects were awarded funding in the 2015-2018 program cycle. Factoring in that additional funding along with MATPB's funding allocation, the average annual TAP funding has been $746,000. Off-street bicycle facilities, such as grade-separated crossings and side paths, have also been included in recent years as part of street construction projects funded by MATPB through the federal STBG (formerly STP) Urban program. Excluding the TAP funding, an average annual total of $4.05 million has been programmed for off-street bicycle projects in the past three Transportation Improvement Programs, resulting in an average total of $4.8 million in available funding each year. On street bicycle and pedestrian facility costs are included as part of street projects, and have no stand alone costs. As a result, no projections were generated for on-street facilities.

Figure 6-5

Annual Transit Revenue Estimates ($000's)

for the Madison Metropolitan Planning Area

Bicycle and Pedestrian Facilities	Funding Program	Avg. Annual Funding ($000s)
Off-Street Facilities		
Federal/State Funding	STBG - Transportation Alternatives Program (TAP) Set Aside	$ 746
Local and Other Funding	County PARC & Ride Bicycle Grant Program, Local municipal funding, Other	$ 4,054
Subtotal		$4,800

PROJECTED REVENUES THROUGH 2050

Figure 6-6 shows the projected total revenues for transportation projects for the next 34-year period from 2017 to 2050 assuming that recent funding levels remain relatively constant other than inflationary increases. It is estimated that a total of $13.3 billion could potentially be available to finance projects over the 34-year planning period. The federal and state roadway revenue estimates are based on a 6-year rolling average[1] of expended funds between 2011 and 2016 obtained from WisDOT. Local roadway revenue estimates on based on the 5-year average of expended funds from 2010-2014 obtained from State Department of Revenue reports after subtracting out federal and state funding received. Metro Transit capital revenues (federal and 20% local match) are based on the 5-year average from 2011-2015 in the agency's NTD reports. Metro operating funding (federal, state, and local) is based on the average annual percent increase in operating funding in constant dollars during the same period (0.7%) based on the NTD reports. Federal funding for off-street bicycle and pedestrian facilities is based on the current average annual allocation to MATPB for the FY 2016-2020 program plus additional funding received for FYs 2016-2018, while local and other funding is based on the average funding programmed in the past three TIPs (2015-'19, '16-'20, and '17-'21). Averages were extrapolated to 2050 using an inflation rate of 2 percent. In the case of transit operating revenues, the inflation rate was applied to the assumed average annual increase in constant dollars. Funds were then divided into three time periods (2017-2020, 2021-2035, and 2036-2050) reflecting programmed projects over the next four-year period to 2020 and then two subsequent 15-year increments.

[1] 5-year rolling average period for the General Transportation Aids and Connecting Highway Aids programs and Local Bridge program. Majors program funding is based on average annual amount enumerated for projects from FY 2014-2020.

Figure 6-6

Estimated Transportation Revenue, 2017 - 2050 ($000's)

for the Madison Metropolitan Planning Area

Source	2017-2020	2021-2035	2036-2050	Total
Roadway Construction				
State Highways				
Federal/State Funding	$279,505	$1,269,419	$1,708,470	$3,257,394
Local Roadways				
Federal/State Funding	$96,139	$436,633	$587,650	$1,120,423
Local Funding	$180,002	$817,509	$1,100,259	$2,097,770
Subtotal of Local Roadways	***$276,142***	***$1,254,142***	***$1,687,910***	***$3,218,193***
Subtotal of Roadway Construction	**$555,647**	**$2,523,560**	**$3,396,380**	**$6,475,587**
Roadway Maintenance and Operations				
State Highways				
Federal/State Funding	$31,855	$144,673	$194,710	$371,238
Local Roadways				
Federal/State Funding	$24,048	$109,216	$146,990	$280,254
Local Funding	$209,560	$951,750	$1,280,930	$2,442,239
Subtotal of Local Roadways	***$233,607***	***$1,060,966***	***$1,427,920***	***$2,722,493***
Subtotal of Maintenance and Operations	**$265,462**	**$1,205,638**	**$1,622,630**	**$3,093,731**
Metro Transit				
Capital				
Federal Funding	$20,583	$93,481	$125,813	$239,877
Local Funding	$5,146	$23,370	$31,453	$59,969
Subtotal of Capital	***$25,729***	***$116,851***	***$157,266***	***$299,846***
Operating				
Federal Funding	$28,548	$138,929	$207,604	$375,081
State Funding	$78,730	$383,142	$572,538	$1,034,410
Local Funding	$75,587	$367,849	$549,686	$993,122
Farebox	$58,860	$286,445	$428,041	$773,346
Subtotal of Operating	***$241,725***	***$1,176,365***	***$1,757,869***	***$3,175,959***
Subtotal of Metro Transit	**$293,182**	**$1,410,067**	**$2,072,402**	**$3,475,805**
Bicycle and Pedestrian Facilities				
On-Street Facilities	----included as part of street project funding ----			
Off-Street Facilities				
Federal/State Funding	$3,136	$14,244	$19,170	$36,550
Local Funding	$16,709	$75,887	$102,133	$194,729
Subtotal of Off-Street Facilities	***$19,845***	***$90,130***	***$121,303***	***$231,279***
Subtotal	**$19,845**	**$90,130**	**$121,303**	**$231,279**
Total Projected Revenue	**$1,134,136**	**$5,229,396**	**$7,212,716**	**$13,276,402**

PROJECTED EXPENSES THROUGH 2050

Figure 6-7 shows projected transportation expenses. Expenses are estimated at $12.8 billion for the planning period. Separate methodologies, detailed below, were developed to determine future expenses for roadway construction, maintenance, and operations; bicycle and pedestrian facilities; and Metro Transit capital and operating costs.

Figure 6-7

Estimated Transportation Expenses, 2017 - 2050 ($000's)

for the Madison Metropolitan Planning Area

Source	2017-2020	2021-2035	2036-2050	Total
Roadway Construction				
State Highways	$279,505	$1,269,419	$1,708,470	$3,257,394
Local Roadways	$263,269	$1,228,992	$1,724,617	$3,216,878
Subtotal	$542,774	$2,498,411	$3,433,087	$6,474,272
Roadway Maintenance and Operations				
State Highways	$31,855	$144,673	$194,710	$371,238
Local Roadways	$183,788	$857,961	$1,203,957	$2,245,706
Subtotal	$215,643	$1,002,633	$1,398,667	$2,616,943
Bicycle and Pedestrian Facilities				
On-Street Facilities	----included as part of street project funding ----			
Off-Street Facilities	$22,783	$80,003	$113,764	$216,550
Subtotal	$22,783	$80,003	$113,764	$216,550
Metro Transit				
Capital Expenses	$25,729	$116,851	$157,266	$299,846
Operating Expenses	$241,725	$1,176,365	$1,757,869	$3,175,959
Subtotal	$267,453	$1,293,216	$1,915,136	$3,475,805
Total Projected Expenses	**$833,010**	**$3,871,630**	**$5,461,987**	**$12,783,571**

Roadway Construction, Maintenance, and Operations

To begin the process of projecting expenses for construction, maintenance, and operations of the roadway network in the region, the revenue analysis was coupled with a pavement condition analysis to compare funding levels over the past five years to pavement conditions for all roadways by jurisdiction (state, local) and functional classification (arterial, collector, local). Overall, Interstate, US, and state trunk highway conditions in the Metropolitan Planning Area have been gradually improving in recent years as measured by Pavement Condition Index (PCI), which reflects the structural integrity of the roadway. PCI was developed by the US Army Corps of Engineers, and is based on a visual survey of the number and types of distresses in the pavement.[2] In contrast to state highway conditions in the Metro area, local roadway pavement conditions—as measured by a similar rating system as PCI called Pavement Surface Evaluation and Rating or PASER—have been steadily deteriorating during this same period. These outcomes can be tied to state funding priorities and challenges, some of which were discussed at the beginning of this section, and local funding challenges. Figure 6-8 provides a comparison of roadway conditions between 2013 and 2015. These years were not the only ones analyzed, but are the only two with complete data sets for state highways, City of Madison streets, and other local roads and streets.

Next, average roadway construction and roadway maintenance and operations costs were calculated for local streets, collectors, and local arterials within the City of Madison and other metropolitan area cities, villages, and towns by averaging the total lane miles in each municipality by the average annual costs between 2010 and 2014. Average maintenance and operations costs

[2] The Federal Highway Administration requires states to report highway conditions as measured by the International Roughness Index (IRI), which measures the smoothness of the roadway pavement. IRI data indicate the condition of state highways is in worse condition. WisDOT has indicated that Pavement Condition Index (PCI) is the more accurate and appropriate measure because IRI doesn't necessarily mean a roadway is in poor condition and needs extensive rehabilitation or maintenance work.

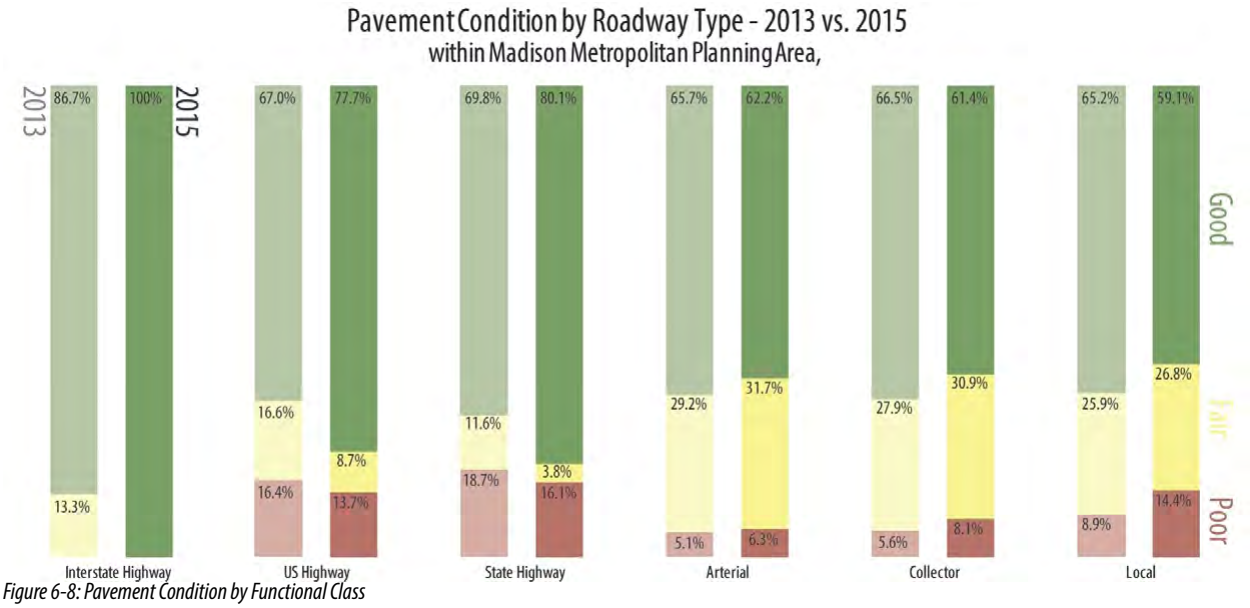


Figure 6-8: Pavement Condition by Functional Class

were highest within the City of Madison at over $10,915 per lane mile annually, compared to only $4,327 in towns. Construction costs were, surprisingly, highest in suburban cities bordering Madison, at over $18,211 per lane mile, compared to $14,968 for Madison and $13,304 for villages. These cost differences are likely due to the addition of new urban infrastructure when roads are reconstructed, such as street lights, curb and gutter, and urban furniture.

A lane mileage growth factor was calculated by comparing year-over-year growth of the local transportation network within the Metro area. The number of lane-miles of local roads has grown at a rate of 0.09%, while the growth rate for arterials was 0.9%. The growth rate, lane mileage cost, and inflation factor of 2 percent were applied to each spending category for municipal roads and extrapolated to 2050.

Using these assumptions, it is projected that $3.2 billion will be needed for local roadway construction over the 34-year planning period to 2050, while $2.2 billion will be needed for maintenance and operations. Projected local roadway revenues are $5.9 billion, resulting theoretically in a "surplus" of around $478 million. However, this additional revenue will likely be needed to fund preservation projects to avoid the continued deterioration of area roadways.

Because of the assumed increase in arterial lane miles, projected local roadway construction costs should include the cost of the major capacity expansion projects on local roadways listed in Appendix A. The cost of those projects total $247 million in inflation adjusted dollars over the planning period. If the cost of these projects isn't fully

covered, however, the "surplus" could cover any extra costs for them.

The projected "surplus" will be needed for additional roadway maintenance and non-capacity expansion construction projects in order to maintain or improve roadway network condition in the future. That is because the projected expenses will merely maintain existing trends – a steadily deteriorating local roadway system. An infusion of additional revenue will be needed to ensure that roadways receive preventive maintenance before significant deterioration, which can add 15-20 years of useful life at a substantial cost savings over reconstruction. Even with timely maintenance, streets eventually need to be reconstructed and utilities replaced.

Figure A-1 in Appendix A includes a list of programmed, planned, and other potential needed future high-cost arterial reconstruction projects based on current roadway condition and year the roadway was originally constructed (where that data was available). The total inflation adjusted cost of these projects over the planning period is $378 million. This includes some programmed and planned intersection and bridge projects. Some of the identified potential roadway reconstruction projects are in peripheral developing or planned development areas that will need to be reconstructed to urban standards, but many are in existing older developed areas.

The major source of funding for local arterial reconstruction projects is the STBG (formerly STP) Urban program for which MATPB receives an allocation of funding for each multi-year program cycle. The total amount of STBG Urban funding projected to be available over the 34-year planning period is $347 million, assuming 2% annual inflationary increases in funding. Using the current 60/40 cost share policy of MATPB, this would fund projects totaling $578 million. This would cover over 90% of the local arterial reconstruction projects (both capacity expansion and preservation) identified. Some of the projects listed will be funded locally and so even though some STBG Urban funding has been and will be used for other types of projects, this demonstrates the feasibility of funding the capacity expansion projects identified while still meeting major arterial preservation project needs in the region.

Recent trends demonstrate improving pavement conditions on the state highway system within the Madison metropolitan area. This analysis assumes that maintenance and operations will continue at current expenditure levels to the end of the planning period, with a 2% inflationary growth factor. While it would appear that the system would be maintained at a high level, it should be noted that the trend of improving state highway conditions over the past few years represents only a relatively small data sample. Based on the analysis conducted by WisDOT in 2013 and again in 2016 for the state transportation fund solvency study, a substantial increase in funding will be required just to maintain current pavement conditions. The trend in pavement condition of the state and local roadway systems will continue to be monitored. WisDOT is in the process of developmenting a State Highway Investment Plan, which will include an analysis of 20-year infrastructure investment needs.

Information produced from this planning effort will be incorporated into the next 5-year update of the RTP.

For state highway construction expenditures, programmed (or scheduled with funding attached) and other near-term (5-15 years) planned projects were identified and costs estimated using the 2% annual inflationary factor. See Figure A-1 in Appendix A. Included are WisDOT Major Highway Development program projects, specifically Interstate 39/90 expansion south of the Beltline and the Verona Road (US 18/151) expansion project. The only planned Major Highway Development program project included in the plan at this time is the Beltline/Interstate interchange. This project includes three phases, the third of which includes conversion of US 12/18 east of the interchange to a freeway with an interchange at CTH AB.

Other Major Highway Development program projects, which must be recommended for enumeration by the state Transportation Projects Commission (TPC) and enumerated by the Legislature and Governor, are not known at this time. This includes potential capacity expansion projects on the Beltline, Stoughton Road, and US 51 (McFarland to Stoughton) that are currently being studied, as well as the I-39/90/94 and WIS 19 / North Mendota Parkway corridors that are recommended for future study. The preferred roadway improvement alternatives for the Beltline and Stoughton Road corridors have not been determined. Once the studies are completed, the scope of specific improvements identified, costs estimated, and Major Highway Development program funding either secured or determined to be reasonably likely to be available, the plan will be amended to add the project(s) with an updated financial analysis. A preferred alternative for the US 51 (McFarland to Stoughton) corridor has been identified pending completion of the environmental study, however Major Highway Development program funding for the project is uncertain given the other potential Madison area projects for which such funding will be sought in the near future. If the US 51 (McFarland to Stoughton) project does not receive this funding, alternative sources may be needed and the project would then need to be completed in multiple segments over time.

Based on the funding for the Madison area projects enumerated for the Major Highway Development program for FYs 2014-2020, a total of $1.6 billion in inflation adjusted funding can be expected to be available during the planning period. This would cover the currently estimated inflation-adjusted cost of the Beltline/Interstate interchange ($550 million) with around $1 billion available for additional project(s). This would be sufficient to fund the Stoughton Road and US 51 projects should Major Highway Development program funding be sought for them or possibly the Beltline project. However, the region would need to garner a much larger percentage of the Major Highway Development program funding and/or total statewide funding would need to be significantly increased to fund the Beltline project, US 51 projects, and other needs such as the interstate in the Madison area. The Beltline project, which is expected to cost in excess of $1 Billion, would be expected to rate as a high priority under the project selection criteria, but would face competition from other major needs in the state, particularly on the southeast area freeway system.

Because the list of Major Highway Development program and other state highway construction projects is incomplete, a major surplus in funding remains, particularly in the last time period – 2035-2050. Because it is assumed that all available funding for construction will be expended, expenditures were adjusted to match revenues.

Public Transportation

Capital Costs

The single largest capital expense for Metro Transit by far is replacement buses. Metro typically replaces buses on a cycle of about 15 years. With a fleet of just over 200, it purchases about 15 new buses per year. Although the availability of traditional federal funding for replacement buses has decreased in recent years due to the elimination of discretionary transit capital funding in MAP-21 , Metro has been relatively successful in securing local and other federal funds necessary to maintain its fleet. MATPB awarded federal STBG Urban funds in 2015-'17 to purchase a total of 21 buses. Another major capital cost is the ongoing renovation of Metro's maintenance facility. Maintaining Metro's fleet replacement schedule, the facility renovation, and other usual capital expenses can be covered with projected revenues based on recent trends.

However, in order to fully implement the recommended transit system improvements there are some major new capital costs that will require significant additional funding. The two most immediate capital needs are a new bus storage and maintenance facility and bus rapid transit (BRT) infrastructure. In addition, new buses in the future will likely be electric and some may be longer, high-capacity articulated buses. The planned Nakoosa Trail bus storage and maintenance facility is estimated to cost about $35 million. Final design work for the facility will be done this year. The new facility is necessary for Metro to be able to expand its peak period service area and frequency, and to house and maintain articulated buses, which will be needed for the BRT system. Metro has unsuccessfully applied for discretionary federal TIGER grant funding in the past, but plans to apply again in 2017, assuming the program is continued.

Detailed costs for the planned BRT system are not known, but a feasibility study completed in 2013 estimated that the 20-mile system envisioned would cost between $105 and $155 million, excluding the cost for the bus storage and maintenance facility. Costs for BRT vary greatly based on the scope of the project. The system envisioned in the feasibility study includes new articulated buses, new stations, and some roadway modifications. A planned 2017 study will provide more detailed cost estimates for a first phase project, which could be constructed, and in service by 2021-'22. Capital funding is anticipated to be provided through a federal Small Starts program grant covering up to 80% of project costs. If other federal funding is not secured, the Small Starts grant could also cover up to one-half of the cost of the new satellite bus storage and maintenance facility, which is needed for the BRT buses. The City of Madison has included required local match funding for the starter BRT project and facility in its multi-year capital budget. Funding for the study and BRT project design is available from previous federal grants and state funding. Once the 2017 study is completed and the initial BRT project identified with an estimated cost, an amendment to the RTP is anticipated to add the project to the fiscally constrained, federally recognized plan.

New articulated and electric buses, as recommended in the plan, will be more expensive than the standard 40-foot diesel buses and hybrid-electric buses currently in use. Electric buses have become more common as the technology improves and the price drops. Articulated buses have been in use in the industry for many years. With the new service planned (bus rapid transit, new all-day service, frequency improvements, and regional express service), the fleet size is expected to grow by about 70 buses, including spares. If all of the recommended service improvements in the plan are implemented, the capacity of Metro's primary and planned satellite facilities will be largely exhausted. Future expansion of the fleet would require additional storage capacity.

Table 6-9 lists the major capital expenses necessary to fully implement the recommended transit improvements. The total estimated cost in today's dollars is over $300 million – far more than Metro is likely to receive based on historical trends. The recent average annual spending on capital needs is about $6 million, which is generally sufficient for meeting Metro's bus replacement needs, but not for expanding or upgrading the fleet. Some expansion of the fleet for new service and/or upgrading of the fleet to electric buses may be feasible with other federal funding and increased local funding, but implementation of the full suite of planned improvements would not be possible. Metro will need to fund the new maintenance facility to accommodate planned service expansion regardless of whether it pursues BRT.

While Metro may be able to secure discretionary federal grants for the Nakoosa Trail bus storage and maintenance facility and initial BRT project, funding the complete list of capital needs identified in the plan will likely require a regional funding mechanism.

Figure 6-9

Estimated Costs of Needed Transit System Capital Projects

Major Capital Expense	Estimated Cost in Millions
Bus Rapid Transit System with buses and Nakoosa Trail bus storage and maintenance facility	$165
Second satellite bus storage and maintenance facility	$35
Fleet expansion for new all-day service and regional express service	$30
Upgrade standard 40-foot buses to electric buses with some articulated buses	$75
Grand Total	**$305**

Operating Costs

Implementing the service improvements recommended in this plan will require an estimated additional 255,000 annual service hours, a 63% increase. See Figure 6-10. This planning-level estimate includes the BRT service, new all-day service, frequency improvements in central Madison, and the network of regional express bus routes. Assuming the service improvements are phased in over the approximately 34-year plan time-frame, the increase translates to about 1.5% per year.

Figure 6-10

Estimated Annual Service Hours for Recommended Regional Transit System

Service Category	Estimated Annual Revenue Service Hours	Estimated Cost in Millions
Existing Metro Transit Service	406,000	$55
Bus Rapid Transit	104,000	$14
New All-Day Service	88,000	$12
Frequency Improvements	7,000	$1
Regional Express Service	56,000	$8
Grand Total	**661,000**	**$90**

This 1.5% growth rate is considerably higher than Metro's historical growth rate of about 0.9% per year since 2003. Before 2003, there had actually been a trend of decreasing service hours following the route restructure and expansion in 1998. Between 2010 and 2015, Metro Transit's operating funding increased an average of 0.7% per year in constant 2015 dollars. This increase allowed for some increased service – in fact, during that same time period, service hours actually increased at an average of 1.4% per year. However, this level of funding would not provide the resources necessary to support the transit service recommendations in this plan. Because service hours rose faster than operating funding, some hours were added through improved efficiencies, and there are limits to these efficiency gains. Also, increased funding has come from local governments, and competing funding demands and the state expenditure restraint program make its continuation unlikely.

If the number of service hours was to increase at the same rate as operating funding has risen – 0.7% per year – Metro could expect to be able to operate about 112,000 additional annual service hours by 2050, slightly less than one-half of the service hours recommended in this plan. The remaining unfunded 143,000 annual service hours will require a new funding source. See figure 6-11.

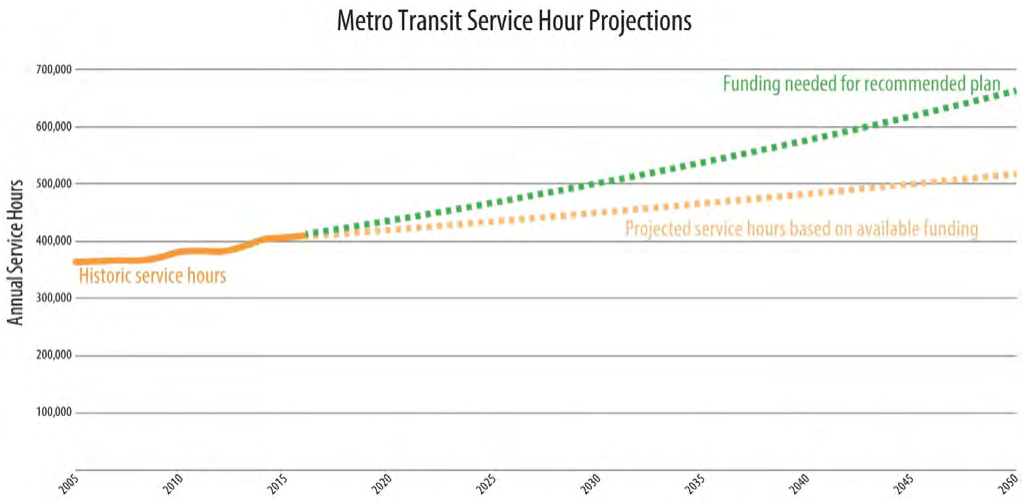


Figure 6-11: Metro Transit Service Hour Projections

Figure 6-12 identifies the types of revenue generation mechanisms that could be used to fund the expansion of the transit system as well as the estimated annual revenue generation of these sources. A vehicle registration fee alone would not be enough to fund the planned transit system, but would allow Metro to make targeted service expansions and pursue needed capital improvements. A ¼ percent sales tax would likely be sufficient to fund a steady implementation of the planned transit system while a ½ percent sales tax would act as a safeguard against future state and federal funding reductions, and allow faster implementation of the planned system. It is important to note that an RTA could be used to fund transit alone or all modes of transportation depending on the statutory language in the enabling legislation. The recommendations above assume all funds are allocated to transit. If funds are divided between modes, additional funding may be required to implement the planned transit system.

Figure 6-12

Estimated Annual Revenue Generated from New Taxing Authority

Revenue Source	Estimated Cost in Millions
RTA - ¼ % Sales Tax	$23
RTA - ½ % Sales Tax	$46
Vehicle Registration Fee - $20 per year	$8

Bicycle Projects

New urban arterial streets and high-volume collector streets are almost universally built with bicycle facilities. Urban arterial street reconstruction projects generally include bicycle facilities, where feasible, given right of way constraints and competing demands for the space. The cost of these facilities is included in the budget for street projects. Therefore, no additional need for funding is anticipated for on-street bicycle facilities beyond that projected for the roadway system. Major regional off-street facilities, such as shared-use paths, are generally stand-alone projects, although some side paths and grade-separated crossings are now being funded as part of roadway projects such as those on CTH M and CTH PD. The *2015 Bicycle Transportation Plan* identified a network of planned regional priority paths and estimated the cost for these projects. Figure A-2 in Appendix A lists these projects and a planning level cost estimate for them. There are also some major shared-use path and grade-separated crossing recommendations that have been identified as part of major state highway corridor projects, most notably the Beltline and Stoughton Road. It is expected that at least some of those projects would be funded as part of those projects.

Bicycle project costs were estimated for the *2015 Bicycle Transportation Plan* based on planning-level cost assumptions, taking into account the length of the path, character of the corridor, and presence of bridges and underpasses. Programmed projects were then assigned a construction year and, as with the roadway projects, the longer term projects were assigned to one of two time periods – 2021 to 2035 and 2036 to 2050. Project costs include a 2% per year inflationary factor. The costs of these regional priority projects, about $80 million in 2021-2035 and $114 million in 2036-2050, are forecasted to be within the projected funds

available ($90 million in 2021-2035 and $121 million in 2036-2050). Other path projects included in the bicycle facilities plan may be completed with urban development projects, in conjunction with roadway construction projects, or may be funded separately.

CONCLUSION

The financial capacity analysis for the RTP assumes a 2% annual inflationary increase in federal, state, and local funding. However, the state gasoline tax rate will need to be increased, or other new revenue sources (e.g., new mileage based registration fee) created, in order to offset inflationary increases in project costs. The state gas tax hasn't been increased since, 2006 when the automatic indexing of the gas tax and vehicle registration fees to the inflation rate was eliminated. The State Commission on Transportation Finance and Policy's report, *Keep Wisconsin Moving – Smart Investments, Measurable Results*, provided recommendations for generating additional revenue, but thus far the state legislature has not addressed the long-term solvency of the state transportation fund.

An increase in funding levels is necessary to maintain the existing condition of the region's roadway system. The overall condition of the state highway system has improved the past few years, but necessary major reconstruction projects loom on the horizon. Also, a WisDOT analysis of the statewide system indicates that spending at the same level as the current budget will result in a 93% increase in state highway miles rated in poor or worse condition by FY 2027. The overall condition of the local roadway system has been steadily deteriorating. It is difficult to estimate the level of increase in funding that would be necessary to maintain or improve the condition of local roadways in the region, but clearly the current level of funding is insufficient.

The financial analysis indicates that projected revenues will be sufficient to implement the state and local arterial roadway capacity expansion projects identified in Figure 5-2 in Chapter 5 and listed in Figure A-1 in Appendix A while at the same time addressing roadway preservation needs in a manner similar to recent trends. However, this means that roadway conditions, at least on the local system, will continue to slowly deteriorate. Major capacity improvements in two state highway corridors (Stoughton Road, Beltline) currently being studied would probably not all be able to be fully funded with current funding levels – the Beltline project alone is expected to cost over $1 billion. Major Highway Development program projects funding, which is provided on a statewide discretionary basis, will be sought for these projects. Some local arterial capacity expansion needs will not be able to be addressed without additional funding, most notably the western segment of the planned North Mendota Parkway.

Significant new transit funding will be needed to implement the recommended regional transit service improvements, including BRT, new regional commuter service, and increased local service frequencies in high-demand corridors. The estimated costs to fully implement the plan include over $300 million in capital costs and a 63% increase in annual service hours at an estimated additional annual cost of $45 million. Implementation of these improvements will likely require a new regional funding mechanism, such as a regional transit authority, with the ability to levy a sales tax. It is estimated that a ½ cent sales tax today would generate $46 million annually.

Current funding levels, adjusted annually for inflation, would be sufficient to fund the major regional priority path projects illustrated in Figure 5-8 in Chapter 5 and listed in Figure A-2 in Appendix A. These projects were identified as needed to address key gaps and barriers, and complete the planned primary regional network found in Figure 5-10 in Chapter 5. Additional identified projects would need to be completed in conjunction with new development, as part of roadway construction projects or with additional funding. On-street facilities are assumed to be included as part of roadway projects.