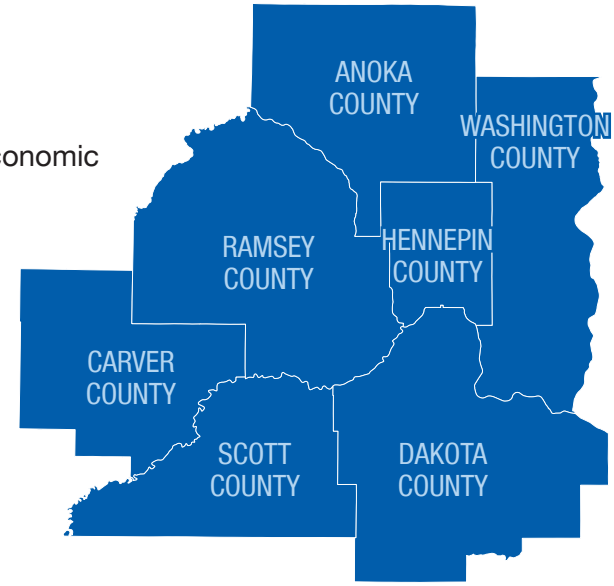
2016 Transportation System Performance Evaluation

METROPOLITAN COUNCIL

Purpose and Acknowledgments

The Council's mission is to foster efficient and economic growth for a prosperous metropolitan region.



Metropolitan Council seven-county area

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The Metropolitan Council is the regional planning organization for the seven county Twin Cities area. The Council operates the regional bus and rail system, collects and treats astewater, engages communities and the public in planning for future growth, coordinates regional water resources, plans and helps fund regional parks, and administers federal funds that provide housing opportunities for low- and moderate-income individuals and families.

The 17-member Council board is appointed by and serves at the pleasure of the governor.

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Executive Summary

This report is a comprehensive review of the Twin Cities transportation system as prepared by Metropolitan Council in 2016. The Minnesota State Legislature adopted statutes in 1996 requiring the Metropolitan Council to produce this report (previously called the Transportation System Audit). This report was prepared to inform the 2018 update of the region's long-range transportation plan, the *2040 Transportation Policy Plan* (*2040 TPP*).

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Transportation System Stewardship
Sustainable investments in the transportation system are protected by strategically preserving, maintaining, and operating system assets.

Safety and Security
The regional transportation system is safe and secure for all users.

Access to Destinations
People and businesses prosper by using a reliable, affordable, and efficient multimodal transportation system that connects them to destinations throughout the region and beyond

Competitive Economy
The regional transportation system supports the economic competitiveness, vitality, and prosperity of the region and state.

Healthy Environment
The regional transportation system advances equity and contributes to communities' livability and sustainability while protecting the natural, cultural, and developed environments.

Leveraging Transportation Investment to Guide Land Use
The region leverages transportation investments to guide land use and development patterns that advance the regional vision of stewardship, prosperity, livability, equity, and sustainability.

2040 Transportation Policy Plan: Updated Regional Transportation Benchmarks

Minnesota has a long and respected history of performance-based transportation planning, operations, and decision-making. The *2040 TPP* advances this philosophy and identifies six goals for the regional transportation system, including a framework for how to achieve them. The goals identified in the *2040 TPP* include:

- Transportation system stewardship
- Safety and security
- Access to destinations
- Competitive economy
- Healthy environment
- Leveraging transportation investment to guide land use

These goals can directly contribute to the vision in *Thrive MSP 2040*, the Metropolitan Council's long term comprehensive development guide for the seven-county Twin Cities area that provides the vision for our region's future. The *2040 TPP* goals and objectives respond to *Thrive's* policy direction and tie to the regional outcomes it identifies. The *2040 TPP* links each goal with one or more of the Thrive outcomes:

- Stewardship
- Prosperity
- Equity
- Livability
- Sustainability

Consistent with Minnesota practice and U.S. Department of Transportation requirements, the Council is also working to develop performance measures and targets to evaluate the effectiveness of our region's actions on achieving these goals and outcomes. When relevant, these performance measures are now incorporated into the Transportation System Performance Evaluation.

Scope of this Report

This document reviews the changing demographics of the region, focusing on population and employment changes from 2000 to 2015. The review of demographics includes 2000 and 2010 US Census data, as well as 2015 American Community Survey data. The various modes of transportation (highways, transit, freight, bicycle and pedestrian, aviation) are reviewed within their own chapters. Comparisons to peer regions are made where applicable. Each modal chapter includes an existing system description, a review of the system performance where data is available, and a discussion of issues and trends for that system, called Findings and Conclusions.

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Findings and Conclusions

The Region

The Twin Cities region has been gaining population and households steadily since 1970, as shown in **Figure ES-1**. Growth in population has outpaced growth in households leading to a slight increase in average household size.

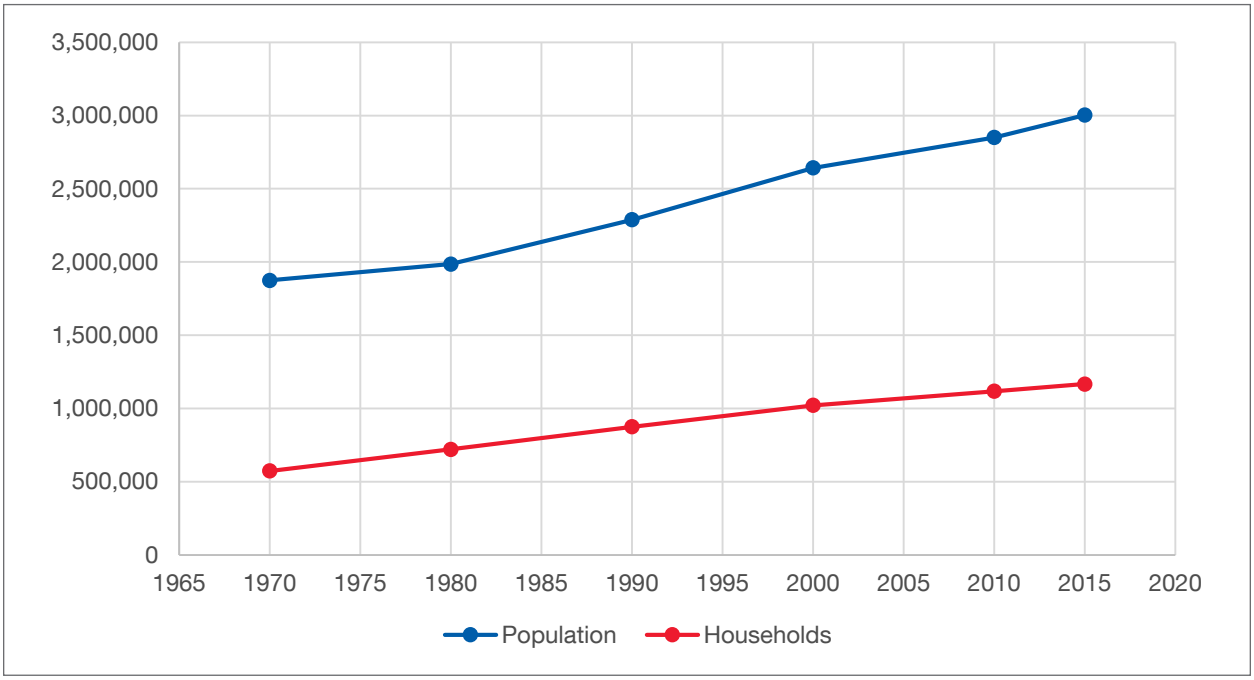

Figure ES-1: Population and Households in Twin Cities Region

Population in the central cities has remained steady, but the regional percentage of households located there has dropped as new households formed or moved to the developing areas over the last 45 years. **Figure ES-2** shows this trend slowed starting in the year 2000, and Minneapolis and Saint Paul added nearly 45,000 people since 2010.

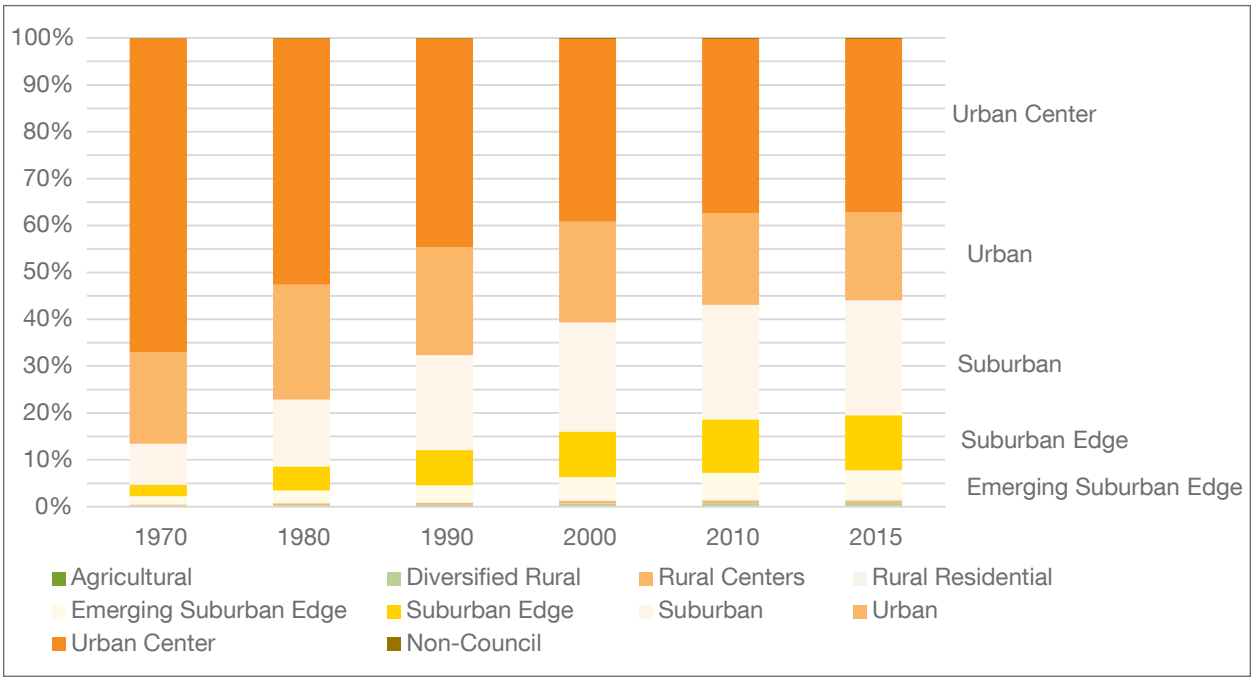

Figure ES-2: Percent Households by Framework Area

With recent high-rise multi-family and infill development, the downtown areas of Minneapolis and St. Paul have the densest areas of population in the region. The central cities are more densely developed than the suburbs. There are pockets of dense development in the outer-ring suburbs, but **Figure ES-3** shows overall, density falls dramatically while moving outward from the downtown areas and central cities.

When analyzed by community designation, there is also an inverse relationship between population density and vehicle miles traveled. As population density decreases by community designation, average vehicle miles traveled per household increases (except in rural centers). In a related fashion, transit commute percentages by community designation increase as population density increases. There is more information on this in Chapter 2.

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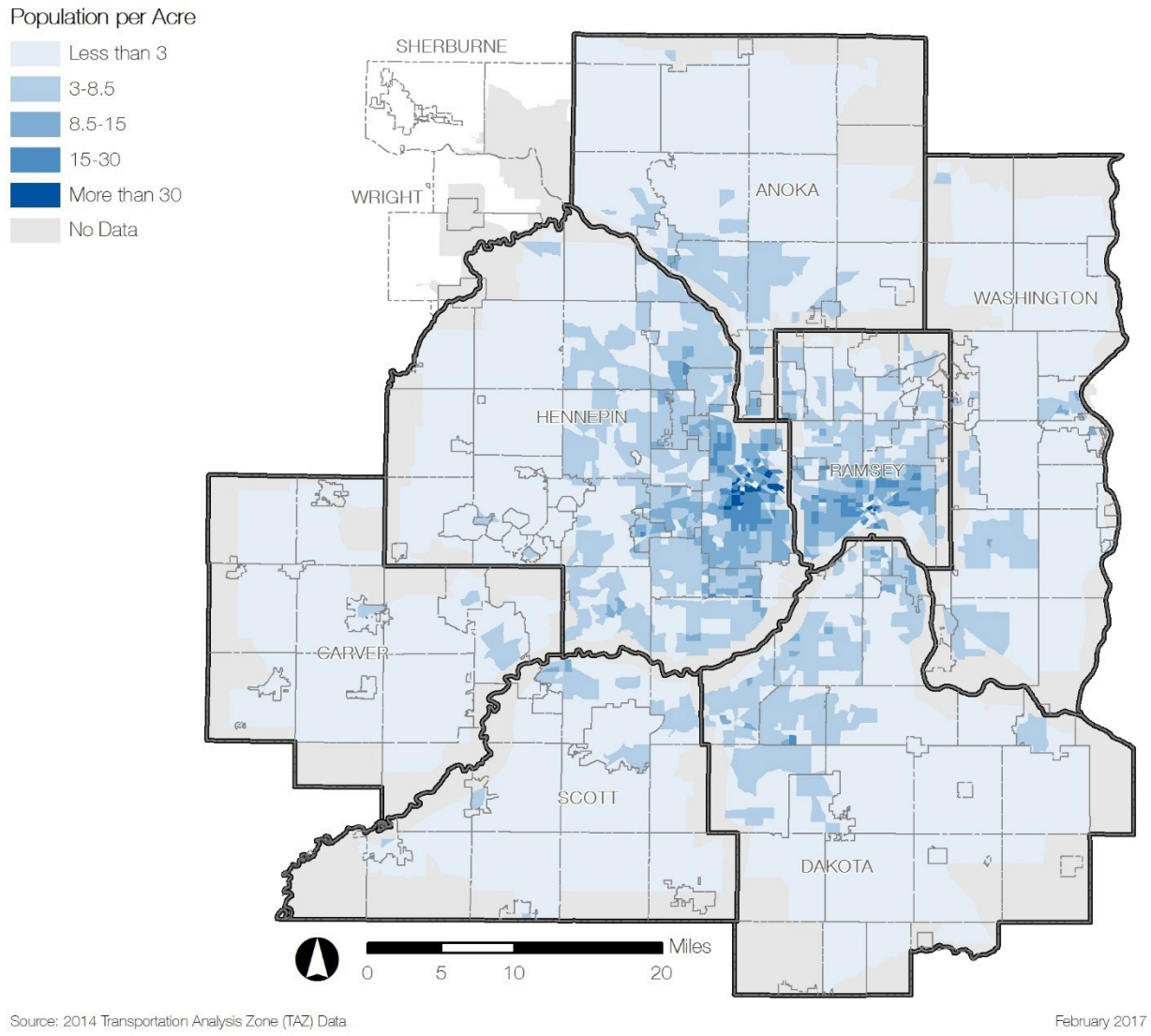

Figure ES-3: 2014 Population Density of Twin Cities Region

The downtown areas of Minneapolis and St. Paul have the highest concentrations of jobs in the Twin Cities region. **Figure ES-4** also shows that outside of the downtown areas, employment density varies greatly. There are several other large job clusters located along major highway corridors, especially in the southwest quadrant of the region.

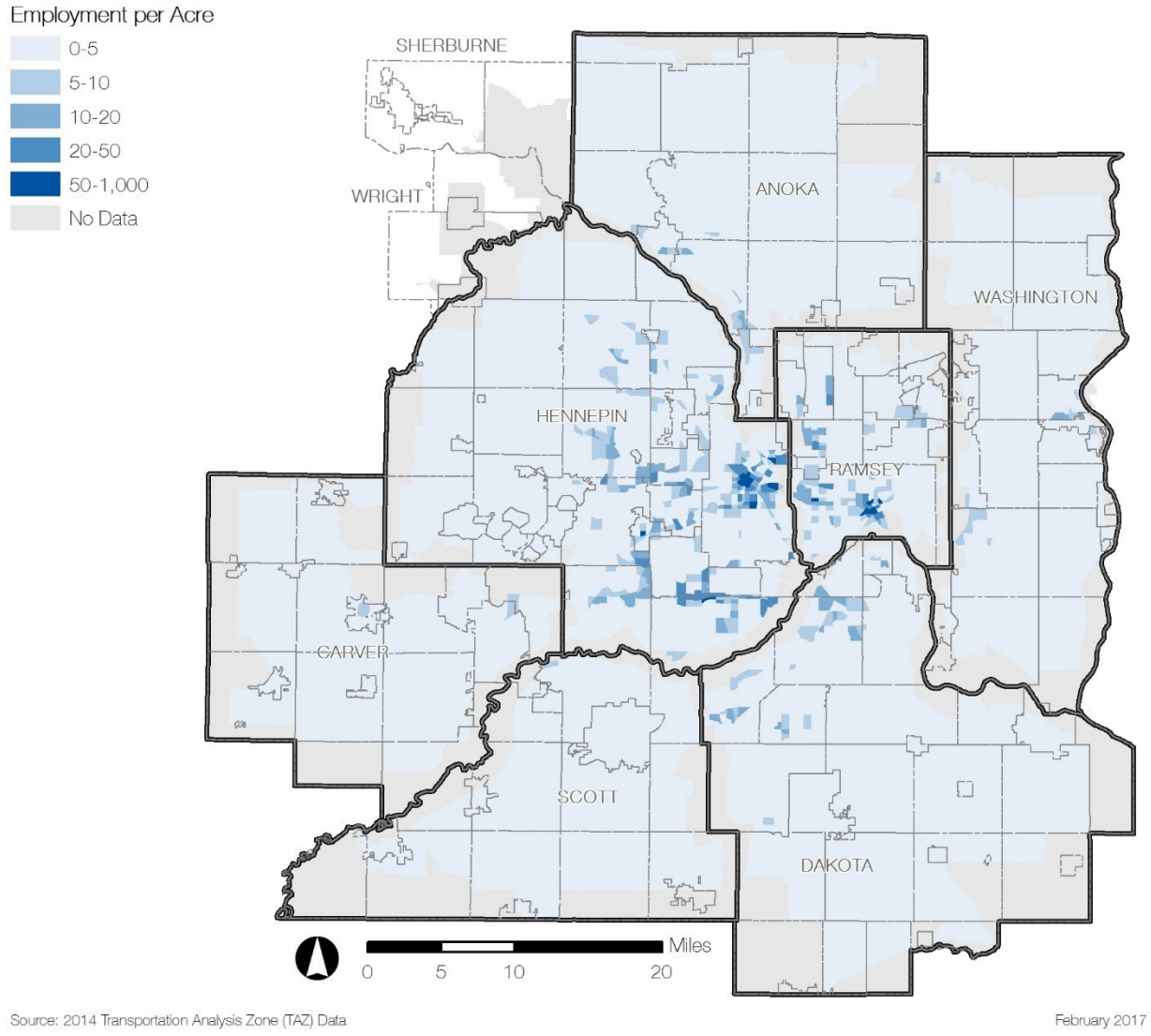

Figure ES-4: Employment Density of the Twin Cities Region

Employment growth has been strong in the region over the last 15 years, especially when acknowledging the impacts from for two economic recessions. However, the recovery has not been geographically balanced. **Figure ES-5** shows from 2000 to 2015, employment fell 3 percent in urban centers, while increasing more than 2 percent in the suburban edge and emerging suburban edge. Over 49 percent of jobs in the region are in suburban areas, compared to just below 46 percent in urban areas.

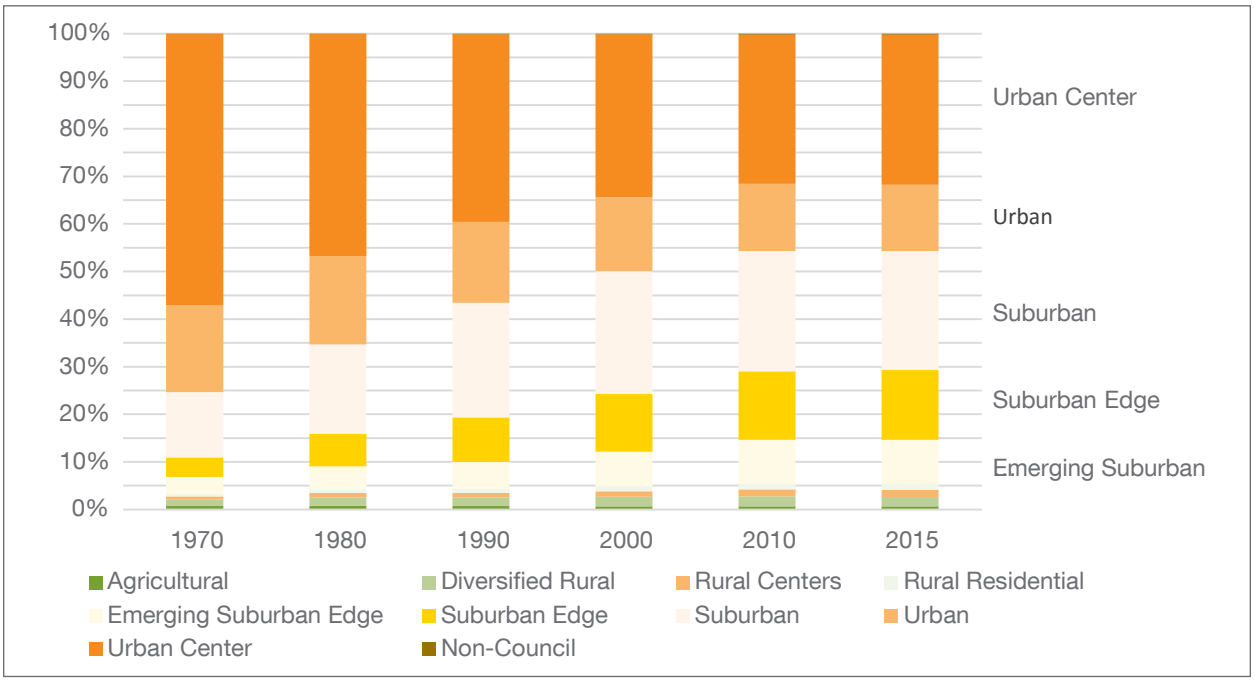

Figure ES-5: Percent Employment by Framework Area

The Highway System

As the number of vehicles has steadily increased and highway revenues per vehicle have declined, highway performance management has needed to continue shifting toward pavement and bridge preservation, and system management strategies such as MnPASS lanes and ramp meters.

Roadway pavement quality in the Twin Cities Region has generally not met Ride Quality Index (RQI) targets since 2001. However, the percentage of regional principal and non-principal arterials with a good or very good rating has increased slightly since 2009. Additionally, the percentage of regional principal and non-principal arterials with a poor or very poor rating has generally decreased since 2009. See **Figure ES-6** for principal arterial data, and more information is available in the Highway chapter.

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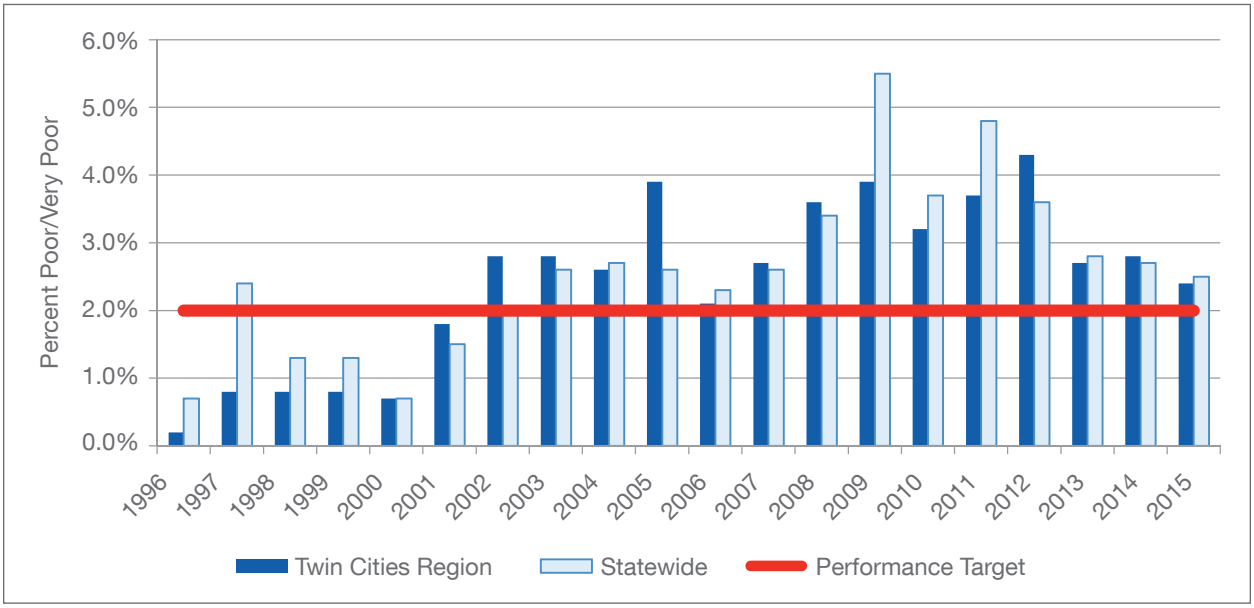

Figure ES-6: Principal Arterials - RQI in Poor/Very Poor Category

The percentage of non-principal arterial bridge area in poor condition increased to a 10-year high in 2015, reaching approximately 7 percent and this trend should be monitored by MnDOT and Metropolitan Council.

In 2015, all MnDOT targets for bridge condition were met for both principal and non-principal arterial bridges in the Twin Cities Region, demonstrating better performance than the statewide averages. The percentage of non-principal arterial bridge area in poor condition increased to a 10-year high in 2015, as shown in **Figure ES-7**, reaching approximately 7 percent and this trend should be monitored by MnDOT and Metropolitan Council. More information is available in the Highway chapter.

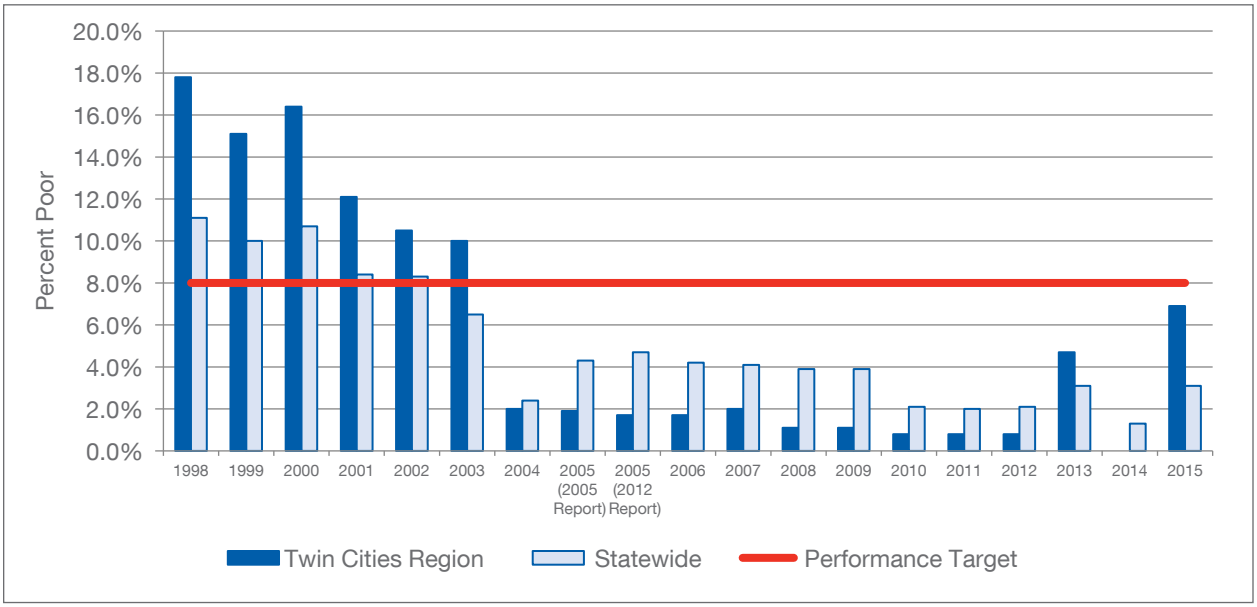

Figure ES-7: Percent Non-Principal Arterial Bridge Area in Poor Category

Annual VMT has generally increased each year, with the exception of a slight reduction in 2012. **Figure ES-8** also shows that since 2000, VMT has increased at a much slower pace compared to the 1990s. VMT per person in the Twin Cities generally exceeds the average for peer cities.

While congestion is affecting more miles of the regional highway system over time, hours of delay per auto commuter and the proportion of travel time spent in delay has remained stable since 2000.

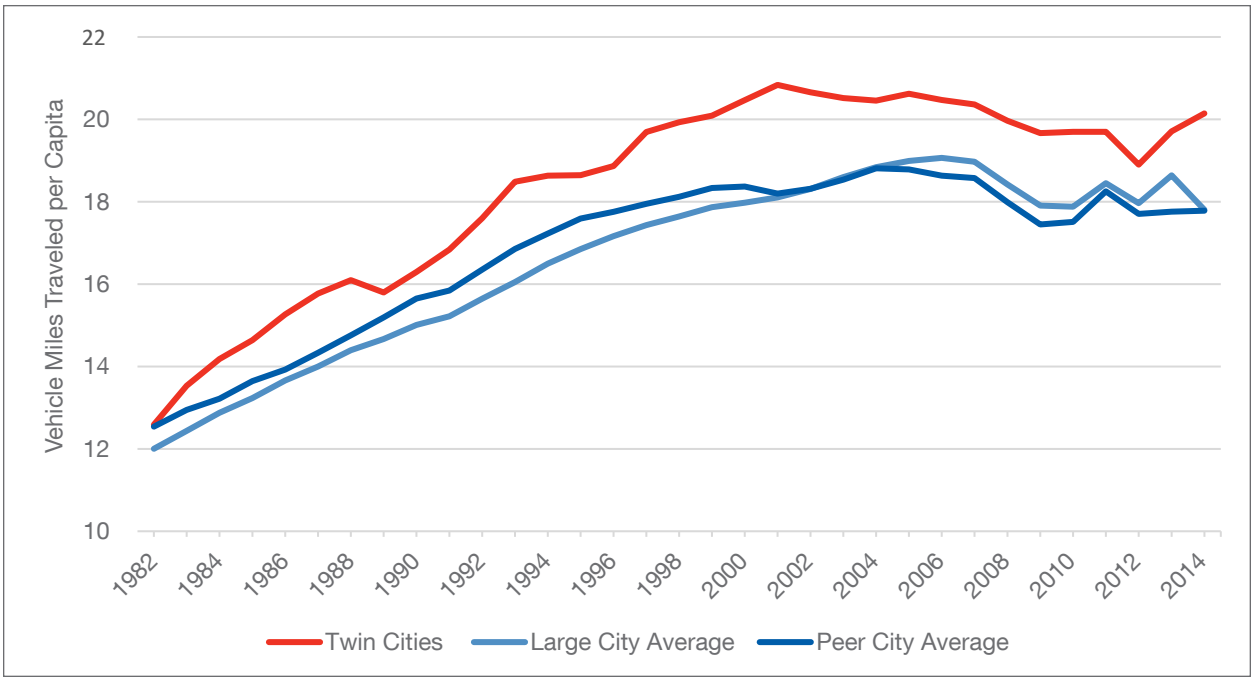

Figure ES-8: Daily Vehicle Miles Traveled per Person[ES-1]

ES-1 Source: Texas Transportation Institute

The Transit System

There are currently six modes of public transit service in the Twin Cities area: commuter rail, light rail transit, bus rapid transit (BRT), regular-route bus, dial-a-ride, and vanpool. The Twin Cities is home to five public transit providers, and the University of Minnesota Twin Cities transit service.

System ridership has increased over time as additional transit options have been added to the system. However, as illustrated in **Figure ES-9**, bus ridership has been on a decline both in absolute numbers and percentage of system ridership. There are several likely reasons for declining bus ridership. These include:

- Restructuring of the bus network connecting to the METRO Green Line in 2014, resulting in a shift of riders from bus to rail that becomes particularly pronounced in 2014 and 2015 (see **Figure ES-9**)
- Lower fuel prices, creating less of a cost incentive to ride transit
- Growth in the express bus market that occurred during significant regional park-and-ride expansion has tapered off in the last few years
- Construction on the Nicollet Mall and the temporary relocation of bus routes that resulted in a less convenient option for some riders

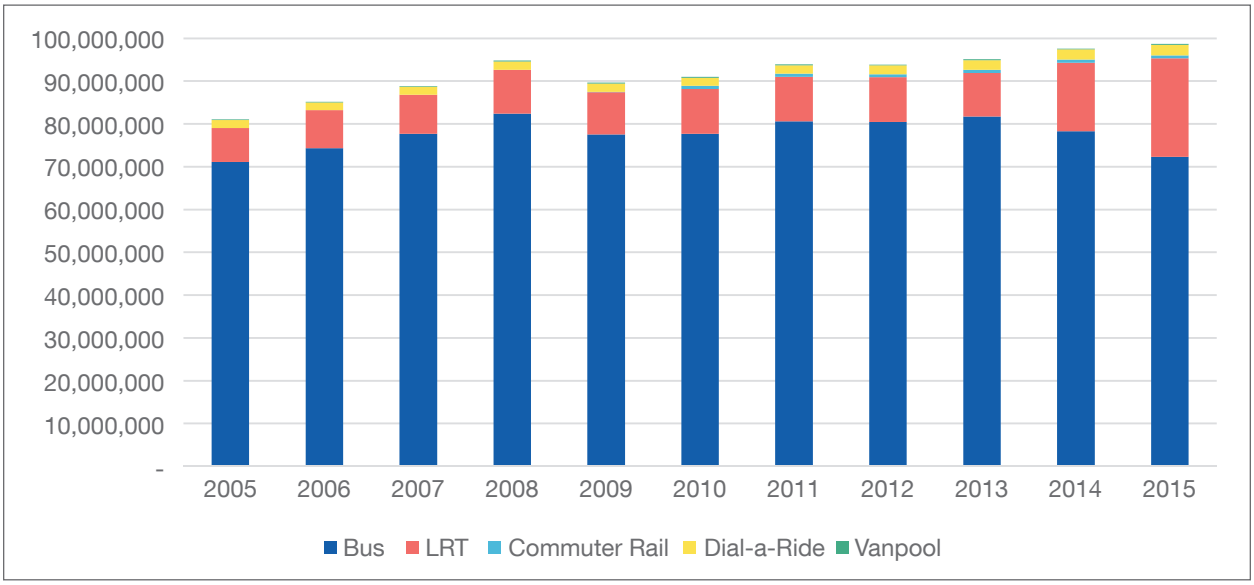

Figure ES-9: Twin Cities Annual Ridership by Mode (2005-2015)

Despite some of these challenges, there have also been a number of success stories in transit where investments result in improved transit performance. The transit chapter includes a more thorough discussion of the following case studies:

- The A Line bus rapid transit project, complete with enhanced stations with off-board fare collection, improved customer information, fewer stops and new buses, opened in 2016 and immediately experienced a 33 percent increase in ridership in the corridor over 2015 levels.
- The METRO Green Line light rail project open in 2014 as the region's second light rail line and ridership is already exceeding ridership projections out 15 years. The line as also experienced over $5 billion of urban development by the end of 2016.
- The METRO Red Line bus rapid transit project opened in 2013 but a major improvement is under construction with plans to open in 2017. The Cedar Grove Transit Station currently a requires a significant detour off Cedar Avenue for the Red Line buses. A new center-median station with skyway connection will save an estimated 10 percent of the cost and attract an estimated 15 percent more riders by providing a significantly faster travel time for riders.
- On the local bus system, the Route 11 was recently upgraded to high-frequency service from south Minneapolis through downtown to northeast Minneapolis. Early indications are that ridership on this route has increased 20 percent over the same time the previous year.

There have also been a number of success stories in transit where investments result in improved transit performance:

A Line – 33 percent increase in ridership

METRO Green Line – more than $5 billion in development

METRO Red Line – faster trip and lower operating cost plus more riders

The region has also spent a significant amount of time and resources expanding the park-and-ride system over the last 10+ years and the result was increased demand for much of the last decade. However, demand growth has tapered off in the last few years, as seen in **Figure ES-10**, and the percent of spaces that are full on an average day has been nearly constant since 2010. The current capacity was built to support population growth for 2030, but tweaks to the system will still likely need to occur to adapt to changing demographics over time.

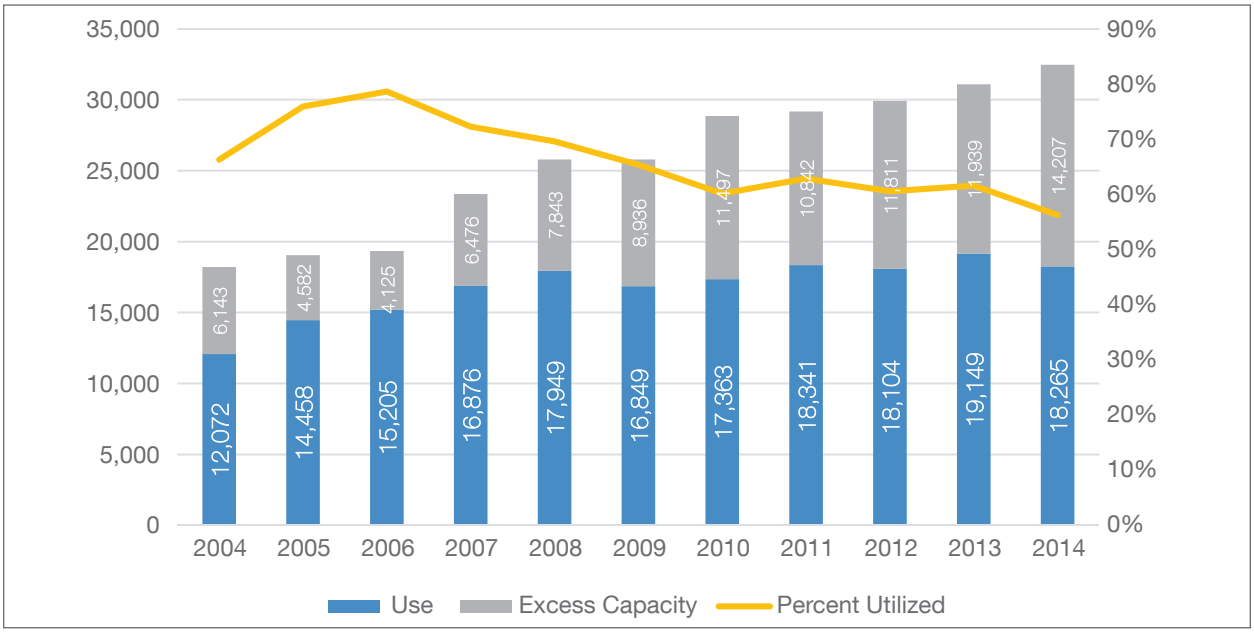

Figure ES-10: Twin Cities Transit System Park-and-Ride Utilization

Regional fare recovery has been declining over time leading to increasing subsidies per passenger as shown in **Figures ES-11** and **ES-12**. A few major contributing factors to this trend include:

- Increasing Metro Mobility ridership driving up its share of regional subsidy
- Declining bus ridership
- Increasing costs without increasing fares (have not had a fare increase since 2008)

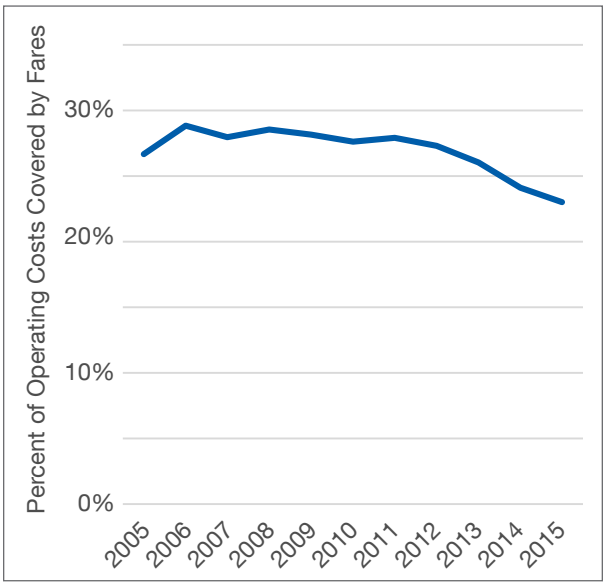

Figure ES-11: Fare Recovery (2005-2015)

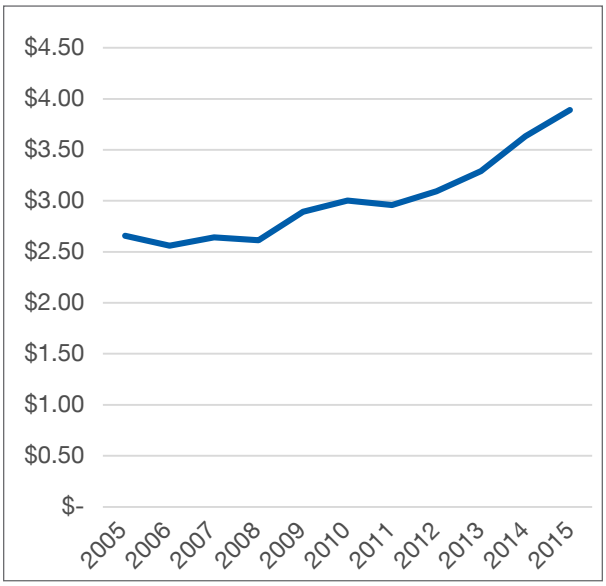

Figure ES-12: Subsidy per Passenger (2005-2015)

The Freight System

Rail continues to carry a significant percentage of freight, moving approximately 25 percent of all freight tonnage into and out of the region in 2012.

Freight shipments to and from the region have recovered from recession levels, and **Figure ES-13** shows that total tons of freight to and from the region in 2012 exceeded 2007 levels by 6 percent. Growth in total value over the same period exceeded the growth in total freight tonnage, with an increase of 13.2 percent. Trucking remained the dominant mode for freight, with trucks carrying 87 percent of total freight value into and out of the region in 2012. Rail continued to carry a significant percentage of freight, moving approximately 25 percent of all freight tonnage into and out of the region in 2012.

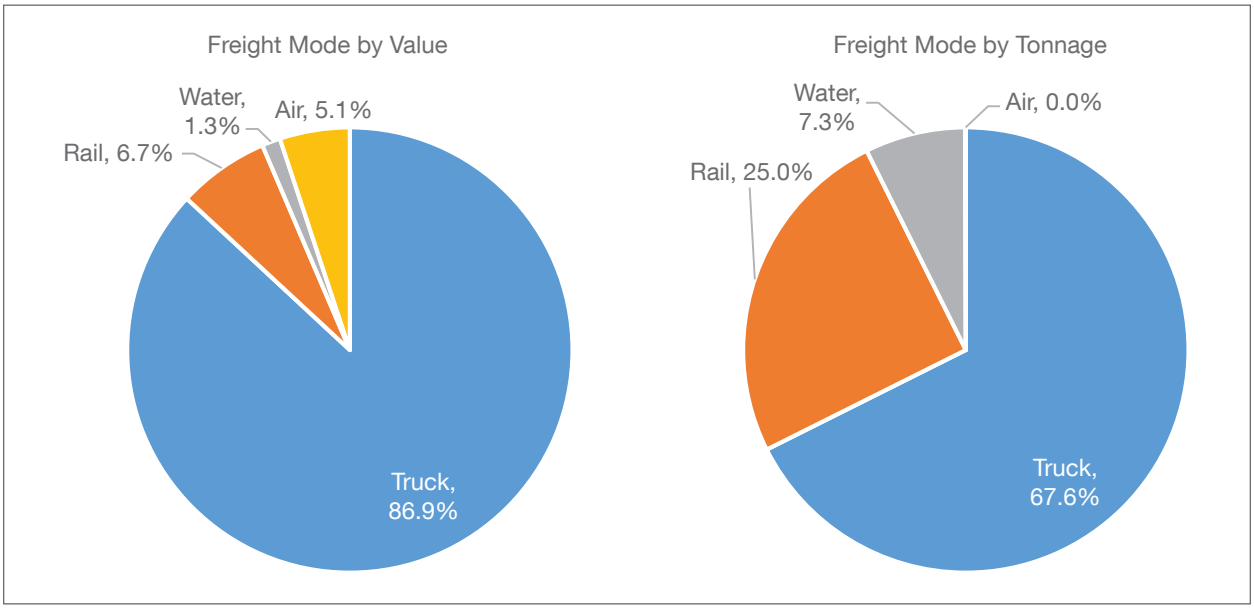

Figure ES-13: 2012 Regional Freight Modal Split by Value and Tonnage (Estimates Based on Multiple Data Sources)

The Bicycle and Pedestrian System

Bicycling and walking have become increasingly important in the Twin Cities for commuting to work or school, running personal errands, and traveling to entertainment and activity venues. The region has a strong infrastructure and policy foundation on which the regional bicycle and pedestrian systems are based, and the potential to further expand biking and walking in the region for transportation is significant.

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According to the 2010 TBI, 6.1 percent of all trips made within the seven-county region are done by walking, and 1.6 percent of all trips are made by bicycle. Between 2000 and 2010, the share of walking trips within the region increased 0.4 percentage points and the share of bicycling trips in the region increased by 0.5 percentage points.

The Regional Bicycle Transportation Network, the region's vision for regional bikeways is shown in **Figure ES-14**. It consists of more than 1,300 miles of existing, planned, or anticipated on- and off-road bicycle facilities. Future editions of this TSPE will include a performance measure that will track progress on RBTN implementation.

The Council has developed a Regional Bicycle System Inventory in collaboration with the seven metropolitan counties that have coordinated with their municipalities to provide a region-wide reference mapping platform. This database includes all the existing and planned trails and on-street facilities from most cities that have developed local bicycle networks. In 2016 there were more than 3,900 miles of existing bicycle facilities with another 2,860 miles anticipated in local bicycle plans.

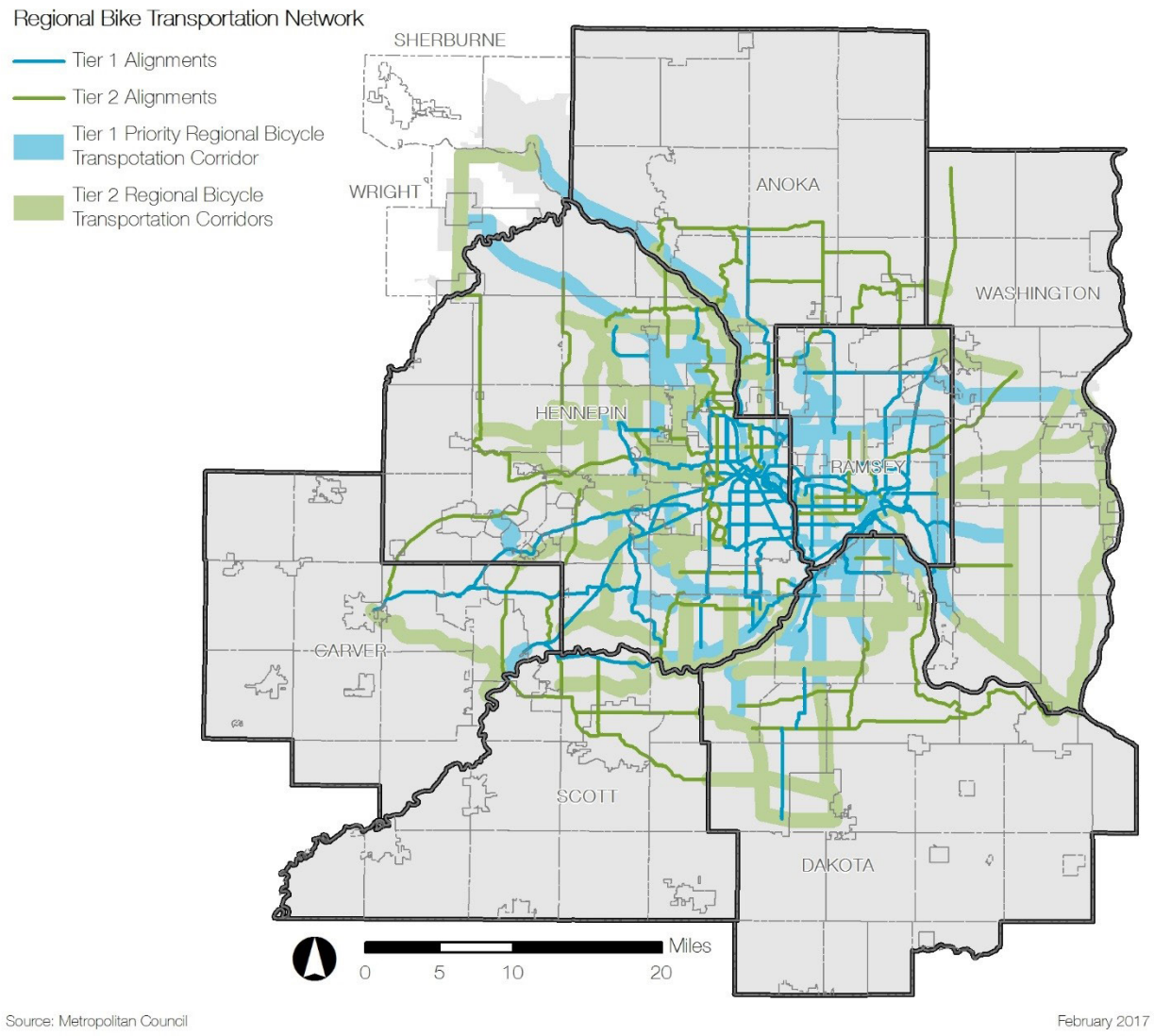

Figure ES-14. Regional Bicycle Transportation Network

The Aviation System

The Twin Cities region aviation system is shown in **Figure ES-15** and consists of eleven airports, one commercial airport and ten general aviation airports, that provide aviation services to the region.

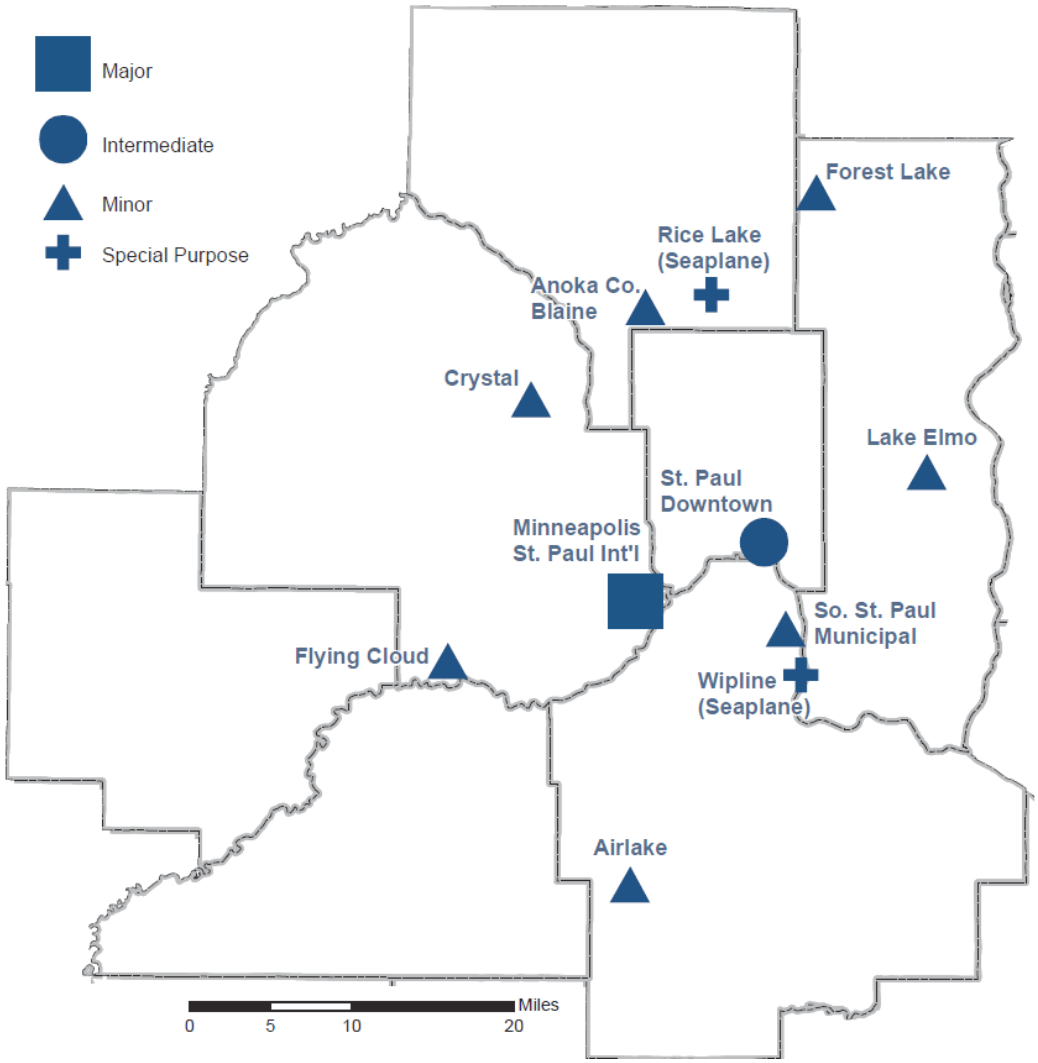

Figure ES-15: Regional Airports by System Role

Since 2010, MSP has experienced a steady increase in passenger enplanements (14 percent) with a corresponding decrease in aircraft operations (7 percent). This trend is consistent with the airline industry trend to focus on productivity and use fewer flights with greater capacity (larger airplanes or simply putting more seats on existing airplanes) to serve major destinations.

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Chapter 1: The Purpose

This report is a comprehensive review of the Twin Cities transportation system as prepared by Metropolitan Council in 2016. This report was prepared to inform the 2018 update of the region's long-range transportation plan, the 2040 Transportation Policy Plan (TPP).

The Minnesota State Legislature adopted statutes in 1996 requiring the Metropolitan Council to produce this report (previously called the Transportation System Audit).

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The statutory language has since been amended to read as follows:

473.1466 TRANSPORTATION SYSTEM PERFORMANCE EVALUATION.

(a) Prior to each major revision of the transportation policy plan, the council must carry out a performance evaluation of the metropolitan area's trans-portation system as a whole. The performance evaluation must:

(1) evaluate the area's ability to meet the need for effective and efficient transportation of goods and people;

(2) evaluate trends and their impacts on the area's transportation system;

(3) assess the region's success in meeting the currently adopted regional transportation benchmarks; and

(4) include an evaluation of the regional transit system, including a comparison with peer metropolitan regions with regard to key operating and investment measurements.

(b) The council must update the evaluation of the regional transit system every two years.

(c) The council shall use the results of the performance evaluation to make recommendations for improving the system in each revision of the transportation policy plan.

(d) The council must conduct a peer review of the performance evaluation using at least two nationally recognized transportation and transit consultants.

(e) The council must submit the performance evaluation to the chairs and ranking minority members of the house of representatives and senate committees

The Metropolitan Council completed the first full Transportation Systems Audit in 1997.

The Metropolitan Council completed the first full Transportation Systems Audit in 1997. Since that time the Metropolitan Council has prepared subsequent assessments of the transportation system as a whole and of the transit system separately. This report is an update of the 2012 Transportation System Performance Evaluation and several other iterations of the transit performance audit.

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2040 Transportation Policy Plan: Updated Regional Transportation Benchmarks

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The 2040 TPP goals and objectives respond to Thrive's policy direction and tie to the regional outcomes it identifies.

- **Stewardship** advances the Council's longstanding mission of orderly and economical development by responsibly managing the region's natural and financial resources and making strategic investments in our region's future.
- **Prosperity** is fostered by investments in infrastructure and amenities that create regional economic competitiveness, thereby attracting and retaining successful businesses, a talented workforce, and consequently, wealth.
- **Equity** connects all residents to opportunity and creates viable housing, transportation, and recreation options for people of all races, ethnicities, incomes, and abilities so that all communities share the opportunities and challenges of growth and change.
- **Livability** focuses on the quality of our residents' lives and experiences in our region, and how places and infrastructure create and enhance the quality of life that makes our region a great place to live.
- **Sustainability** protects our regional vitality for generations to come by preserving our capacity to maintain and support our region's well-being and productivity over the long term.

Consistent with Minnesota practice and U.S. Department of Transportation requirements, the Council is also working to develop performance measures and targets to evaluate the effectiveness of our region's actions on achieving these goals and outcomes. When relevant, these performance measures are now incorporated into the Transportation System Performance Evaluation.

The *2040 TPP* goals and objectives are identified here, along with the relevant *Thrive MSP 2040* outcomes.

2040 TPP Goals and Objectives

Goal: Transportation System Stewardship

Sustainable investments in the transportation system are protected by strategically preserving, maintaining, and operating system assets.

OBJECTIVES

- Efficiently preserve and maintain the regional transportation system in a state of good repair.
- Operate the regional transportation system to efficiently and cost-effectively connect people and freight to destinations.

***Thrive MSP 2040* Outcomes:** Stewardship, Prosperity

Goal: Safety and Security

The regional transportation system is safe and secure for all users.

OBJECTIVES

- Reduce crashes and improve safety and security for all modes of passenger travel and freight transport.
- Reduce the transportation system's vulnerability to natural and man-made incidents and threats.

***Thrive MSP 2040* Outcomes:** Stewardship, Livability, Equity

Goal: Access to Destinations

People and businesses prosper by using a reliable, affordable, and efficient multimodal transportation system that connects them to destinations throughout the region and beyond.

OBJECTIVES

- Increase the availability of multimodal travel options, especially in congested highway corridors.
- Increase travel time reliability and predictability for travel on highway and transit systems.
- Ensure access to freight terminals such as river ports, airports, and intermodal rail yards.
- Increase transit ridership and the share of trips taken using transit, bicycling, and walking.
- Improve multimodal travel options for people of all ages and abilities to connect to jobs and other opportunities, particularly for historically underrepresented populations.

***Thrive MSP 2040* Outcomes:** Equity, Livability, Prosperity

Goal: Competitive Economy

The regional transportation system supports the economic competitiveness, vitality, and prosperity of the region and state.

OBJECTIVES

- Improve multimodal access to regional job concentrations identified in Thrive MSP 2040.
- Invest in a multimodal transportation system to attract and retain businesses and residents.
- Support the region's economic competitiveness through the efficient movement of freight.

***Thrive MSP 2040* Outcomes:** Prosperity, Livability, Sustainability

Goal: Healthy Environment

The regional transportation system advances equity and contributes to communities' livability and sustainability while protecting the natural, cultural, and developed environments.

OBJECTIVES

- Reduce transportation-related air emissions.
- Reduce impacts of transportation construction, operations, and use on the natural, cultural, and developed environments.
- Increase the availability and attractiveness of transit, bicycling, and walking to encourage healthy communities and active car-free lifestyles.
- Provide a transportation system that promotes community cohesion and connectivity for people of all ages and abilities, particularly for historically underrepresented populations.

***Thrive MSP 2040* Outcomes:** Stewardship, Equity, Livability, Sustainability

Goal: Leveraging Transportation Investment to Guide Land Use

The region leverages transportation investments to guide land use and development patterns that advance the regional vision of stewardship, prosperity, livability, equity, and sustainability.

OBJECTIVES

- Focus regional growth in areas that support the full range of multimodal travel.
- Maintain adequate highway, riverfront, and rail-accessible land to meet existing and future demand for freight movement.
- Encourage local land use design that integrates highways, streets, transit, walking, and bicycling.
- Encourage communities, businesses, and aviation interests to collaborate on limiting incompatible land uses that would limit the use of the region's airports.

***Thrive MSP 2040* Outcomes:** Stewardship, Livability, Sustainability

Chapter 2: The Region and Travel

Twin Cities Metropolitan Planning Organization Planning Area: Demographics

The Metropolitan Council's official jurisdiction is the seven-county Twin Cities metropolitan area, made up of the following counties: Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington. It contains the two central cities of Minneapolis and St. Paul, located respectively in Hennepin and Ramsey counties, as well as 184 surrounding communities.

In 2014, the Metropolitan Council transportation planning area boundary and metropolitan planning organization (MPO) jurisdiction was expanded to encompass portions of Wright and Sherburne Counties. The expansion resulted from the designation of these areas as part of the Minneapolis-St. Paul Urbanized Area by the 2010 U.S. Census.

The Metropolitan Council's official jurisdiction contains the two central cities of Minneapolis and St. Paul, located respectively in Hennepin and Ramsey counties, as well as 184 surrounding communities.

The Transportation System Performance Evaluation (TSPE) now covers the MPO area consisting of the seven counties, as well as portions of Sherburne and Wright Counties. It contains the two central cities of Minneapolis and St. Paul, located respectively in Hennepin and Ramsey Counties. This area will be called the Twin Cities region (or just "the region").

The MSA area includes 16 counties: the seven counties in the Metropolitan Council region, seven adjacent counties in Minnesota (Chisago, Isanti, LeSueur, Mille Lacs, Sherburne, Sibley, Wright), and two neighboring counties in Wisconsin (Pierce and St. Croix).

Because of data availability from the US Census, comparisons to peer regions will be made at the broader metropolitan statistical area (MSA)[2-1]. Larger than the Twin Cities region, the MSA area includes 16 counties: the seven counties in the Metropolitan Council region, seven adjacent counties in Minnesota (Chisago, Isanti, LeSueur, Mille Lacs, Sherburne, Sibley, Wright), and two neighboring counties in Wisconsin (Pierce and St. Croix). **Figure 2-1** shows the TSPE planning area and broader MSA.

2-1 A metropolitan statistical area (MSA) is a US Census definition for an urban area of 50,000 people or more, consisting "of one or more counties and includes the counties containing the core urban area, as well as any adjacent counties that have a high degree of social and economic integration (as measured by commuting to work) with the urban core."

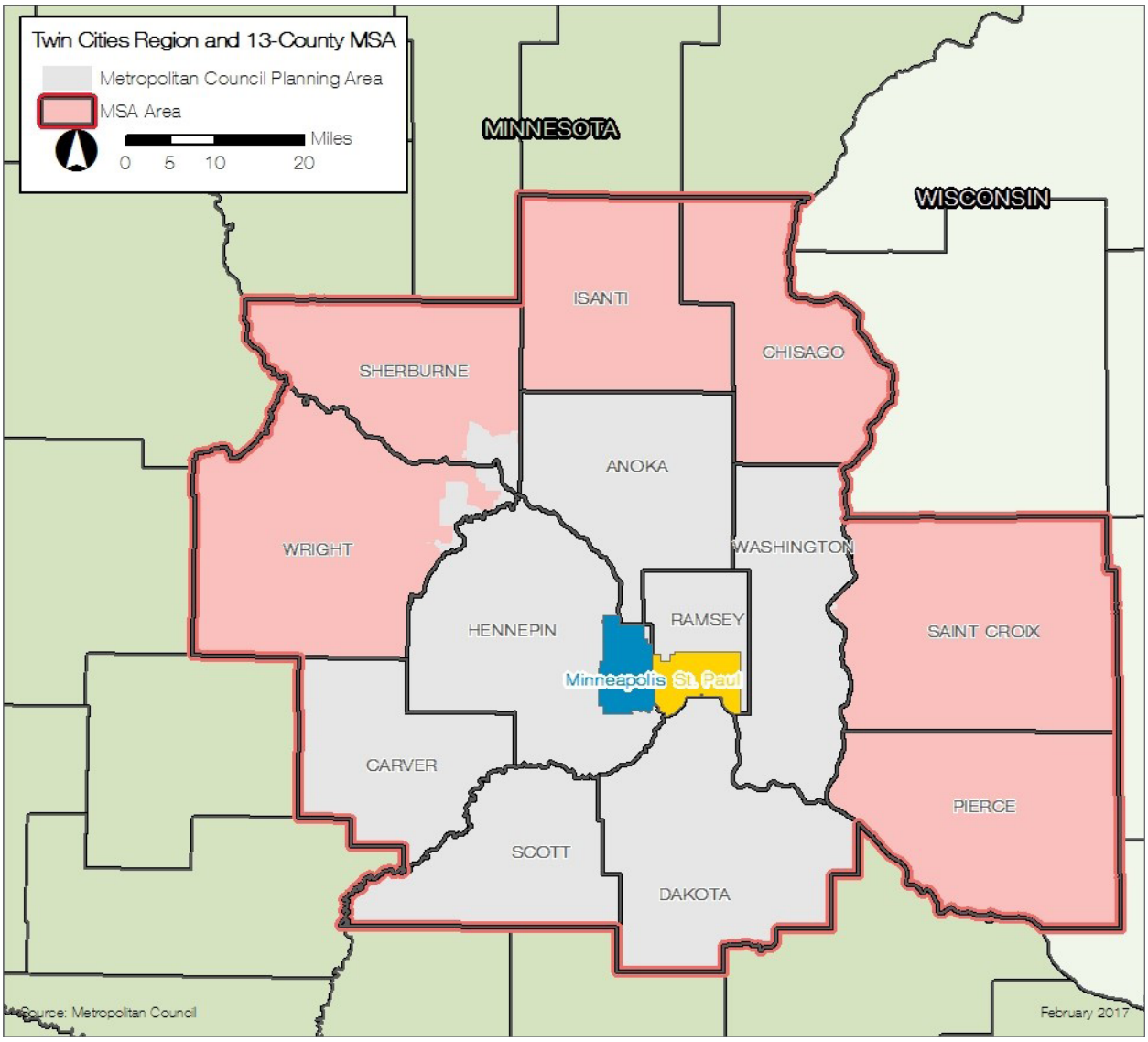

Figure 2-1: Twin Cities Region and 16-County MSA

Data will also be examined by planning areas identified in the metropolitan development guide. The most-recent metropolitan development guide, *Thrive MSP 2040*, the umbrella policy plan in the Twin Cities region, was adopted in 2014. Areas with similar development and expected growth patterns were grouped together (developed areas, developing areas, rural residential, etc.) into planning areas, depicted in **Figure 2-2**. Population and employment statistics will be presented for these areas. More information about the development guide can be found at https://metrocouncil.org/Planning/Projects/Thrive-2040.aspx.

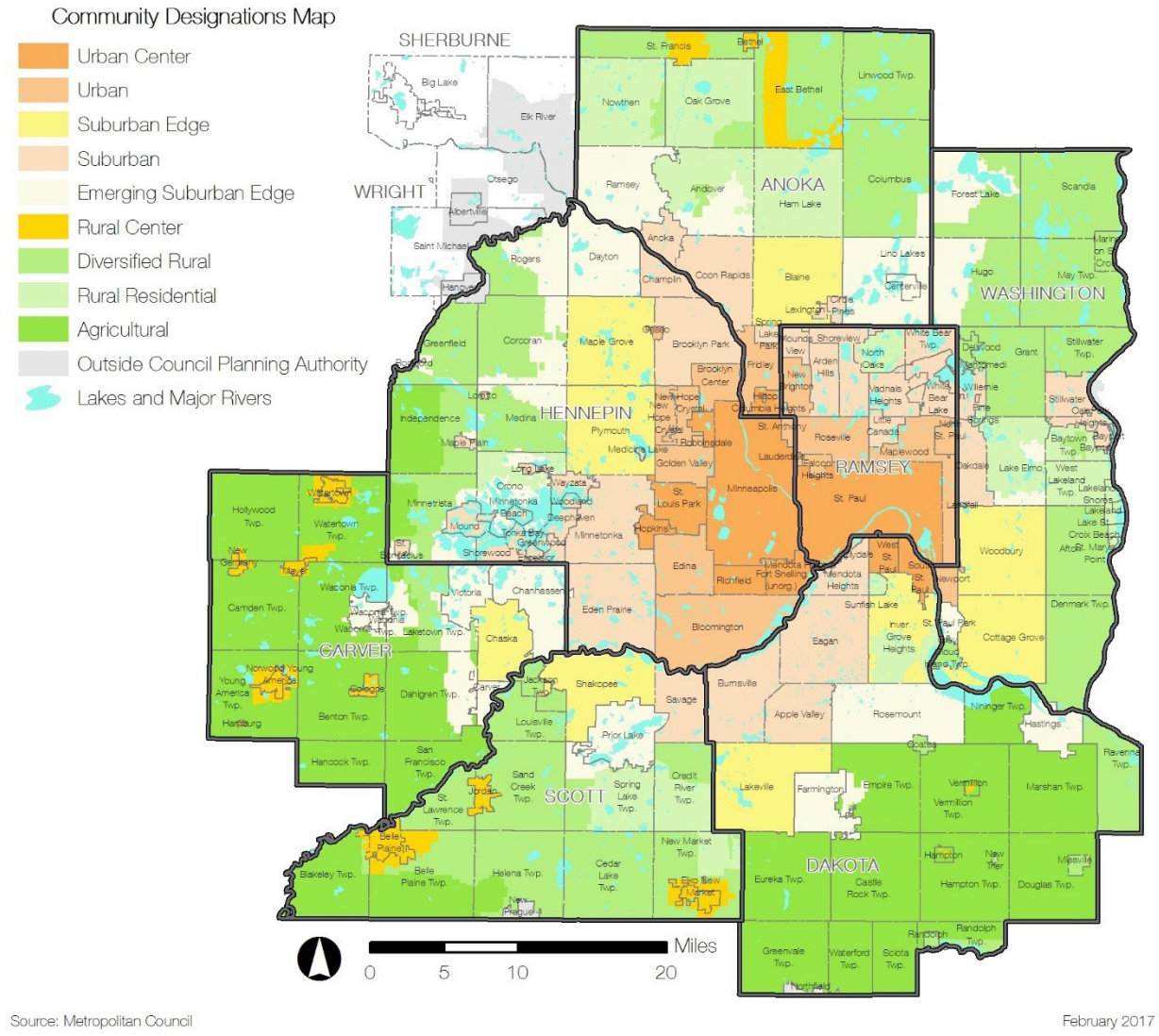

Figure 2-2: Thrive MSP 2040 Planning Areas

Planning Area Dynamics

Population Trends

The Twin Cities region has been gaining population and households steadily since 1970. In 2015, the Twin Cities region had 3,002,689 people in 1,167,130 households based on 2011-2015 American Community Survey (ACS) 5-Year Estimates.

In 2015, the Twin Cities region had 3,002,689 people in 1,167,130 households based on 2011-2015 American Community Survey (ACS) 5-Year Estimates.

In the 1980s and 1990s, the region's population grew 15 percent each decade. However, growth slowed dramatically between 2000 and 2010, to just under 8 percent. Since 2010, population has been growing an average of roughly 1 percent per year compared to a growth rate of approximately 0.8 percent per year between 2000 and 2010. **Figure 2-3** depicts the growth of population and households in the Twin Cities Region.

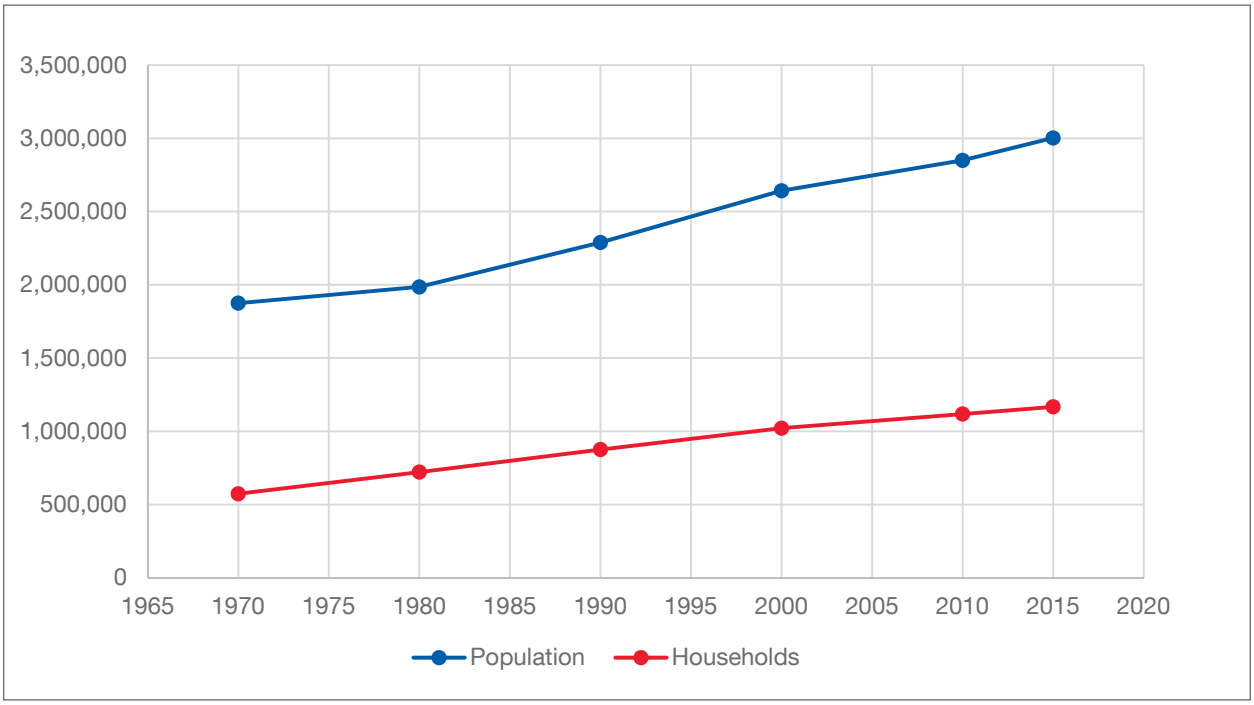

Figure 2-3: Population and Households in Twin Cities Region

Population in the central cities has remained steady, but the regional percentage of households located there has dropped as new households formed or moved to the developing areas.

Shifting Population

Development in the Twin Cities region before 1945 was concentrated in the central cities of Minneapolis and St. Paul. During the 1950s, growth moved into the first ring suburbs. By 2000, the first-ring was mostly developed and the rate of growth there had slowed. Growth moved to the second- and third-ring suburbs, which boomed in the late 90s and early 2000s. Population in the central cities has remained steady, but the regional percentage of households located there has dropped as new households formed or moved to the developing areas during the last 45 years.

The population growth rate in the first-ring area (previously defined as the developed area) slowed between 2000 and 2010. Between 2010 and 2015, the percentage of households by framework area remained relatively constant, with a slight increase in the percentage of households in the suburban edge and emerging suburban edge, and slight decreases in urban areas and urban centers. **Figure 2-4** shows the distribution of households by framework area in the seven-county area (excluding the additional extended areas of Sherburne and Wright Counties, where data is unavailable).

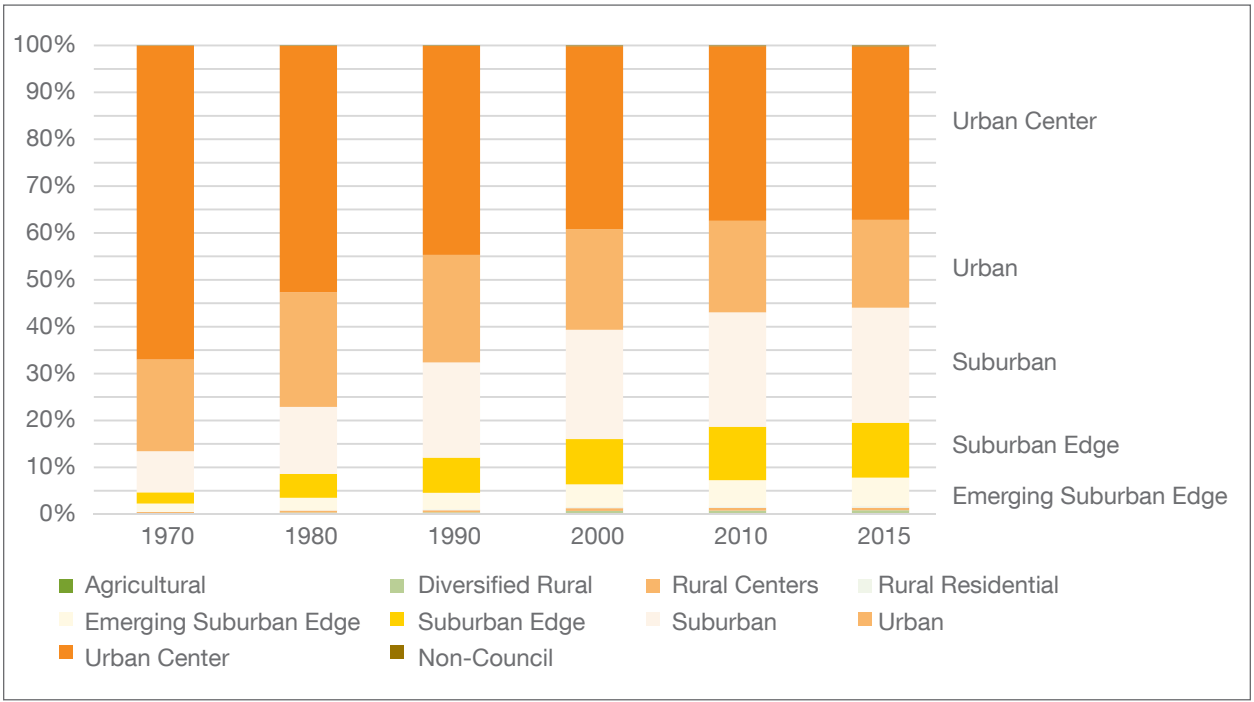

Figure 2-4: Percent Households by Framework Area

Figure 2-5 shows the current population density in the Twin Cities region, mapped based on 2014 Transportation Analysis Zone (TAZ) data. With recent high-rise condominium and infill development, the downtown areas of Minneapolis and St. Paul are the densest areas of population in the region. The central cities are more densely developed than the suburbs. There are pockets of dense development in the outer-ring suburbs, but overall, density falls dramatically while moving outward from the downtown areas and central cities.

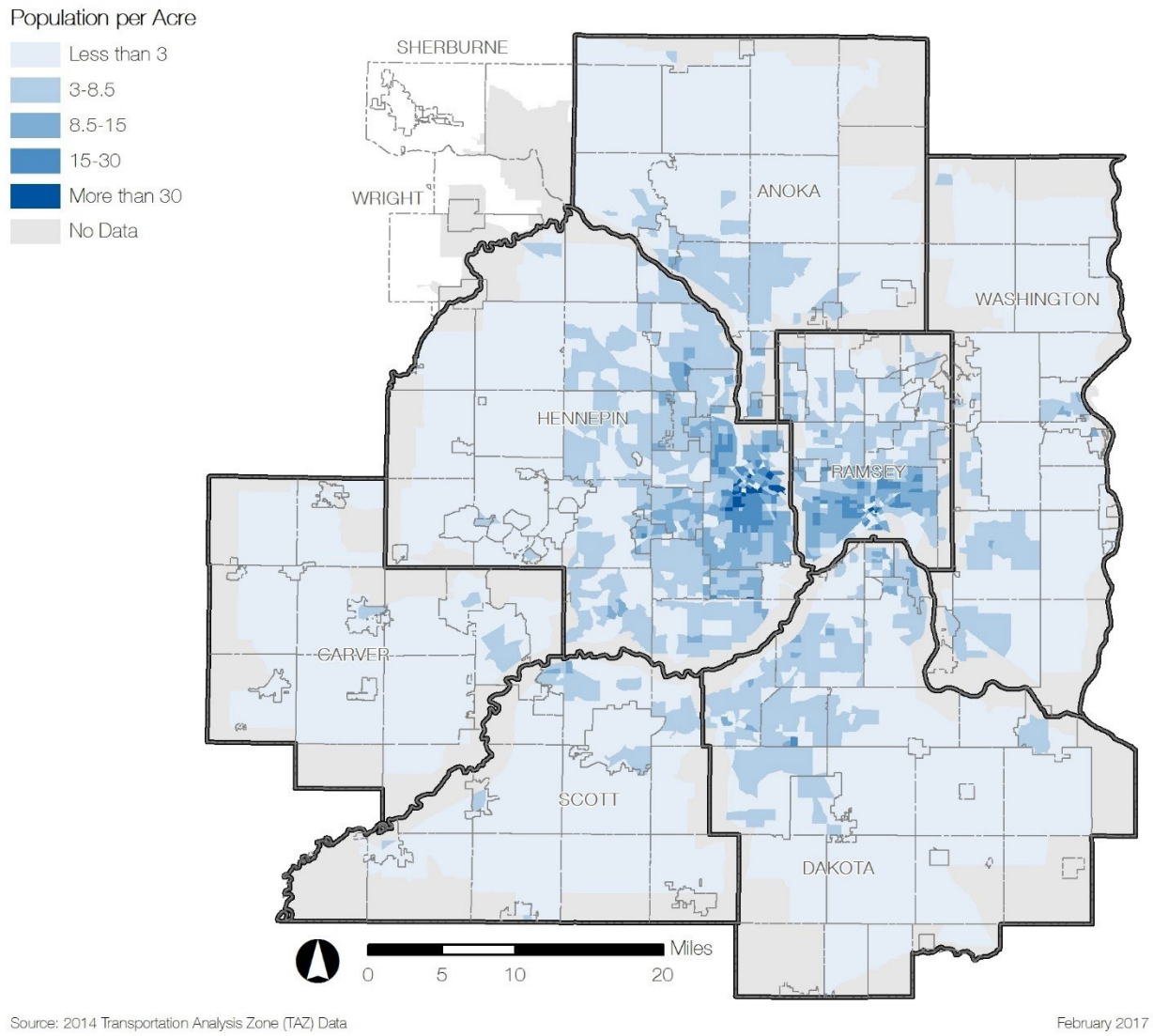

Figure 2-5: 2014 Population Density of Twin Cities Region

Household Size

Based on ACS data, from 2010 to 2015, growth in population outpaced the growth in households for the seven-county region.

In the Twin Cities region, the 2000 to 2010 growth of households outpaced the growth of population, 9.4 percent to 7.9 percent respectively, adding 96,293 households and 207,505 people. Based on ACS data, from 2010 to 2015, growth in population outpaced the growth in households for the seven-county region. Over this period, the population increased by 153,122 people, or 5.4 percent, and the number of households increased by 49,381, or 4.4 percent. This yields an average household size of 2.57, an increase from 2.55 for the seven-county Twin Cities region according to the 2010 U.S. Census. From 2000 to 2010, the percentage of one-person households increased slightly from 27.5 percent of households to 28.5 percent of households. ACS data suggests that the number of one-person households has remained approximately unchanged, with a very slight increase to 28.6 percent from 2010 to 2015.

Population Age

According to the American Community Survey, the region is aging.

In 2010, 27.5 percent of the Twin Cities region was aged 0 to 19 years, 62.1 percent was aged 20 to 64 years, and 10.4 percent were over 65 years. The median age was 35.8 in 2010. According to the American Community Survey, the region is aging slightly. In 2015, the Twin Cities region was 26.5 percent aged 0 to 19 years, 61.6 percent aged 20 to 64 years, and 11.8 percent were over 65 years. The median age in 2015 was 36.8 years.

Employment Trends

Twin Cities employment did not escape the impact of the national recession at the end of the last decade. The booming job growth in the 1990s slowed; in fact, the region lost jobs for the first time in recent decades. Since travel to and from work is the largest generator of transportation trips, the downturn in employment affected peak period travel and transportation trends in general.

The economy did not experience a consistent trend of decline over the last 15 years but had several periods of recession and recovery.

Regional employment peaked in 2001. A national recession soon followed, causing job losses. The 2001 levels were not matched again until 2005 (See **Figure 2-6**). The region continued to gain jobs until 2007, but another recession caused extensive job losses through 2009 - 2010.

These up and down cycles resulted in a total loss of 65,000 jobs between 2000 and 2010.

Since 2010, regional employment has increased each year coming out of the recession, first surpassing 2007 levels in 2013. According to the Bureau of Labor Statistics, the Twin Cities region has added over 179,000 new non-farm jobs since 2010.

Since 2010, regional employment has increased each year coming out of the recession, first surpassing 2007 levels in 2013.

The regional employment trends were comparable to the national trends. Both regionally and nationally, pre-recession employment peaked in 2007, with lowest levels observed in 2002 and 2010. National employment has also increased since 2010, first surpassing 2007 levels in 2014. **Figures 2-6** and **2-7** illustrate these regional and national trends, respectively.

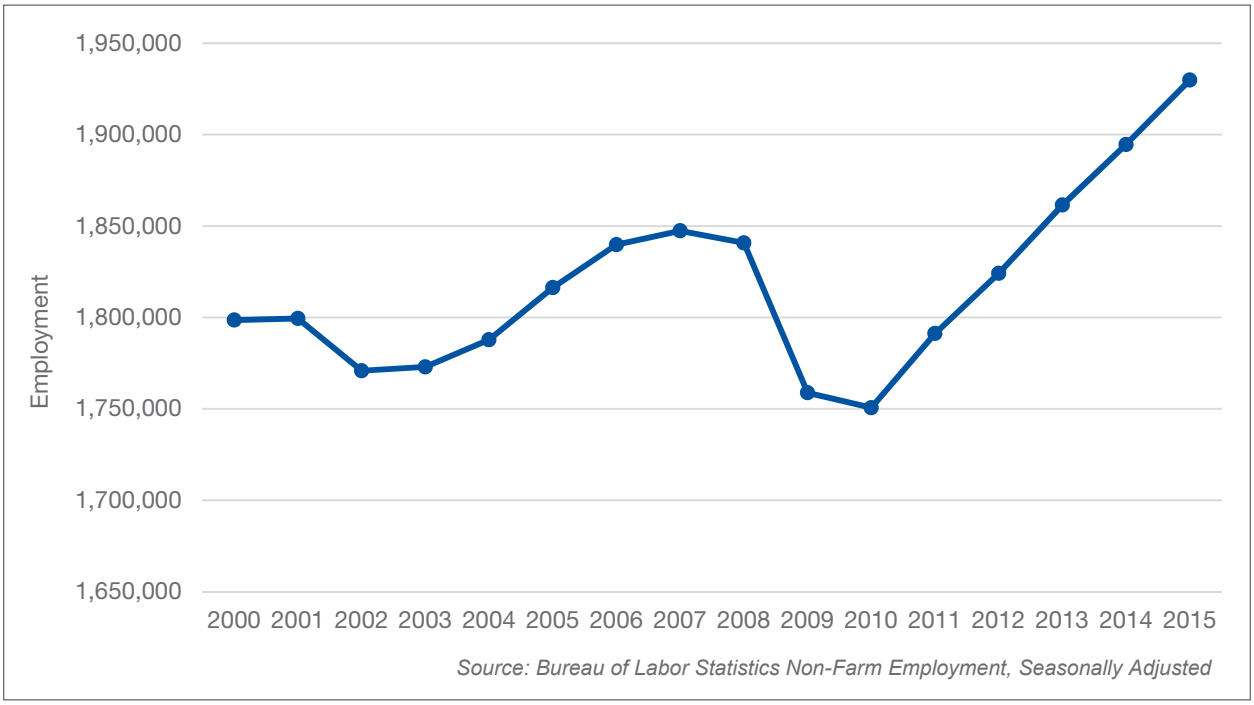

Figure 2-6: Regional Employment 2000-2015[2-2]

2-2 Data for Minneapolis-St. Paul-Bloomington, MN-WI combined statistical area

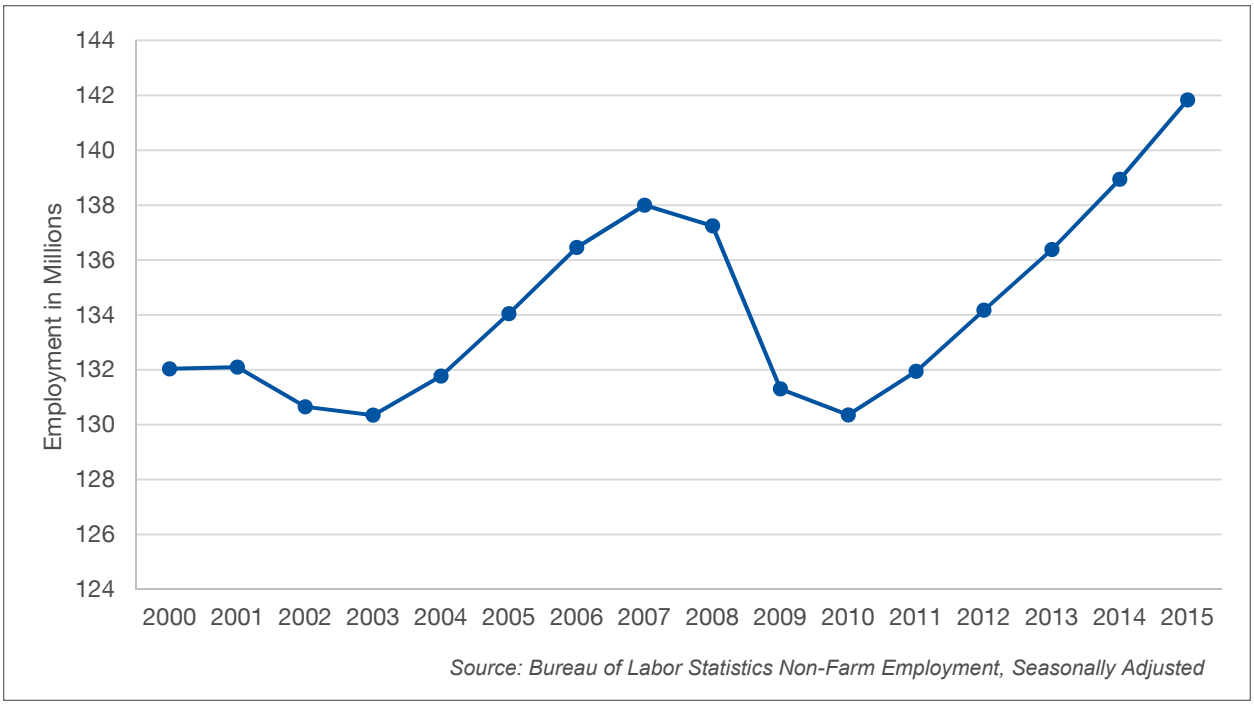

Figure 2-7: National Employment 2000-2015

Education and health services were the only industries to have major gains in employment over the 2000 to 2010 period, adding more than 74,000 jobs.

The manufacturing, construction, and retail economic sectors suffered the biggest job losses over the 2000 to 2010 period. Education and health services were the only industries to have major gains in employment in that period, adding more than 74,000 jobs.

According to 2016 Bureau of Labor Statistics data, the three largest non-farm employment sectors in the Twin Areas were (including: Sherburne, Wright, Mille Lacs, Isanti, Chisago, LeSueur, Sibley Counties in Minnesota, and St. Croix and Pierce Counts in Wisconsin):

- Trade, transportation, and utilities (357,200 jobs)
- Education and health services (334,100 jobs)
- Professional and business services (317,800 jobs)

Education and health services, as well as professional and business services jobs increased 4 percent from December 2015 to December 2016.

Employment Locations

The downtown areas of Minneapolis and St. Paul have the highest concentration of jobs in the Twin Cities region. Outside of the downtown areas, employment density varies greatly. There are several other large job clusters located along major highway corridors, especially in the southwest quadrant of the region. While the downtown areas experienced a job loss and gain cycle similar to the region as whole, they have not recovered as well, and the number of jobs is still significantly lower than 2001 levels.

In addition to downtown Minneapolis and St. Paul, there are several other large job clusters located along major highway corridors, especially in the southwest quadrant of the region.

Figure 2-8 shows the current employment density in the Twin Cities region, mapped based on 2014 TAZ data.

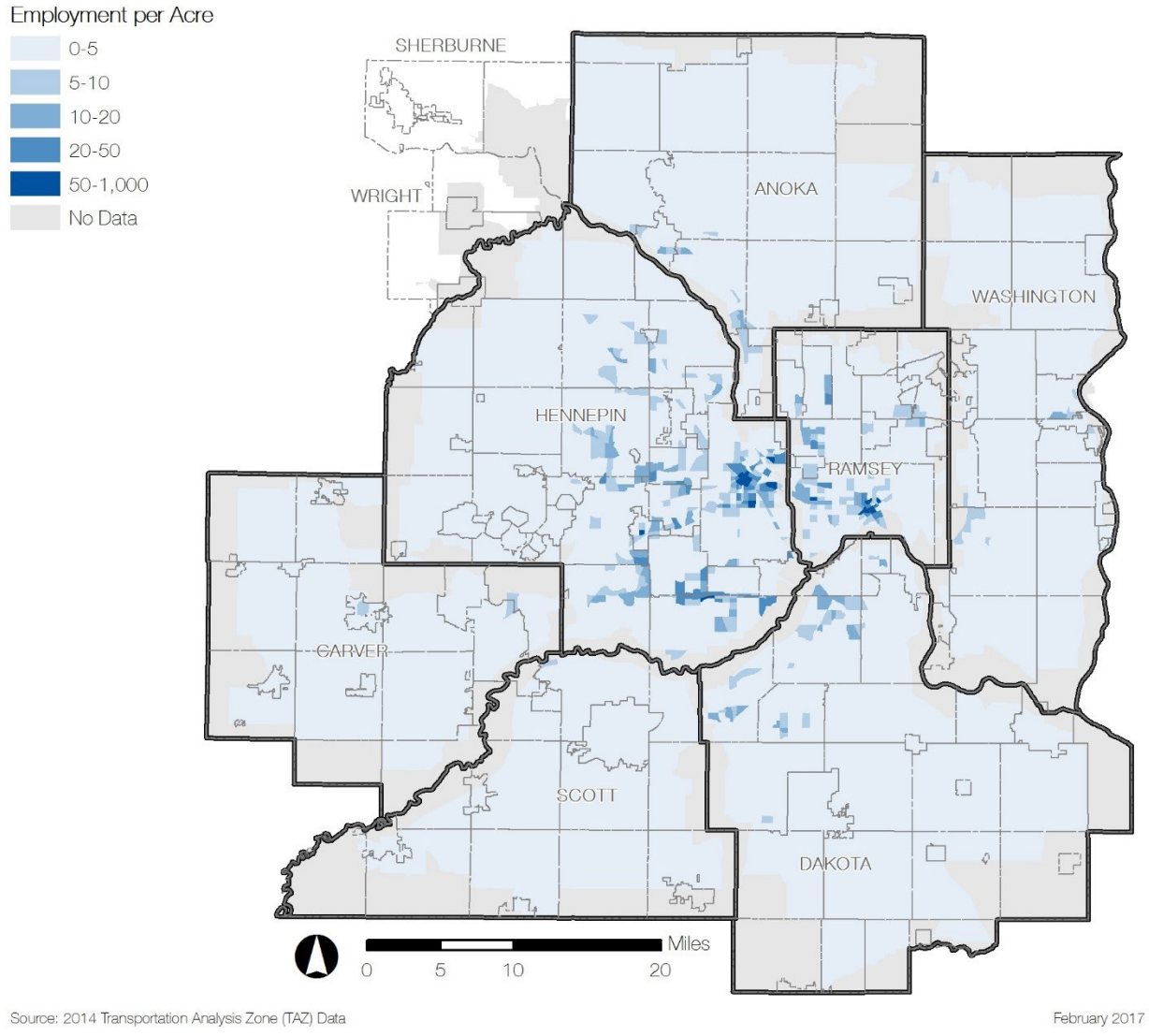

Figure 2-8: Employment Density of the Twin Cities Region

Figure 2-9 shows the breakdown of employment by framework area in the seven-county area (excluding the additional extended areas of Sherburne and Wright Counties, where data is unavailable). From 2000 to 2015, employment fell 3 percent in urban centers, while increasing more than 2 percent in the suburban edge and emerging suburban edge. Over 49 percent of jobs in the region are in suburban areas, compared to just below 46 percent in urban areas.

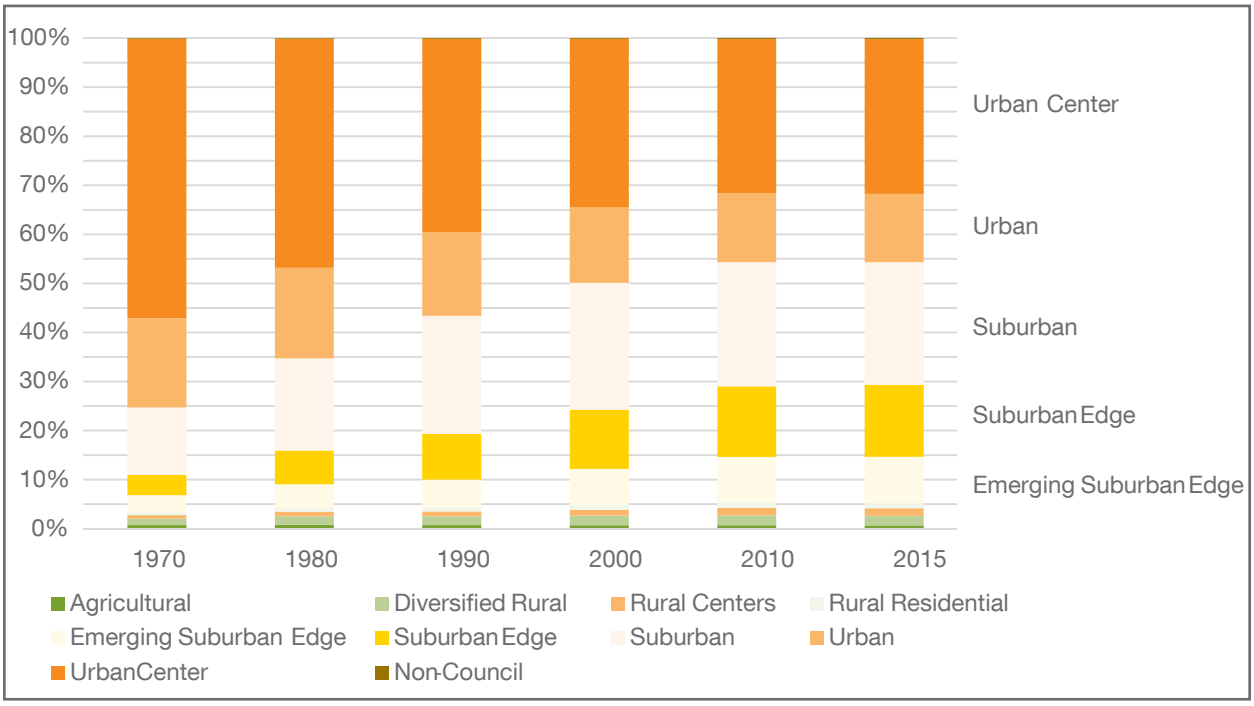

Figure 2-9: Percent Employment by Framework Area

Regional Income and Areas of Concentrated Poverty

Median household income in the region was $65,181 in 2010. According to 2011-2015 ACS 5-Year Estimates, the average median household income in the seven-county region was $75,172. The extended planning area including the portions of Sherburne and Wright Counties had an average median household income of $81,040, bringing the overall averaged median household income to $78,106. This is well above the national median household income of $53,889. Approximately 10 percent of the region's households were considered in poverty by federal standards, compared with 15.5 percent nationally. **Figure 2-10** on the following page depicts areas of concentrated poverty in the region, as well as areas of concentrated poverty where 50 percent of the residents are people of color. These are census tracts where 40 percent or more of the residents live in poverty. As of 2015, nearly 370,000 residents live in the region's areas of concentrated poverty.

Approximately 10 percent of the region's households were considered in poverty by federal standards, compared with 15.5 percent nationally. As of 2015, nearly 370,000 people live in the region's areas of concentrated poverty.

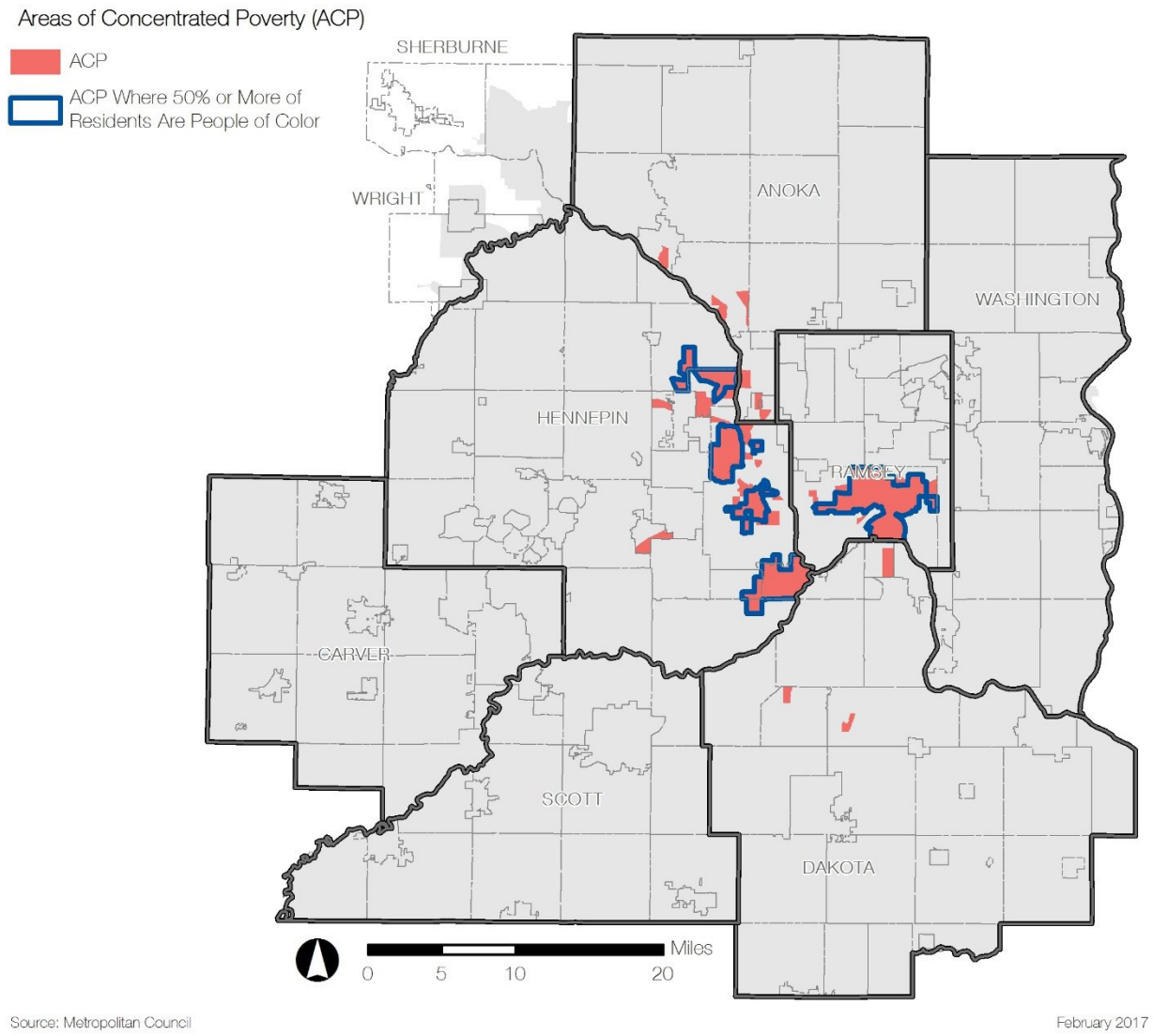

Figure 2-10: Areas of Concentrated Poverty

Land Use and Transportation Relationship

There is an important relationship between the characteristics of land use and development and travel trends of the region. *Thrive MSP 2040* designated planning areas by community types based on similar issues facing them in planning for the future, but they also represented similar characteristics in how the communities have developed to date. **Figure 2-11** shows that as community types from *Thrive MSP 2040* become less dense, their households typically produce more vehicle miles traveled. This is both a result of their development patterns and their location relative to the region's center. Similarly, **Figure 2-12** shows a pattern of less transit use by commuters as density decreases. This is also a factor of transit availability that generally relates to a community's transit market potential, although commuters in most communities also have access to park-and-ride facilities.

There is an important relationship between the characteristics of land use and development and travel trends of the region.

The relationship of land use and vehicle miles traveled is important because vehicle miles traveled are highly correlated with several other important outcomes of transportation. As vehicle miles traveled increases, these measures also generally increase:

- Number of crashes, and fatalities and serious injuries resulting from crashes
- Levels of congestion and travel delay
- Vehicle emissions for pollutants and greenhouse gases
- Wear and tear on pavement and bridge quality

The relationship of land use and vehicle miles traveled is important because vehicle miles traveled are highly correlated with several other important outcomes of transportation. As vehicle miles traveled increases, so does ***number and severity of crashes, level of congestion and delay, vehicle emissions, and impact on pavement and bridge quality.***

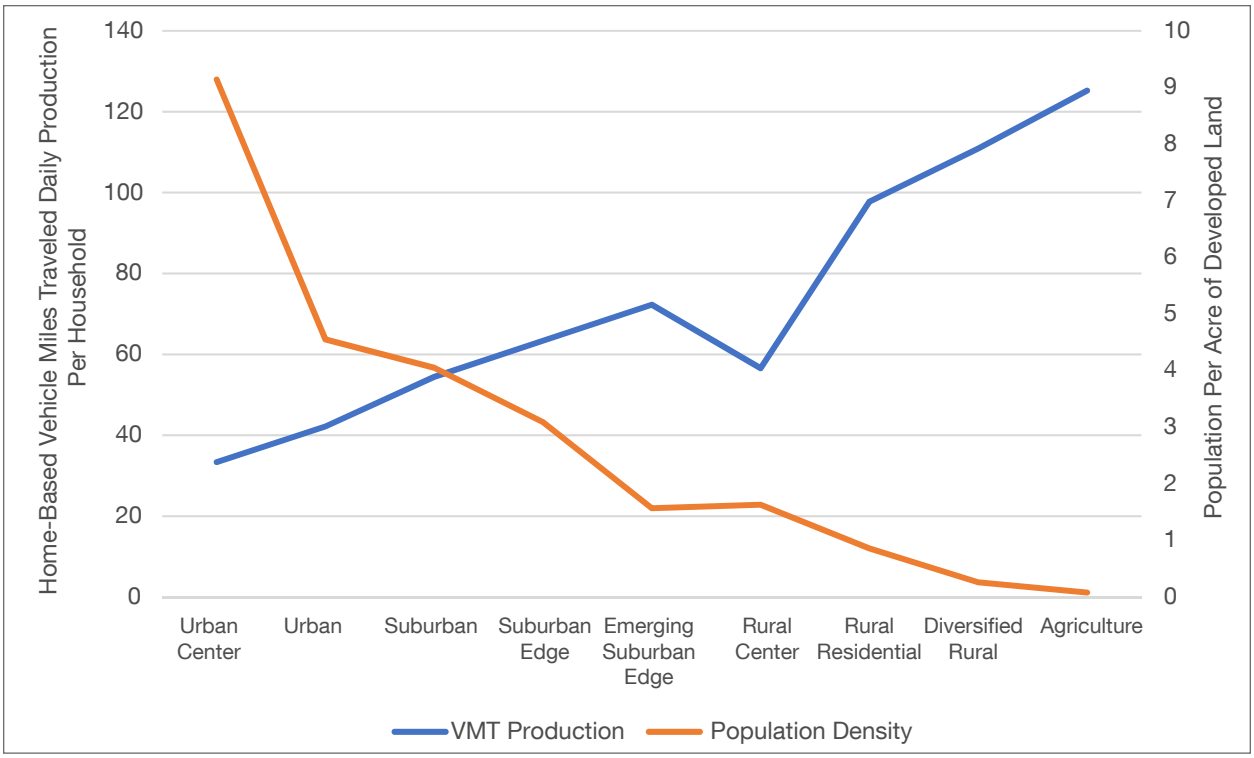

Figure 2-11: Population Density and Vehicle Miles Traveled

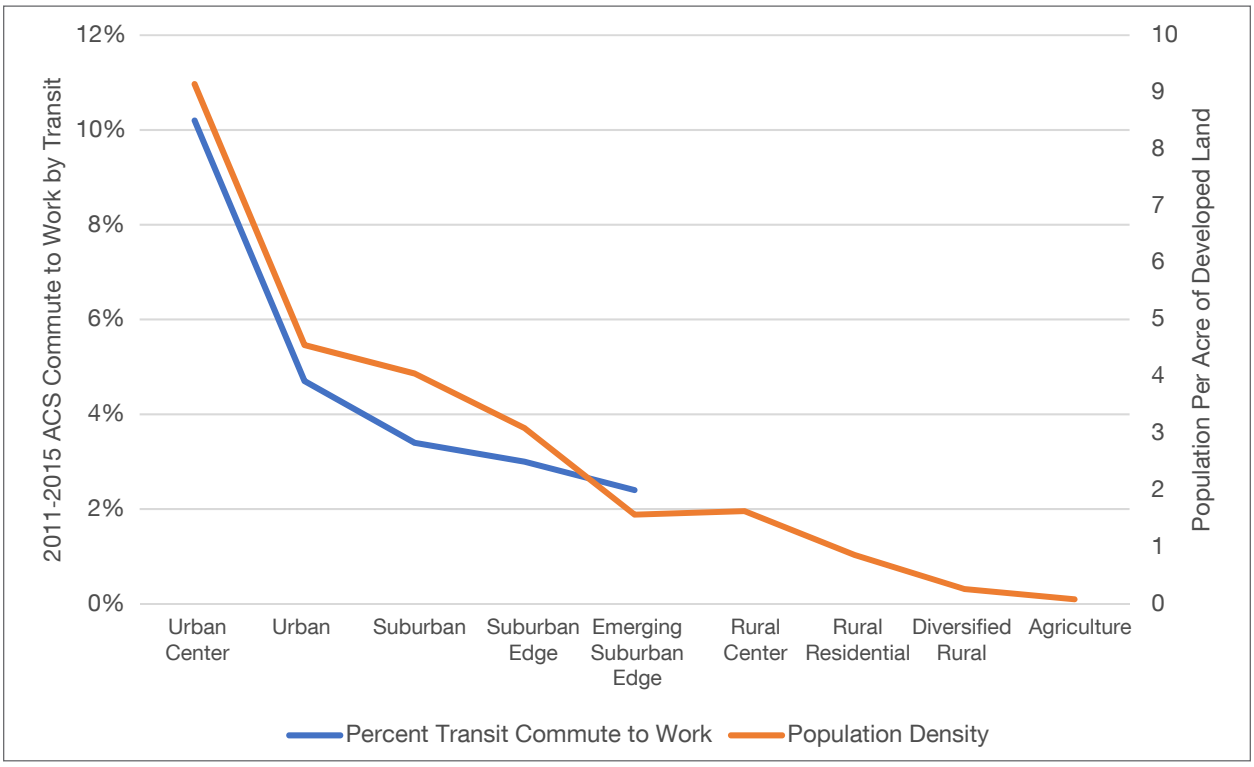

Figure 2-12: Population Density and Transit Use

Cost of Transportation

According to Center for Neighborhood Technology figures, the average annual vehicle miles traveled per household in the Twin Cities is 21,163 miles. The cost of transportation by itself, and as a percent of income for a typical household in the region is an important metric in assessing the affordability and accessibility of travel options for residents. Transportation costs include automobile ownership costs, automobile use costs (e.g. fuel), and transit use costs. In the Twin Cities, the average annual transportation cost is $12,818, or an average of 19 percent of total household income.

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How the Twin Cities Compares with Peer Regions

Introduction

Information is presented in this chapter, where available, for the planning area (Twin Cities region), as well as for the larger MSA used for comparing to peer regions. The main demographic peer regions used for comparison are the 25 most populated MSAs in the United States. The chapters for each transportation mode, which make up most of this plan, will use different sets of peer regions to compare each modal system. Peer groups will be defined in greater details in those chapters. **Figure 2-13** includes the peer regions used for comparison in this chapter.

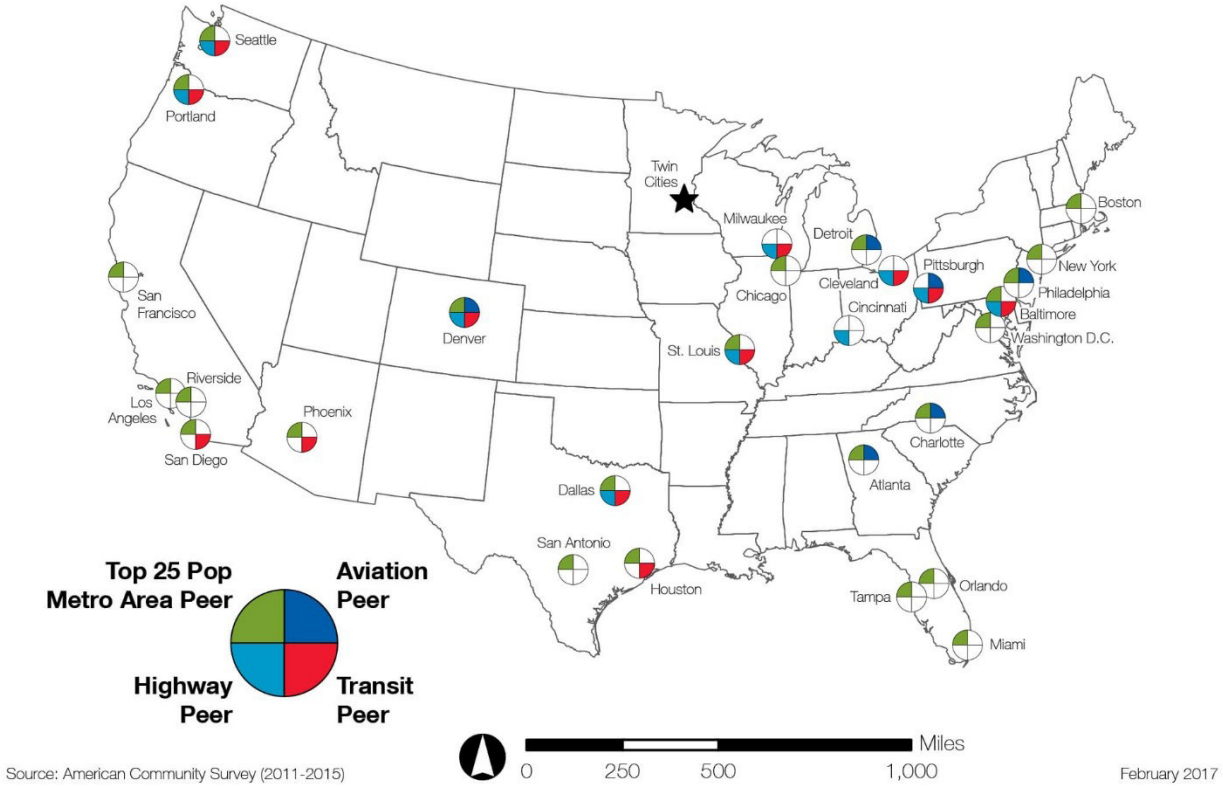

Figure 2-13: Peer MSA Regions

Population

Of the 25 peer regions, the Twin Cities MSA ranks 16th for total population, as shown in **Figure 2-14**. Between 2010 and 2015, all peer regions gained population. The Twin Cities MSA population increase of 5.2 percent, was below the peer average of 6.7 percent. The seven-county region experienced slowing growth from 2010 to 2015 like the Twin Cities MSA.

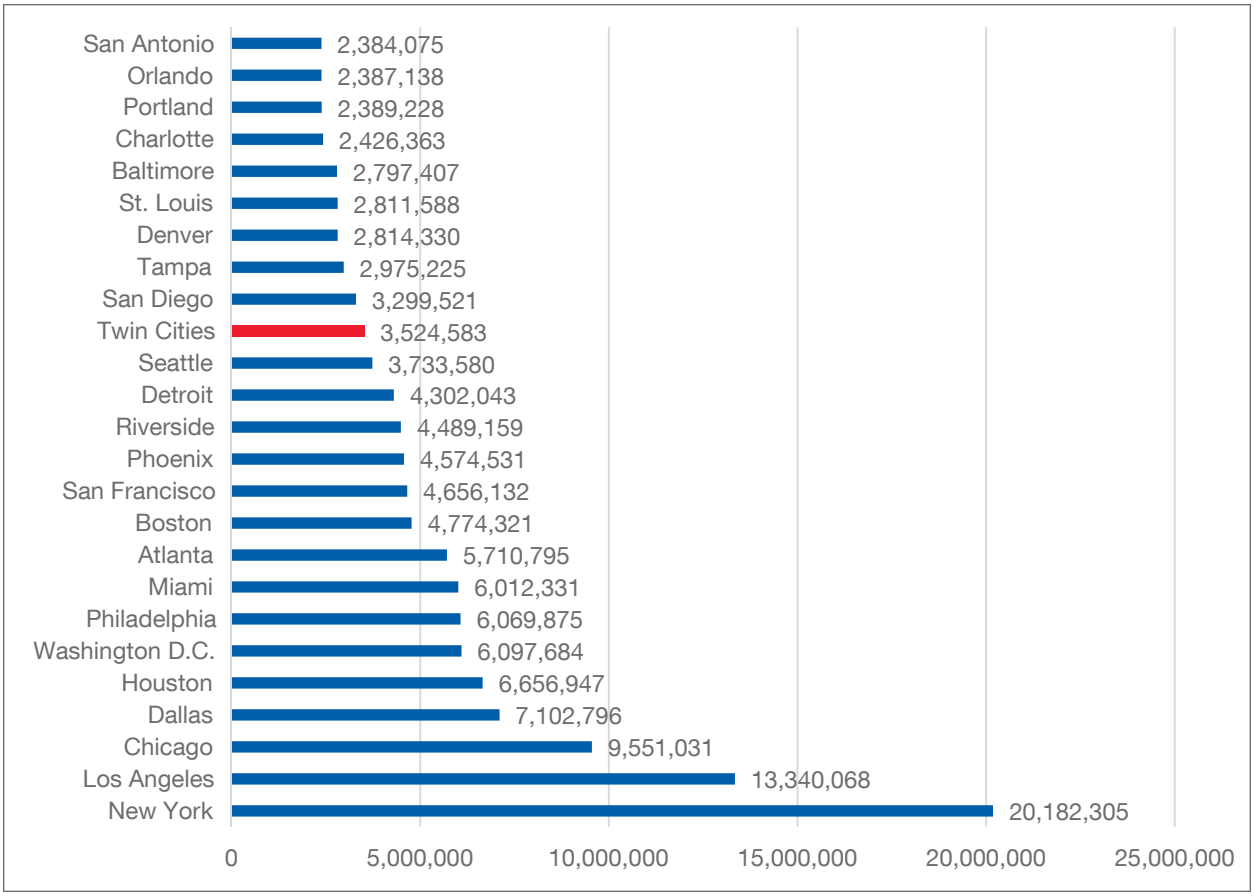

Figure 2-14: Peer Regions (Top 25 MSAs by Population) ranked by 2015 population

Age

The elderly population in the Twin Cities MSA is growing. This is still significantly less than the 2015 national average of 14.1 percent and peer region average of 12.8 percent.

The elderly population in the Twin Cities MSA is growing. In 2010, 10.3 percent of the MSA population was older than age 65. In 2015, 11.9 percent of the MSA population was older than age 65. This is still significantly less than the 2015 national average of 14.1 percent and peer region average of 12.8 percent.

The Twin Cities MSA is slightly below average for percentage of population within working age (15-64 year olds), ranking 16th among its peers. About 68 percent of the MSA population is within this age range.

Unemployment

Among peer regions, the Twin Cities MSA unemployment rate ranked fourth in 2010, and was the lowest of all peer regions in 2015.

The Twin Cities MSA had 5.8 percent unemployment in 2015, according to 2015 American Community Survey data. This is down from 8.8 percent in 2010. Among peer regions, the Twin Cities MSA unemployment rate ranked fourth in 2010, and was the lowest of all peer regions in 2015.

Household Income

The Twin Cities MSA ranked 6th highest among peer MSAs by median household income in 2015, while the region ranks 16th for total population.

The Twin Cities MSA ranked 6th highest among peer MSAs by median household income in 2015, with a value of $68,778. This is a 3.04 percent increase from the Twin Cities MSA median household income in 2012, when it also ranked 6th among peer regions. The average median household income among peer regions (excluding the Twin Cities MSA) is $61,546, an increase of 2.01 percent since 2012. Nationally, the median household income is $53,889.

The percentage of middle-income households is one measure of the economic health and stability of a region. The Twin Cities MSA ranks eighth among peer regions for largest set of middle income households, with 44.5 percent of households earning between $35,000 and $99,999 annually. This is above the peer average (excluding the Twin Cities MSA) of 42.33 percent, and the national value of 43.3 percent. Additionally, 31.4 percent of households in the Twin Cities MSA have a household income of greater than $100,000. This is 7th highest among peer regions.

The percentage of middle-income households in the Twin Cities MSA decreased by 1.31 percent since 2012. All peer regions saw decreases from 2012 to 2015. Nationally, there was a slight decrease of 0.41 percent since 2012.

Figure 2-15 depicts households in various income groups for the peer regions, according to 2015 American Community Survey data.

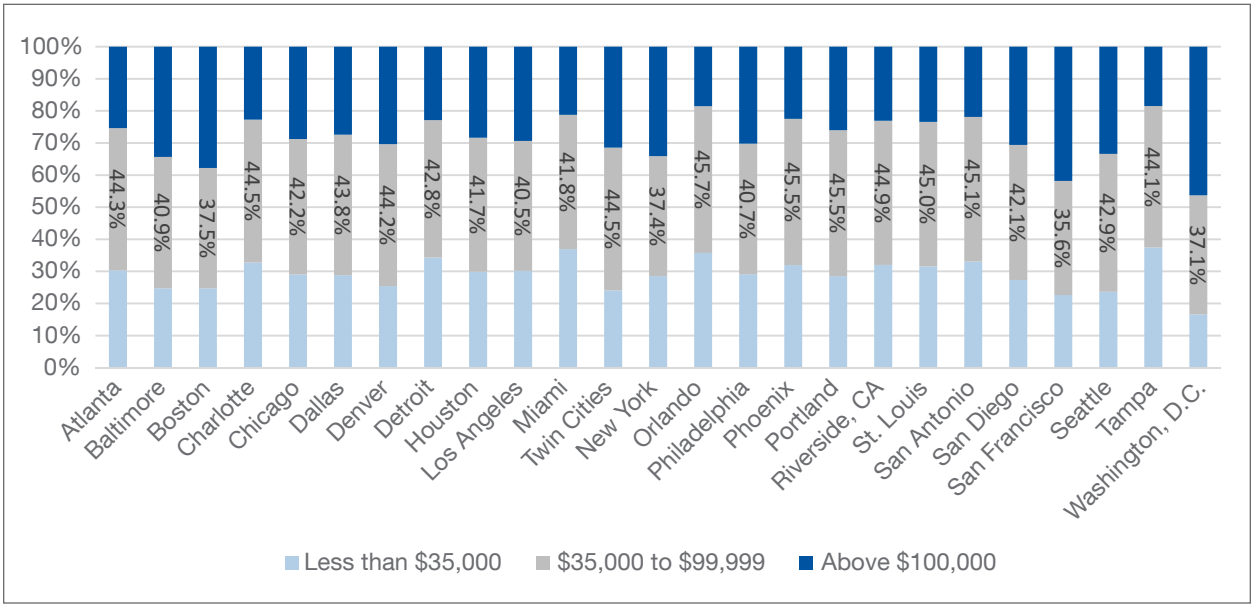

Figure 2-15: Households by Low, Middle, High Income Groups

Poverty

Using the federal definition for poverty, the total number and percentage of people in poverty increased in the Twin Cities region from 6.9 percent in 2000 to 10 percent in 2010.

The Twin Cities MSA has lower than average poverty but it is increasing at a greater than average rate. In 2005, the Twin Cities MSA had the 2nd lowest poverty rate of peer regions. In 2010, it had risen to 4th lowest poverty rate.

The Twin Cities MSA has lower than average poverty but it is increasing at a greater than average rate. In 2010, it had risen to 4th lowest poverty rate.

In the Twin Cities MSA, 16.2 percent of households make less than $25,000 per year, according to 2015 American Community Survey data, which is below the Federal household poverty level for a family of four. The Twin Cities MSA has a lower than average poverty level at 10.3 percent, unchanged since 2012.

The average poverty rate among peer regions (excluding the Twin Cities MSA) is 14.23 percent of people below the poverty.

Factors Affecting Workforce & Employment Statistics

The Twin Cities MSA ranks first among peers for female participation in the workforce, at 81.4 percent, and is well above the peer average of 73.34 percent of women participation in the workforce.

From 1970 to 1990, the percent of women in the workforce grew dramatically, bringing new workers to the workforce and creating new trips and new transportation system demand during traditional commuting times. From 1990 to 2015, the female participation rate has remained the same or dipped slightly and is no longer a large factor in increased travel demand. The Twin Cities MSA ranks first among peers for female participation in the workforce, at 81.4 percent, and is well above the peer average of 73.34 percent of women participation in the workforce.

How the Region Moves: Multimodal Transportation

How are the residents of the Twin Cities moving? And how has that changed?

The most comprehensive source of local data on transportation in the region comes from the Travel Behavior Inventory (TBI). The TBI is a battery of surveys conducted roughly every 10 years since 1949. Current TBI data is from 2010.

Between the 2000 and 2010 TBI surveys, the region added one light rail transit (LRT) line and one commuter rail line. Between 2000 and 2010, transit ridership increased by 18 percent. Total roadway lane miles in the Twin Cities region increased by 11.9 percent. Increases in both transit ridership and roadway lane mile expansion outpaced the increase in population growth, which was just under 8 percent.

Between 2000 and 2010, transit ridership increased by 18 percent.

While the road system was expanding, the actual number of trips and the trips per person by all modes were down in 2010. For instance, the total number of car trips decreased from 7.7 million in 2000 to 6.3 million in 2010. This was a marked change from previous decades, when increases in trips and trips per person increased significantly. In keeping with previous results, the vast number of trips were in a private vehicle (85 percent). Alternate modes of transportation accounted for 11.2 percent of trips, which has increased from 9.4 percent of trips in 2000.

Alternate modes of transportation accounted for 11.2 percent of trips, which has increased from 9.4 percent of trips in 2000.

While the total number of trips decreased for many modes between 2000 and 2010, the following is true of the relative proportion of all trips by mode:

- Transit trips increased by 25 percent as a percentage of all trips.
- Driving with a passenger increased by 4 percent as a percentage of all trips.
- Riding a bicycle increased by 13 percent as a percentage of all trips.
- Walking increased by 16 percent as a percentage of all trips.

Figure 2-16 depicts trips by mode in 2010.

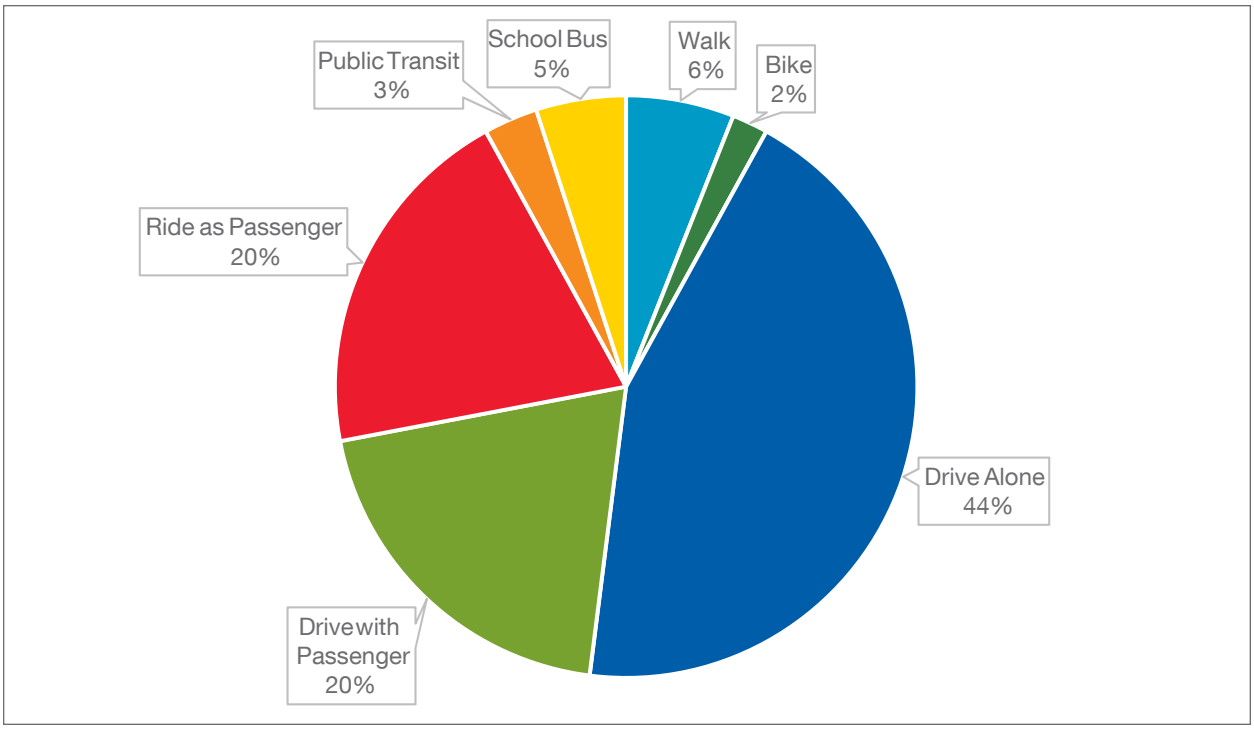

Figure 2-16: Trips by Mode

Travel Statistics

Daily Trips

Through recent decades, **Figure 2-17** shows daily trips were increasing. The rate of increase accelerated between 1980 and 2000, putting more demand on the transportation system. The 2010 TBI shows a marked difference – trips are down for the first time since the start of the TBI.

Additionally, falling for the first time in recent decades, the daily trips per capita went from 4.2 in 2000 to 3.1 in 2010 (see **Figure 2-18**). The increase in unemployment is one major explanation for fewer daily trips.

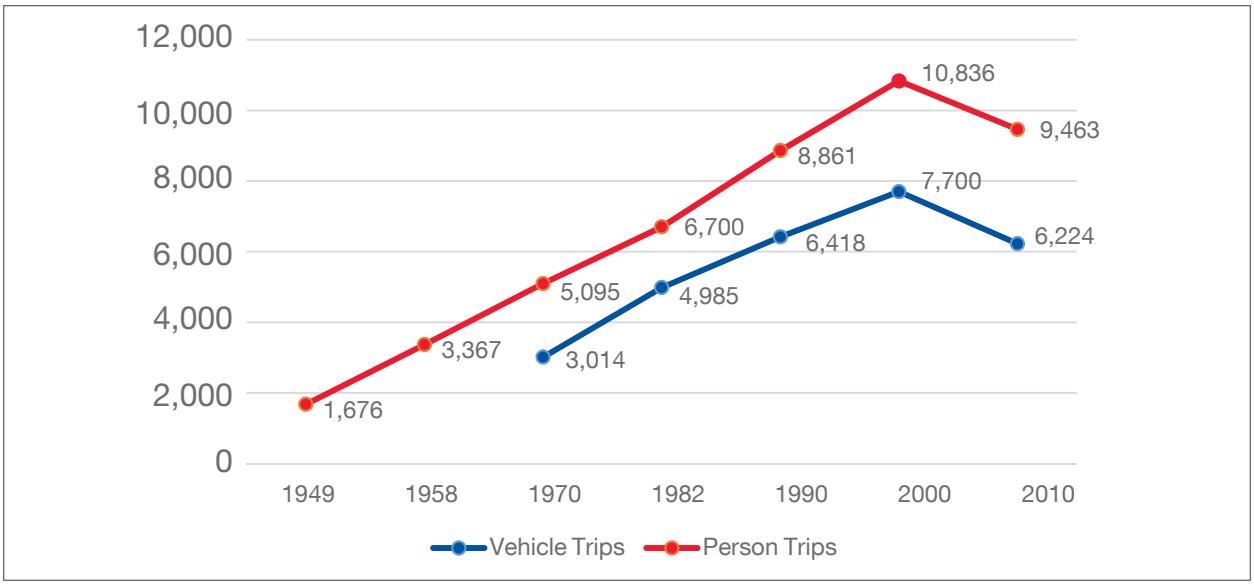

Figure 2-17: Trends in Daily Trips

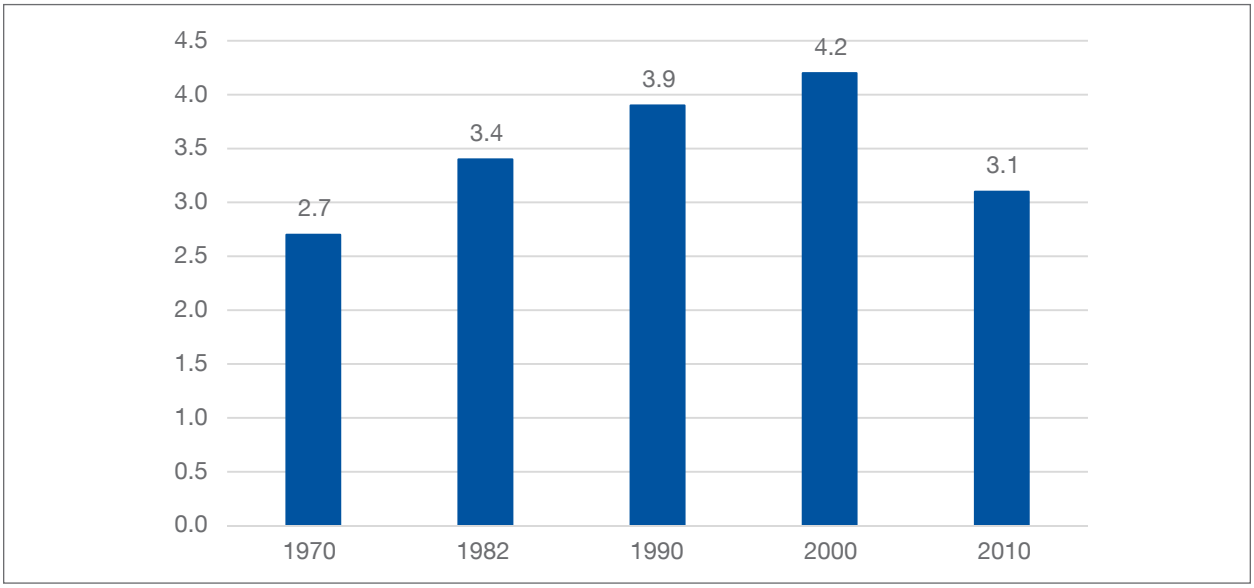

Figure 2-18: Daily Motorized Trips per Capita

Crashes

The total number of crashes within the Twin Cities region decreased during the recession, but **Figure 2-19** shows they increased between 2012 and 2015. The five-year rolling average number of crashes was approximately 44,770 crashes per year for the 2011-15 period, up by 2.3 percent compared to the 2006-10 five-year period.

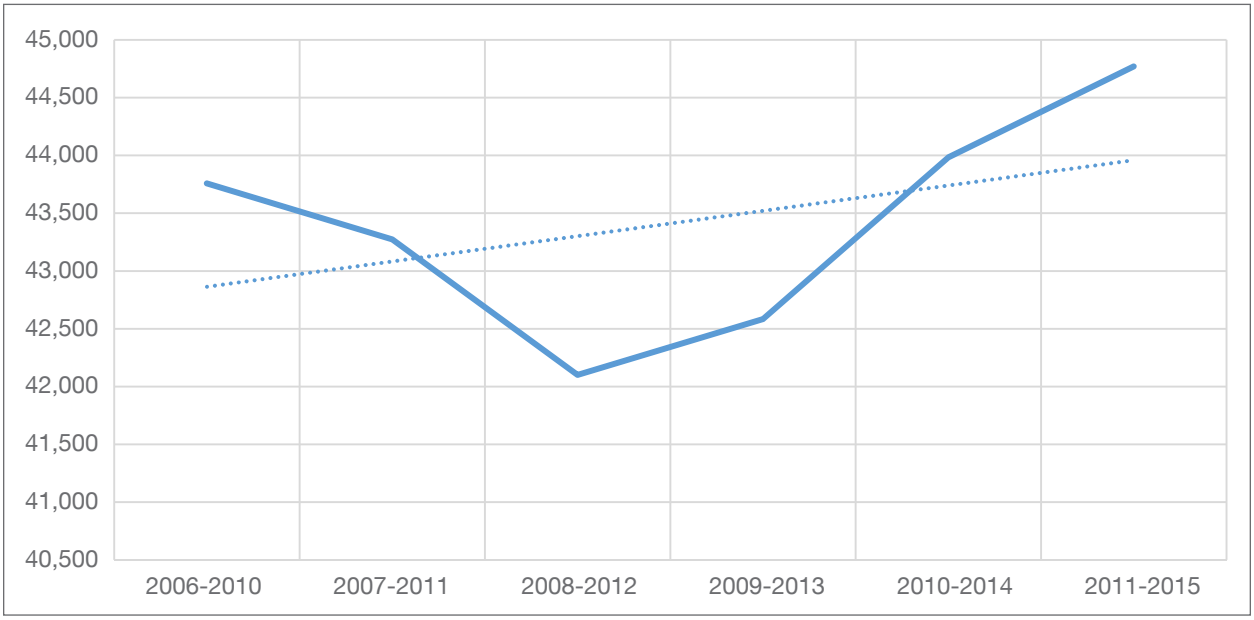

Figure 2-19: Annual Number of Crashes (Five-Year Rolling Average), With Linear Trend Line

Serious Injuries and Fatalities

Although the total number of crashes within the Twin Cities region has increased in recent years, the total number of fatalities and serious injuries have steadily decreased as shown in **Figure 2-20**. The five-year rolling average number of serious injuries was approximately 486 serious injuries per year for the 2011-15 period, down by 20.5 percent compared to the 2006-10 five-year period. The five-year rolling average number of fatalities was approximately 104 fatalities per year for the 2011-15 period, down by 22.7 percent compared to the 2006-10 five-year period.

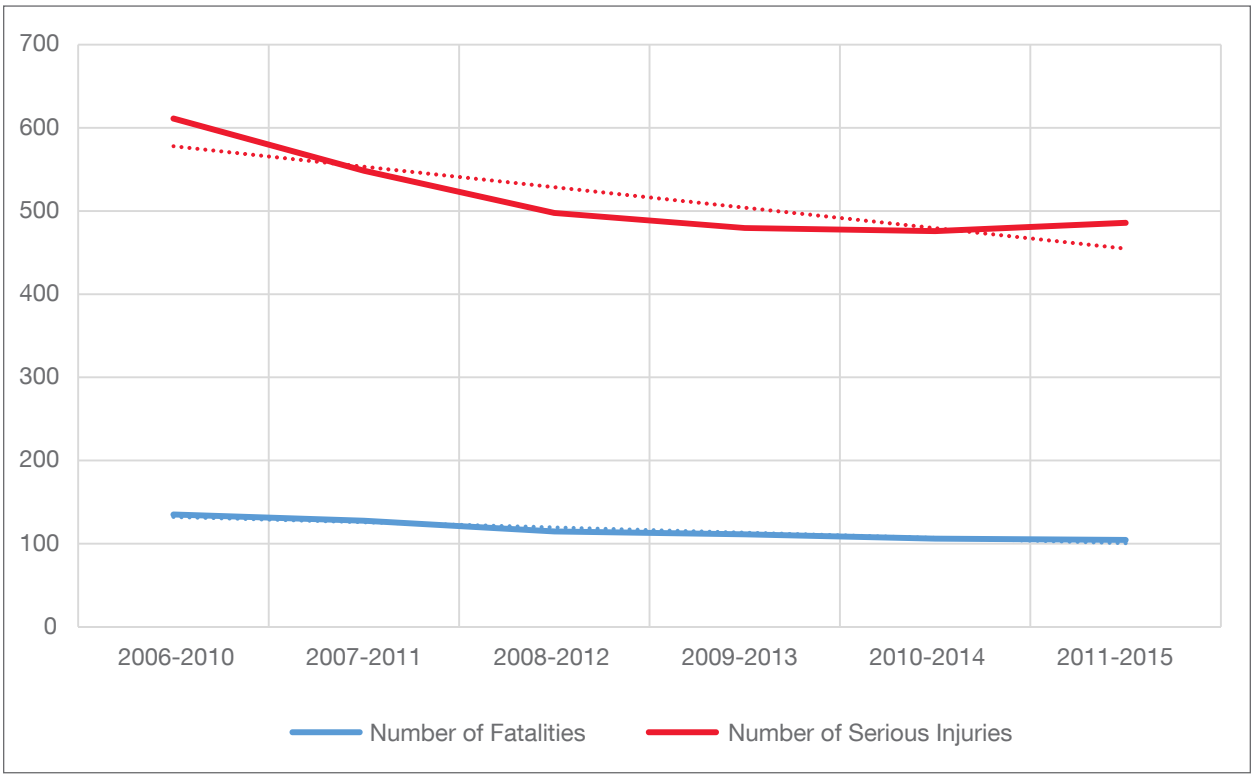

Figure 2-20: Total Number of Fatalities and Serious Injuries (Five-Year Rolling Average), With Linear Trend Lines

Vehicle Miles Traveled Per Person

According to the 2010 TBI, the number of vehicle miles traveled and the number of trips per person decreased between 2000 and 2010. More information is available in the highway chapter.

Vehicle Occupancy Trends

Vehicle occupancy rates for work trips have continued to drop to levels of nearly one person per vehicle.

Overall vehicle-occupancy rates had been dropping in past decades, from a high of 1.57 persons in 1960 to 1.29 in 2010. There was a slight increase from 1990 to 2000, however, 2010 returned to 1990 levels of occupancy. Vehicle occupancy rates for work trips have continued to drop to levels of nearly one person per vehicle. **Figure 2-21** depicts trends in vehicle occupancy since 1949.

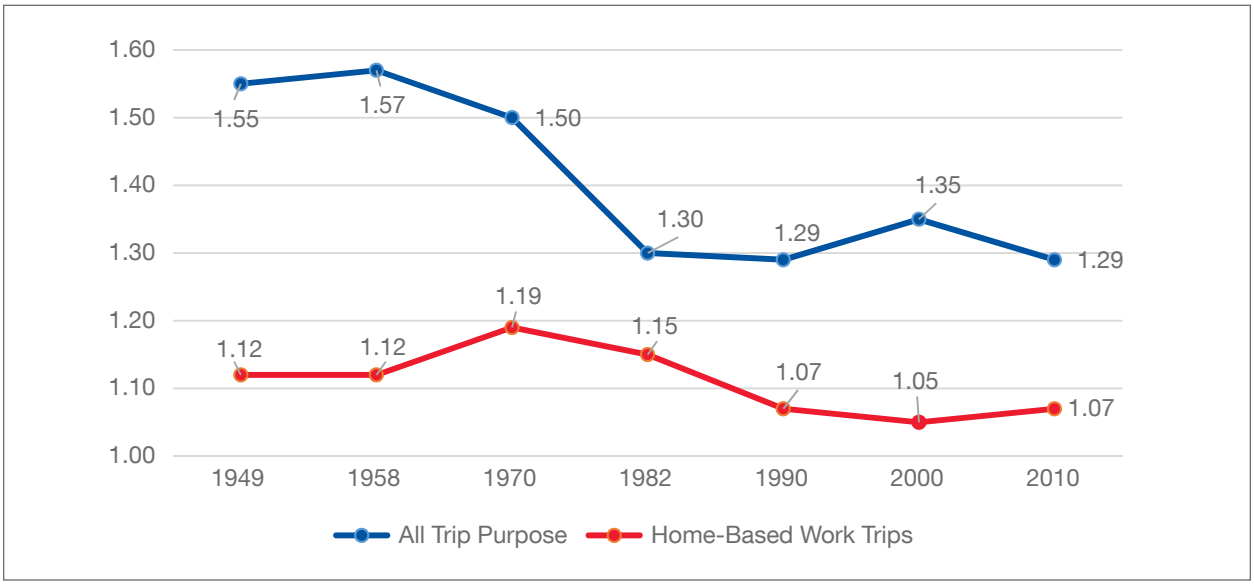

Figure 2-21: Trends in Vehicle Occupancy

Travel Time per Trip

Travel time for the home-based work trip and for all trip purposes continues to increase.

Travel time for the home-based work trip and for all trip purposes continues to increase. The TBI found that the commute trip lengthened from an average of 21 minutes in 1990, to 24 minutes in 2000, and an average of 27 minutes in 2010. Commuting to work accounts for 18 percent of regional travel, and almost 90 percent of regional commute trips are made by car. According to American Community Survey data, the average commute time in the Twin Cities MSA in 2015 was 25.1 minutes.

The average duration of trips for all purposes increased from 15.8 minutes in 1990 to 17 minutes in 2000 to 21 minutes in 2010. **Figure 2-22** depicts the changes in average travel time.

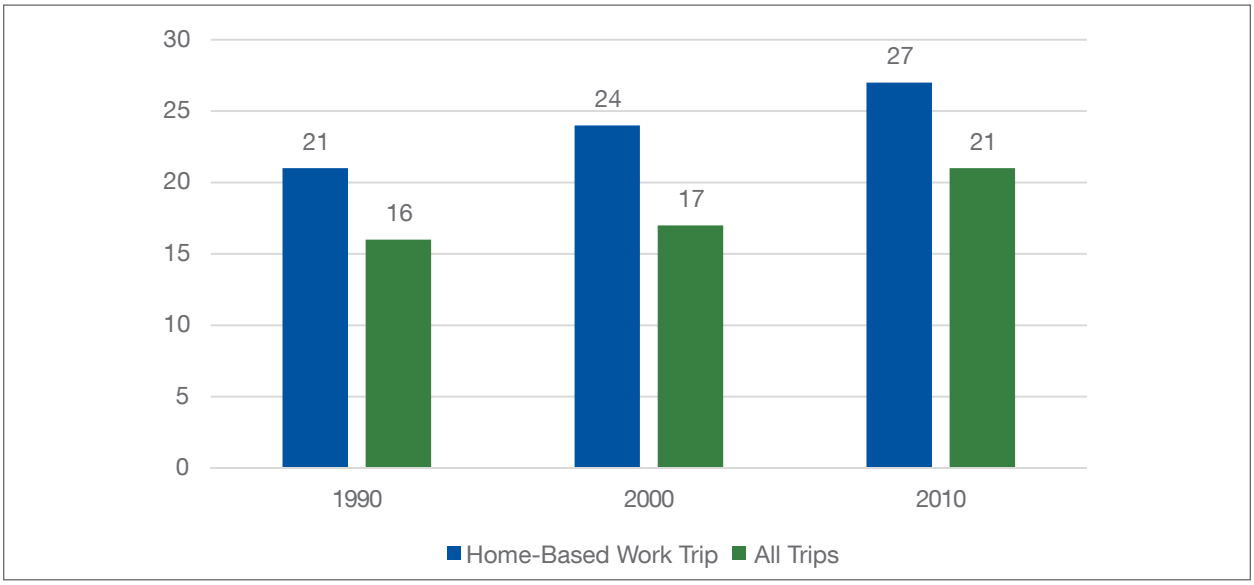

Figure 2-22: Average Travel Time

Length of Trip

The average commutof vehicle trips has also increased over time. Between 1970 and 2000, the average length of a trip increased from 6.7 miles to 7.9 miles, an increase of almost 18 percent. Length of trip is not available yet from the 2010 TBI. The 2000 TBI forecasted the length of trip to modestly increase through 2020.

Reliability Index

The Reliability Index measure serves as a proxy for congestion, and represents the total travel time that should be planned for a trip to be late for only one work trip per month (1 out of 20 days). A higher Reliability Index indicates a greater level of congestion. According to 2014 data from the Texas Transportation Institute, the Freeway Planning Time Index in 2014 for the Twin Cities region was 2.72 for automobiles, ranked 20th among urban areas evaluated. An index of 2.72 means that for one work trip per month, the total travel time will exceed 2.72 times what it takes to make the same trip in light traffic.

Contributing Factors to Travel Behavior Changes

Two major factors influencing travel behavior are the cost of gasoline and the impacts of economic downturns on local employment levels.

Since 2013, average gas prices have declined to prices between $2.00 and $3.00 per gallon, similar to prices seen in 2007.

The price of gasoline went through a period of extreme volatility. In mid-2005, the cost of a gallon of regular gas was hovering around $2. Three years later, in mid-2008 gas prices were peaking at $4 per gallon followed by a precipitous drop in late 2008/early 2009 to under $2 per gallon. This was followed by gradual climb to levels in 2012 and 2013 of $3.00 to $4.00 per gallon. Since 2013, average gas prices have declined to prices between $2.00 and $3.00 per gallon, similar to prices seen in 2007.

Employment levels in the Twin Cities region went through a period of significant decline in the past several years; the employment in the region in 2010 was the lowest it had been in more than a decade. Regional employment has since rebounded since 2010.

The changes to these two parameters resulted in significant changes in travel behavior. Not only did the economic slump result in fewer jobs (thus fewer trips to and from work), but also prompted concerns around job security and personal income. This resulted in households typically reducing their discretionary spending (less spent on shopping, entertainment, etc.). These changes also resulted in fewer trips, and shorter trips (to reduce gasoline use). It also encouraged the conversion from auto to transit trips.

Chapter 3: The Highway System

Characteristics of the Regional Highway System

The Twin Cities region has nearly 17,000 miles of roadways. The region uses a four-class system to designate the function of its roads — principal arterials, minor arterials, collectors, and local streets.

Infrastructure

Roadways

The Twin Cities region has nearly 17,000 miles of roadways as shown in **Figure 3-1**. The Functional Classification of a roadway describes its role within the hierarchy of roadways according to its primary function— for example, mobility for through trips or access to adjacent lands. The region uses a four-class system to designate the function of its roads — principal arterials, minor arterials, collectors, and local streets.

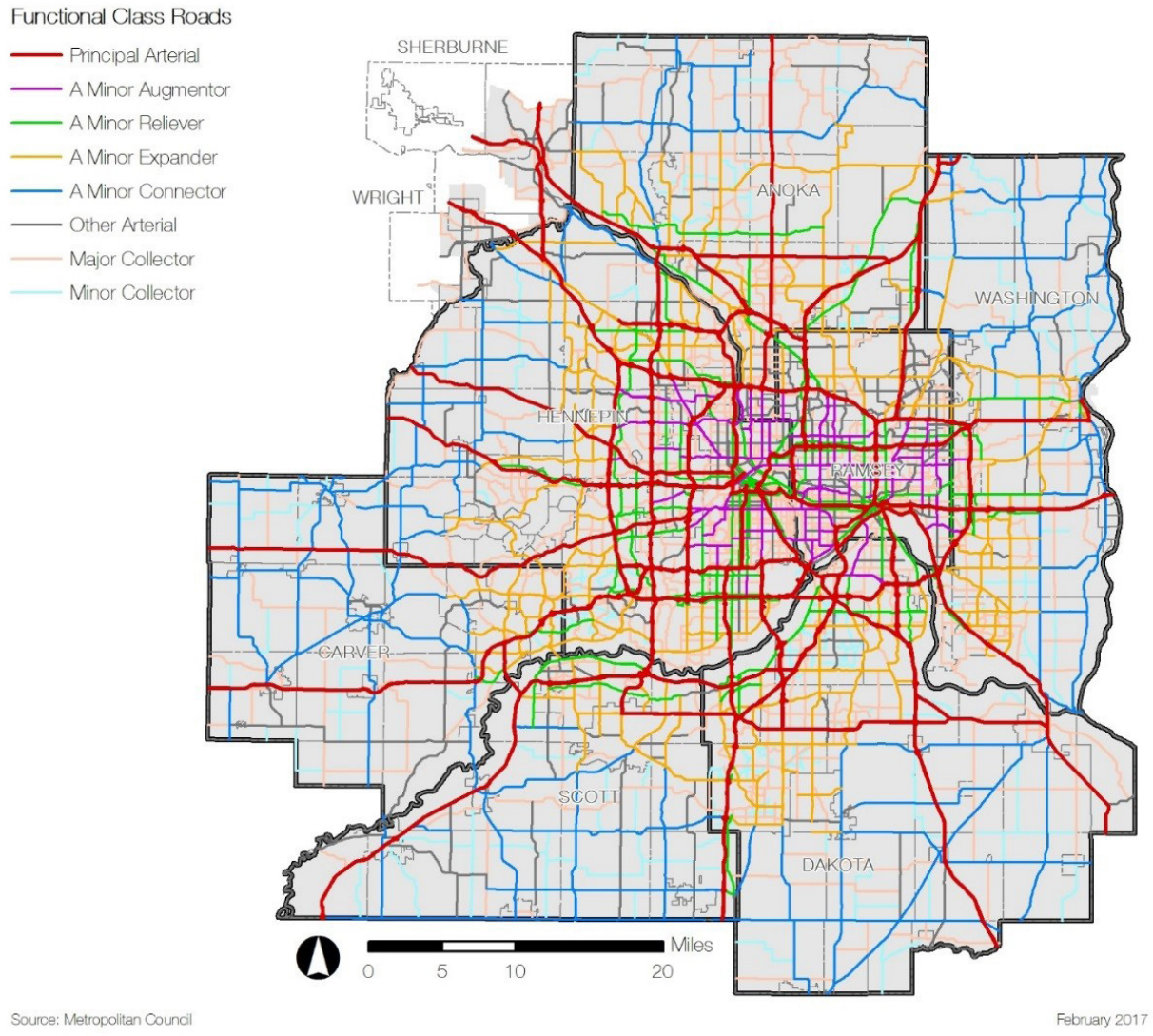

Figure 3-1: Roadway Functional Classification

Principal Arterials – Principal arterials are the high-capacity highways that make up the Metropolitan Highway System. The emphasis of principal arterials is on moving large volumes of traffic over long distances rather than providing direct access to land. They connect the region with other areas in the state, the nation, and the world. Principal arterials also connect regional concentrations and freight terminals within the metropolitan area. Principal arterials should support the longest trips in the region, including intercity bus, express bus, and highway bus rapid transit services. These are primarily the interstate and state trunk highway system, although some county highways are also included in the principal arterial system. There are approximately 700 miles of principal arterials within the region.

The emphasis of principal arterials is on moving large volumes of traffic over long distances rather than providing direct access to land.

Minor Arterials – These are highways and streets within the Twin Cities region that are not principal arterials but perform a regionally significant role in the transportation system. The minor arterial system supplements the principal arterial system and provides connections to the principal arterial system. Minor arterials also support access to major traffic generators, including regional job concentrations and freight terminals, and between rural centers within and just outside the region. Minor arterials should serve medium-to-short trips, including arterial bus rapid transit, limited-stop bus, and local bus service.

The Minor Arterial System Supplements The Principal Arterial System And Provides Connections To The Principal Arterial System.

Within the seven-county area, not including Wright and Sherburne counties, the Metropolitan Council and its local partners have chosen to identify a subset of the most regionally significant minor arterials and designate them as the A-Minor Arterial System.

Within the seven-county area, not including Wright and Sherburne counties, the Metropolitan Council and its local partners have chosen to identify a subset of the most regionally significant minor arterials and designate them as the A-Minor Arterial System. The region has further classified its A-minor arterials into the following groups:

- **Augmentors** – Minor arterials that supplement the principal arterial system in more densely developed or redeveloping areas. These roads are located within Thrive MSP 2040-designated urban center and urban communities. The principal arterial network in these communities is in place, not changing significantly, and the community development density warrants the additional multimodal capacity and connectivity that Augmentors provide. There are approximately 200 miles of Augmentors in the seven-county region.
- **Connectors** – These roads provide safe, direct connections between rural centers and to principal arterials in rural areas without adding continuous general purpose lane capacity. They are located within Thrive MSP 2040-defined rural communities. One end may be outside the seven county area or may be in the urban service area. There are approximately 680 miles of Connectors in the seven-county region.
- **Expanders** – Minor arterials that supplement the principal arterial system in less densely developed or redeveloping areas. They are located within Thrive MSP 2040-designated urban, suburban, suburban edge, and emerging suburban edge communities. There are approximately 650 miles of Expanders in the seven-county region.
- **Relievers** – These roads provide supplementary capacity for congested, parallel principal arterials. They are in the Thrive MSP 2040-defined urban service area (urban center, urban, suburban, suburban edge, and emerging suburban edge communities). There are approximately 400 miles of Relievers in the seven-county region.

To differentiate from the A-minor arterial system, the Council refers to all minor arterials in Wright and Sherburne counties as “other minor arterials”. The Council also uses the phrase “other minor arterials” to refer to minor arterials within the seven-county area that are not on the A-minor arterial system.

To differentiate from the A-minor arterial system, the Council refers to all minor arterials in Wright and Sherburne counties as “other minor arterials”.

Collector Roads – Mobility and land access are equally important on the collector road system. The collector system provides connections between neighborhoods and from neighborhoods to regional job concentrations and local centers. It also provides supplementary connections between major traffic generators within regional job concentrations. Direct land access should primarily be to development concentrations. Collectors typically serve short trips of one to four miles, including local bus service. The Federal Highway Administration requires road authorities to distinguish between major and minor collectors. Major collectors serve higher density residential areas (often penetrating residential neighborhoods for significant distances), job and activity centers and freight terminals that are not on the arterial system, and they serve longer local trips, including local bus service. Minor collectors serve shorter local trips and lower density land uses (often penetrating residential neighborhoods only for a short distance). There are approximately 1,850 miles of major and minor collector streets within the region.

The collector system provides connections between neighborhoods and from neighborhoods to regional job concentrations and local centers.

Local Roads – Local roads connect blocks and land parcels, and the primary emphasis is on land access. In most cases, local roads connect to other local roads and collectors. Local roads serve short trips at low speeds, including trips made by foot, bicycle, and occasionally local bus service. There are approximately 12,000 miles of local streets within the region.

Local Roads Serve Short Trips At Low Speeds, Including Trips Made By Foot, Bicycle, And Occasionally Local Bus Service.

Lane-Miles

The number of lane-miles within the Twin Cities Region increased by 3.0 percent (1,094 lane-miles) between 2010- and 2014. **Table 3-1** shows nearly all of this increase is from the addition of existing highways and roads in the parts of Wright and Sherburne counties now within the Twin Cities metropolitan area. Within the seven-county area, lane-miles increased by approximately 150 lane-miles, or 0.4 percent. The regional number of lane-miles increased at a slower rate when compared to the increase in regional population between 2010 and 2015 (3.6 percent).

Within the seven-county area, lane-miles increased by approximately 15 lane-miles, or 0.4 percent.

These slower rates of growth are in stark comparison to the 11 percent increase in lane-miles observed between 2000 and 2010.

Table 3-1: Lane-Miles by Functional Classification[3-1]

	Seven-County Region			Wright + Sherburne Portion
Functional Classification	**2000**	**2010**	**2014**	**2014**
Principal Arterial	2,866	2,949	3,048	78
Minor Arterial	5,622	6,127	6,226	87
Collector	3,579	3,984	3,820	127
Local Systems	20,598	23,328	23,443	653
Total	**32,665**	**36,388**	**36,537**	**945**

3-1 Source: Minnesota Department of Transportation

Pavement Condition

The Minnesota Department of Transportation evaluates the quality of the road pavement under its jurisdiction. This is measured in terms of the Ride Quality Index (RQI). The RQI is an indicator of pavement smoothness based on user ratings. The RQI is expressed as a number between 0 and 5 with the smaller values indicating greater pavement roughness. MnDOT classifies RQI using the following categories:

- Very Good: RQI > 4.0
- Good: RQI > 3.0
- Fair: RQI > 2.0
- Poor: RQI > 1.0
- Very Poor: RQI ≤ 1.0

MnDOT has established performance targets to maintain at least 70 percent of principal arterials and 65 percent of non-principal arterials in good or very good condition, and allow less than 2 percent of principal arterials and 3 percent of non-principal arterials to be in poor or very poor condition. Statewide, MnDOT's trunk highway system consists of approximately 12,000 centerline miles of pavement, comprised of roughly 13 percent Interstate, 40 percent Other National Highway System (NHS), and 47 percent Non-NHS.

Pavement condition for principal arterials and or non-principal arterials have not met MnDOT performance targets since 2001 and the late 1990s, respectively.

As shown in **Figures 3-2** through **3-5**, the pavement condition for both principal arterials and non-principal arterials did not meet MnDOT's performance targets in 2015. In the metropolitan region, the condition of the principal arterials met both performance targets until 2001. Since 2001, the percentage of roadways with good or better pavement condition exceeded 70 percent in only two years, 2010 and 2013. Additionally, the percentage of roadways with a poor or very poor rating has not dropped below 2 percent since 2001.

The non-principal arterials have not met pavement quality performance targets since the late 1990s. The non-principal arterials exhibit a greater and more consistent gap between the observed pavement conditions and the performance targets.

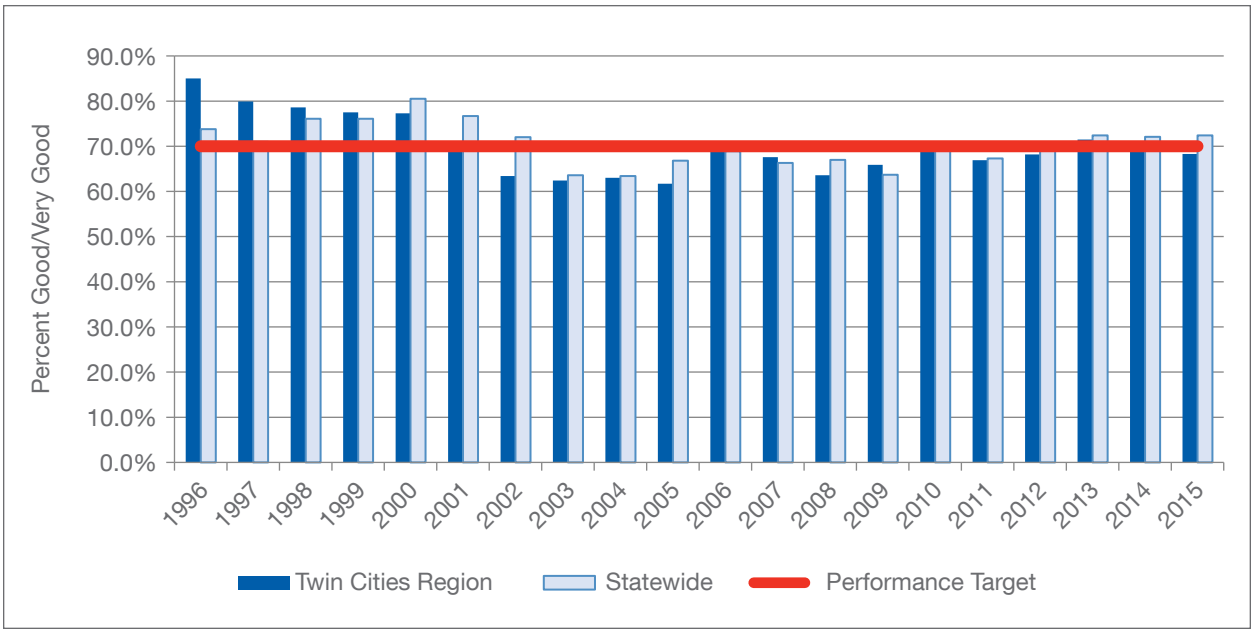

Figure 3-2: Principal Arterials - RQI in Good/Very Good Category

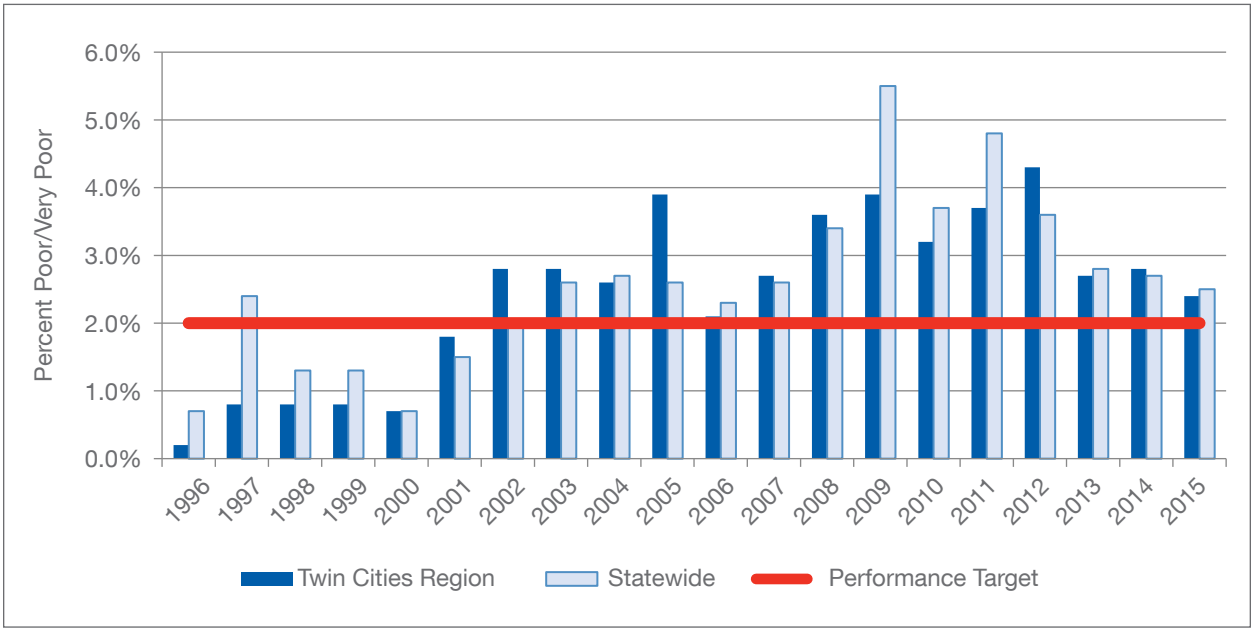

Figure 3-3: Principal Arterials - RQI in Poor/Very Poor Category

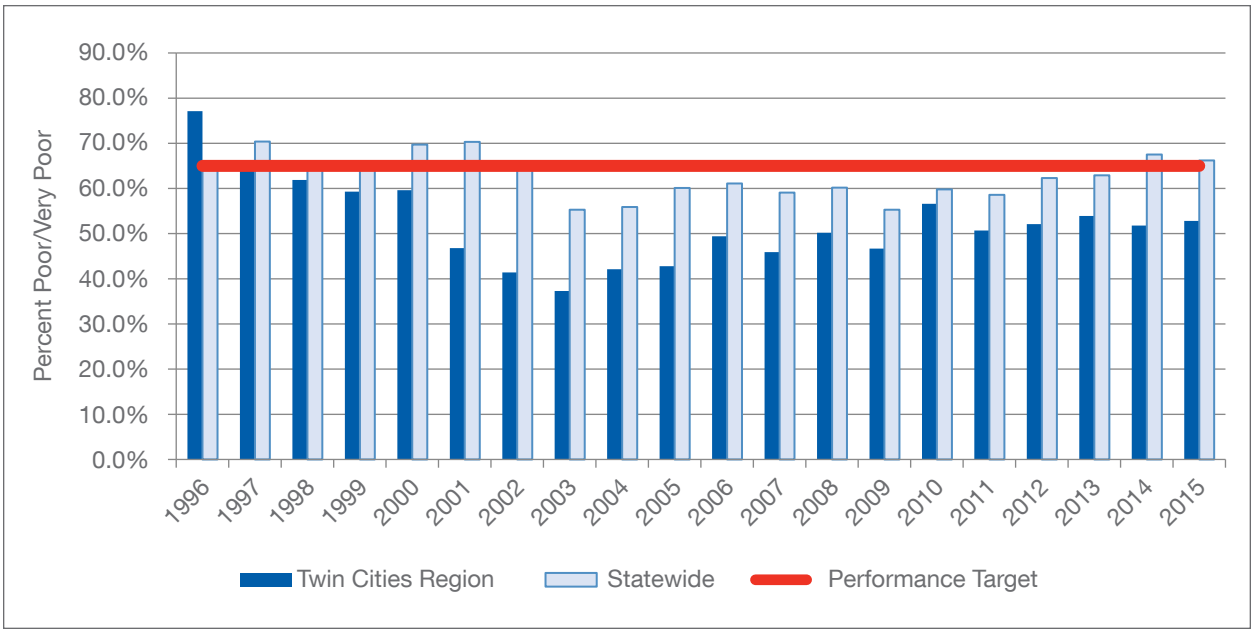

Figure 3-4: Non-Principal Arterials - RQI in Good/Very Good Category

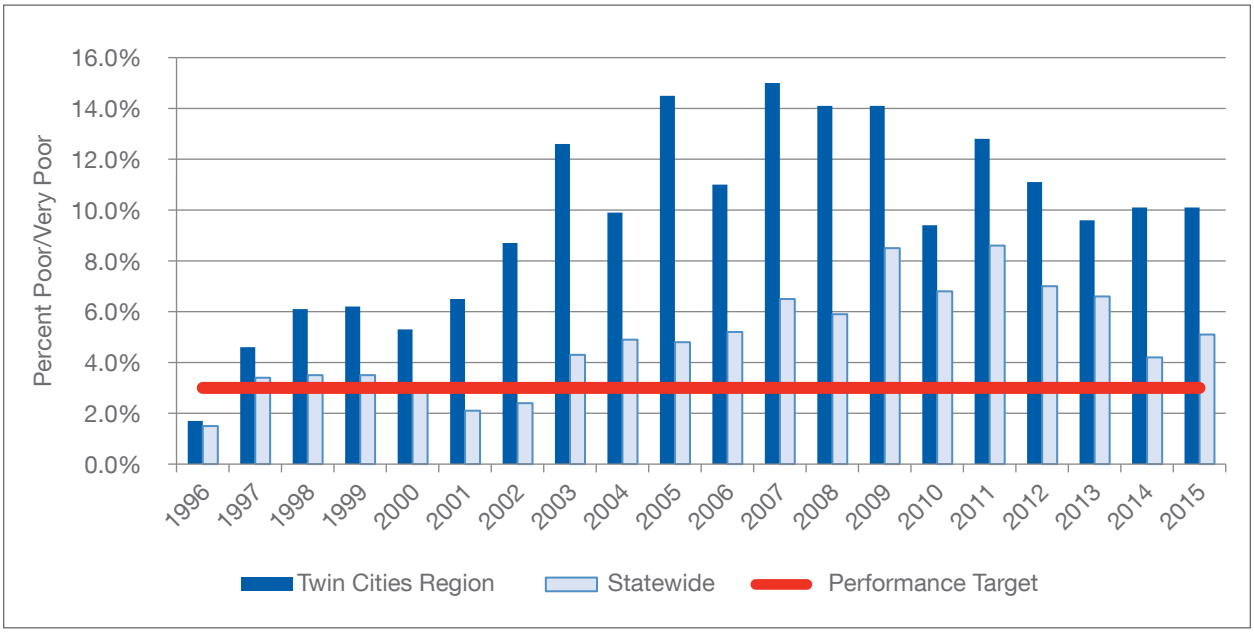

Figure 3-5: Non-Principal Arterials - RQI in Poor/Very Poor Category

Bridge Conditions

In 2008, MnDOT developed a program for the accelerated repair and replacement of trunk highway bridges throughout the state, focusing on bridges classified as either structurally deficient or fracture critical.

On August 1, 2007 the I-35W bridge over the Mississippi River in Minneapolis collapsed. In 2008, the Minnesota State Legislature enacted legislation known as the Trunk Highway Bridge Improvement Program Chapter 152. Under this program, MnDOT developed a program for the accelerated repair and replacement of trunk highway bridges throughout the state, focusing on bridges classified as either structurally deficient or fracture critical. The status of the 177 bridges listed in the 2016 annual report was as follows:

- 114 bridges substantially complete (i.e., open to traffic)
- 7 bridges will be complete in 2017
- 21 bridges scheduled to be under contract for repair or replacement in 2017-2018
- 32 bridges only need routine maintenance during the Chapter 152 program years
- 2 bridges are privately owned
- 1 bridge is closed to traffic and therefore will not receive any work under Chapter 152

Principal arterial bridges in good condition has improved since 2007, meeting the target each year except 2013. However, principal arterial bridges in poor condition did not meet MnDOT performance targets until 2015. Metropolitan Council and MnDOT should continue to monitor these trends.

MnDOT uses a measure to assess system-wide trunk highway bridge performance. The measure is the Bridge Structural Condition Rating, which is based on the National Bridge Inventory (NBI) scale from 0 to 9 and uses a combination of Condition Code and Appraisal Rating to assign a good, fair, or poor condition. MnDOT establishes performance targets for bridge condition in its statewide multimodal transportation plan, Minnesota GO.

As shown in **Figure 3-6,** the principal arterial bridge ratings for the Twin Cities region fell below the performance target for the good category in the early 2000s. Performance met targets after 2005, with the Twin Cities region's bridges meeting the performance target each year except for 2013. As shown in **Figure 3-7**, principal arterial bridges did not meet the MnDOT performance target for percent of bridges in poor condition up until 2015, when it met the performance target for the first time.

Non-principal arterial bridges have met the MnDOT performance targets every year after 2003, as shown in **Figure 3-8** and **Figure 3-9**. However, the percentage of non-principal arterial bridges in poor condition significantly increased in 2015 and this trend should be monitored by MnDOT and Metropolitan Council.

In 2015 all MnDOT performance targets for bridge condition were met for both principal and non-principal arterial bridges in the metro area, which was not the case statewide.

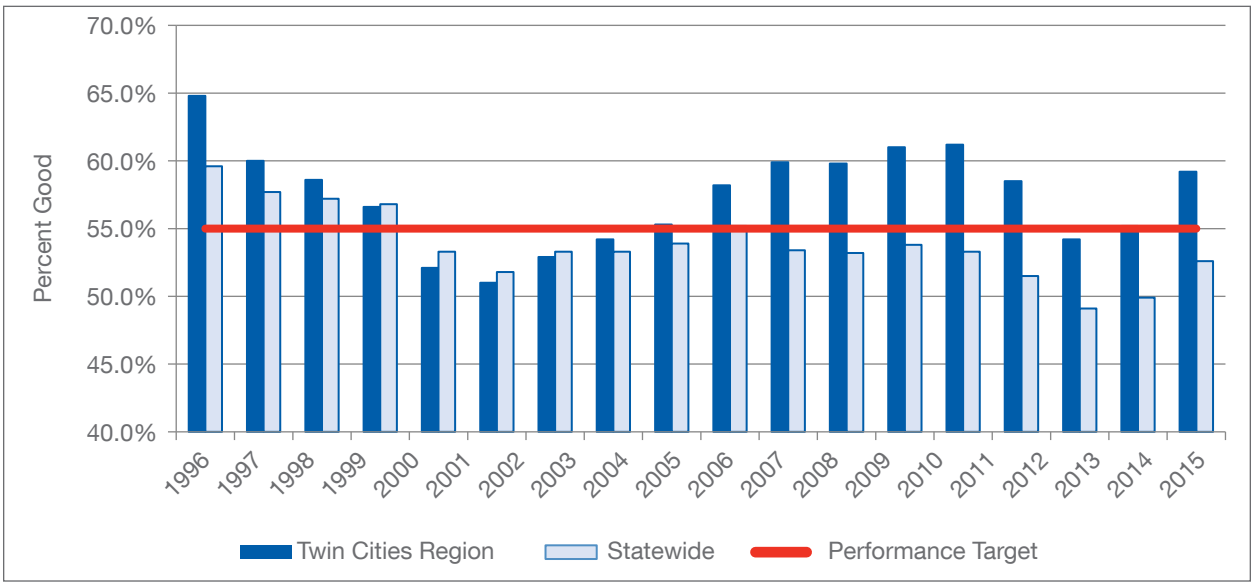

Figure 3-6: Percent Principal Arterial Bridge Area in Good Category

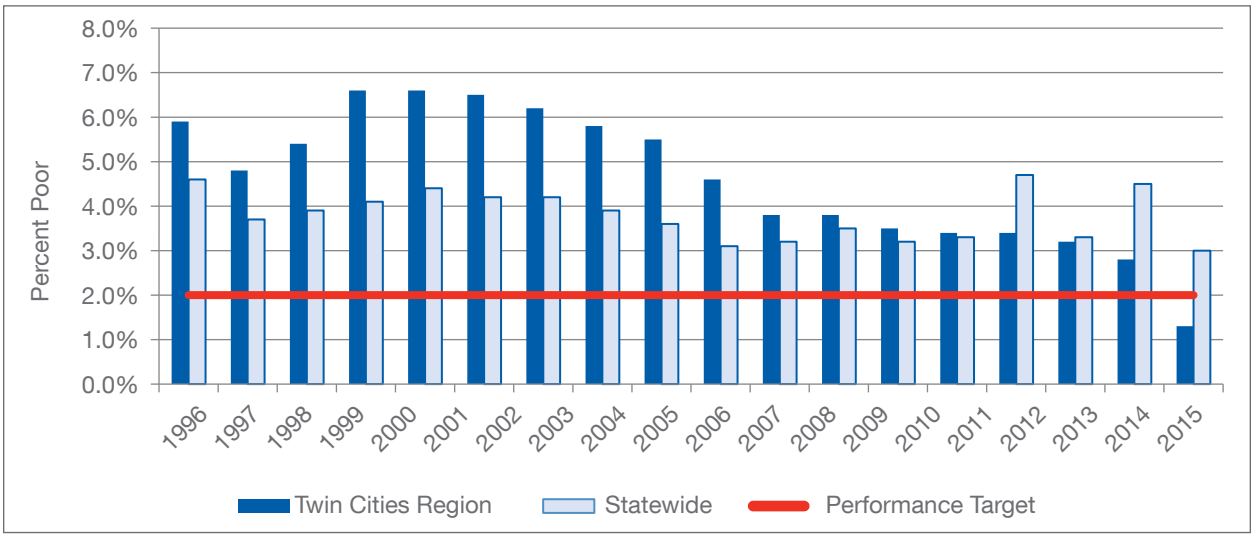

Figure 3-7: Percent Principal Arterial Bridge Area in Poor Category

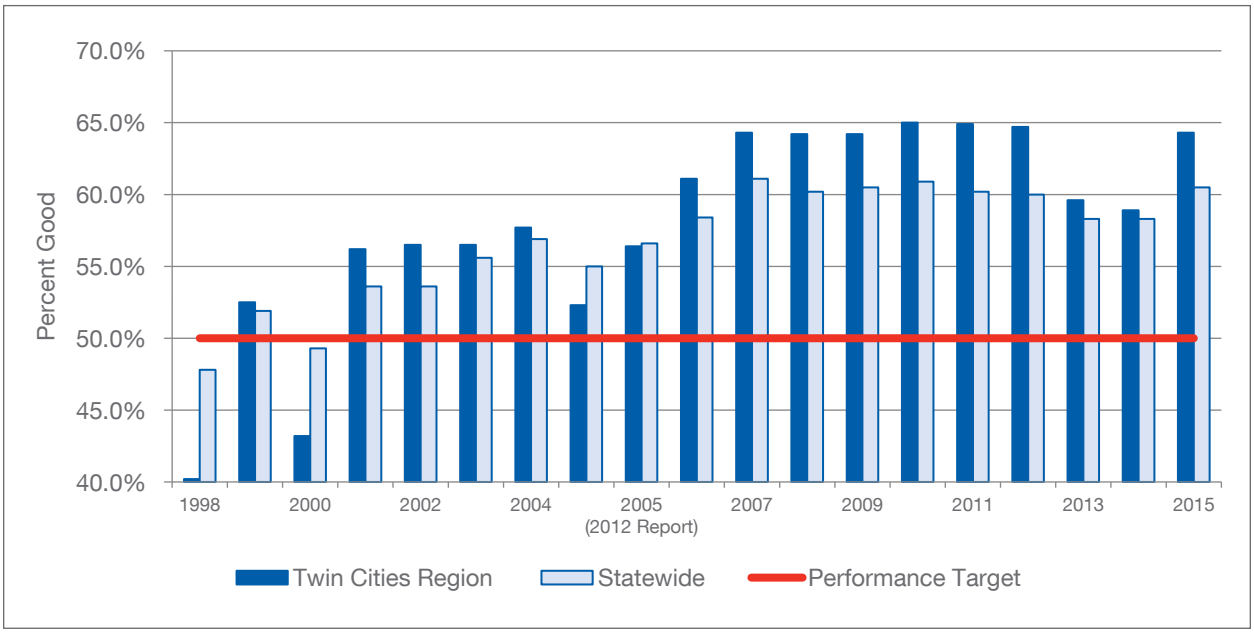

Figure 3-8: Percent Non-Principal Arterial Bridge Area in Good Category

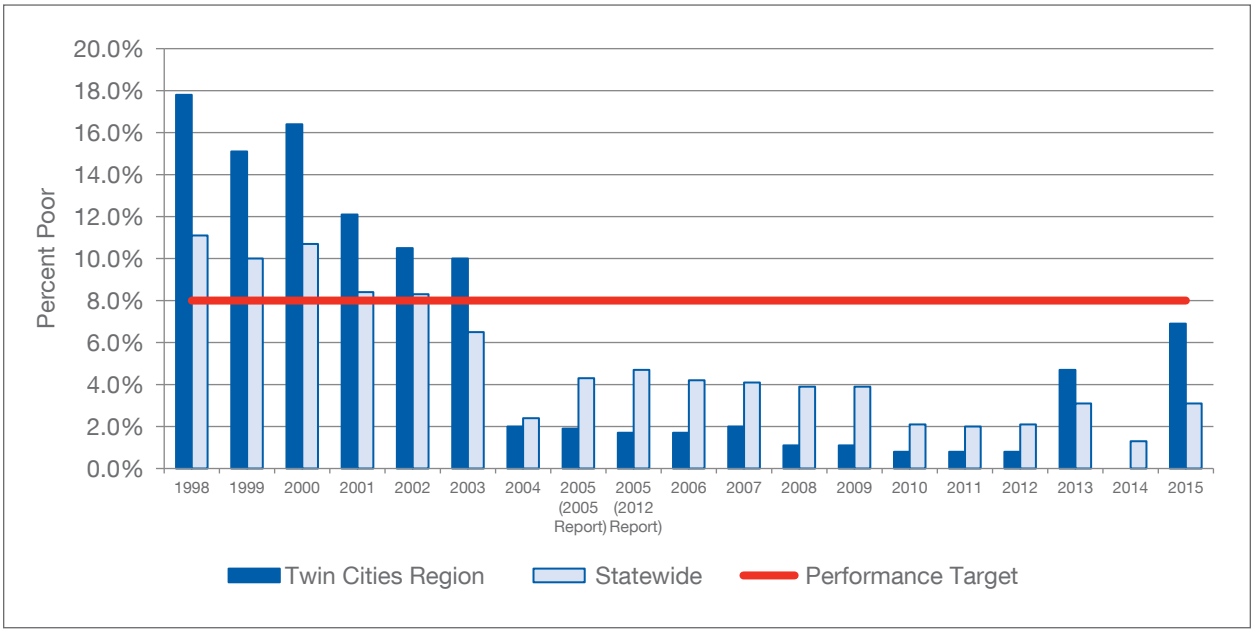

Figure 3-9: Percent Non-Principal Arterial Bridge Area in Poor Category

Operations

Vehicle-Miles Traveled

A typical measurement of road system usage is the daily vehicle-miles traveled (VMT), which is the number of miles driven by vehicles in the region.

Table 3-2 shows that nearly 50 percent of the increase in regional VMT is associated with expanding the planning area to include parts of Sherburne and Wright counties. Within the seven-county area, VMT increased by approximately 2.1 percent between 2010 and 2014.

Nearly 50 percent of the increase in regional VMT is associated with expanding the planning area to include parts of Sherburne and Wright counties.

Freeway principal arterials carry a disproportionate amount of the vehicle traffic compared to other system roads. In the Twin Cities region, freeway principal arterials comprise 5.2 percent of lane-miles but carry 41 percent of the vehicle-miles traveled.

Recent trends within the seven-county area (excluding the addition of Sherburne and Wright Counties) have shown an increase in vehicle-miles traveled on principal arterials, minor arterials, and local systems, and a slight decrease on collector roadways.

As shown in **Figure 3-10**, data from the Texas Transportation Institute, which tracks historical VMT across the nation's metropolitan regions, shows that freeway and arterial roadway use has increased generally consistently over the past 30 years. Both freeway and arterial roadway daily VMT decreased in 2012, but subsequently increased in 2013 and 2014. In the 14 years between 2000 and 2014, daily VMT on freeways increased nearly 12 percent, while daily VMT increased by over 21 percent on arterial streets. Total VMT increased approximately 49 percent between 1990-2000. Since 2000, VMT has increased by approximately 16 percent. Values differ slightly from the previously reported data due to the different regional boundaries assumed by Texas Transportation Institute.

Data from the Texas Transportation Institute shows that freeway and arterial roadway use has increased generally consistently over the past 30 years.

Table 3-2: Vehicle-Miles Traveled by Functional Classification[3-2]

	Seven-County Region		Wright + Sherburne Portion
Functional Classification	**2010**	**2014**	**2014**
Principal Arterial – Freeway	29,870,155	30,656,640	307,988
Principal Arterial – Other	7,835,310	8,162,947	617,759
Minor Arterial	20,991,308	21,365,000	323,859
Collector	5,416,585	5,252,757	183,113
Local Systems	8,790,957	9,017,601	234,296
Total	72,904,315	74,454,945	1,667,015
2010-2014 Percent Change		+2.1%	+2.3%

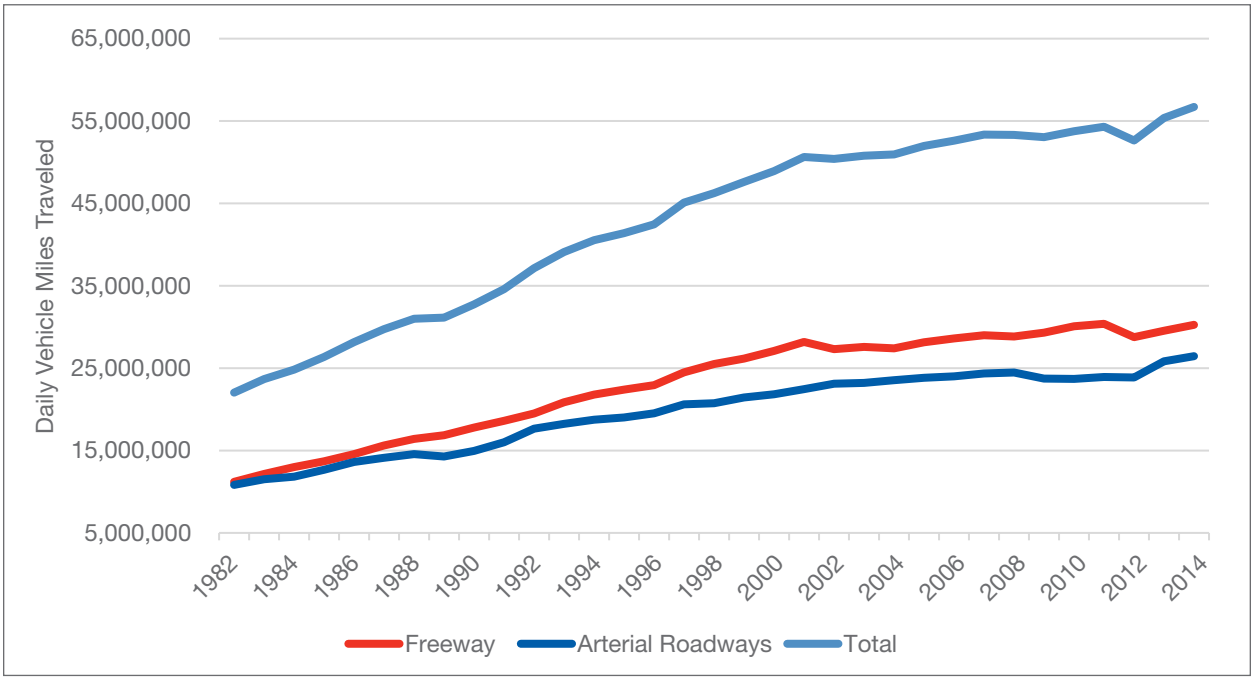

Figure 3-10: Daily Vehicle Miles Traveled – Twin Cities Region[3-3]

3-2 Source: MnDOT

3-3 Source: Texas Transportation Institute

Peak Period Travelers

Data from the Texas Transportation Institute on peak period travelers shows a generally increasing trend in peak period travel in the Twin Cities region. **Figure 3-11** shows between 1990 and 2014, the number of travelers on the roadways in the Twin Cities region during the peak period increased by about 80 percent.

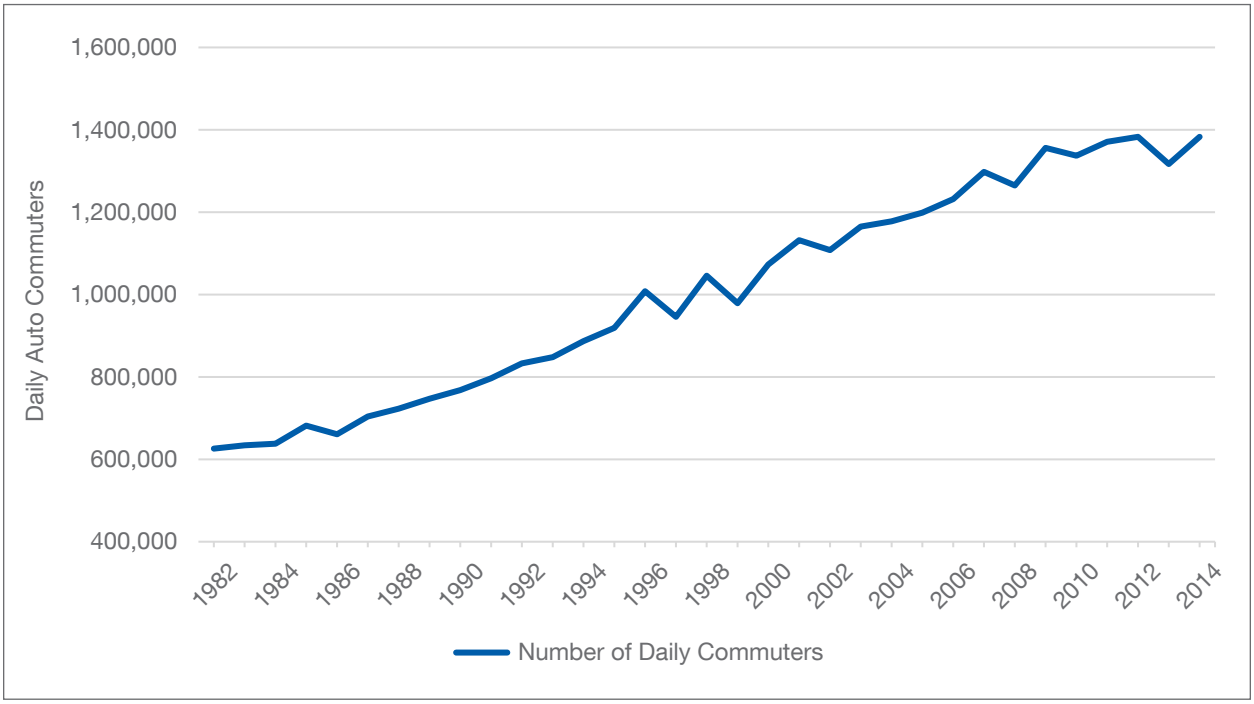

Figure 3-11: Peak Period Travelers[3-4]

3-4 Source: Texas Transportation Institute

Truck Vehicle-Miles Traveled

The Minnesota Department of Transportation maintained data on daily truck (heavy commercial) miles traveled on trunk highways through 2013, after which data collection was suspended due to a change in software and development of a replacement. **Figure 3-12** shows in the Twin Cities Region, truck VMT has followed a generally increasing trend from 2001 through 2013.

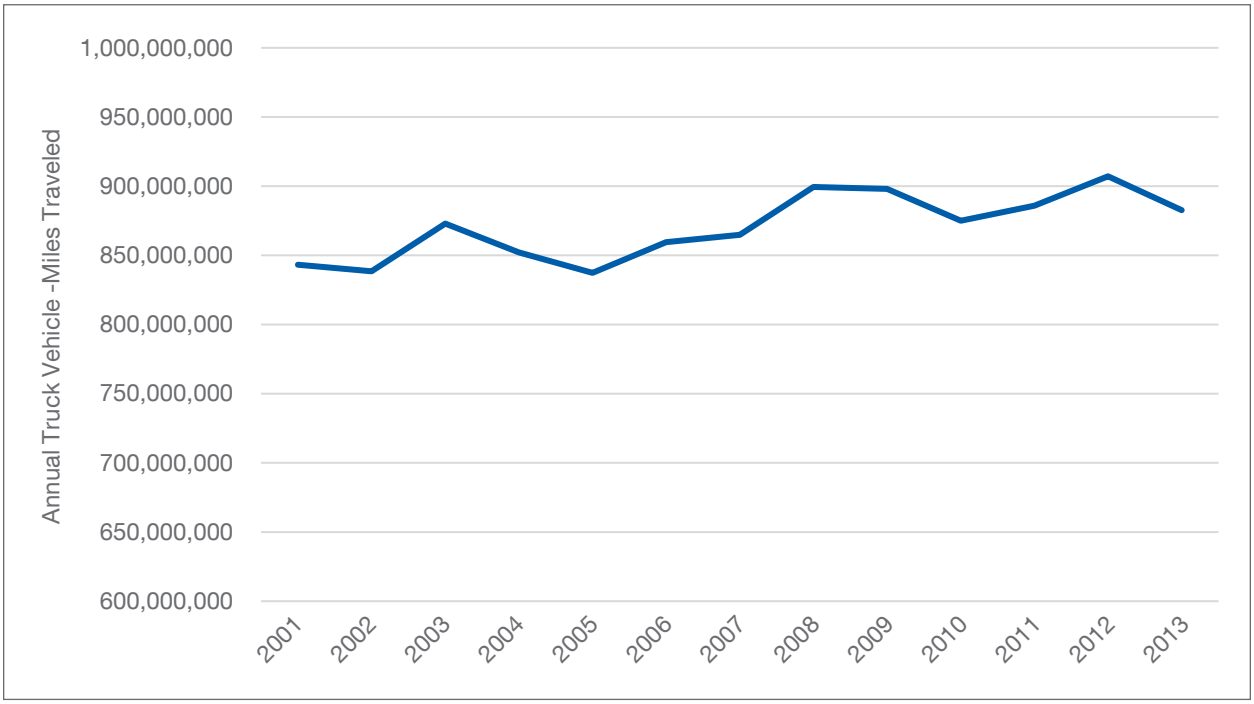

Figure 3-12: Truck Vehicle-Miles Traveled per Year

MnPASS System

Priced managed lanes provide a reliable, congestion-free travel option during rush hours for people who ride transit or in carpools, and other motorists who are willing to pay. In the Twin Cities, we call this system MnPASS. The region currently operates MnPASS lanes on Interstate 394, Interstate 35W south of downtown Minneapolis, and Interstate 35E north of downtown Saint Paul. The MnPASS lanes on I-394 extend 11 miles between I-494 in Wayzata and downtown Minneapolis. The I-394 lanes were converted from high-occupancy vehicle (HOV) lanes in 2005.The MnPASS lanes on I-35W extend 20 miles between the I-35 split in Burnsville and downtown Minneapolis. The I-35W lanes also started as HOV lanes, but were extended and converted to MnPASS lanes through a project funded by the federal Urban Partnership Agreement (UPA) program. The most recently added MnPASS lane is on I-35E. In the northbound direction, the MnPASS lane extends 9 miles between Cayuga Street in downtown St. Paul and County Road J in White Bear Lake, with a gap around the I-694 interchange area. In the southbound direction, the MnPASS lane begins at County Road 96 and provides a continuous lane through Cayuga Street. The I-35E MnPASS lane was the first in the east metro. The portion between Cayuga Street and I-694 opened in 2015, and the remaining portion between I-694 and County Road J opened in 2016.

The region currently operates MnPASS lanes on Interstate 394, Interstate 35W south of downtown Minneapolis, and Interstate 35E north of downtown Saint Paul.

Table 3-3 describes MnPASS system reliability in the Twin Cities, showing the daily share of time that each MnPASS lane maintained speeds of 45 miles per hour or greater in July, August, and September 2016.

Table 3-3: MnPASS Lane Percentage Time Uncongested (July, August, September 2016)

Road Segment	AM	PM
I-394 EB from I-494 to TH 100	94.5%	-
I-394 EB from TH 100 to Downtown MPLS	98.7%	-
I-394 WB from Downtown MPLS to TH 100	-	99.9%
I-394 WB from TH 100 to I-494	-	99.8%
I-35W NB from Burnsville to I-494	96.3%	-
I-35W NB from I-494 to Downtown MPLS	92.9%	94.4%
I-35W SB from Downtown MPLS to I-494	98.1%	98.6%
I-35W SB from I-494 to Burnsville	-	98.0%
I-35E SB from Little Canada to Cayuga St	98.7%	-
I-35E NB from Cayuga St to Little Canada	-	98.9%

MnDOT installed the first ramp meters in the Twin Cities region on I-35E in St. Paul in 1969. They now have 433 ramp meters in the Twin Cities region to manage freeways in the Twin Cities region so that they move more smoothly and maintain high average speeds throughout the system.

Ramp Metering

MnDOT installed the first ramp meters in the Twin Cities region on I-35E in St. Paul in 1969. They now have 433 ramp meters in the Twin Cities region to manage freeways in the Twin Cities region so that they move more smoothly and maintain high average speeds throughout the system. In 2000, MnDOT conducted a study of the effectiveness of the ramp meters in the region involving the shutdown of the ramp-meter system. The study reported the following summary of the annual benefits of ramp metering:

- **Traffic Volumes and Throughput:** After the meters were turned off, there was an average of a 9 percent traffic-volume reduction on freeways and no significant traffic-volume change on parallel arterials included in the study. Also during peak-traffic conditions, freeway mainline throughput declined by an average of 14 percent in the "without meters" condition.
- **Travel Time:** Without meters, the decline in travel speeds on freeway facilities more than offsets the elimination of ramp delays. This results in annual system-wide savings of 25,121 hours of travel time with meters.
- **Travel-Time Reliability:** Without ramp metering, freeway travel time is almost twice as unpredictable as with ramp metering. The ramp metering system produces an annual reduction of 2.6 million hours of unexpected delay.

- **Safety:** In the absence of metering and after accounting for seasonal variations, peak period crashes on previously metered freeways and ramps increased by 26 percent. Ramp metering results in annual savings of 1,041 crashes or approximately four crashes per day.
- **Emissions:** Ramp metering results in net annual savings of 1,160 tons of emissions.
- **Fuel Consumption:** Ramp metering results in an annual increase of 5.5 million gallons of fuel consumed. This was the only criteria category that worsened by ramp metering.
- **Benefit/Cost Analysis:** Ramp metering results in annual savings of approximately $40 million to the Twin Cities traveling public. The benefits of ramp metering out-weigh the costs by a significant margin and result in a net benefit of $32 million to $37 million per year. The benefit/cost ratio indicates that benefits are approximately five times greater than the cost of entire congestion management system and more than 15 times greater than the cost of the ramp metering system alone.

A new ramp metering algorithm was deployed system-wide following testing on Highway 100 in 2012. The mainline benefits resulting from the study on Highway 100 are summarized below; as compared to the previous ramp metering algorithm:

A new ramp metering algorithm was deployed system-wide following testing on Highway 100 in 2012.

- The new metering strategy resulted in 5.3 percent greater VMT and 9.5 percent fewer vehicle hours traveled (VHT)
- Delayed vehicle hours decreased by 48 percent
- The 95th percentile Travel Time Buffer Index decreased by 21 percent, indicating travel time reliability has increased substantially after the new metering algorithm was implemented

In addition to the Highway 100 study, MnDOT analyzed the benefits of new ramp meters on Highway 212 west of I-494 and found that delay was reduced by approximately 12 percent while VMT increased by roughly 3 percent.

Congestion

MnDOT has embedded detectors that estimate the speed of traffic to help in assessing the performance of the freeway system. As defined by MnDOT, free-flow conditions are speeds above 45 miles per hour, and speeds below 45 miles per hour are deemed congested. MnDOT calculates the share of freeway system mileage that operate at congested speeds for any length of time. Directional congestion is further defined by the number of congested hours per peak period:

- Low: < 1 Hour
- Moderate: 1 to 2 Hours
- Severe: > 3 Hours

MnDOT data shows the same trend as the Texas Transportation Institute data, with congestion increasing considerably during the 1990s and leveling off somewhat during the early 2000s.

Tracking trends in congestion over time is difficult using the MnDOT data since the data-collection methods have been altered at various points prior to 2002 and because the usage of detectors and extent of the monitored system has been expanding over time. However, MnDOT data (**Table 3-4** and **Figure 3-13**) shows the same trend as the Texas Transportation Institute VMT data (see **Figure 3-10**), with congestion increasing considerably during the 1990s and leveling off somewhat during the early 2000s. The share of freeway miles that are congested hovered between about 17 percent and 21.5 percent between 2002 and 2014, peaking at 23.4 percent in 2015.

Table 3-4: Miles of Directional Congestion (AM Plus PM)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Severe	70	83	72	83	64	82	51	55	82	73	85	99	76	115
Moderate	84	105	105	94	97	112	104	107	127	125	128	90	118	120
Low	101	106	104	101	107	111	108	114	117	121	113	114	127	120
Total[3-5]	255	293	280	277	267	305	263	276	326	319	325	302	321	354

Figures 3-14 through **3-19** show how freeway congestion has changed on the system from 1995 to 2015.

3-5 Total may not equal Severe + Moderate + Low due to rounding.

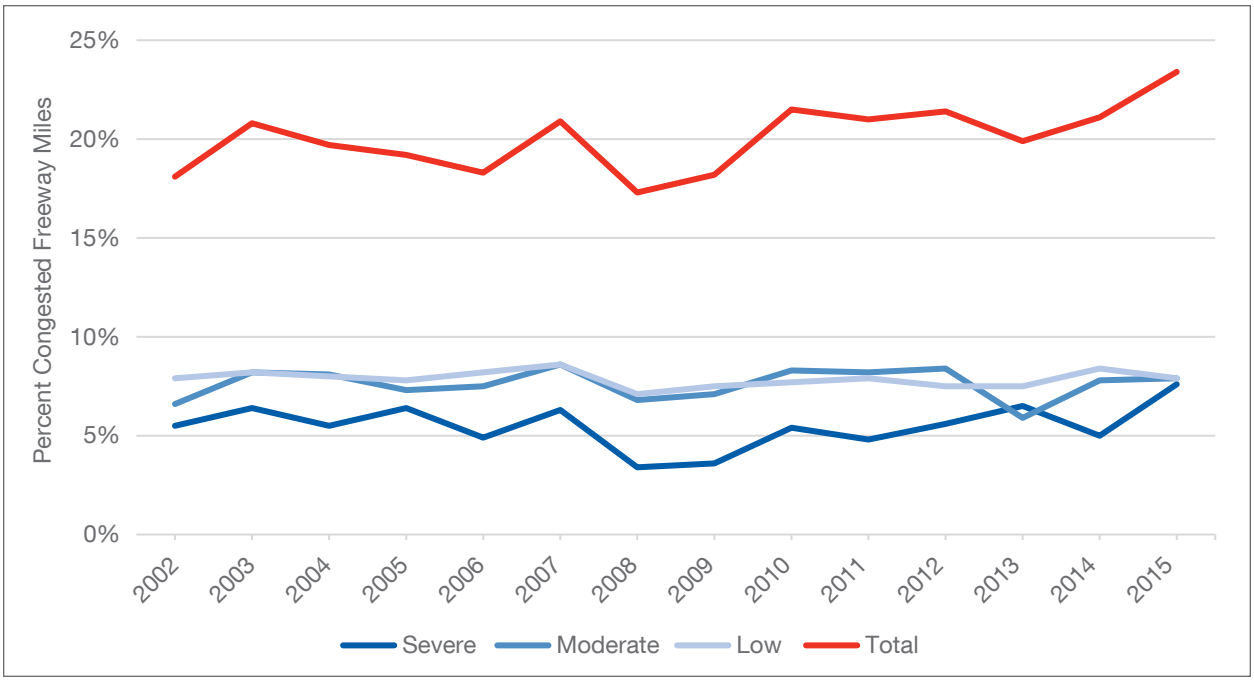

Figure 3-13: Percent of Miles of Directional Congestion (AM Plus PM)

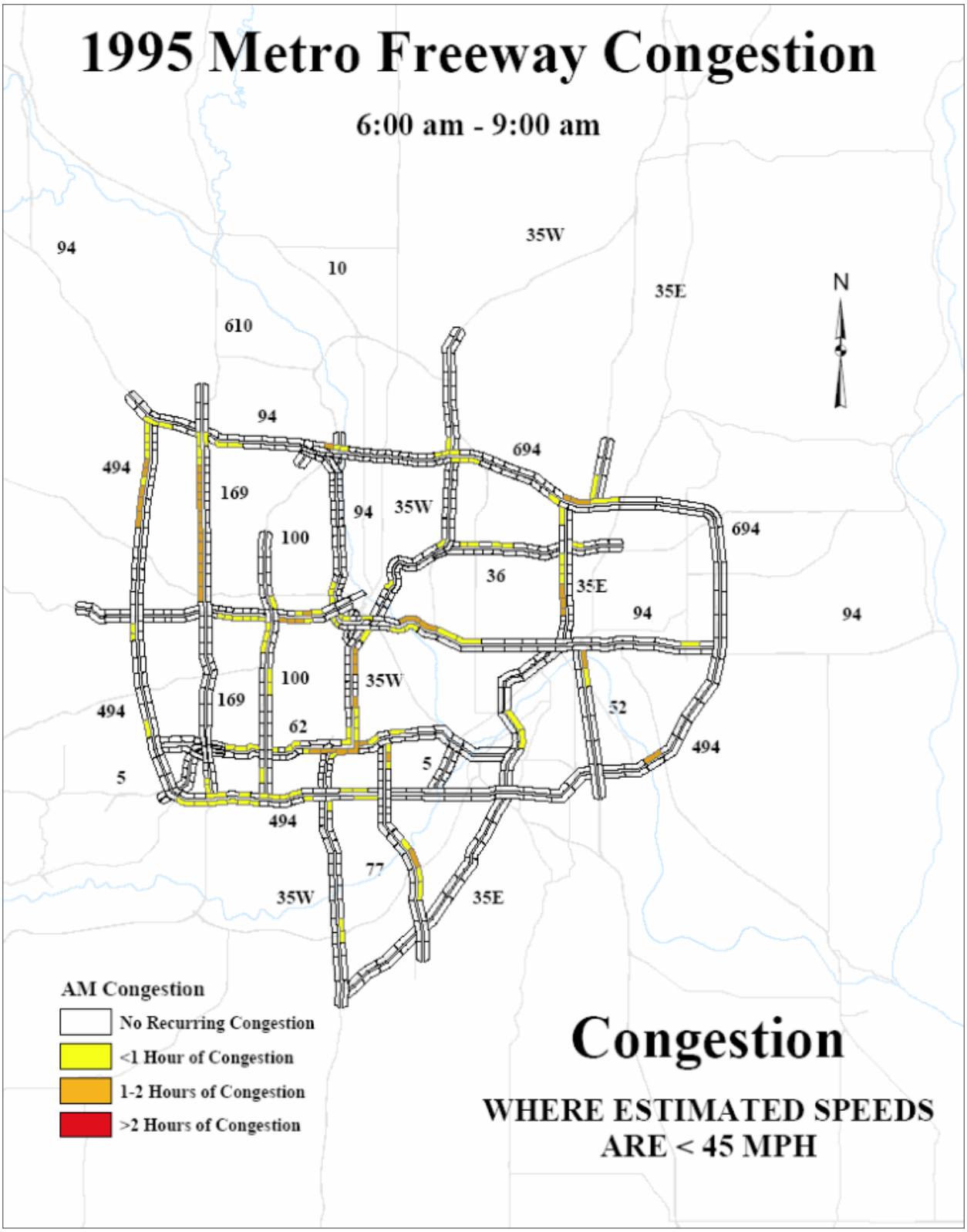

Figure 3-14: 1995 AM Congestion

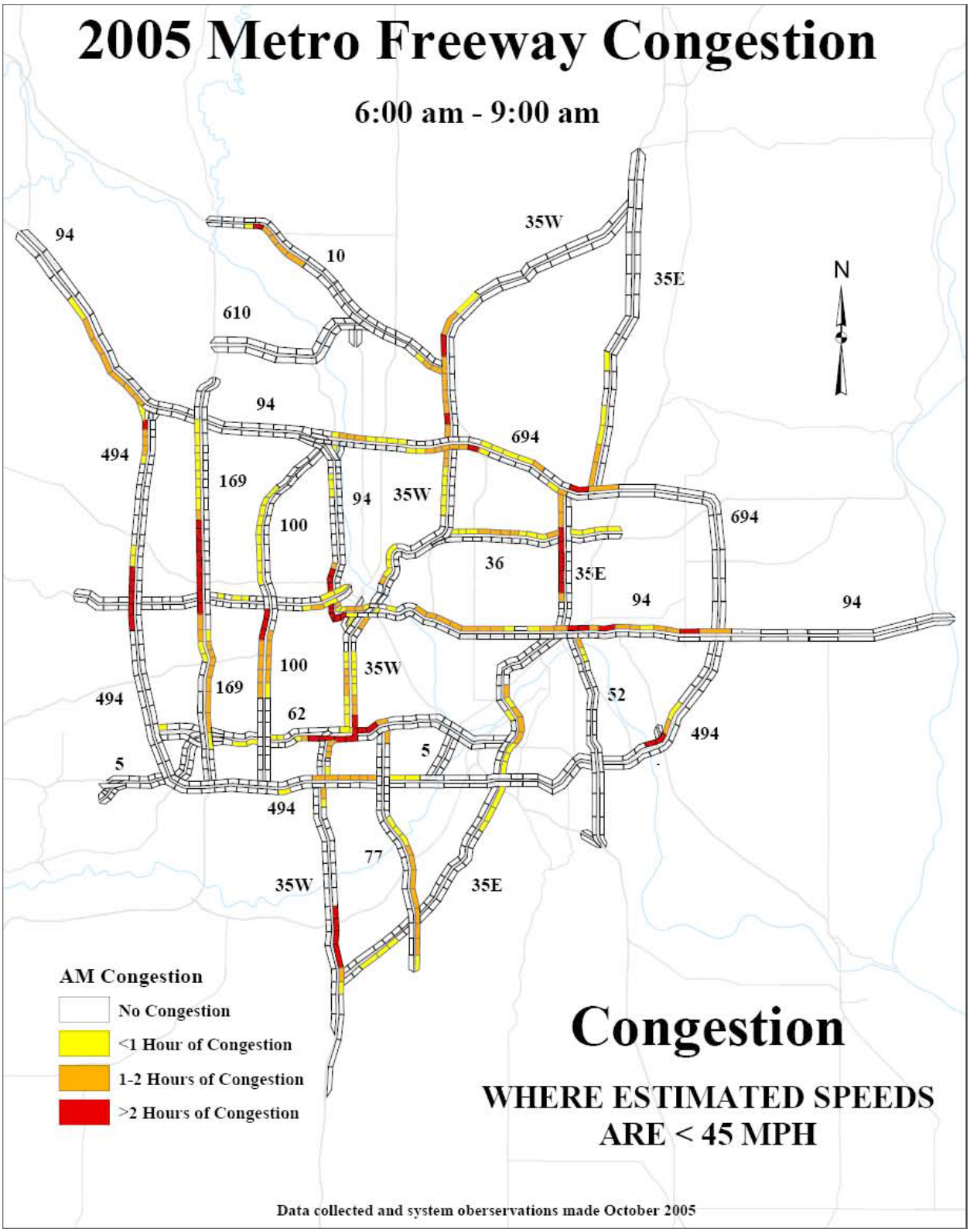

Figure 3-15: 2005 AM Congestion

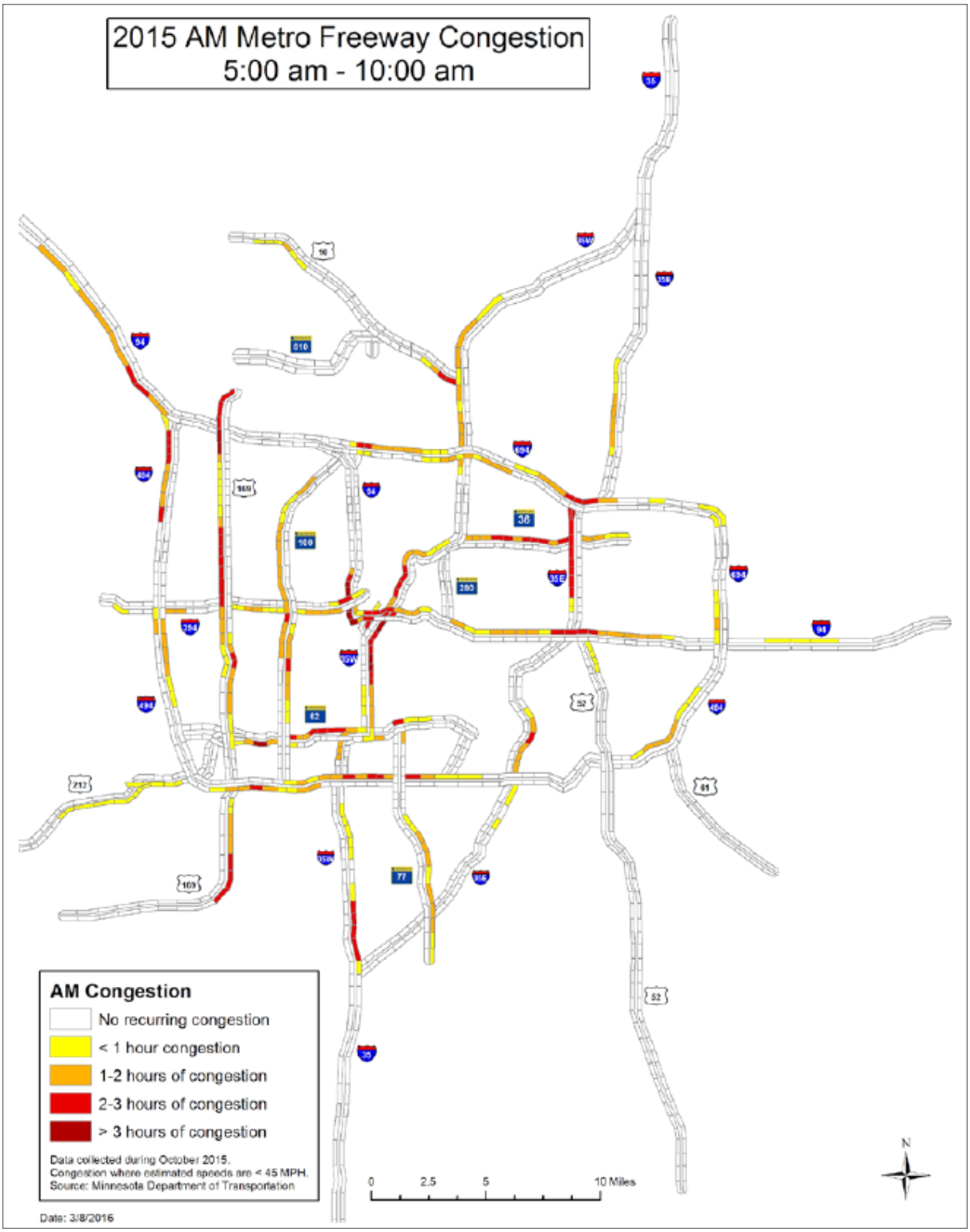

Figure 3-16: 2015 AM Congestion

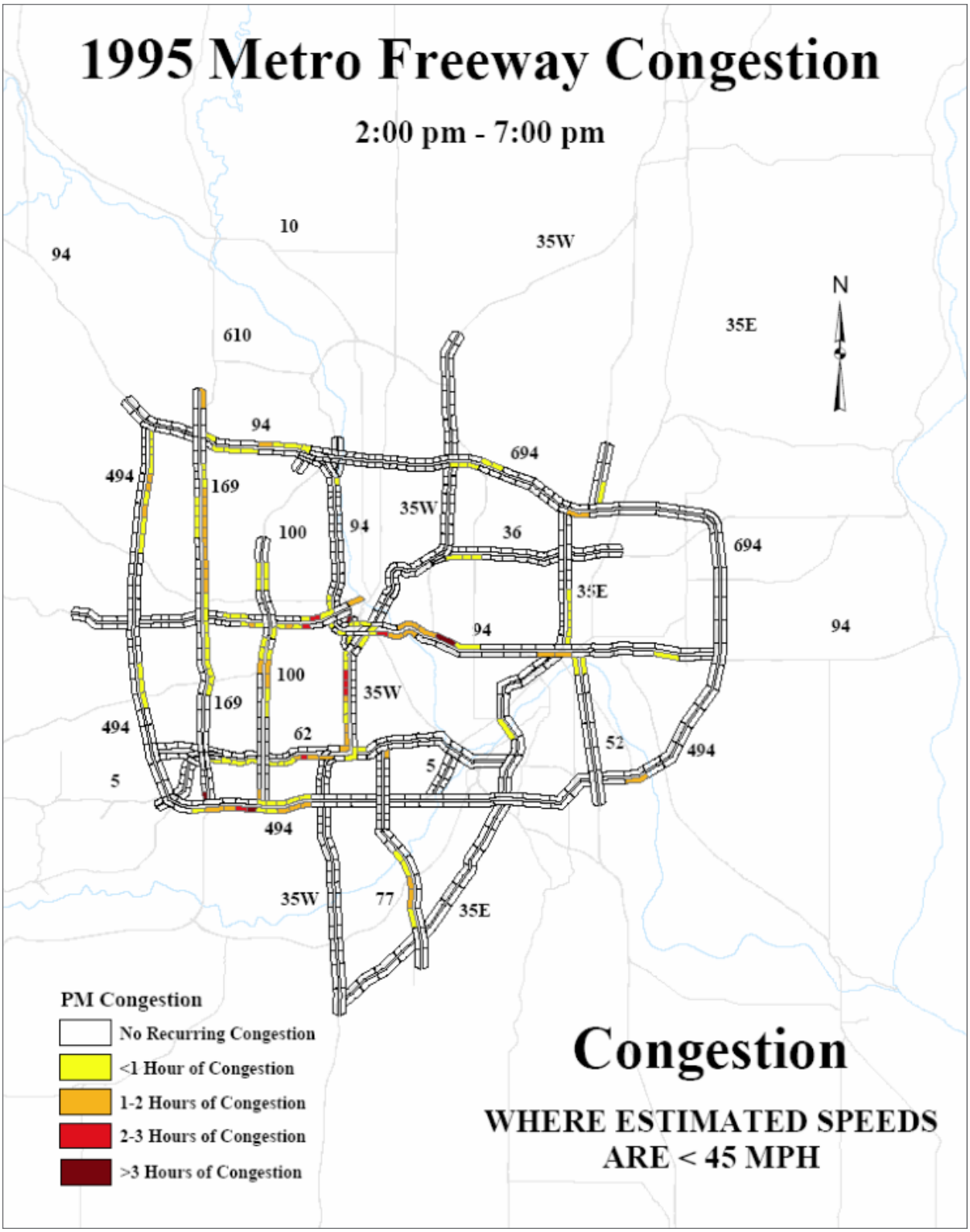

Figure 3-17: 1995 PM Congestion

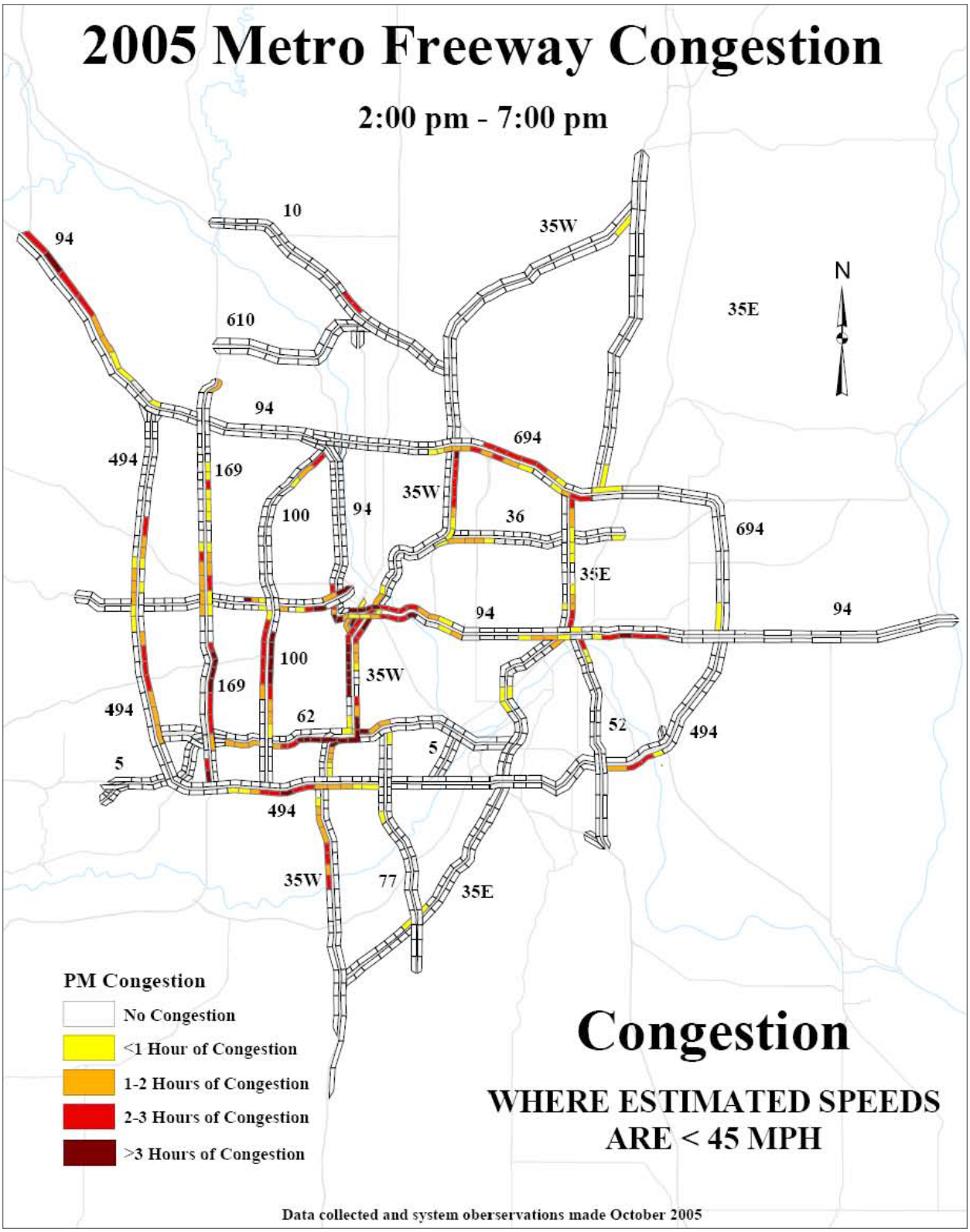

Figure 3-18: 2005 PM Congestion

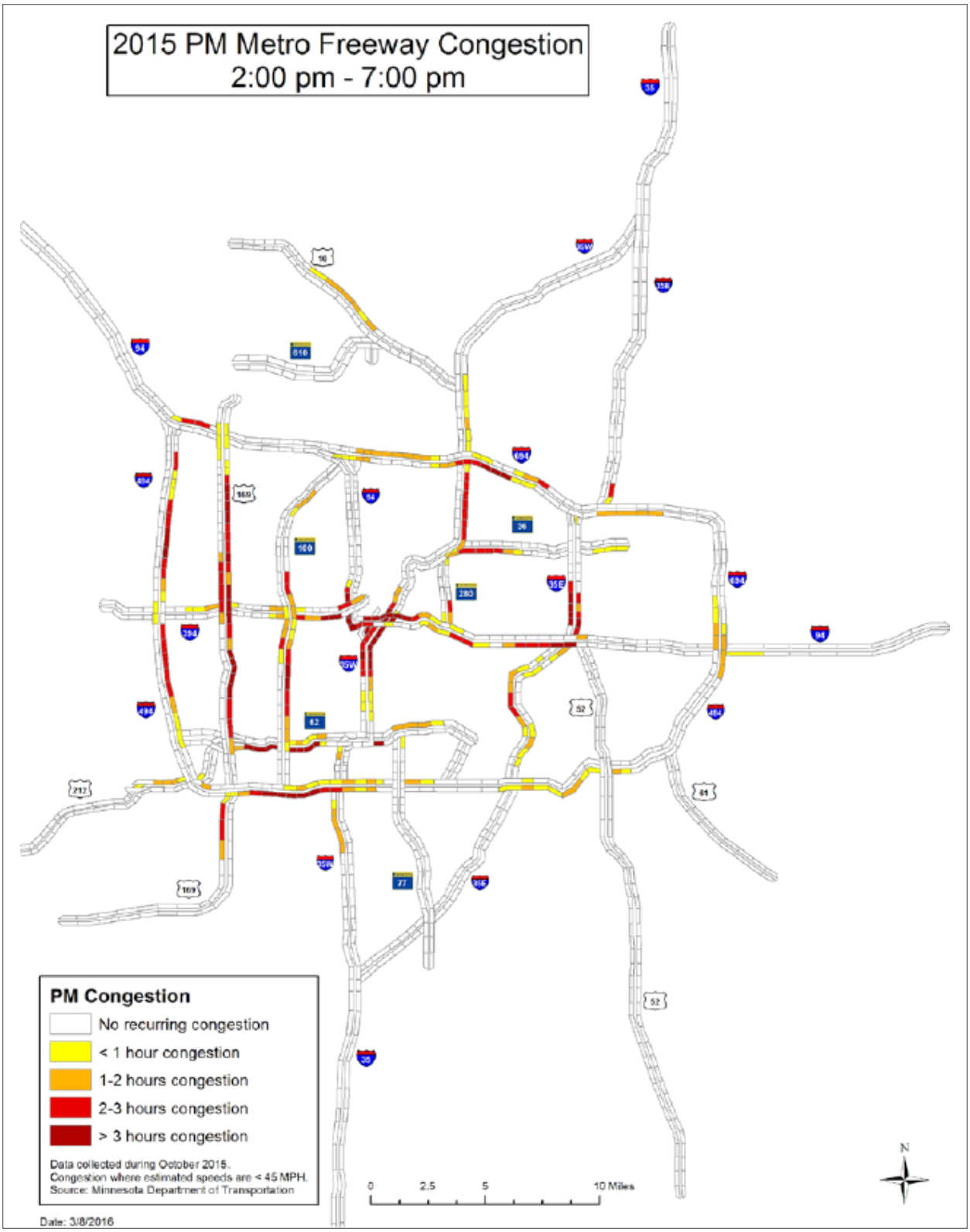

Figure 3-19: 2015 PM Congestion

Delay

In 2014, the average Twin Cities auto commuter spent 47 hours delayed in traffic throughout the year, up from 24 hours in 1990, and similar to the 48 and 42 hours in 2000 and 2010, respectively.

To the typical commuter, the amount of time spent in congestion is generally more important than the number of congested freeway miles. In 2014, the average Twin Cities auto commuter spent 47 hours delayed in traffic throughout the year based on data from Texas Transportation Institute. For comparison, in 1990 the average was 24 hours, in 2000 the average was 48 hours, and in 2010 the average was 42 hours.

Travel Time

The Travel Time Index measures the proportion of additional time that a trip takes due to congestion.

Another measure of congestion is the time it takes to make trips in congested conditions versus the time it would take in free-flow conditions. The Travel Time Index is used to assess these impacts. The Travel Time Index measures the proportion of additional time that a trip takes due to congestion. A Travel Time Index of 1.30 indicates that it takes 30 percent longer to make a trip in the peak period than in off-peak conditions, when the motorist could travel at free-flow speeds.

Figure 3-20 shows the Travel Time Index for the Twin Cities urban area was 1.26 in 2014, up slightly from 1.25 in 2010, but down slightly from 1.27 in 2000.

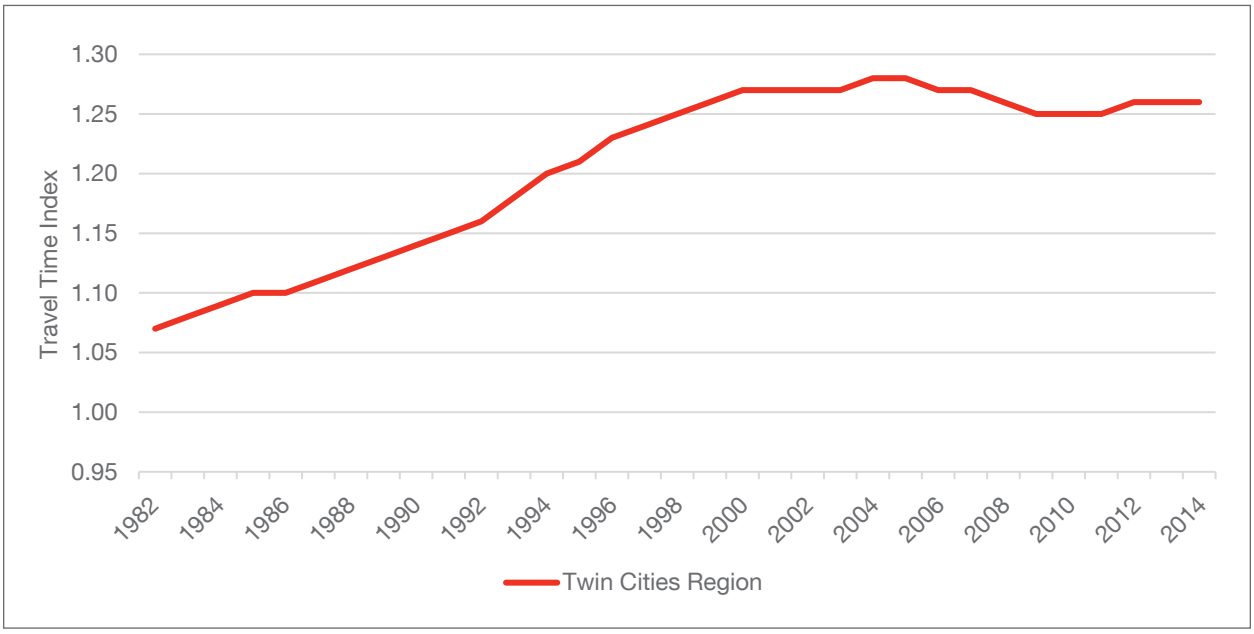

Figure 3-20: Travel Time Index in the Twin Cities Region

Peer Regions

The Texas Transportation Institute compiles data on transportation system performance for metropolitan areas throughout the United States. This data can be used to measure changes in the performance of the Twin Cities' highway system over time and provide a rough comparison with other urban areas in the United States. Texas Transportation Institute considers the Twin Cities a "large urban area, " the second-largest urban area category. In this report, the Twin Cities area is compared to the average for other large urban areas, as well as with the average for 10 identified highway peer urban areas. These peer urban areas are Baltimore, Cincinnati, Cleveland, Dallas, Denver, Milwaukee, Pittsburgh, Portland, Seattle and St. Louis. The most recent year for which the Texas Transportation Institute had available data was 2014. A map of highway peer cities is shown in **Figure 2-13**.

VMT per Person

Daily Vehicle Miles Traveled (VMT) per person, as measured by the Texas Transportation Institute, increased from 16 in 1990 to a peak of almost 21 daily VMT per person in 2001 in the Twin Cities Region (**Figure 3-21**). Since 2001, daily VMT per person has generally leveled off, with some year-to-year variability following the 2008 recession. Travelers in the Twin Cities region have consistently traveled one to two vehicle-miles per person per day more than averages for travelers in large cities and the region's peer cities.

Travelers in the Twin Cities region have consistently traveled one to two vehicle-miles per person per day more than averages for travelers in large cities and the region's peer cities.

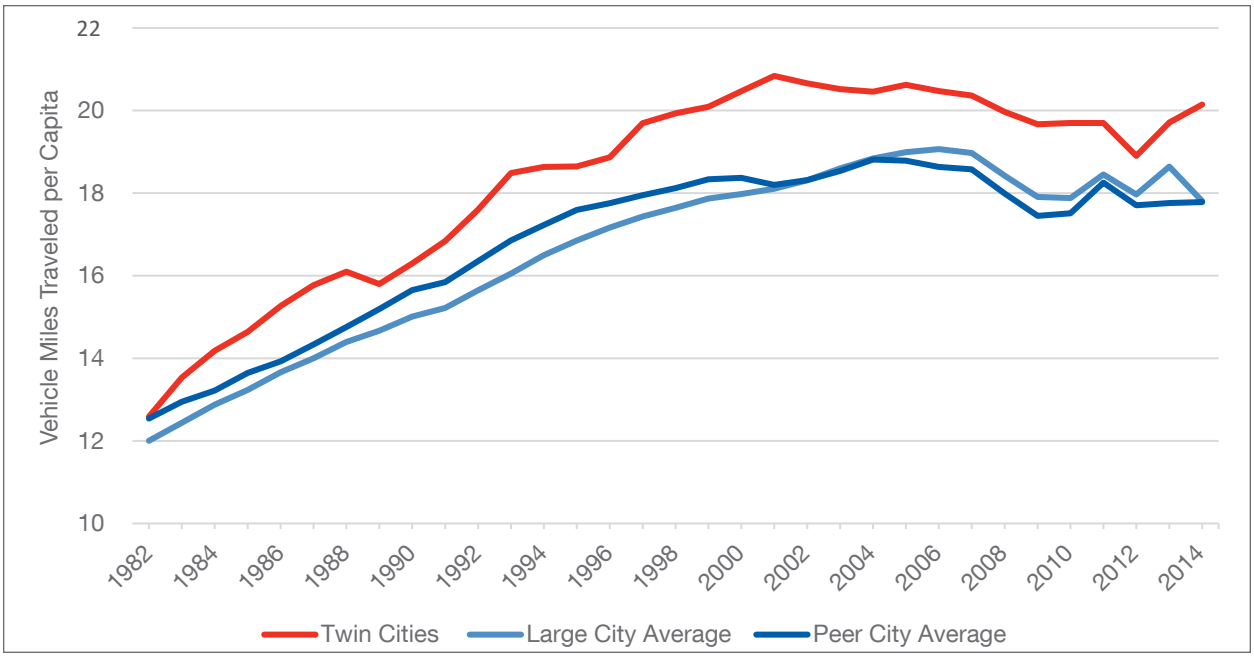

Figure 3-21: Daily VMT per Person

Travel Time

The 2014 average Travel Time Index for the region's peer cities was 1.24 and 1.22 for large cities. Since 1993, the Twin Cities area has consistently had a higher Travel Time Index than the peer city and large city averages (**Figure 3-22**).

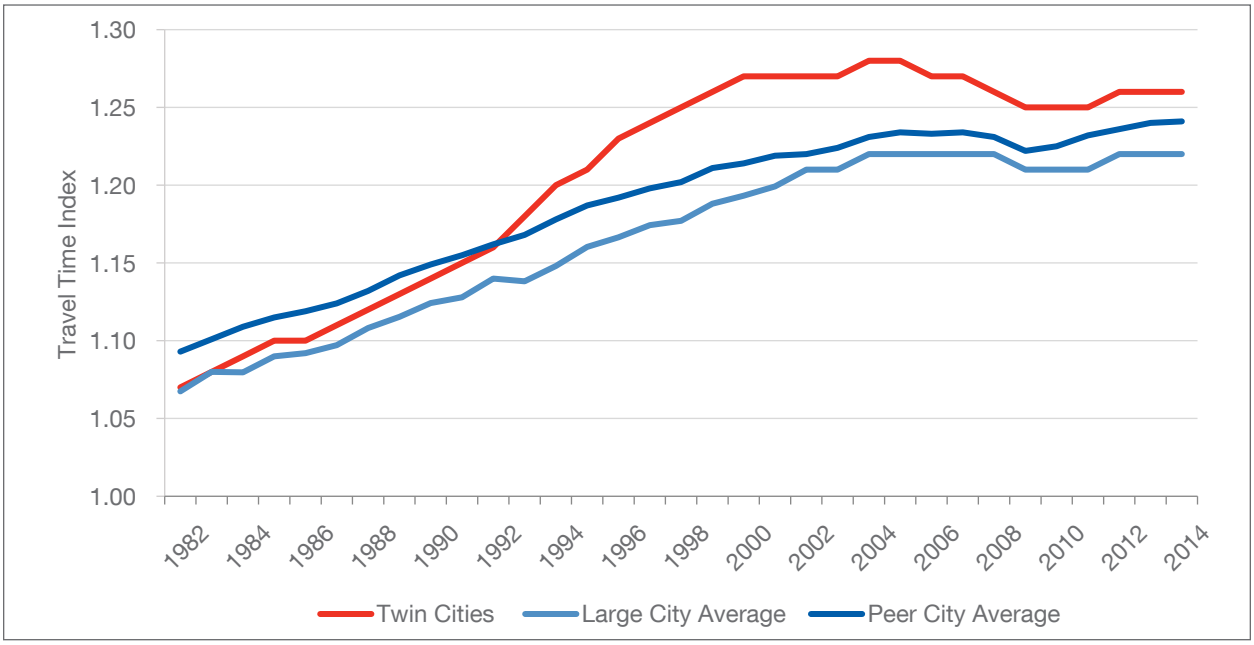

Figure 3-22: Travel Time Index Pattern

Delay

Among the 11 peer urban areas (including the Twin Cities), the Twin Cities went from fifth lowest in 2010 to seventh lowest in 2014 in terms of annual hours of delay per auto commuter.

Between 2010 and 2014, delay for peak auto travelers in the Twin Cities increased by 12 percent, whereas the peer city and large city averages increased by 7 percent and 5 percent, respectively. **Figures 3-23** through **3-28** illustrate these findings and provide more information.

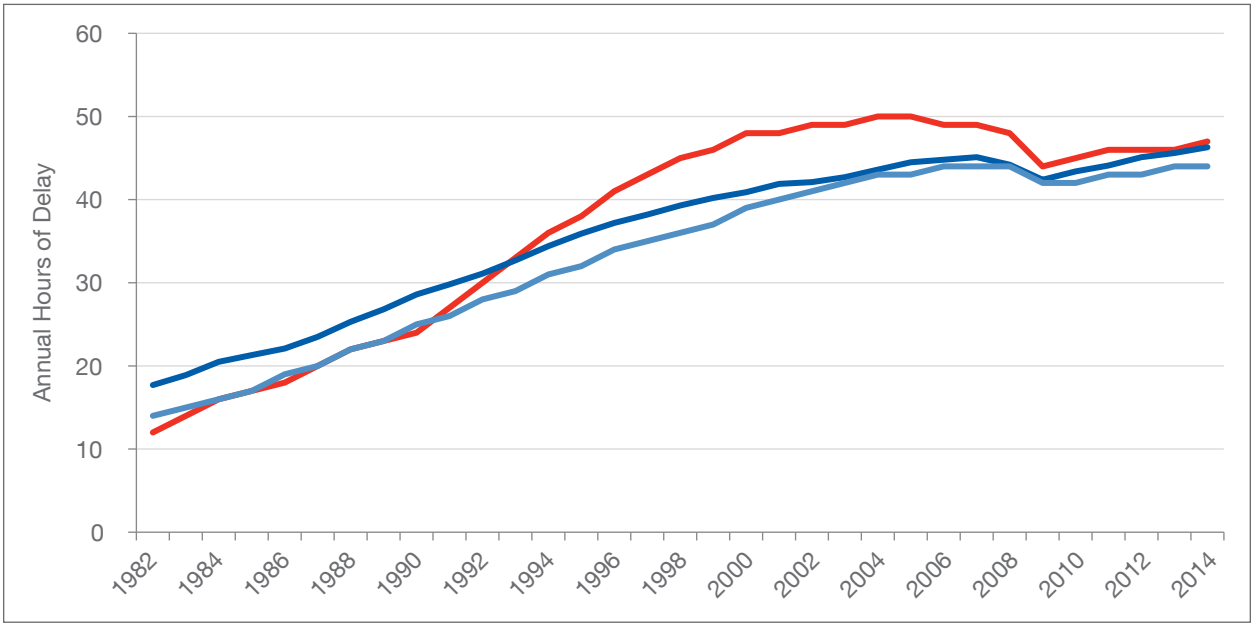

Figure 3-23: Annual Hours of Delay per Peak Auto Commuter

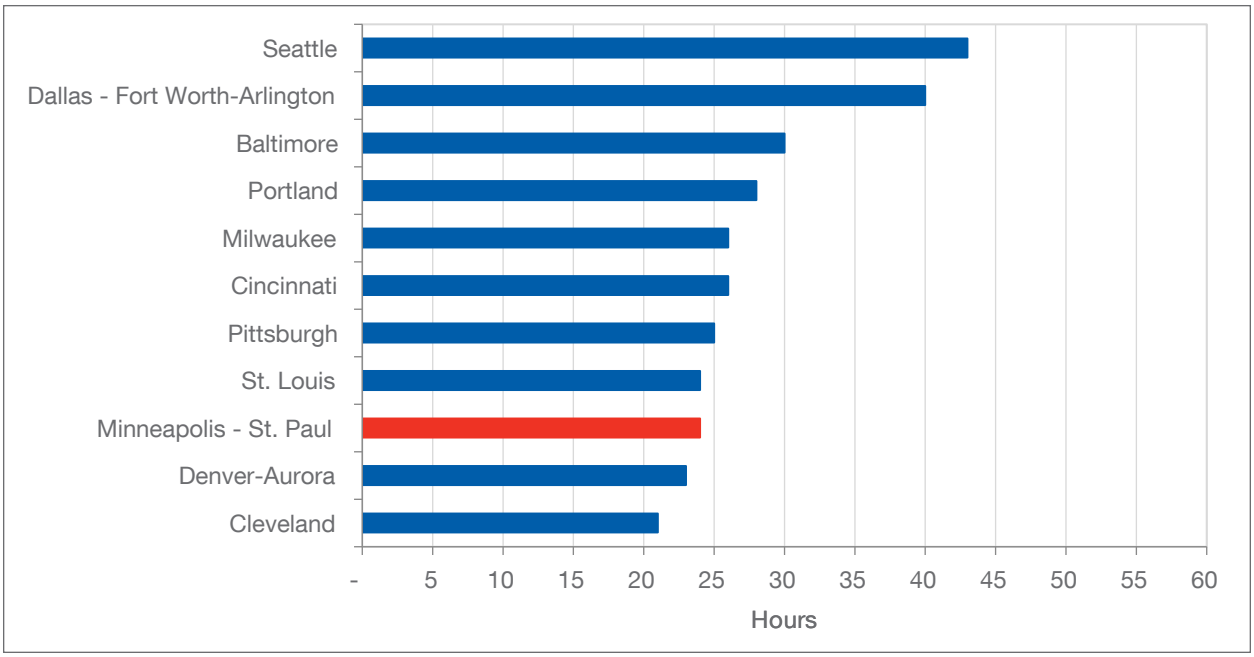

Figure 3-24: 1990 Annual Delay per Peak Commuter

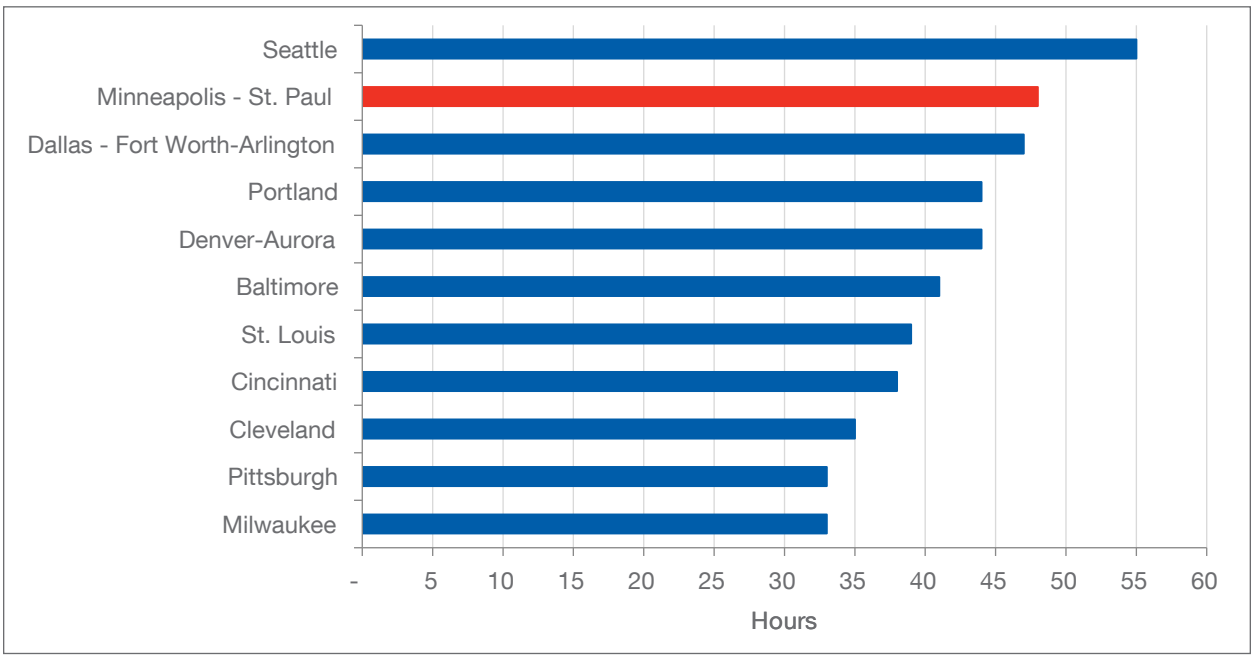

Figure 3-25: 2000 Annual Delay per Peak Commuter

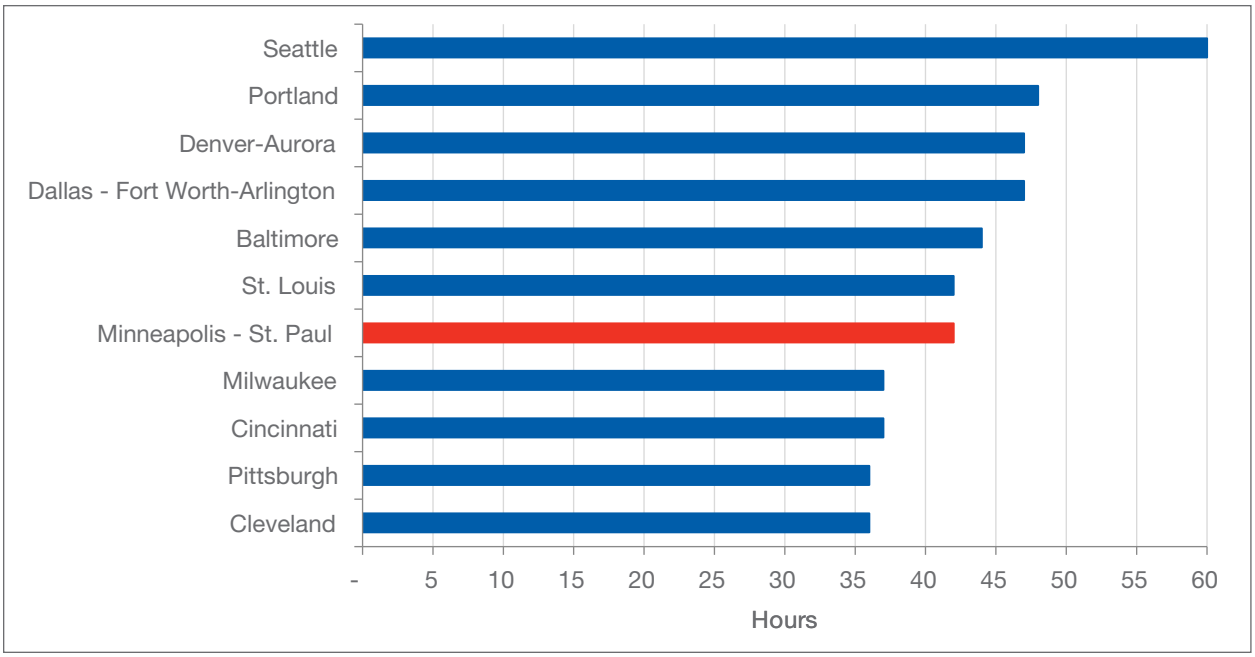

Figure 3-26: 2010 Annual Delay per Peak Commuter

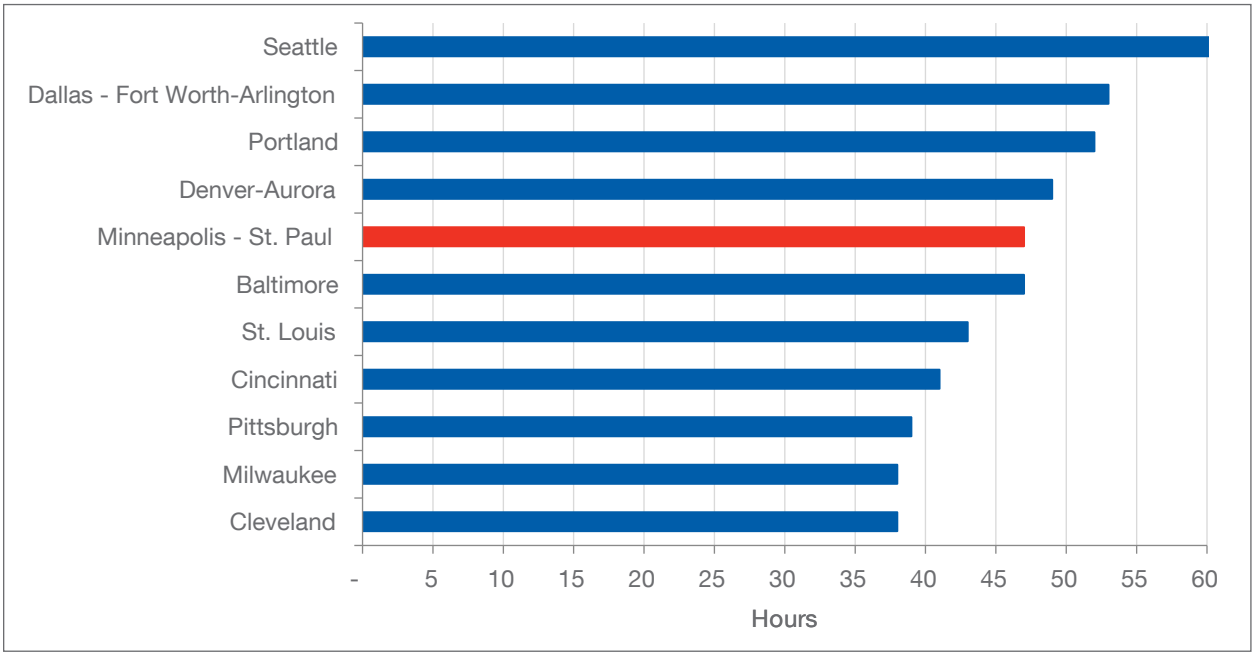

Figure 3-27: 2014 Annual Delay per Peak Commuter

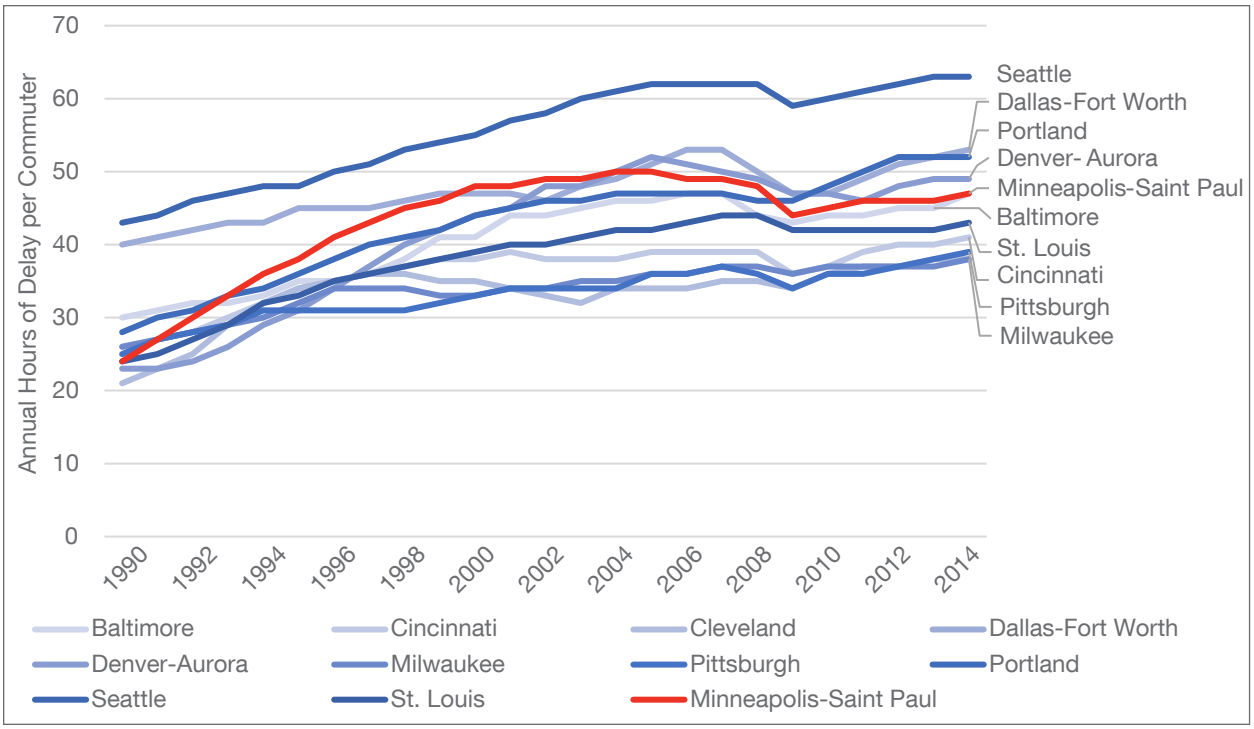

Figure 3-28: Annual Hours of Delay per Peak Auto Commuter (1990-2014)

Costs of Congestion

In the *Urban Mobility Report*, the Texas Transportation Institute estimates the annual cost imposed by congestion. Texas Transportation Institute recently changed their methodology for calculating congestion (and consequentially, congestion cost), and as such, has revised historical values based on the updated methodology.

In 2014 the estimated cost of congestion for the Minneapolis-St. Paul region was $1,035 annually per auto commuter.

Based on the Texas Transportation Institute data, in 2014 the estimated cost of congestion for the Minneapolis-St. Paul region was $1,035 annually per auto commuter. For comparison, the average for peer cities was just under $1,094, and $1,034 for large areas (as published by Texas Transportation Institute). **Figure 3-29** illustrates the trend between 1982 and 2014. The annual cost increased from 1982 up to 2003 when it peaked, then dropped until 2009, where it has since remained relatively constant.

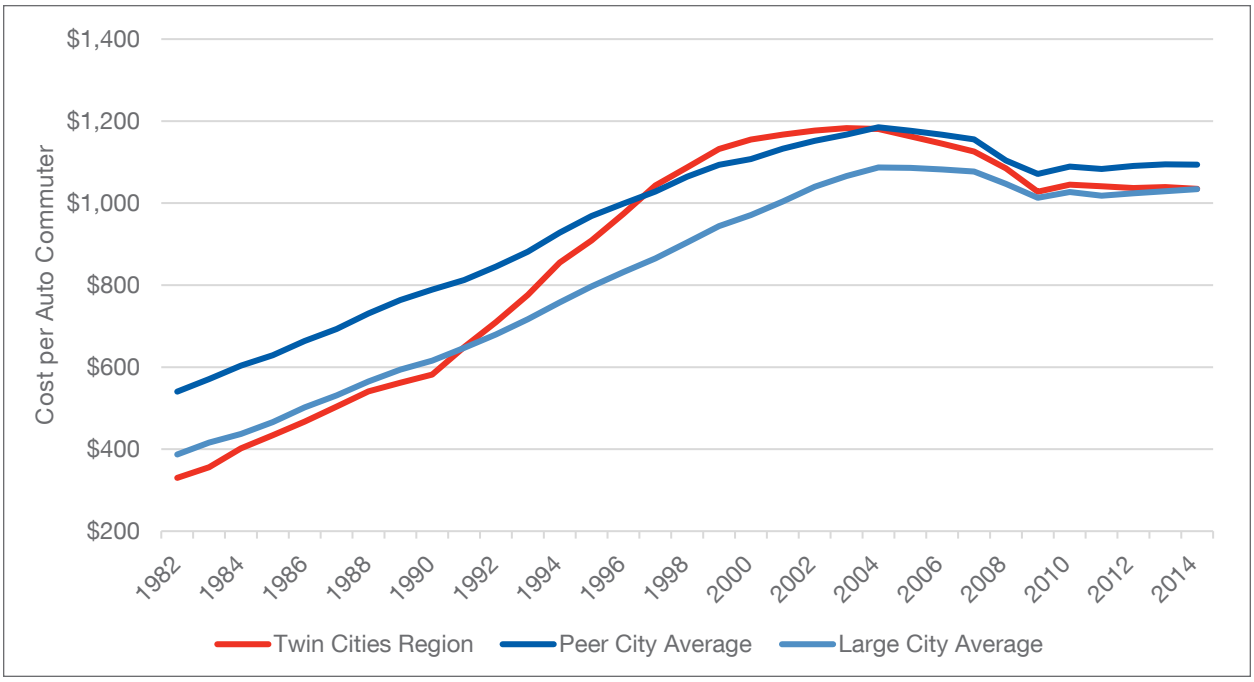

Figure 3-29: Annual Cost of Congestion 1982 – 2014 per Auto Commuter

Findings and Conclusions

As the number of vehicles has steadily increased and highway revenues per vehicle have declined, highway performance management has needed to continue shifting toward pavement and bridge preservation, and system management strategies such as MnPASS lanes and ramp meters.

As the number of vehicles has steadily increased and highway revenues per vehicle have declined, highway performance management has needed to continue shifting toward pavement and bridge preservation, and system management strategies such as MnPASS lanes and ramp meters. The following findings and trends provide an overview of the highway system through 2015:

- Lane miles on the Principal Arterial system grew slowly between 2000 and 2010, and again slowly between 2010 and 2014. On the minor arterial and local highway systems, the significant growth observed between 2000 and 2010 slowed decidedly between 2010 and 2014 (for appropriate comparison across years in this context, minor arterial and local highway system in the urbanized portion of Wright and Sherburne counties is not included).
- While the Principal Arterial and Minor Arterial systems comprised 25 percent of the lane-miles, they served 81 percent of the vehicle miles traveled in 2014 (including the urbanized portion of Wright and Sherburne counties).
- Roadway pavement quality in the Twin Cities Region have generally not met Ride Quality Index (RQI) targets since 2001. However, the percentage of regional principal and non-principal arterials with a poor or very poor rating has generally decreased since 2009.
- In 2015, all MnDOT targets for bridge condition were met for both principal and non-principal arterial bridges in the Twin Cities Region, demonstrating better performance than the statewide averages. The percentage of non-principal arterial bridge area in poor condition increased to a 10-year high in 2015, however, reaching approximately 7 percent and this trend should be monitored by MnDOT and Metropolitan Council.
- Since 2010, annual VMT has generally increased each year, with the exception of a slight reduction in 2012. VMT per person in the Twin Cities generally exceeds the average for the selected peer cities.
- Miles of directional congestion on Metro area freeways did not significantly increase between 2010 and 2014. In 2015, however, the percentage of miles of directional congestion reached a 15-year peak.

- Metro area MnPASS lanes provide a consistently reliable travel time, with most segments operating at 45 miles per hour or more 95 percent of the time.
- The regional travel time index has remained below the 2005 value in every one of the last 10 years, only slightly increasing between 2010 and 2014. The index has generally exceeded the peer city average, however, during this time period.
- Annual hours of delay per peak auto commuter has generally been higher in the Twin Cities compared to the selected peer cities since the 1990s; in 2015, the difference between Twin Cities average and the peer city average was essentially negligible, however.
- Annual costs of congestion have remained steady since 2009, with the Twin Cities falling below the peer city average.
- Some highway system measures appear to be a cause for concern, such as increasing vehicle miles traveled and number of congested miles. However, stable results for highway user measures such as delay per user, travel time index, and cost of congestion show that individual highway user experiences differ from trends for overall highway system performance. Highway users may be avoiding congested times and places by leveraging the flexibility offered by a higher share of retired population and greater flexibility offered by employers in work schedules and telecommuting availability.

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Chapter 4: The Transit System

Characteristics of the Transit System

Operations

Twin Cities Transit Modes and Providers

There are currently six modes of public transit service in the Twin Cities area: commuter rail, light rail transit, bus rapid transit (BRT), regular-route bus, dial-a-ride, and vanpool.

- Light-rail transit service was first added to the regional system in 2004.The second light rail line opened in mid-2014.
- Commuter rail service was added to the region in late 2009.
- Highway BRT service was added to the regional system in 2013. The first arterial BRT service opened in 2016.

There are currently six modes of public transit service in the Twin Cities area: commuter rail, light rail transit, bus rapid transit (BRT), regular-route bus, dial-a-ride, and vanpool.

- Regular-route bus service is provided on a fixed schedule along specific routes, with vehicles stopping to pick up and drop off passengers at designated locations.
- Dial-a-ride service does not follow a fixed route. Passengers board and arrive at prearranged times and locations within the designated service area. Typically, each trip is scheduled separately.
- Vanpool service provides vehicles and financial incentives to groups, typically five to 15 people, sharing rides to a common destination or area not served by regular-route transit service.

The Twin Cities is home to five public transit providers, and the University of Minnesota Twin Cities transit service. Each provider is described below.

METROPOLITAN COUNCIL

The Metropolitan Council provides public transit service through two of its operating divisions: Metro Transit and Metropolitan Transportation Services. **Figure 4-1** shows the routes as of February 2017.

Metro Transit

Metro Transit is the largest provider of regular-route transit service in the Minneapolis/St. Paul metropolitan area and operates several types of service.

Metro Transit Regular-Route Bus

In December 2014, Metro Transit provided direct service on 129 routes – 65 local routes and 64 express routes.

Table 4-1: 2014 Operating Statistics: Metro Transit Bus

Service	Operating Cost	Fare Revenue	Ridership	In-Service Hours	Subsidy per Passenger	Passengers per In-Service Hour
Urban Local Bus	$229,195,931	$49,800,916	56,749,751	1,357,836	$3.16	41.8
Suburban Local Bus	$9,219,293	$1,791,124	2,003,872	50,287	$3.71	39.8
Express Bus	$44,268,298	$17,308,945	7,803,357	203,354	$3.45	38.4
Other Service	$2,634,404	$1,109,178	469,228	-	-	-
Metro Transit Bus Total	**$285,317,926**	**$70,010,163**	**67,026,209**	**1,611,476**	**$3.21**	**41.6**

Light Rail Transit

Metro Transit began operating the region's first light rail service, the 12-mile Hiawatha Line (subsequently renamed the METRO Blue Line), in 2004. The line currently serves 19 stations. Improvements to expand stations to allow service from three-car train sets, which allow for additional capacity during high-demand periods, were completed in 2010. Metro Transit opened the METRO Green Line between St. Paul and Minneapolis in mid-2014. The line serves 18 new stations and five stations that are shared with METRO Blue Line. Metro Transit is in the process of extending both light rail lines. The statistics below include both the Blue Line and the Green Line, although Green Line service did not begin until June 2014.

Metro Transit began operating the region's first light rail service, the METRO Blue Line in 2004, the METRO Green Line in mid-2014, and Metro Transit is in the process of extending both rail lines.

Table 4-2: 2014 Operating Statistics: Metro Transit Light Rail

Service	Operating Cost	Fare Revenue	Ridership	In-Service Hours	Subsidy per Passenger	Passengers per In-Service Hour
Light Rail	$47,904,426	$15,405,531	15,999,994	105,780	$2.03	151.3

Commuter Rail

Metro Transit began operating the region's first commuter rail service, the 40-mile Northstar line, in late 2009. There were six stations in operation as part of the initial project, and an additional station was completed in Ramsey in November 2012. The line operates with six locomotives and 18 passenger cars that are maintained at a service facility in Big Lake.

Table 4-3: 2014 Operating Statistics: Metro Transit Commuter Rail

Service	Operating Cost	Fare Revenue	Ridership	In-Service Hours	Subsidy per Passenger	Passengers per In-Service Hour
Commuter Rail	$15,149,243	$2,349,875	721,215	3,247	$17.75	222.1

The region's first arterial BRT line, the A Line, opened in 2016 along Snelling Avenue, Ford Parkway, and 46th Street.

Bus Rapid Transit

The region's first arterial BRT line, the A Line, opened in 2016 along Snelling Avenue, Ford Parkway, and 46th Street. Two more arterial BRT lines are currently under development: the C Line along Penn Avenue and the D Line along Chicago, Emerson, and Fremont Avenues. Metro Transit is also leading development of the region's second highway BRT service, the METRO Orange Line. The METRO Orange Line, planned to open in 2019, will connect Minneapolis and other communities along the I-35W corridor south of downtown.

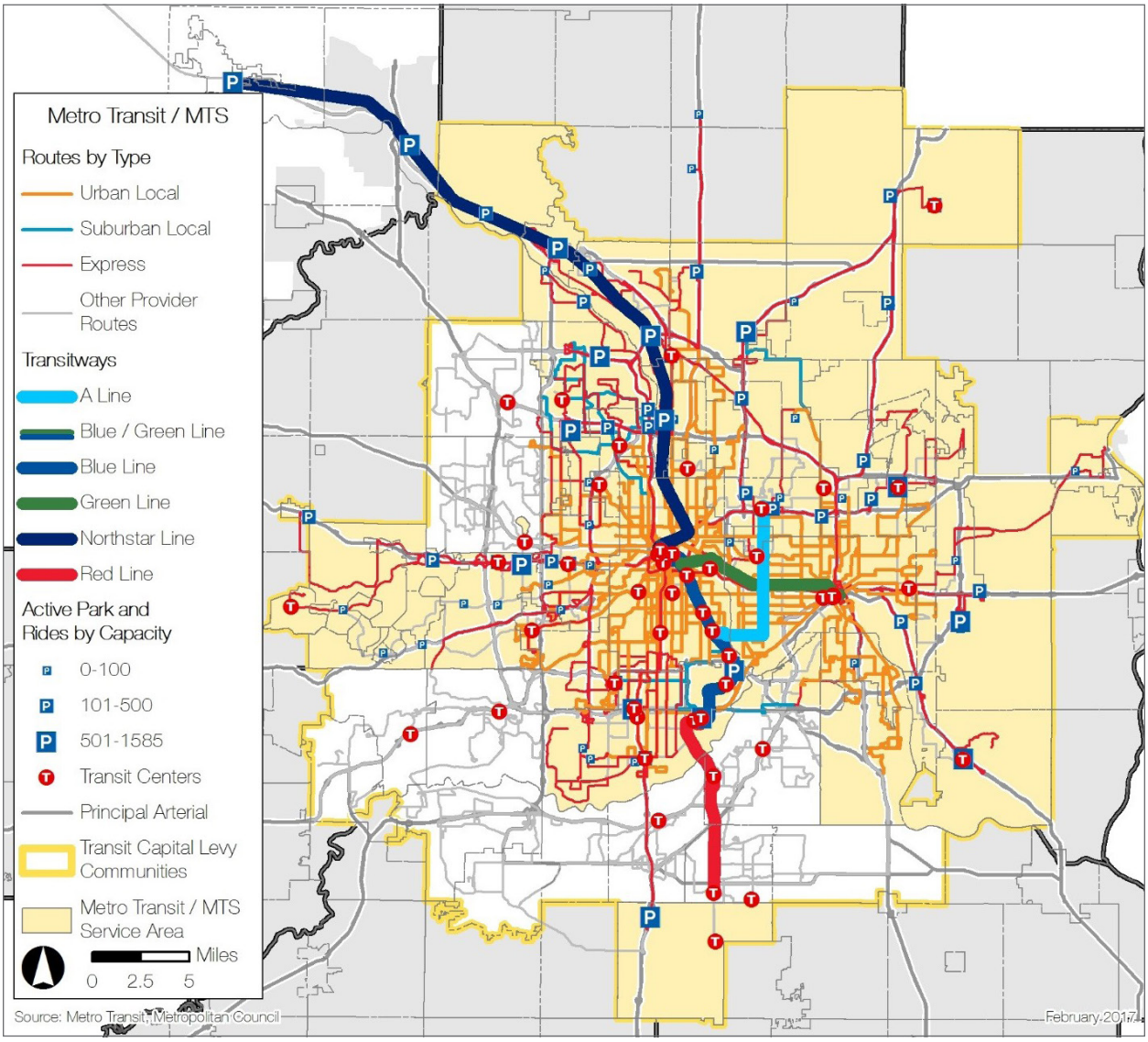


Figure 4-1 Existing Metropolitan Council Regular-Route Transit Service and Park and Rides

Metropolitan Transportation Services (MTS)

The Metropolitan Transportation Services (MTS) division of Metropolitan Council oversees or operates several kinds of public transit service.

MTS Contracted Regular-Route Bus

In 2014, Metropolitan Council provided bus service on 28 routes through five contracts with private transportation companies. All contracts are similar in size based on the number of contracted hours. Contracted service is used primarily to provide service using buses smaller than a typical 40-foot bus and is often provided in suburban areas.

In 2014, Metropolitan Council supplements Metro Transit service by providing bus service on 28 additional routes through five contracts with private transportation companies.

Table 4-4: 2014 Operating Statistics: MTS Contracted Regular Routes

Service	Operating Cost	Fare Revenue	Ridership	In-Service Hours	Subsidy per Passenger	Passengers per In-Service Hour
Urban Local Bus	$2,931,683	$563,988	604,064	37,055	$3.92	16.3
Suburban Local Bus	$9,508,013	$1,786,873	1,880,181	120,124	$4.11	15.7
Express Bus	$1,878,642	$631,705	256,280	10,497	$4.87	24.4
MTS Bus Total	**$14,318,338**	**$2,982,566**	**2,740,525**	**167,676**	**$4.13**	**16.3**

Bus Rapid Transit

The Red Line is complemented by extensive express bus service in the corridor that provide a variety of options for travelers.

The METRO Red Line, the region's first highway BRT line, opened in 2013. The Red Line runs on Cedar Avenue between the Mall of America and Apple Valley Transit Station and is operated by the Minnesota Valley Transit Authority (MVTA) under contract to MTS. The Red Line is complemented by extensive express bus service in the corridor that provide a variety of options for travelers. Further refinements and extensions to the service are currently underway or being considered and are expected to decrease travel time and/or increase ridership.

Table 4-5: 2014 Operating Statistics: Bus Rapid Transit

Service	Operating Cost	Fare Revenue	Ridership	In-Service Hours	Subsidy per Passenger	Passengers per In-Service Hour
Highway Bus Rapid Transit	$3,210,960	$224,474	265,515	17,161	$11.25	15.5

Metro Mobility

The Americans with Disabilities Act requires transit agencies provide dial-a-ride service to people with disabilities within ¾ mile of fixed-route transit service that is a comparable level of service.

Metropolitan Transportation Services provides Metro Mobility service as required by the Americans with Disabilities Act (ADA) to persons whose disabilities prevent them from using the regular-route transit system. This act requires transit agencies provide dial-a-ride service to people with disabilities within ¾ mile of fixed-route transit service that is a comparable level of service. Minnesota State 473.386 requires service beyond the requirements of the Americans with Disabilities Act, the required service area within the Twin Cities is shown in **Figure 4-2**. Metro Mobility was recently restructured to improve customer service, reduce duplication, and improve efficiency. Metro Mobility transitioned from three county contracts and two core contracts to three large service contracts. Service is now provided by two private companies.

The aging regional population is one factor that has driven increased paratransit usage. Between 2010 and 2014, Metro Mobility saw a ridership increase of 30.4 percent, from 1.52 million rides in 2010 to 1.98 million rides in 2014. The growing elderly population will continue to increase demand for paratransit service in the future.

Table 4-6: 2014 Operating Statistics: Metro Mobility

Service	Operating Cost	Fare Revenue	Ridership	In-Service Hours	Subsidy per Passenger	Passengers per In-Service Hour
Metro Mobility	$55,085,370	$6,825,988	1,975,625	964,065	$24.43	2.0

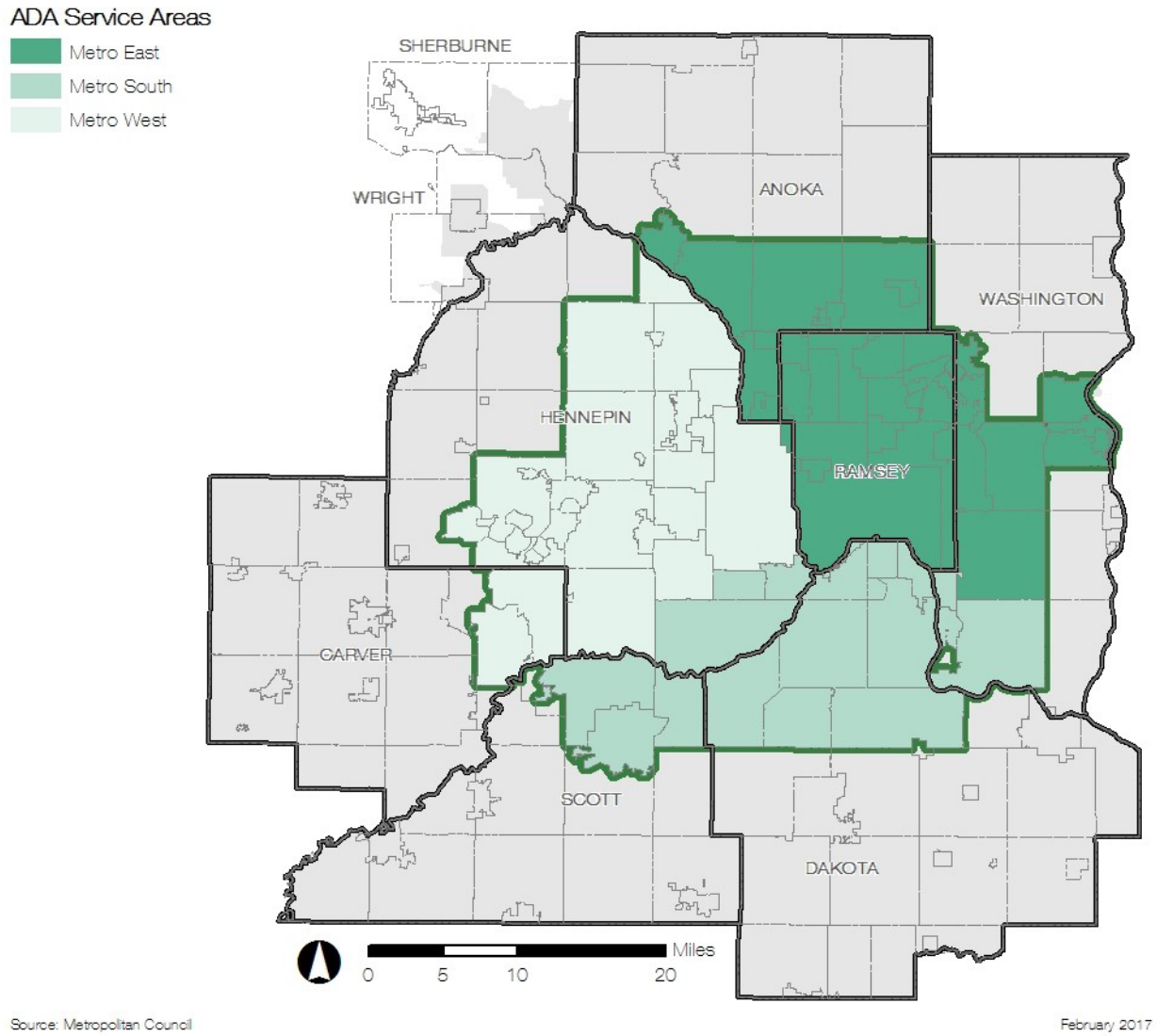


Figure 4-2: ADA Service Areas

The Transit Link program provides rides in parts of the region not served by regular route transit.

Transit Link

Transit Link is a region-wide contracted service that was started in 2010 after significant stakeholder input. With the introduction of Transit Link, the Council phased out annual subsidies to locally controlled, community-based dial-a-ride programs and replaced it with a coordinated and uniform program available regionwide (**Figure 4-3**). The Transit Link program provides rides in parts of the region not served by regular route transit and connects people to the closest regular route stop or station that will provide service to their destination.

Table 4-7: 2014 Operating Statistics: Transit Link

Service	Operating Cost	Fare Revenue	Ridership	In-Service Hours	Subsidy per Passenger	Passengers per In-Service Hour
Transit Link	$7,391,717	$879,582	336,039	124,399	$19.38	2.7

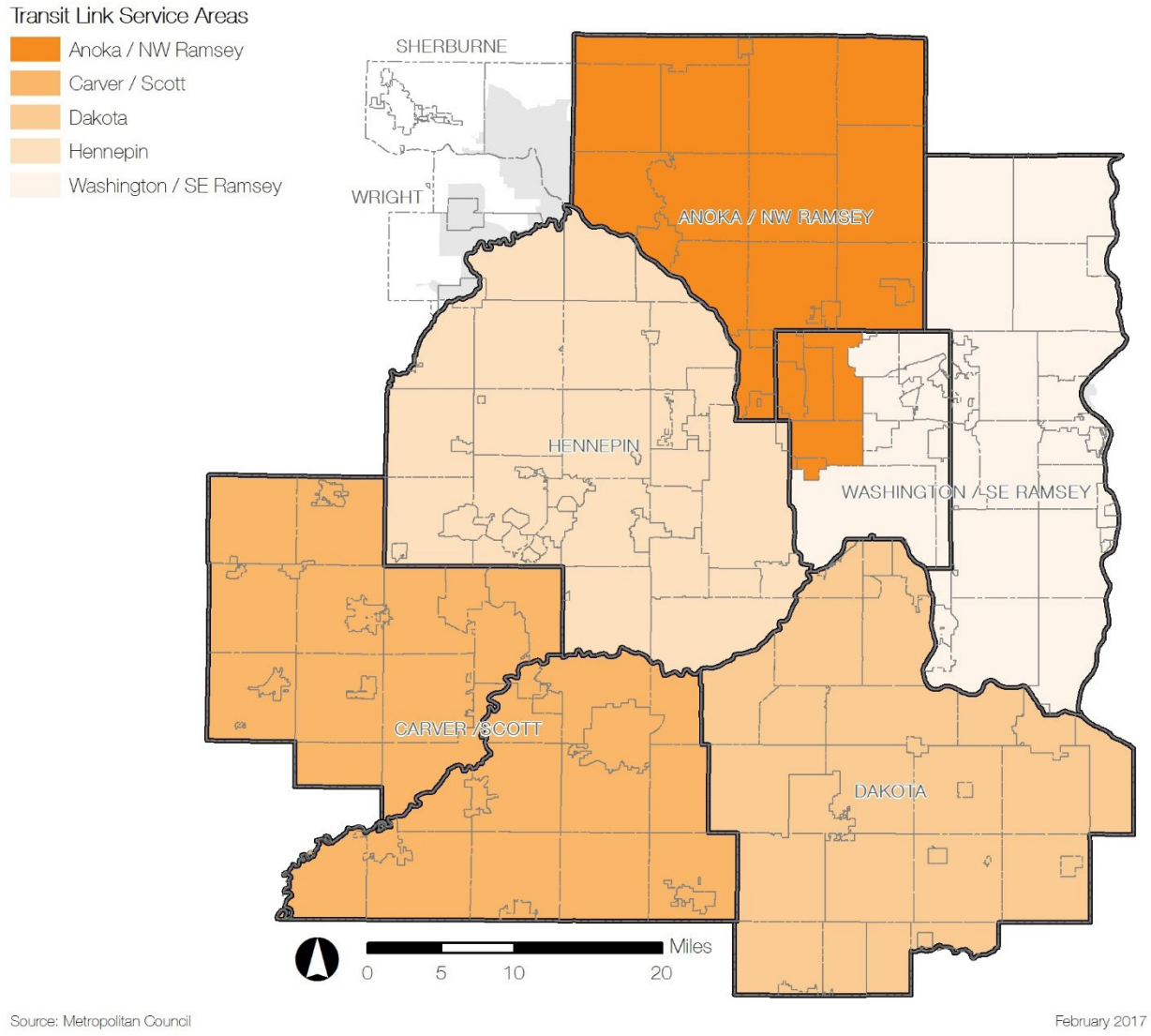


Figure 4-3: Transit Link Service Areas

Metro Vanpool

Metro Vanpool started in 2001 as a way of providing transit service for a collection of people living or working in the same area not served by regular-route bus service.

Metro Vanpool is a commuter vanpool program subsidized by the Metropolitan Council and overseen by MTS. This program started in 2001 as a way of providing transit service for people living or working in areas not served by regular-route bus service. People driving long distances from low-density areas add a disproportionate number of vehicle miles traveled (VMT), so removing or reducing these trips on the road network leads to significant benefits in terms of traffic congestion, air pollution, and greenhouse gas emissions.

Table 4-8: 2014 Operating Statistics: Metro Vanpool

Service	Operating Cost	Fare Revenue	Ridership	In-Service Hours	Subsidy per Passenger	Passengers per In-Service Hour
Metro Vanpool	$1,416,387	$741,456	176,527	38,063	$3.82	4.6

Suburban Transit Providers

Prior to 1982, the Metropolitan Transit Commission (the predecessor to Metro Transit) levied a property tax throughout the region to provide funding for transit operations. In 1982, the legislature authorized cities to retain up to 90 percent of the property tax levied in their communities to "opt out" of Metro Transit service and to provide transit service independent of Metro Transit. Twelve cities chose to provide their own transit service through the legislation. Today, through agreements and consolidations, the region includes four suburban transit providers (**Figure 4-4**).

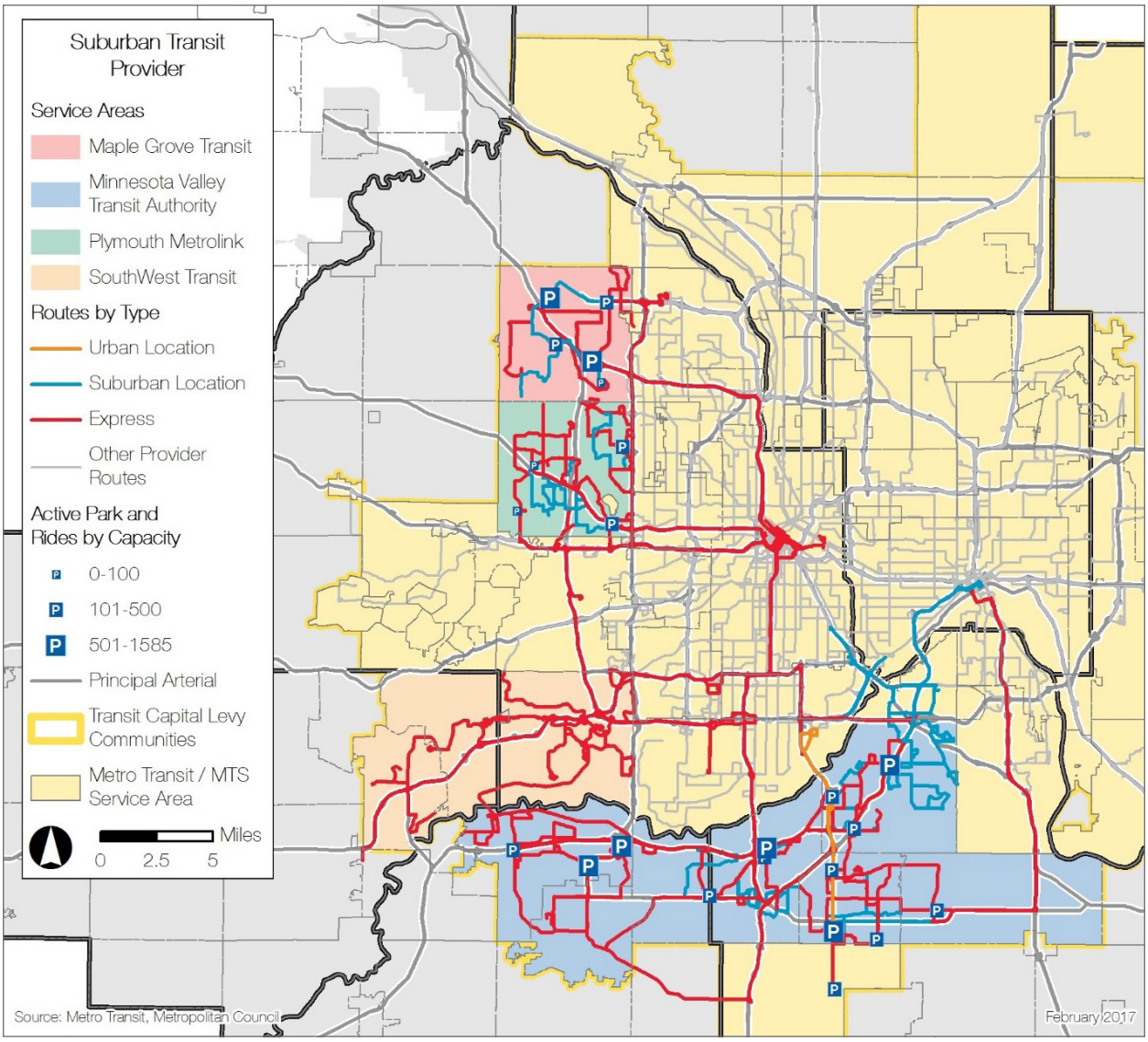


Figure 4-4: Suburban Service Areas with Routes by Route Type

MVTA serves the residents and businesses of Apple Valley, Burnsville, Eagan, Prior Lake, Rosemount, Savage, and Shakopee.

Minnesota Valley Transit Authority (MVTA)

MVTA was established as a Joint Powers Board in 1990 and serves the residents and businesses of Apple Valley, Burnsville, Eagan, Prior Lake, Rosemount, Savage, and Shakopee. MVTA service in Prior Lake and Shakopee began in 2015 when Shakopee and Prior Lake requested that MVTA operate the Shakopee circulator and Prior Lake BlueXpress commuter service. At the end of 2014, MVTA operated a total of 31 routes: one BRT line, three flex-routes and/or shuttles operating in the suburban area, 14 express routes into downtown Minneapolis, two express routes into downtown St. Paul, and 11 local routes. Nine of these routes offer peak-period reverse-commute services. MVTA operates services to 15 park-and-ride facilities out of two bus garages.

Table 4-9: 2014 Operating Statistics: MVTA

Service	Operating Cost	Fare Revenue	Ridership	In-Service Hours	Subsidy per Passenger	Passengers per In-Service Hour
Express Bus	$12,417,634	$4,251,180	1,766,662	57,313	$4.62	30.8
Suburban Local Bus	$7,369,818	$713,571	722,769	55,653	$9.21	13.0
Other Service	$146,186	$129,775	57,320	911	-	-
MVTA Total	**$19,933,638**	**$5,094,526**	**2,546,751**	**113,877**	**$5.83**	**22.4**

Table 4-10: 2014 Operating Statistics: Prior Lake/Shakopee

Service	Operating Cost	Fare Revenue	Ridership	In-Service Hours	Subsidy per Passenger	Passengers per In-Service Hour
Express Bus	$1,893,553	$468,197	188,790	6,401	$7.55	29.5
Suburban Local Bus	$323,136	$12,733	28,375	5,601	$10.94	5.1
Prior Lake/ Shakopee Total	**$2,216,689**	**$480,930**	**217,165**	**12,002**	**$7.99**	**18.1**

SouthWest Transit

SouthWest Transit's express services are oriented toward downtown Minneapolis and the University of Minnesota. SouthWest Transit also offers reverse commute express service and SW Prime - its on-demand local service. At the end of 2014, SouthWest Transit operated ten express routes and three suburban local routes and also operated special event services to the Minnesota State Fair and to sporting events throughout 2014. Service is provided from eight park-and-ride facilities.

Table 4-11: 2014 Operating Statistics: SouthWest Transit

Service	Operating Cost	Fare Revenue	Ridership	In-Service Hours	Subsidy per Passenger	Passengers per In-Service Hour
Express Bus	$9,208,820	$2,428,114	1,004,899	47,245	$6.75	21.3
Suburban Local Bus4-[1]	$141,939	$2,156	2,779	845	$50.30	3.3
Other Service	$459,212	$228,290	100,172	1,867	$2.31	53.7
SouthWest Total	**$9,809,971**	**$2,658,560**	**1,107,850**	**49,956**	**$6.46**	**22.2**

Maple Grove Transit

Maple Grove Transit was formed in June 1990 to serve the city of Maple Grove. Maple Grove Transit operates a fleet of 40 buses offering commuter express service to and from Minneapolis utilizing 49 round trips on five routes. Maple Grove also operates five mini-buses that provide a local dial-a-ride service.

Table 4-12: 2014 Operating Statistics: Maple Grove Transit

Service	Operating Cost	Fare Revenue	Ridership	In-Service Hours	Subsidy per Passenger	Passengers per In-Service Hour
Express Bus	$3,757,667	$1,984,299	788,097	17,615	$2.25	44.7
Suburban Local Bus	$114,034	$6,767	9,446	850	$11.36	11.1
Dial-a-Ride	$604,324	$37,465	33,437	11,366	$16.95	2.9
Maple Grove Transit Total	**$4,476,025**	**$2,028,531**	**830,980**	**29,831**	**$2.95**	**27.9**

4-1 This service was suspended in early 2015

Plymouth Metrolink

Operated by the City of Plymouth since 1984, Plymouth Metrolink provides high-quality, safe and cost-effective transit services focused on customer satisfaction. Services include express routes to and from downtown Minneapolis, local shuttles and Dial-A-Ride that services within Plymouth and other local destinations.

Table 4-13: 2014 Operating Statistics: Plymouth Metrolink

Service	Operating Cost	Fare Revenue	Ridership	In-Service Hours	Subsidy per Passenger	Passengers per In-Service Hour
Express Bus	$2,546,482	$851,370	412,050	18,002	$4.11	22.9
Suburban Local Bus	$508,679	$62,180	55,271	4,347	$8.08	12.7
Dial-a-Ride	$717,928	$93,029	42,045	12,674	$14.86	3.3
Plymouth Metrolink Total	**$3,773,089**	**$1,006,579**	**509,366**	**35,023**	**$5.43**	**14.5**

Other Providers: University of Minnesota Parking and Transportation Services

The University of Minnesota contracts with a private provider to operate and maintain a system of buses on five primary routes on the Minneapolis and St. Paul campuses. Free service is provided on four shuttle routes and the high-frequency campus connector. Additionally, the University also provides a free, specialized, curb-to-curb, on-campus transportation service to people with either temporary or permanent physical disabilities.

Table 4-14: 2014 Operating Statistics: University of Minnesota

Service	Operating Cost	Fare Revenue	Ridership	In-Service Hours	Subsidy per Passenger	Passengers per In-Service Hour
Urban Local Bus	$5,973,793	-	3,201,260	46,669	$1.87	68.6
Dial-a-Ride	$196,305	-	5,322	1,493	$36.89	3.6
University of Minnesota Total	**$6,170,098**	**-**	**3,206,582**	**48,162**	**$1.92**	**66.6**

Summary of Transit System Statistics

RIDERSHIP

Regional transit ridership has fluctuated over the past five years. The regional transit system has gained riders every year except 2013, when ridership decreased by about one percent. 2014 ridership was up 5.9 percent over 2013 ridership, which was the largest percentage increase in ridership since 2008. Metro Transit carries 86 percent of the riders in the region. The METRO Blue and Green Lines carried about 16 percent of regional transit trips in 2014, which increased to 23 percent in 2015.

Metro Transit carried 86 percent of the riders in the region. In 2015, the METRO Blue and Green Lines carried about 23 percent of regional transit trips.

Table 4-15: Regional Transit Ridership 2010-2014

Service	2010	2011	2012	2013	2014
Metro Transit Bus[4-2]	64,520,690	68,394,120	69,069,540	68,466,770	67,026,209
Metro Transit Light Rail	10,455,860	10,400,864	10,498,236	10,162,919	15,999,994
Metro Transit Commuter Rail	710,436	703,700	703,425	787,239	721,215
MTS Contracted Regular Route	2,779,015	2,925,341	3,034,055	3,170,135	2,740,525
Highway Bus Rapid Transit	-	-	-	130,733	265,515
Metro Mobility	1,515,336	1,580,135	1,673,573	1,817,561	1,975,625
MTS Dial-a-Ride	335,028	329,857	312,639	341,018	336,039
Vanpool	182,457	189,825	179,013	186,433	176,527
Suburban Transit Providers	4,837,874	5,143,162	5,125,307	4,986,124	5,212,112
Subtotal	85,336,696	89,667,004	90,595,788	90,048,932	94,453,761
Other	55,487	91,112	107,083	-	-
UMN	4,044,192	3,533,691	3,197,701	2,916,536	3,206,582
Regional Total	**89,436,375**	**93,291,807**	**93,900,572**	**92,965,468**	**97,660,340**

PROVIDER SUMMARIES

Table 4-16 provides a summary of key metrics for all transit providers and their services for the year 2014. Subsidy per passenger and passengers per in-service hour are measures of productivity and cost effectiveness, respectively, established in Appendix G of the 2040 Transportation Policy Plan. These metrics are used to evaluate the relative productivity and efficiency of the services provided.

4-2 Metro Transit provides service under contract to some suburban transit providers. These statistics are reported only under suburban transit provider statistics in this section.

Table 4-16: 2014 Regional Transit Operating Statistics by Provider

Service	Operating Cost	Fare Revenue	Ridership	In-Service Hours	Subsidy per Passenger	Passengers per In-Service Hour
Metropolitan Council – Directly Operated						
Metro Transit Bus	$285,317,926	$70,010,163	67,026,209	1,611,476	$3.21	41.6
Metro Transit Light Rail	$47,904,426	$15,405,531	15,999,994	105,780	$2.03	151.3
Metro Transit Commuter Rail	$15,149,243	$2,349,875	721,215	3,247	$17.75	222.1
Metro Transit Subtotal	**$348,371,595**	**$87,765,569**	**83,747,418**	**1,720,503**	**$3.11**	**48.7**
Metropolitan Council – MTS Contracted						
Contracted Regular Route	$14,318,338	$2,982,566	2,740,525	167,676	$4.13	16.3
Highway Bus Rapid Transit	$3,210,960	$224,474	265,515	17,161	$11.25	15.5
Metro Mobility	$55,085,370	$6,825,988	1,975,625	964,065	$24.43	2.0
Transit Link	$7,391,717	$879,582	336,039	124,399	$19.38	2.7
Metro Vanpool	$1,416,387	$741,456	176,527	38,063	$3.82	4.6
MTS Subtotal	**$81,422,772**	**$11,654,066**	**5,494,231**	**1,311,364**	**$12.70**	**4.2**
Non-Metropolitan Council Providers						
MVTA	$19,933,638	$5,094,526	2,546,751	113,877	$5.83	22.4
SouthWest Transit	$9,809,971	$2,658,560	1,107,850	49,956	$6.46	22.2
Maple Grove Transit	$4,476,025	$2,028,531	830,980	29,831	$2.95	27.9
Plymouth Metrolink	$3,773,089	$1,006,579	509,366	35,023	$5.43	14.5
Prior Lake/Shakopee	$2,216,689	$480,930	217,165	12,002	$7.99	18.1
University of Minnesota	$6,170,098	-	3,206,582	48,162	$1.92	66.6
Non-Metropolitan Council Subtotal	**$46,379,510**	**$11,269,126**	**8,418,694**	**288,851**	**$4.17**	**29.1**
Regional Total	**$476,173,877**	**$110,688,761**	**97,660,342**	**3,320,718**	**$3.74**	**29.4**
***Other*[4-3]**	***($8,776,994)***	***$1,983,026***	***57,457***			

4-3 Items that reconcile route totals to differences in NTD reporting methodology. Discrepancies include NTD reporting requirements, costs or revenues reported to NTD as capital or other contract relationships, regional overhead costs, or other minor reporting issues.

SERVICE TYPE SUMMARIES

Table 4-17 provides a summary of key metrics for all transit providers and their services for the year 2014. Subsidy per passenger and passengers per in-service hour are measures of productivity and cost effectiveness, respectively, established in Appendix G of the 2040 Transportation Policy Plan. These metrics are used to evaluate the relative productivity and efficiency of the services provided.

Table 4-17: 2014 Regional Transit Operating Statistics by Mode/Type

Service	Operating Cost	Fare Revenue	Ridership	In-Service Hours	Subsidy per Passenger	Cost per In-service Hour	Fare Recovery	Pass per In-Service Hour
Urban Local Bus	$238,101,407	$50,364,905	60,555,075	1,441,560	$3.10	$165.17	21.2%	42.0
Suburban Local Bus	$27,184,912	$4,375,403	4,702,693	237,707	$4.85	$114.36	16.1%	19.8
Express Bus	$75,971,096	$27,923,810	12,220,135	360,426	$3.93	$210.78	36.8%	33.9
Bus Subtotal	**$341,257,415**	**$82,664,118**	**77,477,903**	**2,039,693**	**$3.34**	**$167.31**	**24.2%**	**38.0**
Light Rail	$47,904,426	$15,405,531	15,999,994	105,780	$2.03	$452.87	32.2%	151.3
Commuter Rail	$15,149,243	$2,349,875	721,215	3,247	$17.75	$4,665.90	15.5%	222.1
Bus Rapid Transit	$3,210,960	$224,474	265,515	17,161	$11.25	$187.11	7.0%	15.5
Dial-a-Ride	$63,995,644	$7,836,064	2,392,468	1,113,997	$23.47	$57.45	12.2%	2.1
Vanpool	$1,416,387	$741,456	176,527	38,063	$3.82	$37.21	52.3%	4.6
Other	$3,239,802	$1,467,243	626,720	2,778	-	-	-	-
Regional Total	**$476,173,877**	**$110,688,761**	**97,660,342**	**3,320,719**	**$3.74**	**$143.83**	**23.2%**	**29.4**
***Other*[4-4]**	***($8,776,994)***	***$1,983,026***	***57,457***					

4-4 Items that reconcile route totals to differences in NTD reporting methodology. Discrepancies include NTD reporting requirements, costs or revenues reported to NTD as capital or other contract relationships, regional overhead costs, or other minor reporting issues.

TRANSIT PERFORMANCE MEASURE TRENDS

Subsidy per Passenger

Operating subsidy per passenger measures the net cost of providing transit service per trip, after accounting for fare revenue.

Operating subsidy per passenger measures the net cost of providing transit service per trip, after accounting for fare revenue. In 2014, the regional average was $3.71, up from $2.95 in 2011 (**Figure 4-5**). Subsidy per passenger is generally expected to increase with inflation but other factors, such as fare revenue and ridership, can influence trends. Subsidy per passenger also varies by type of service and provider. Light rail is the most cost-effective service in the region with a subsidy of $2.07 per passenger.

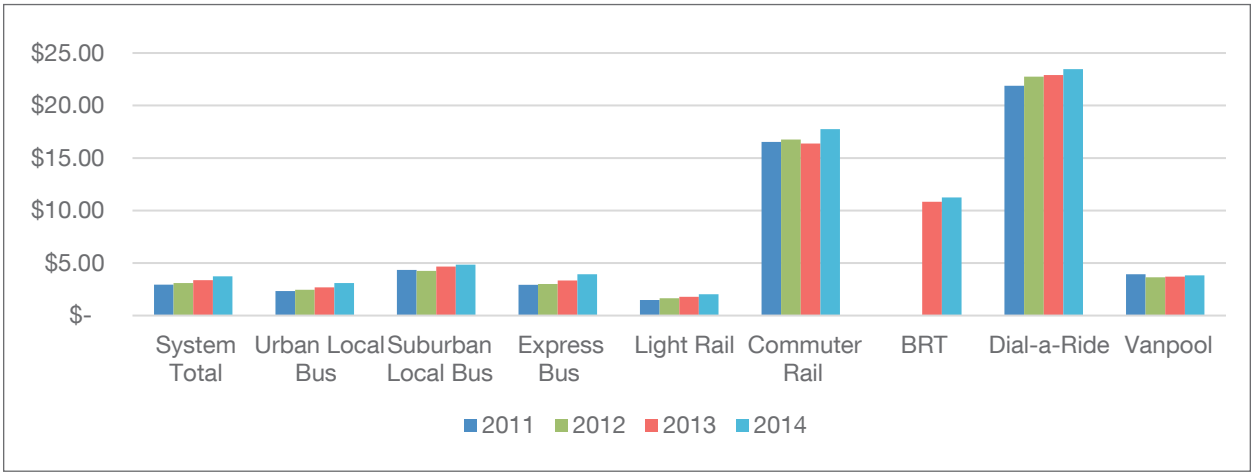


Figure 4-5: Subsidy per Passenger by Service Type (2011-2014)

Passengers per In-Service Hour

Passengers per hour of transit service measures the efficiency of how many people are using a service relative to the amount of service available.

Passengers per hour of transit service measures the efficiency of how many people are using a service relative to the amount of service available. The regional system performed at about 29.8 passengers per in-service hour in 2014, down from 32 passengers per in-service hour in 2011 (**Figure 4-6**). Light rail and commuter rail are the most productive services in the region on a per hour basis. This can mostly be attributed to their higher capacity vehicles and their operation in high-demand corridors.

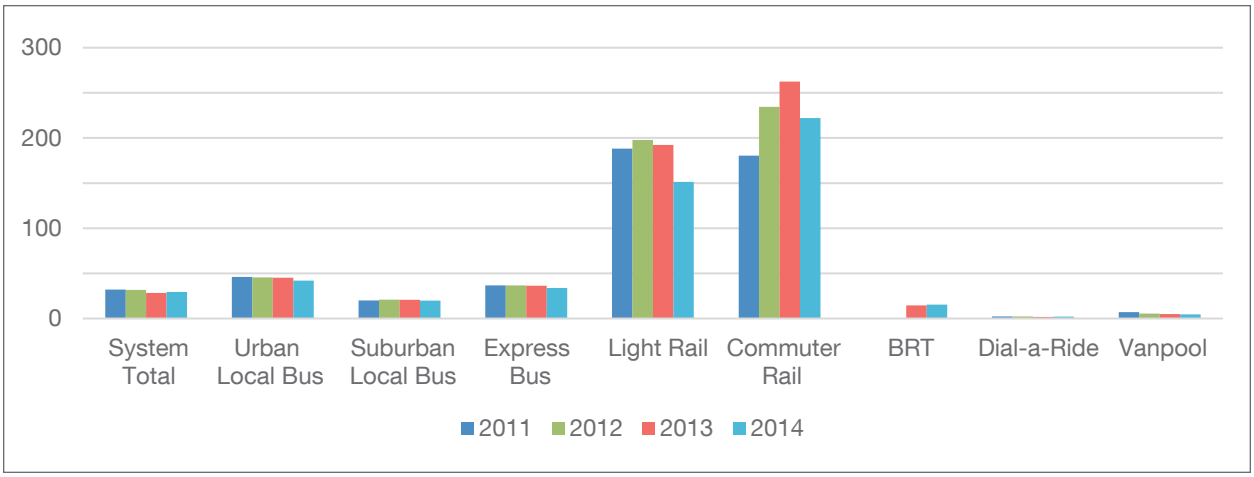


Figure 4-6: Passengers per Hour by Service Type (2011-2014)

Fare Recovery

Fare recovery is the percent of operating costs recovered through fare revenues from passengers. The regional fare recovery was 23.9 percent in 2014, down from 27.9 percent in 2011 and 28.7 percent in 2008 (**Figure 4-7**). Vanpool collects a significant portion of costs from users, but the program is not part of the regional fare structure and user costs include more than just fares. The express bus system collects the highest percent of costs from users within the regional fare structure.

Fare recovery is the percent of operating costs recovered through fare revenues from passengers.

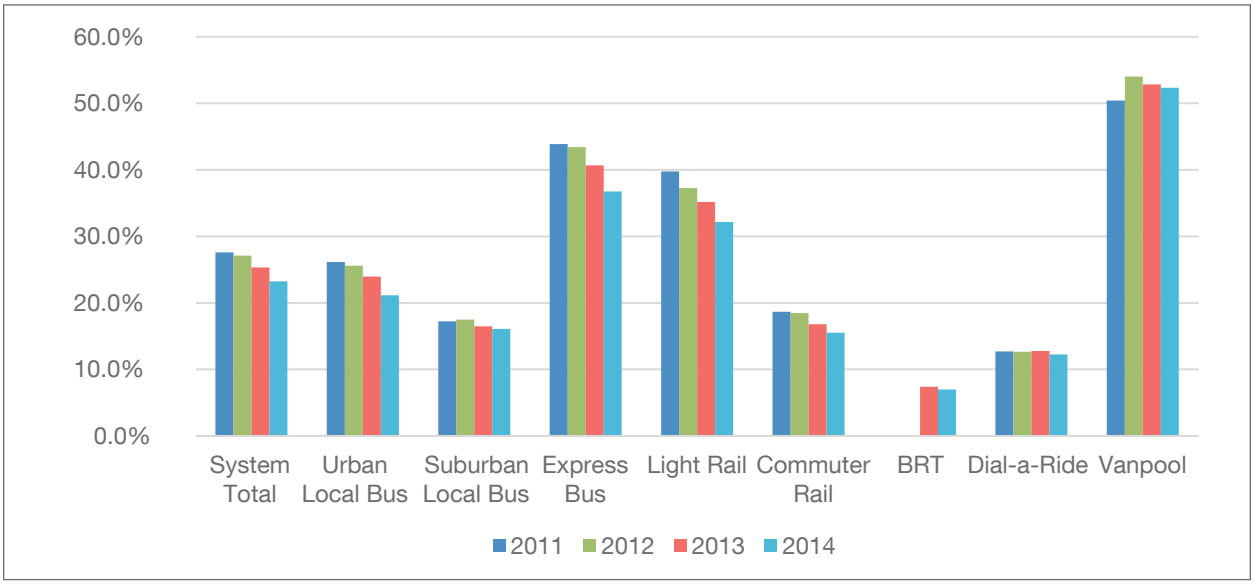


Figure 4-7: Fare Recovery by Service Type (2011-2014)

Infrastructure

Peak Vehicles Operated

The relative number of transit trips taken by rail (17.1 percent) is in stark contrast to the number of vehicles operated as part of the regional system (5.2 percent).

The core of any transit system is its vehicles. In 2014, the maximum number of vehicles used on any given day in the Twin Cities was 1,778. Less than half of these vehicles were used by Metro Transit bus and rail, with the remaining vehicles used by the other programs and providers in the region. The relative number of transit trips taken by rail (17.1 percent) is in stark contrast to the number of vehicles operated as part of the regional system (5.2 percent).

The maximum number of vehicles in service overall has increased by 9.6 percent since 2011. One reason for the growth of vehicles was the introduction of a second light rail line in 2014. Another reason for the increase is the increased demand for the Metro Mobility service, which has grown its fleet by approximately 57 percent since 2005. By contrast, the largest reductions in regional vehicles operated have been in the MTS dial-a-ride programs. After its consolidation under the Transit Link program, it saw a decrease of 20.2 percent in the maximum number of vehicles.

Park-and-Rides

The facilities and capacity of the Twin Cities regional park-and-ride system are continuously in flux as new facilities are opened, underutilized facilities are closed, facilities are temporarily closed for expansions, and temporary facilities are used during expansion or until permanent facilities can be constructed.

The facilities and capacity of the Twin Cities regional park-and-ride system are continuously in flux as new facilities are opened, underutilized facilities are closed, facilities are temporarily closed for expansions, and temporary facilities are used during expansion or until permanent facilities can be constructed. The Twin Cities region had 108 active park-and-ride lots as of 2014, with a total capacity of 32,463 spaces. This is up from a capacity of approximately 15,500 spaces in fall 2002, more than doubling the regional capacity over the past 12 years (**Figure 4-8**). In 2014, the capacity was about 56 percent utilized on an average weekday. This capacity is available for seasonal peaks and was built to serve the park-and-ride demand in the future, based on 2030 projections.

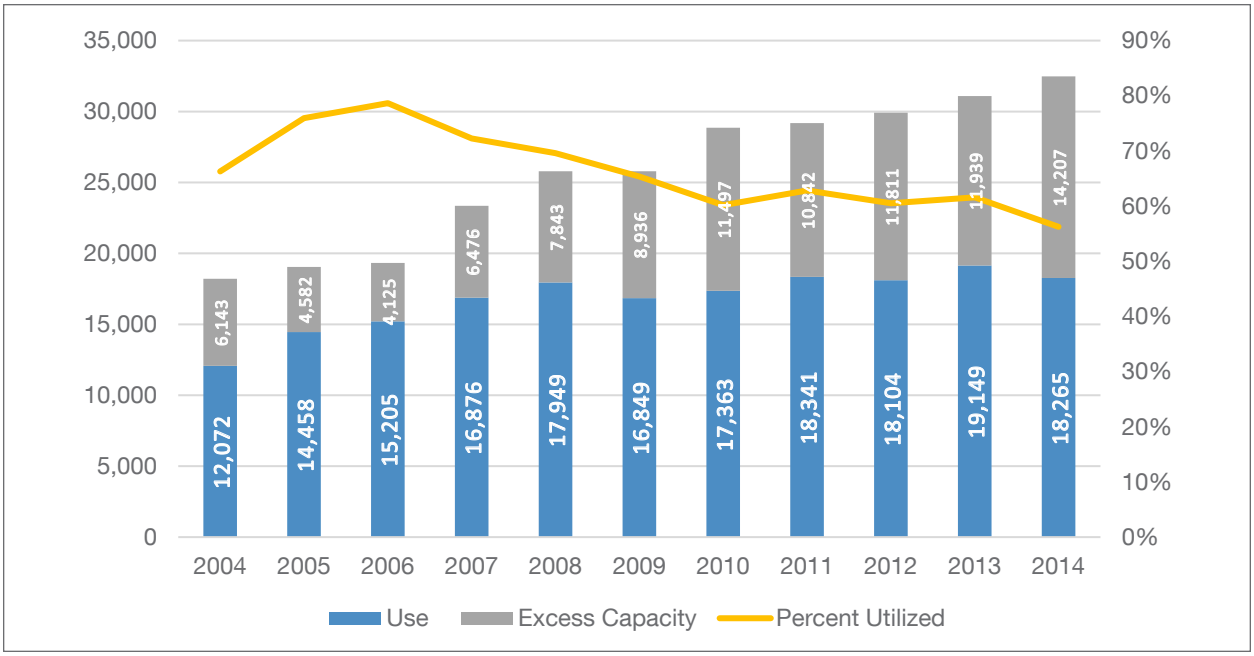


Figure 4-8: Twin Cities Transit System Park-and-Ride Utilization

Even though there are 108 lots, over half of spaces are concentrated in the 21 largest lots. The three largest, the Burnsville Transit Station, 28th Avenue Station, and I-35W & 95th Avenue, have approximately 13 percent of the region's total park-and-ride capacity.

Spaces are provided through three types of arrangements:

- Park-and-rides are owned by transit agencies like Metro Transit or suburban transit provider organizations
- Park-and-rides are owned by the Minnesota Department of Transportation (MnDOT), typically on excess highway right-of-way and used under agreement between MnDOT and the transit provider
- Park-and-rides are joint use with private entities like theaters, shopping centers, or churches

Park-and-rides are served by Metro Transit and the region's suburban transit agencies (**Figure 4-9**). Metro Transit and Metropolitan Council account for about 64 percent of park-and-ride spaces. MVTA, the suburban transit provider with the most park-and-ride spaces, accounted for 15 percent of all spaces in 2014.

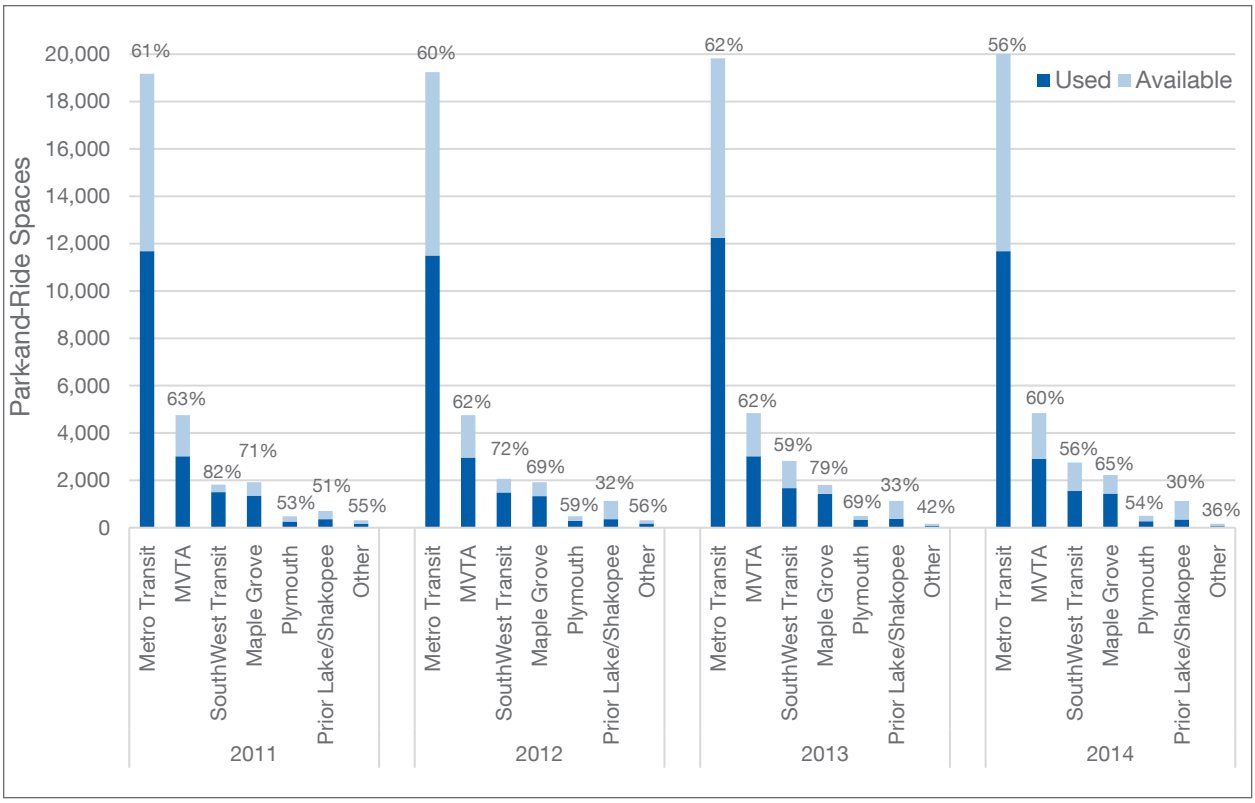


Figure 4-9: Park-and-Ride Capacity and Usage by Provider[4-5]

Every other year, the region surveys park-and-ride facilities to determine the home location of users. The most recent survey was conducted in fall 2016; however, 2014 data was used for this report to be consistent with the date of other transit data discussed. Park-and-ride users come from throughout the region including outside the Transit Capital Levy Communities (communities within the transit taxing district and communities that have come to an agreement with the Metropolitan Council to levy in their community for transit capital) and even beyond the seven-county metropolitan boundary (**Figure 4-10**).

Table 4-18: User Home Origins from Minnesota License Plates by Geography (2014)

Minnesota User Home Origins	Count	% of Total
Inside Transit Capital Levy Communities	12,606	74.0%
Outside Transit Capital Levy Communities but Inside 7-County Metro	1,656	9.7%
Outside of the 7-County Metropolitan Area	2,784	16.3%
Grand Total	**17,046**	**100%**

4-5 Note: Percentages indicate the amount of total park-and-ride spaces utilized by transit provider

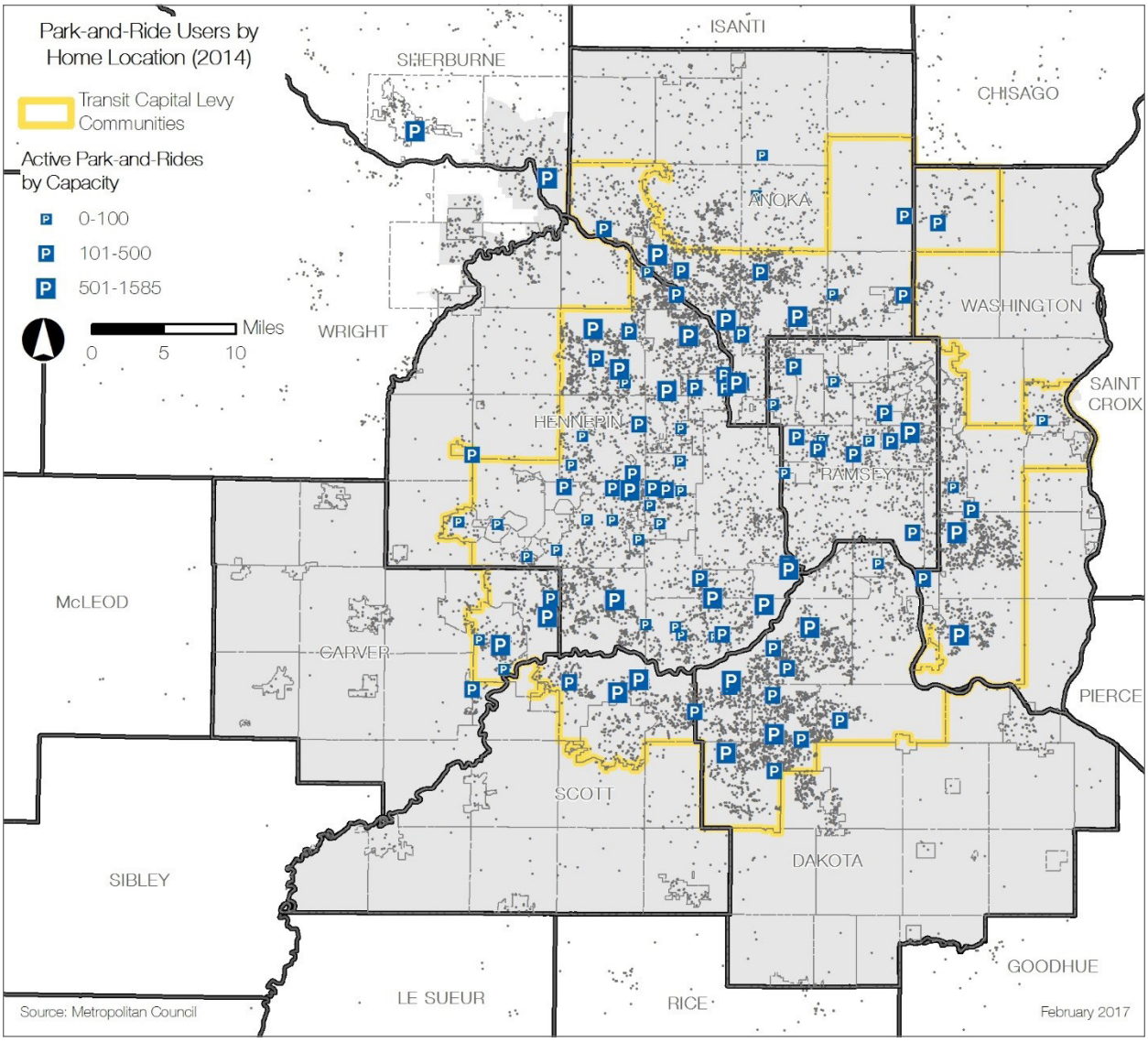


Figure 4-10: Park-and-Ride Users' Home Locations (Fall 2014)

Transit Centers

Transit centers and stations are built to improve waiting conditions and facilitate transfers among buses and trains. Currently, there are 50 transit centers throughout the system (**Figure 4-11**), 19 of which are located adjacent to a park-and-ride. Stations are also available for riders along light rail, commuter rail, highway BRT, and arterial BRT lines. There are currently 68 stations available to riders throughout the region.

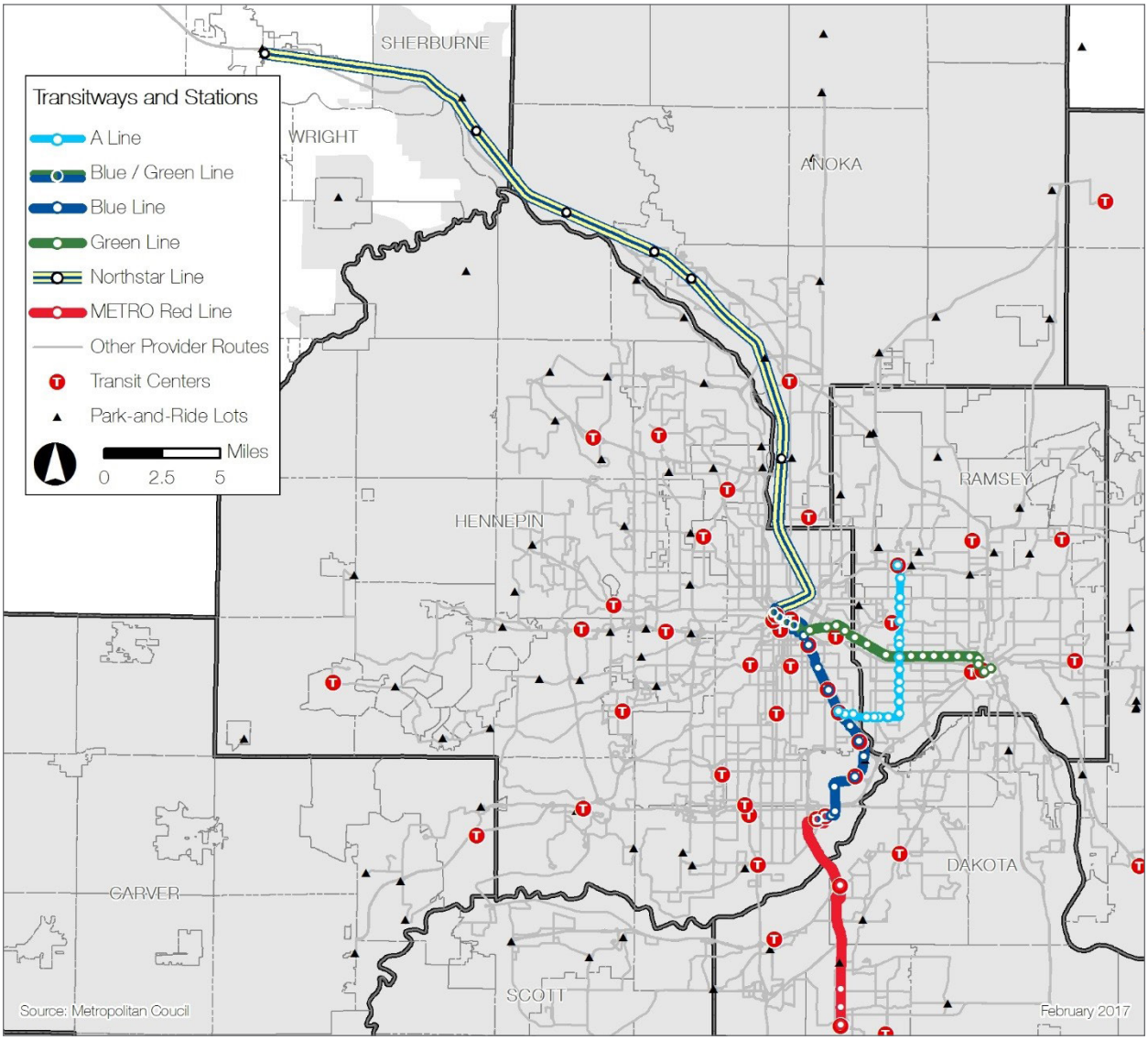


Figure 4-11: Transit Centers and Stations

Support Facilities

The Twin Cities transit system is served by a variety of support facilities. Metro Transit currently has 13 vehicle and facility-related support facilities, with 16 other facilities servicing Metro Mobility, suburban transit providers, MTS, and other contracted service vehicles. Metro Transit also has a transit control center and other operations-related facilities. All facilities, except the Northstar facilities in Big Lake, are located in the seven-county metropolitan area. Several facilities are shared between providers and services.

Metro Transit currently has 13 vehicle and facility-related support facilities, with 16 other facilities servicing Metro Mobility, suburban transit providers, MTS, and other contracted service vehicles.

Transit Advantages

Transit can make use of facilities in the transportation system that give it a travel time and flow advantage over regular traffic.

Transit can make use of facilities in the transportation system that give it a travel time and flow advantage over regular traffic.

State law allows shoulders on highways to be used by buses to bypass congestion and to improve travel times over automobiles. Most of these bus shoulders are 10 to 12 feet wide, which is wider than the typical shoulder that was constructed solely for automobile breakdowns and emergency vehicles. These lanes are also signed as being for bus use only. In 1992, the Twin Cities' first bus-only shoulder was constructed. Since that time, there has been a dramatic growth in the number of bus-only shoulders in the Twin Cities (**Figure 4-12**). The growth of bus-only shoulders continues to be restricted by funding and the decreasing availability of potential bus-only shoulder sites, whether through completion of potential shoulders or physical constraints at key opportunity sites. Since 2011, MnDOT and Scott County have added bus-only shoulder lanes during reconstruction projects. Bus-only shoulder lanes were also added during the construction of the METRO Red Line. While growth has occurred, bus-only shoulder lanes were removed from Interstate 35W with the addition of MnPASS lanes.

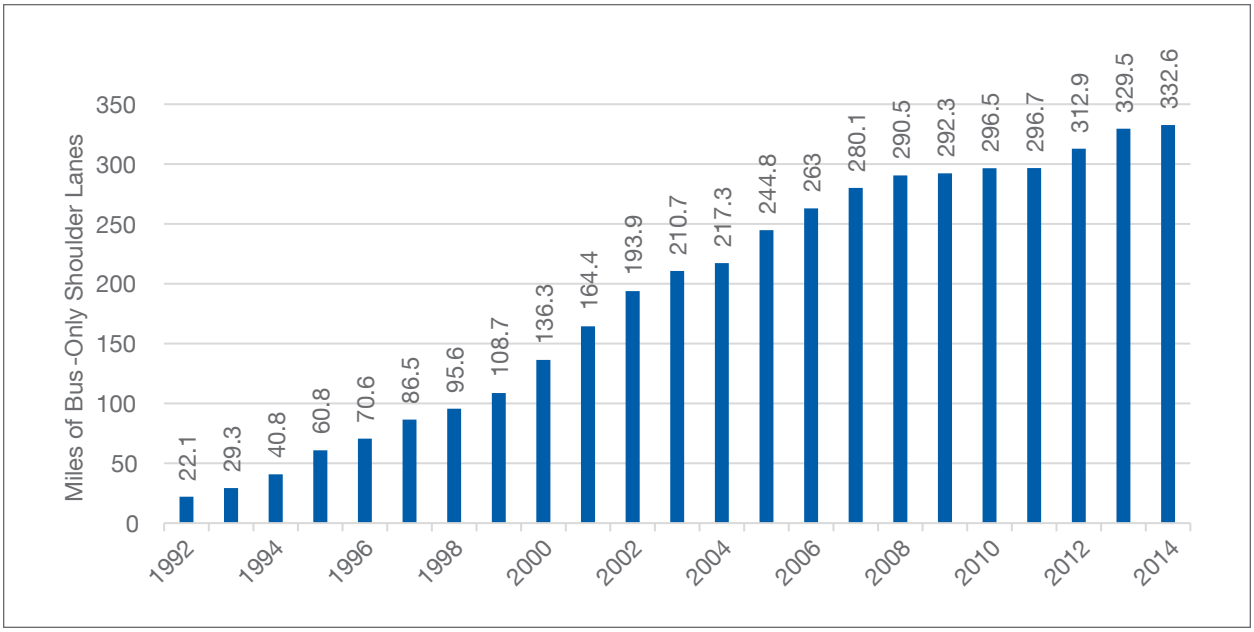


Figure 4-12: Miles of Bus-Only Shoulders

In addition to bus-only shoulders, the region has several other transit facilities that give an advantage to transit vehicles. Those include:

- High-occupancy toll (HOT) or MNPASS lanes
- Ramp meter bypass lanes
- Dedicated busways (University of Minnesota transitway)
- Dedicated local bus lanes, primarily in downtown Minneapolis and St. Paul

Table 4-19: 2014 Summary of Existing Transit Advantages

Bus-Only Shoulder Miles	High-Occupancy Toll Lane Miles	Ramp Meter Bypasses	Busway Lane Miles	Bus Lane Miles (Local)	Online Stations
335.1	53.4	94	6.0	12.9	3

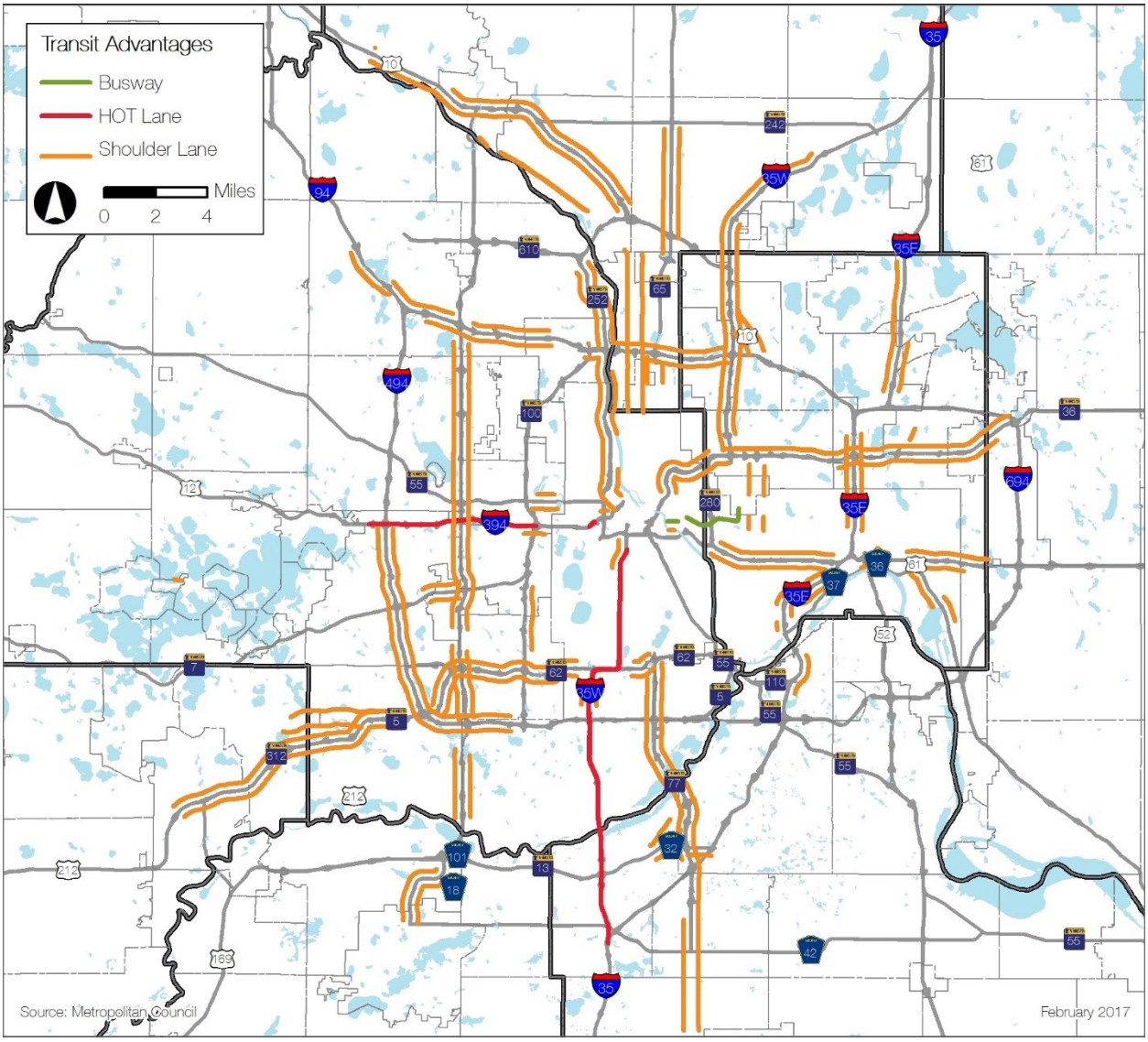


Figure 4-13: Map of Bus-Only Shoulders and HOT Lanes

Transitways

Transitways are investments in high-demand corridors that allow for fast, reliable travel between regional destinations. The Twin Cities region has started a build-out of a network of transitways throughout the metropolitan area.

The 2040 Transportation Policy Plan (TPP) envisions the development of a network of transitways. Transitways are investments in high-demand corridors that allow for fast, reliable travel between regional destinations. The Twin Cities region has started a build-out of a network of transitways throughout the metropolitan area. The METRO Blue Line opened in 2004 and was the first light rail line in the Twin Cities. In 2009, the Northstar commuter rail line opened in the northwest metro. The METRO Red Line, the Twin Cities' first bus rapid transit line, and the METRO Green Line, the second light rail line, opened in 2013 and 2014, respectively. The region's first arterial bus rapid transit line, the A Line, opened in 2016. Several transitways are in the design phases, including C Line, D Line, the METRO Orange Line, the METRO Green Line Extension, the METRO Blue Line extension, and the METRO Gold Line.

Table 4-20: Transitways in Operation, Construction, or Design

Transitway	Status	Opening	Mileage	Stations Served
METRO Blue Line	Complete	2004	12	19
Northstar Commuter Rail	Complete	2009	40	7
METRO Red Line—Phase 1	Complete	2013	11	6
METRO Green Line	Complete	2014	11	23
A Line	Complete	2016	10	20
METRO Orange Line	Project development and Engineering	Planned 2019	17	11
METRO Blue Line Extension	Engineering	Planned 2021	13	12
METRO Green Line Extension	Engineering	Planned 2021	15	17
METRO Gold Line	Project development	Planned 2023	9	18

In addition to the transitways that are open or in development, there are numerous transitway projects under study or in the planning phase where the final project mode and alignment have yet to be determined. Additional information about these transitway projects can be found in MnDOT's Guideway Status Report.

Table 4-21: Transitways in Planning or Analysis Phases

Transitway	Status
Highway 169 Transitway/MnPASS Corridor	Under consideration in Highway 169 Mobility Study
I-35W North	Under consideration in MnPASS Study
Midtown Corridor	Alternatives analysis complete, next step TBD
Nicollet-Central Modern Streetcar	Locally preferred alternative recommended, currently undergoing environmental assessment
Red Rock Corridor	Implementation plan approved
Robert Street Corridor	Alternatives analysis complete, next step is to determine locally preferred alternative
Rush Line Corridor	Alternatives analysis
Riverview Corridor	Alternatives analysis
West Broadway Corridor	Alternatives analysis

Peer Transit Systems

The Twin Cities' transit system performance is assessed, in part, using data from the federal National Transit Database (NTD). The region's performance is compared to the performance of a peer group of 12 urban area transit systems. A map of peer regions is shown in **Figure 2-3** in this report.

Peer Modes

Peer groups were originally established in 1996, and regions were selected that were similar both in size and in composition of transit service. Over the subsequent years, changes in transit agencies, services provided, and regional demographics have led the Council to reevaluate the peer regions and their agencies. Since 1996, two regions have been added to the list (San Diego and Phoenix) while two other regions from past reports were eliminated (Cincinnati and Buffalo).

All the peer regions operate some form of regular bus service and dial-a-ride, and, as of 2015, all the peers except Milwaukee had light rail in operation. The other modes, operated as of the end of 2015, are shown in **Table 4-22**.

Table 4-22: Peer Region Transit Modes

Region	Bus	BRT	Heavy Rail	Commuter Rail	Light rail/ Streetcar	Hybrid Rail	Van Pool	Other
Baltimore	■		■	■	■			
Cleveland	■	■	■		■			
Dallas	■			■	■	■	■	
Denver	■				■		■	
Houston	■				■		■	
Milwaukee	■							
Phoenix	■				■		■	
Pittsburgh	■				■		■	Inclined plane
Portland	■				■	■	■	Aerial Tramway
San Diego	■			■	■	■	■	
Seattle	■	■		■	■		■	Trolley bus, Monorail
St. Louis	■				■		■	
Twin Cities	■	■		■	■		■	

Peer Statistics

Population

When looking at the performance of peer region transit systems, it is important to consider both population and density, particularly of the urbanized area (UZA), to determine which fixed-route transit service will be most effective.

The largest two peer regions are Dallas, TX and Houston, TX. However, the densest peer regions are San Diego, CA and Denver, CO. The varying level of population density contributes to the overall effectiveness of most intensive transit services, such as rail transit.

Table 4-23: Peer Region Densities

Region	Population (2010 UZA)	Land Area (Sq. Mi)	Population Density	Density Rank
Baltimore	2,203,663	717	3,073	5
Cleveland	1,780,673	772	2,307	12
Dallas	5,121,892	1,779	2,879	8
Denver	2,374,203	668	3,554	2
Houston	4,944,332	1,660	2,979	7
Milwaukee	1,376,476	546	2,521	10
Phoenix	3,629,114	1,147	3,164	4
Pittsburgh	1,733,853	905	1,916	13
Portland	1,849,898	524	3,530	3
San Diego	2,956,746	732	4,039	1
Seattle	3,059,393	1,010	3,029	6
St. Louis	2,150,706	924	2,328	11
Twin Cities	2,650,890	1,022	2,594	9

Ridership

While the Twin Cities saw a ridership increase of 5.1 percent during this time period, several of the peer regions saw a greater increase in ridership.

Annual transit ridership grew at a slower rate in the Twin Cities from 2011 to 2015 than the peer region average. While the Twin Cities saw a ridership increase of 5.1 percent during this time period, several of the peer regions saw a greater increase in ridership (**Figure 4-14**). From a longer-term perspective, the Twin Cities has the fourth highest growth rate in ridership from 2005-2015 among peer regions (Seattle, Phoenix, and San Diego grew at a greater rate). While there was an increase in ridership in the Twin Cities from 2013 to 2015, the opening of the METRO Green Line introduced a shift in modal split, as bus ridership declined from people switching from bus to rail. Ridership in the Twin Cities is expected to grow as the transitway system and supporting bus system is expanded in the next five years.

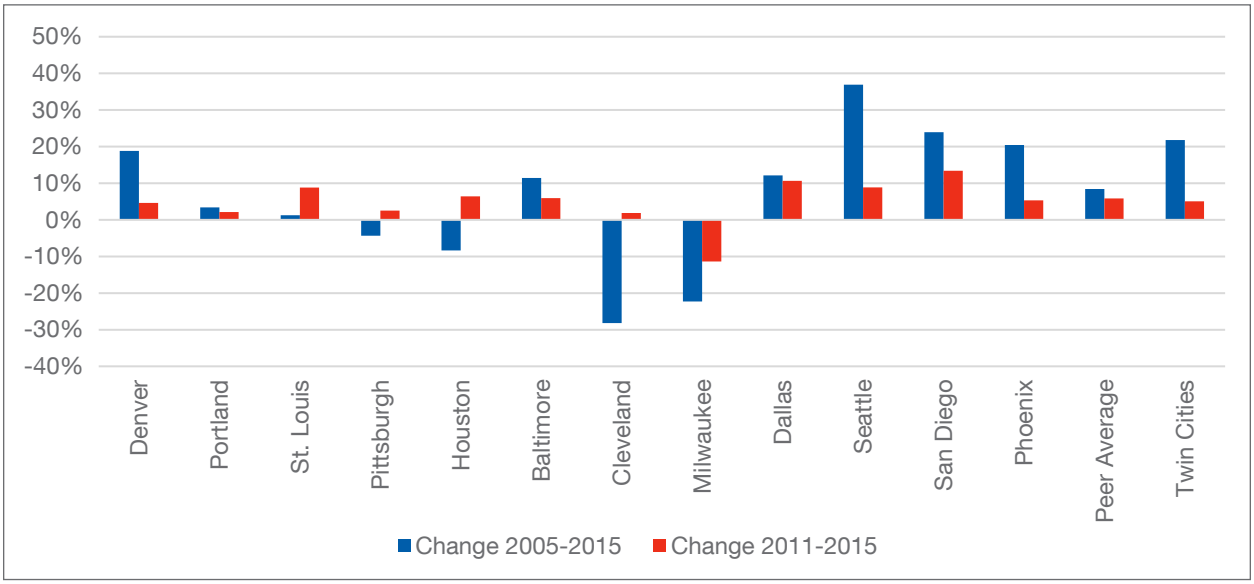


Figure 4-14: Ridership Change Across Peer Cities (2005-2015; 2011-2015)

Expenses

The transit operating cost per hour in the Twin Cities increased 11.9 percent between 2011 and 2015 as compared to 5.7 percent for peer regions. When adjusted for inflation, the Twin Cities operating cost per house increased 6.9 percent compared to 1.0 percent for peer regions.

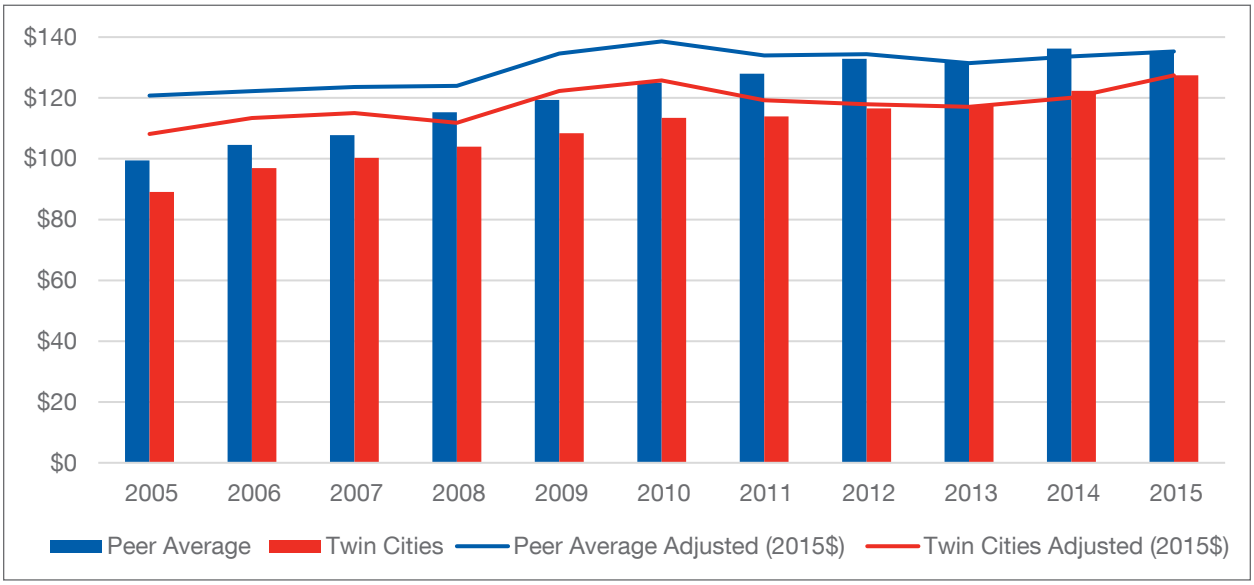


Figure 4-15: Operating Cost per Hour for Twin Cities and the Peer Region Average (Nominal Value and Real Value in 2015$)

Performance Measures

Farebox recovery is the percentage of operating costs covered by passenger fares. **Figure 4-16** shows the Twin Cities region's farebox recovery is slightly lower than the peer group average. Fares paid by the region's transit riders cover 23.0 percent of transit operating costs compared to 23.9 percent for peer regions. While farebox recovery rates have remained fairly steady in the peer group from 2011-2015, the Twin Cities saw a decline of 17.5 percent over this time period.

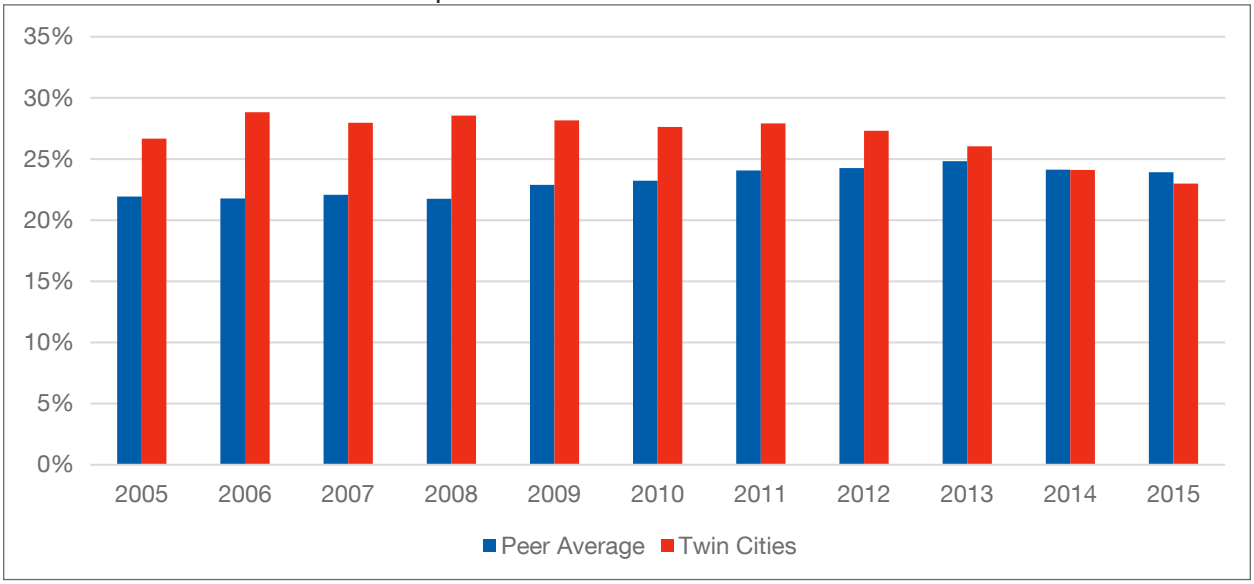


Figure 4-16: Fare Recovery of the Twin Cities and the Peer Average (2005-2015)

Subsidy per passenger is the cost made up by government subsidies after user revenues are deducted. The source of this funding is a combination of federal, state, and local tax revenues as well as other revenues such as advertising. The Twin Cities' net subsidy per passenger increased by $0.93 or 31.5 percent from 2011-2015, while the peer region subsidy increased only 5.7 percent. Between 2005-2015, 2015 was the only year that the Twin Cities had a higher subsidy per passenger than the peer average (**Figure 4-17**).

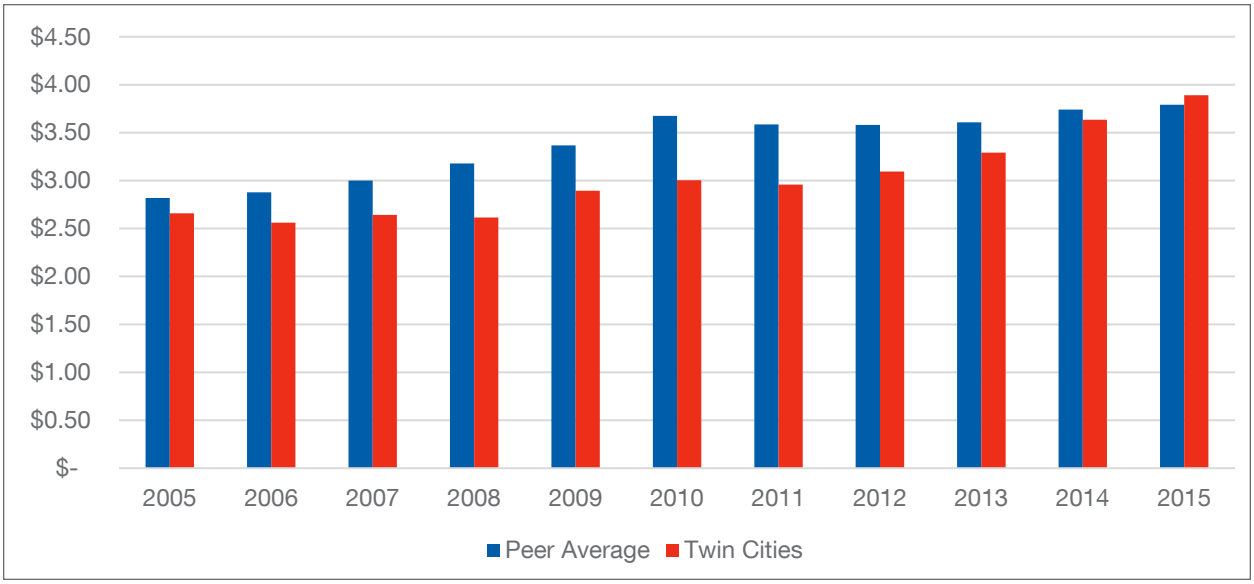


Figure 4-17: Subsidy per Passenger of Twin Cities and Peer Average (2005-2015)

The number of miles of transit service provided in the Twin Cities is above the peer region average. While many similarly sized regions that began expanding their systems earlier have a greater number of miles of transit service, the Twin Cities had the greatest growth in number of miles per capita between 2011-2015 (**Figure 4-18**). One reason for this growth is the significant increase in demand for Metro Mobility and Transit Link.

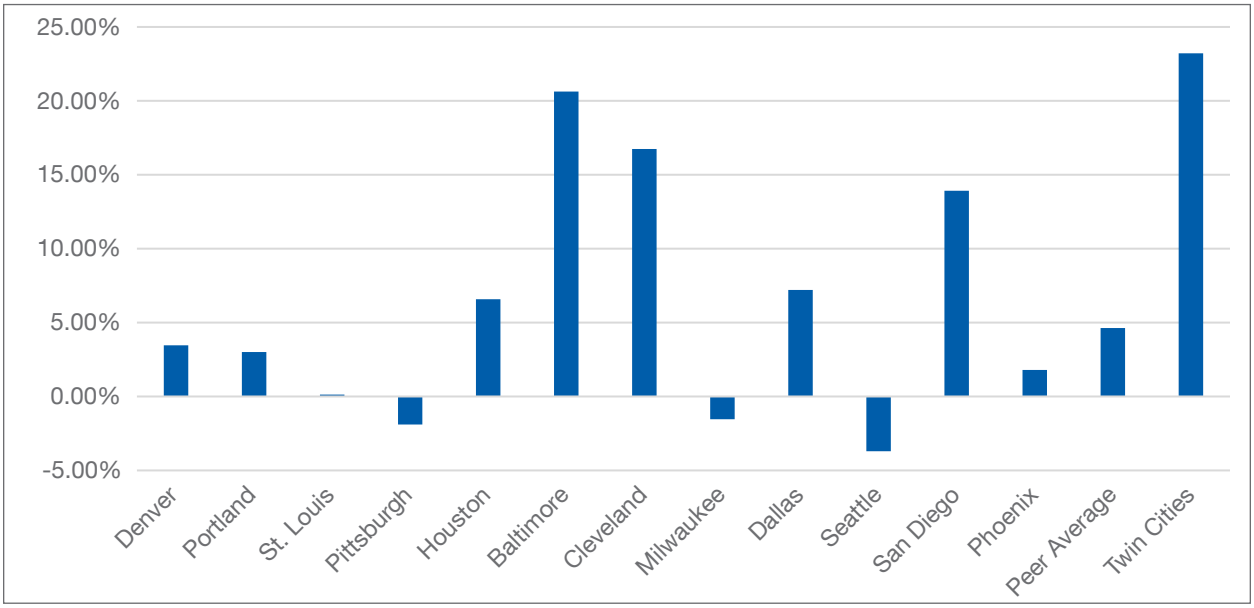


Figure 4-18: Change in Miles of Transit Service per Capita Across Peers (2011-2015)

In 2015, **Figure 4-19** shows the Twin Cities provided about 37.2 transit rides for every person in the region. This was above the peer average of 32.5 but about 40 percent less than Portland, which has the highest trips per capita of any peer region. The peer cities with the highest trips per capita have a higher density than the Twin Cities (Pittsburgh is an exception) and have more miles of service per capita (except Portland and Pittsburgh).

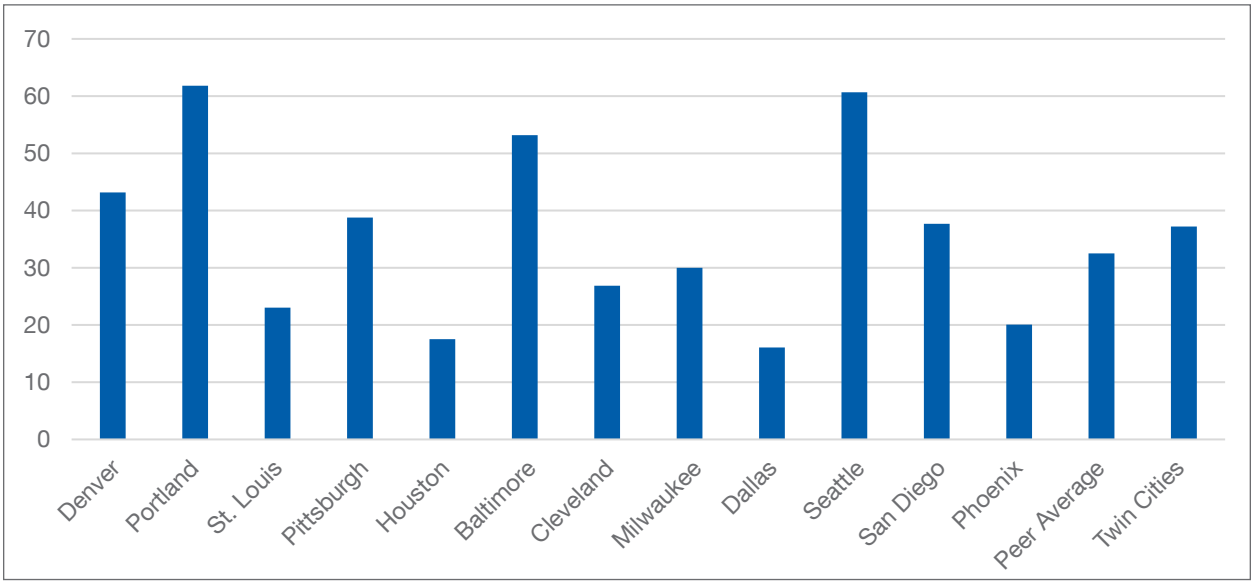


Figure 4-19: Transit Trips per Capita Across Peer Cities (2015)

Improving Transit Performance with Investment – Case Studies

A Line

Investment

Approximately $27 million was invested to plan, design, and construct the A Line.

Improvement

The A Line project built 20 enhanced stations with heated and lit shelters, pylon station markers with real-time information displays, off-board ticketing and fare card validation, security cameras and emergency telephones, and other customer amenities. Curb extension station platforms were constructed to expand the available sidewalk space and position buses for an in-lane stop, reducing delay from weaving in and out of traffic. Platforms were designed with higher curbs for a decreased step into the bus, and clear platform areas allow Metro Transit staff to clear snow from the platforms for a safe winter riding experience. The project added transit signal priority to 17 signals in the corridor. Thirteen low-floor buses with wide rear doors, an open seating layout, Wi-Fi, and distinctive BRT styling were purchased to run A Line service.

Before the A Line, local bus service in the Snelling Avenue/ Ford Parkway corridor served more than 80 bus stops per direction, with all payment collected on board and no active interaction with traffic signals. By stopping less often, collecting fare payment at the station, boarding customers through both bus doors, and extending green lights with transit signal priority, the A Line is approximately 20 percent faster than its predecessor bus route. Through the end of 2016, A Line buses provided on-time service for customers 92.6 percent of the time, exceeding systemwide goals for bus on-time performance.

By stopping less often, collecting fare payment at the station, boarding customers through both bus doors, and extending green lights with transit signal priority, the A Line is approximately 20 percent faster than its predecessor bus route.

As a result of investment in the A Line, ridership in the corridor has grown by 33.5 percent over 2015 levels, with the greatest increases at the connections to the METRO light rail lines and Rosedale Center.

Resulting Outcome

As a result of investment in the A Line, ridership in the corridor has grown by 33.5 percent over 2015 levels, with the greatest increases at the connections to the METRO light rail lines and Rosedale Center. High ridership on Friday evenings and weekends indicates that A Line customers are using the new line to travel for many different purposes—not just commuting.

Fast and frequent service, with reliability afforded by the A Line's design features, means that customers do not need to plan their travel around a bus schedule, and real-time information at the station provides assurance that the bus will be coming along shortly. Customers can pay cash or credit at the station instead of needing to worry about finding exact change for a farebox while customers queue up behind them. Better defined spaces for transit waiting and boarding make the sidewalk and station platform more accessible for all users.

A Line Bus Rapid Transit Snelling & St. Clair Station

METRO Green Line

Investment

Approximately $957 million was invested in the planning, design, and construction of the METRO Green Line.

Improvement

The METRO Green Line is a light rail line between downtown Minneapolis and downtown St. Paul that primarily operates on University Avenue. The METRO Green Line serves 23 stations, including five stations that are shared with the METRO Blue Line through downtown Minneapolis. Similar to the existing METRO Blue Line stations, the METRO Green Line stations have shelter, seating, heat, bike racks, ticket vending machines, and real-time signage. The line provides transit service 24 hours, seven days a week, at a frequency of 10 minutes during the day, 10-15 minutes during the evening, and 30-60 minutes overnight.

US Bank Stadium

In addition to the construction of the tracks and stations, improvements were also made to the areas surrounding the stations. Sidewalks were reconstructed for people to safely get to and from the stations, signage was added to help with wayfinding, and additional crossing infrastructure was installed. The bus system connecting to the METRO Green Line was also restructured to provide improved travel opportunities.

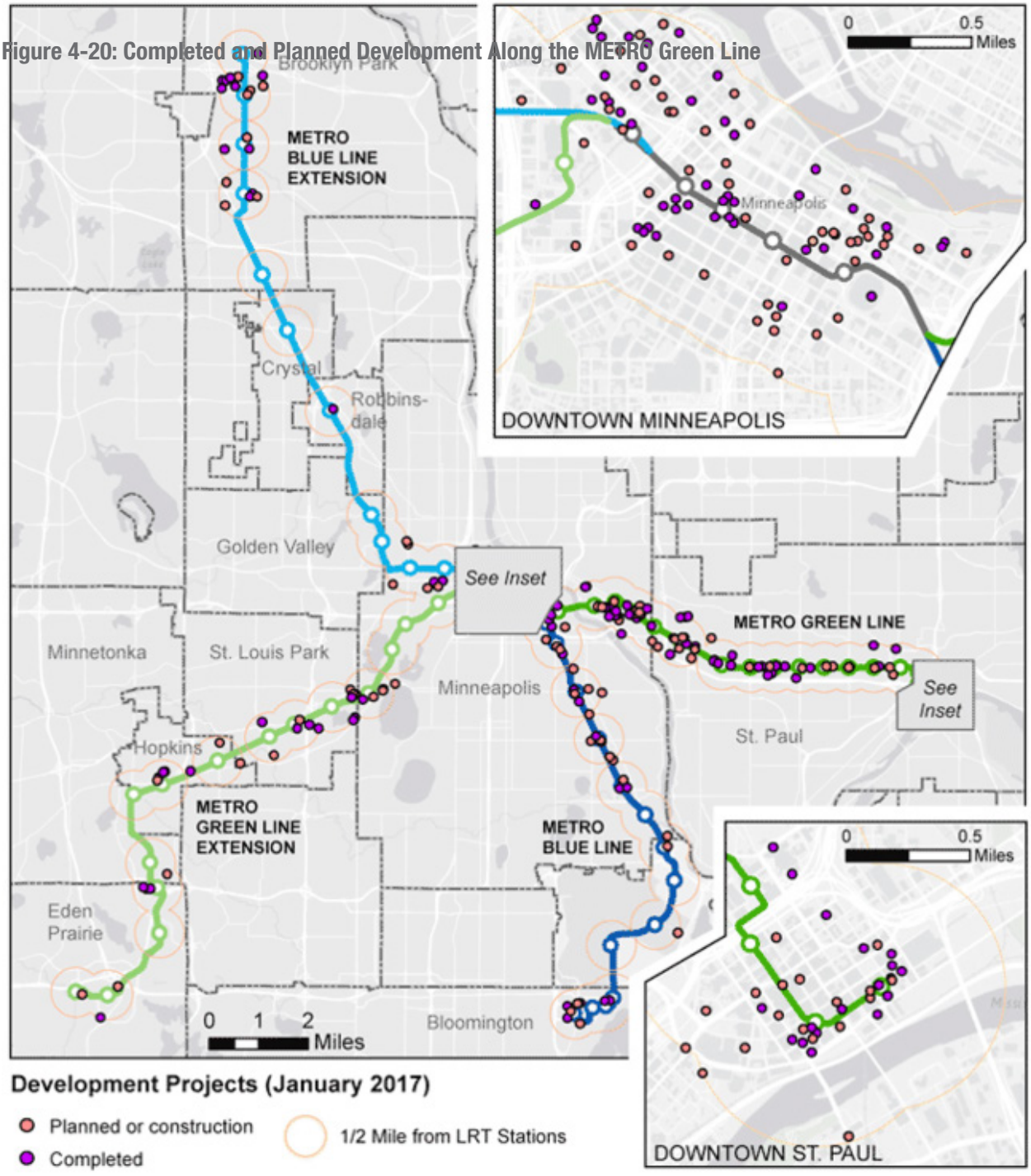
The bus system connecting to the METRO Green Line was also restructured to provide improved travel opportunities.

Resulting Outcome

The METRO Green Line opened in June 2014. As of 2016, ridership on the METRO Green Line increased for the second straight year, finishing with 12.7 million rides. The average weekday ridership on the METRO Green Line is 39,386, which is a ridership level that was not expected for another 15 years.

Figure 4-20 illustrates that development has also been rapidly occurring along the METRO Green Line. Within one-half mile of the line, 13,700 housing units have been added or are planned. Accounting for this housing as well as other developments, a total of $5.1 billion of development has occurred along the METRO Green Line as of the end of 2016.

Figure 4-20: Completed and Planned Development Along the METRO Green Line



Cedar Grove Transit Station

Investment

The investment in the new Cedar Grove Transit Station is approximately $13 million. The project is being constructed in coordination with MnDOT improvements, which add $2 million to the above cost.

Newly Constructed Transit Station

Improvement

A new online transit station is being constructed in the center median of Trunk Highway 77 that will improve the overall efficiency, operation, and reliability of the METRO Red Line and the other express routes that serve this station. The project also includes an enclosed pedestrian overpass from the station to the park-and-ride. Buses will enter and exit the station from the center of Trunk Highway 77, similar to the 46th Street Station on I-35W.

Rendering of the Cedar Grove Transit Station from the East

It is estimated that the new station will save eight minutes for each round trip of the METRO Red Line and the other MVTA express routes that will utilize this station.

Resulting Outcome

While the new Cedar Grove Transit Station is still under construction and not yet in operation, it is estimated that the new station will save eight minutes for each round trip of the METRO Red Line and the other MVTA express routes that will utilize this station. Additionally, in combination with the transit improvements being designed for the Mall of America Transit Station, an operational cost savings of 10 percent and an increase in ridership and revenue of 15 percent are estimated.

Route 11 Hi-Frequency Network

Investment

An investment of $1.87 million was made to add the Route 11 to Metro Transit's Hi-Frequency Network.

Route 11 Bus

Improvement

The Route 11 is a bus route that operates between I-35W & 46th Street Station in south Minneapolis and 29th Avenue & Grand Street in northeast Minneapolis. In order to meet growing demand, the route was added to Metro Transit's Hi-Frequency Network in March 2016. This means that the route now operates at a frequency of 15 minutes or better between 6am and 7pm on weekdays and between 9am and 6pm on Saturdays. Prior to this investment, the Route 11 operated at a frequency of 30 minutes at all times, with the exception of the peak period, when it operated every 15-20 minutes.

Resulting Outcome

Since the route was added to the Hi-Frequency Network, ridership on the Route 11 has increased. Ridership in October 2016 was approximately 20 percent higher than in October 2015. Ridership is expected to increase further as the service matures and more people are aware of this hi-frequency route.

Since the route was added to the Hi-Frequency Network, ridership on the Route 11 has increased.

Findings and Conclusions

A few trends have emerged for the Twin Cities transit system between 2011-2015. These include a mode shift from bus to rail, decreasing fare recovery and increasing rider subsidies, and benefits from system investment/reinvestment and ingenuity.

Declining Bus Ridership

Figure 4-21 shows that transit ridership has shown an increasing trend between 2005-2015.

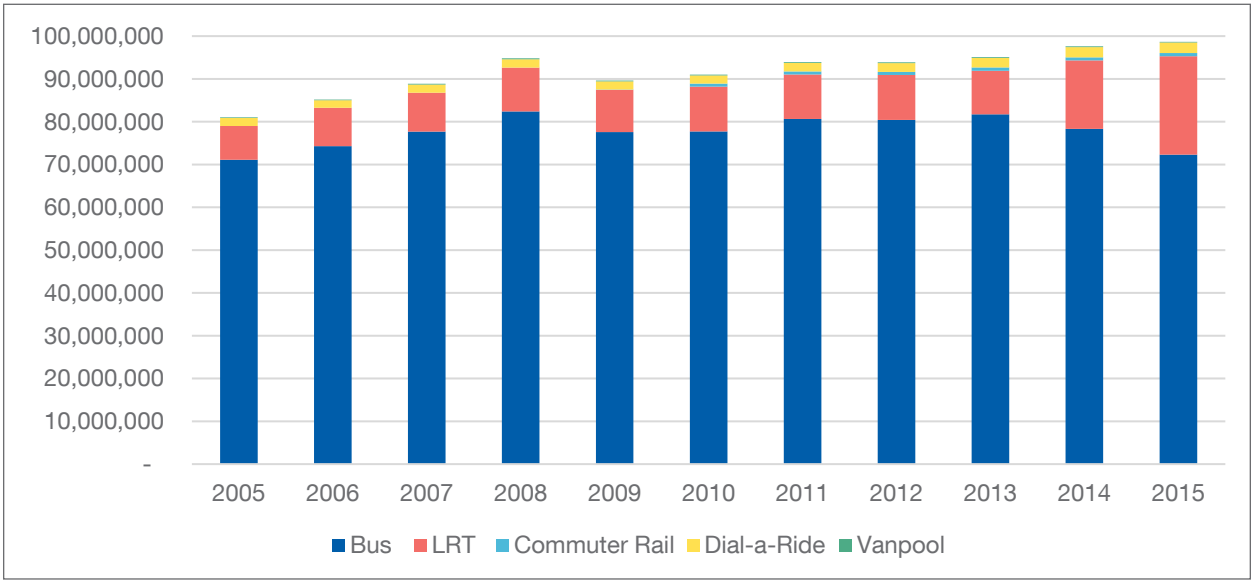


Figure 4-21: Twin Cities Annual Ridership by Mode (2005-2015)

One trend that is emerging, however, is that bus ridership has been declining since 2013. There are several likely reasons for declining bus ridership. These include:

- Restructuring of the bus network connecting to the METRO Green Line in 2014, resulting in a shift of riders from bus to rail that becomes particularly pronounced in 2014 and 2015 (see **Figure 4-22**)
- Lower fuel prices, creating less of a cost incentive to ride transit
- Growth in the express bus market that occurred during significant regional park-and-ride expansion has tapered off in the last few years

- Construction on the Nicollet Mall and the temporary relocation of bus routes that resulted in a less convenient option for some riders

Decreasing Fare Recovery & Increasing Rider Subsidies

Historically, the Twin Cities has been a leader among our transit peers in fare recovery and rider subsidies. In recent years, however, both performance metrics have started to decline (**Figures 4-22** and **4-23**). From 2011-2014, the fare recovery in the Twin Cities has declined by 13.6 percent, while the subsidy per trip has increased by 22.9 percent. A few major contributing factors to this trend include:

- Increasing Metro Mobility ridership
- Declining bus ridership
- Increasing costs without increasing fare (have not had a fare increase since 2008)

Historically, the Twin Cities has been a leader among our transit peers in fare recovery and rider subsidies. In recent years, however, both performance metrics have started to decline.

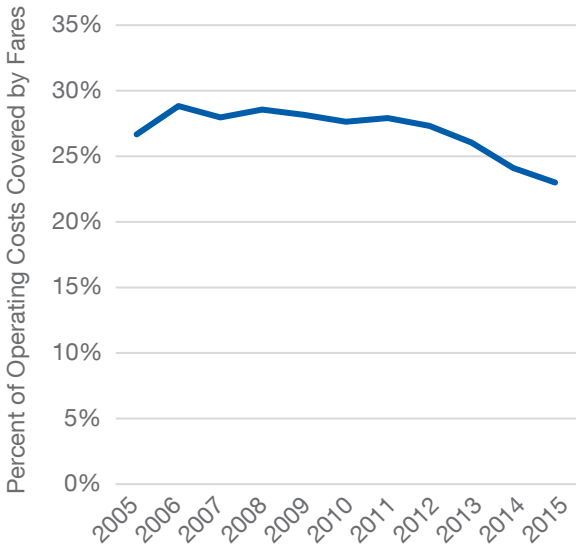


Figure 4-22: Fare Recovery (2005-2015)

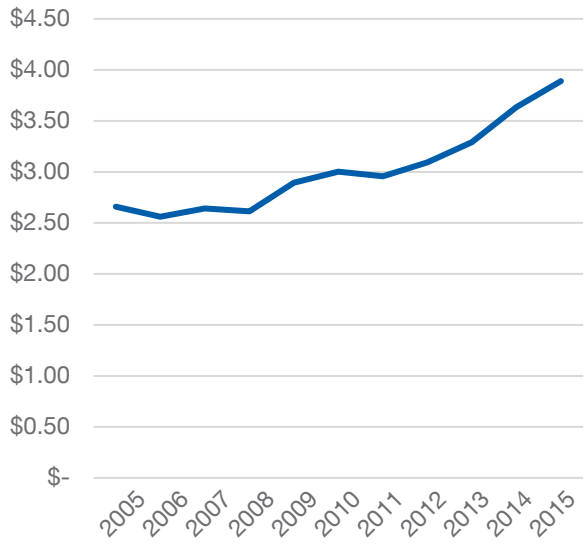


Figure 4-23: Subsidy per Passenger (2005-2015)

Benefits from System Investment/ Reinvestment and Ingenuity

The METRO Green Line and Cedar Grove Transit Station demonstrate the benefits of new investments and how they can be leveraged to grow ridership, improve operations, and encourage transit-supportive development. The addition of the Route 11 to the Hi-Frequency Network demonstrates the ridership benefit of reinvestment.

The case studies discussed previously demonstrate the benefits of new investment, reinvestment, and ingenuity. These three types of investments are likely to continue as the Twin Cities transit system continues to grow. The METRO Green Line and Cedar Grove Transit Station demonstrate the benefits of new investments and how they can be leveraged to grow ridership, improve operations, and encourage transit-supportive development. The addition of the Route 11 to the Hi-Frequency Network demonstrates the ridership benefit of reinvestment. Local buses are the backbone of the Twin Cities transit system, and service improvements to local buses are necessary to keep the whole system growing. Improvements to local buses are also a low cost way to add ridership benefit. The A Line demonstrates the benefit of ingenuity and how the introduction of a new mode to the Twin Cities transit system can increase ridership, benefit operations, and improve the customer experience. The success of the A Line provides support for additional arterial BRT corridors in the Twin Cities.

Increased Access to High-Frequency Transit

High-frequency transit service creates a level of access that allows people to depend on transit for a large portion of their daily travel needs and it is an important indicator of regional economic competitiveness. The Metropolitan Council defines the service as one or more trips every 15 minutes on weekdays between 6 AM and 7 PM, and Saturdays between 9 AM and 6 PM.

Chapter 5: The Freight System

Characteristics of the Regional Freight System

The freight transportation system plays a critical role in supporting the region's economic status, competitiveness, and quality of life, allowing it to stand out as an important business and transportation hub.

Role of the Freight Transportation System

The freight transportation system plays a critical role in supporting the region's economic status, competitiveness, and quality of life, allowing it to stand out as an important business and transportation hub.

Without a safe, efficient, reliable, and robust freight transportation system, many residents would not have access to the goods and materials they need to live, work, and recreate. Many businesses would not be able to distribute their products to customers or receive shipments needed to manufacture items.

Contributions of Freight Modes

Each freight mode contributes to the region's economy in specific ways:

- **Roadways** provide access for truck freight (including long-haul trucks traveling through the region) to freight-generating industries such as manufacturers and processing plants, to last-mile connections for distribution facilities, ports and rail yards, to retail establishments, and home deliveries to consumers.
- **Railroads** move a variety of commodities, especially heavy bulk goods, and containerized freight moved by rail and truck. The region's railroads provide important local and regional connections to the national railroad network, serving national markets and coastal ports for international trade.
- **Air freight and air express services** allow regional businesses to ship low-weight, high-value, and/or time-sensitive goods to both domestic and international markets.
- **Waterways** (i.e., barges) offer less costly and higher-volume shipping options than other modes, particularly for long-distance bulk freight. A number of key industries rely on the affordability provided by water freight transportation.

Freight Modal Distribution

About 178 million tons of freight valued at approximately $280 billion is moved annually in the Minnesota portion of the Minneapolis-St. Paul Combined Statistical Area (CSA), which includes 19 counties.

Based on data from the 2012 Commodity Flow Surveys (CFS), about 178 million tons of freight valued at approximately $280 billion is moved annually in the Minnesota portion of the Minneapolis-St. Paul Combined Statistical Area (CSA), which includes 19 counties. This includes $95 billion in inbound shipments (68 million tons), $128 billion in outbound shipments (55 million tons), and $57 billion in intraregional shipments (56 million tons) as shown in **Tables 5-1** and **5-2**. This does not include through shipments that do not have an origin or destination within the region.

In terms of international trade, the Twin Cities region ranked 16th in the nation in 2015 for the value of its international exports at about $19.6 billion per year according to the International Trade Administration.

Most of the value and tonnage of the region's freight can be attributed to freight moved by truck, as shown in **Figure 5-1**. On average, about 87 percent of freight by value and 68 percent by weight is carried by truck to and from the Twin Cities CSA area. Rail is also a key mode, carrying about 25 percent of regional freight by weight. Compared to trucking and rail, lower levels of freight activity are accommodated via air or water. These secondary modes, however, are critical to sustain particular industries such as agriculture and aggregate products (waterborne freight) and precision medical instruments (air freight).

On average, about 87 percent of freight by value and 68 percent by weight is carried by truck to and from the Twin Cities CSA area.

Table 5-1: Regional Freight Shipments by Value (Billions of Dollars)

	Billions of Dollars per Year		
Type of Shipment	**2007**	**2012**	**Percent Change**
Inbound	$75.44	$95.00	25.9%
Outbound	$112.79	$127.95	13.4%
Intra-Region	$58.94	$56.82	-3.6%
Total	**$247.17**	**$279.77**	**13.2%**

Table 5-2: Regional Freight Shipments by Tonnage (Millions of Tons)

	Millions of Tons per Year		
Type of Shipment	**2007**	**2012**	**Percent Change**
Inbound	47.95	68.15	42.1%
Outbound	47.32	54.51	15.2%
Intra-Region	72.94	55.68	-23.7%
Total	**168.22**	**178.33**	**6.0%**

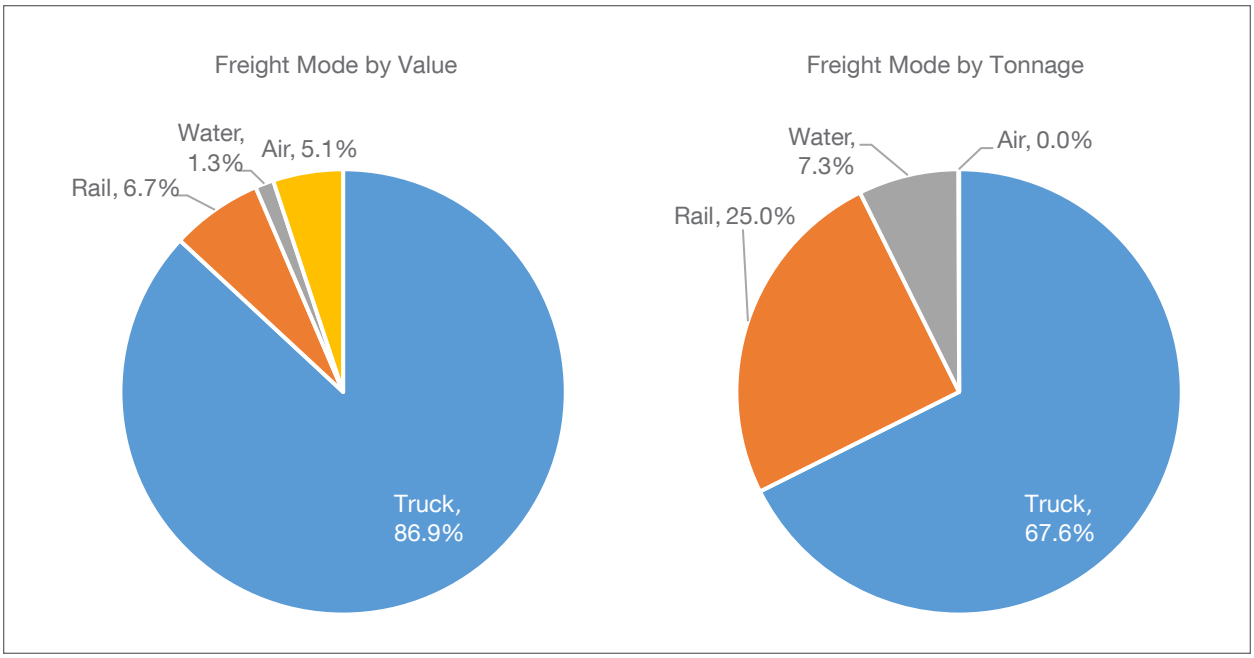


Figure 5-1: 2012 Regional Freight Modal Split by Value and Tonnage (Estimates Based on Multiple Data Sources)

Highway System

Daily Truck Volumes on Highways

Since the majority of freight in the region moves by truck, highways continue to be a critical element of the freight transportation system and the region's economic sustainability.

Highways have been important to the development of the region's economy. Since the majority of freight in the region moves by truck, highways continue to be a critical element of the freight transportation system and the region's economic sustainability. Interstates, freeways and other roadways, including state and county highways and city arterials, support the movement of goods through the metropolitan region. These routes provide important interregional connectors, providing access to the other major economic centers of the state such as Duluth, Rochester, and St. Cloud.

Interstate 94 provides a particularly important freight link, connecting the Twin Cities region to other parts of the Upper Midwest. **Figure 5-2** and **Figure 5-3** show estimated 2012 Heavy Commercial Annual Average Daily Traffic (HCAADT) on regional highways based on Freight Analysis Framework (FAF) network assignment estimates. The heaviest truck activity is via the I-94/I-90 corridor to Chicago and between the Twin Cities and Fargo, North Dakota via I-94. The next highest truck corridor is along I-35 between Des Moines, Iowa and Duluth, Minnesota. The I-94/I-90 corridor to Chicago is of particular significance as volumes of freight trucked via I-94/I-90 to that city's rail and air freight hubs continues to grow.

Figure 5-4 identifies the most heavily-used truck routes based on preliminary results from a regional truck study.

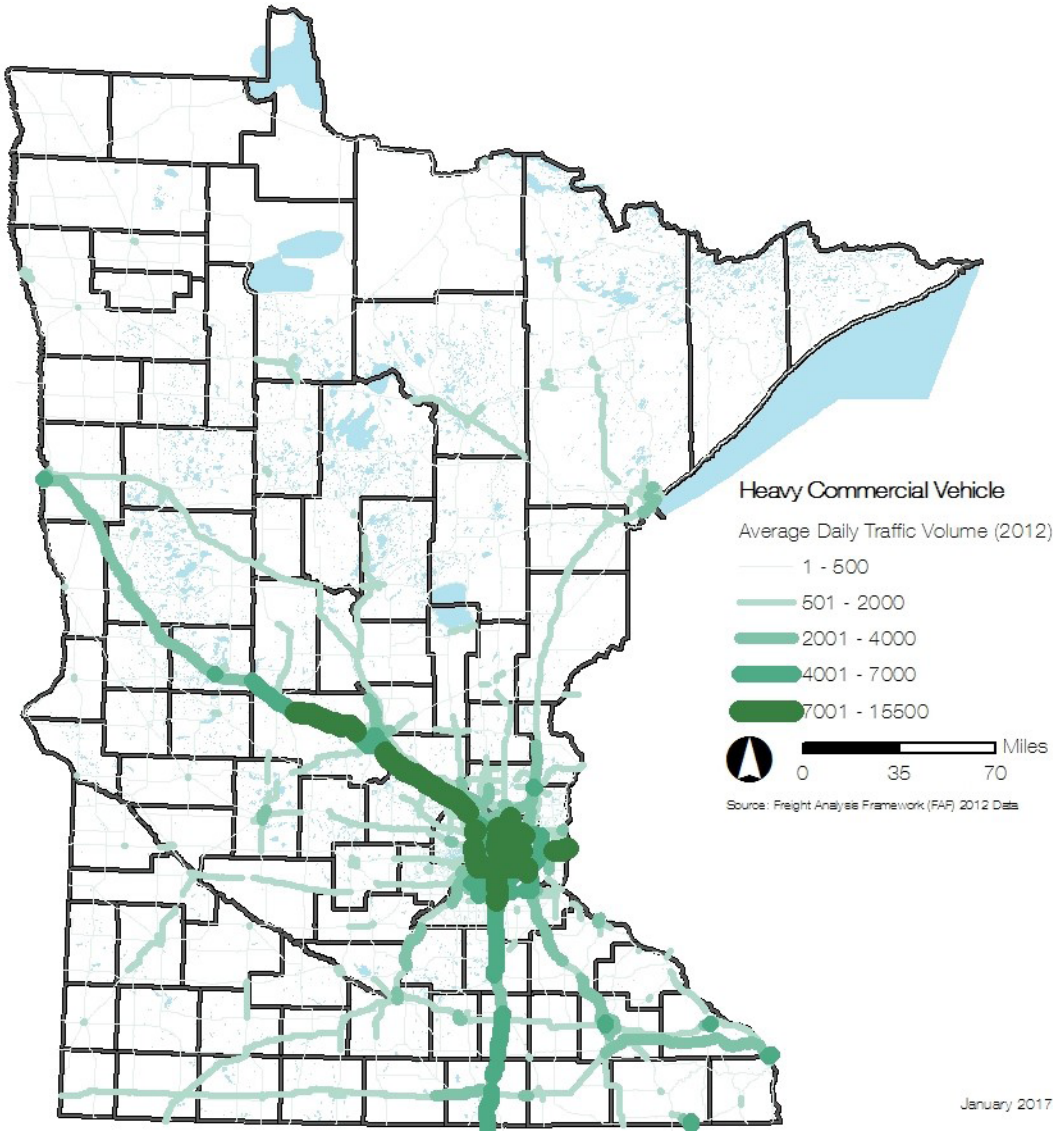


Figure 5-2: Statewide Estimated Daily Truck Volumes (2012)

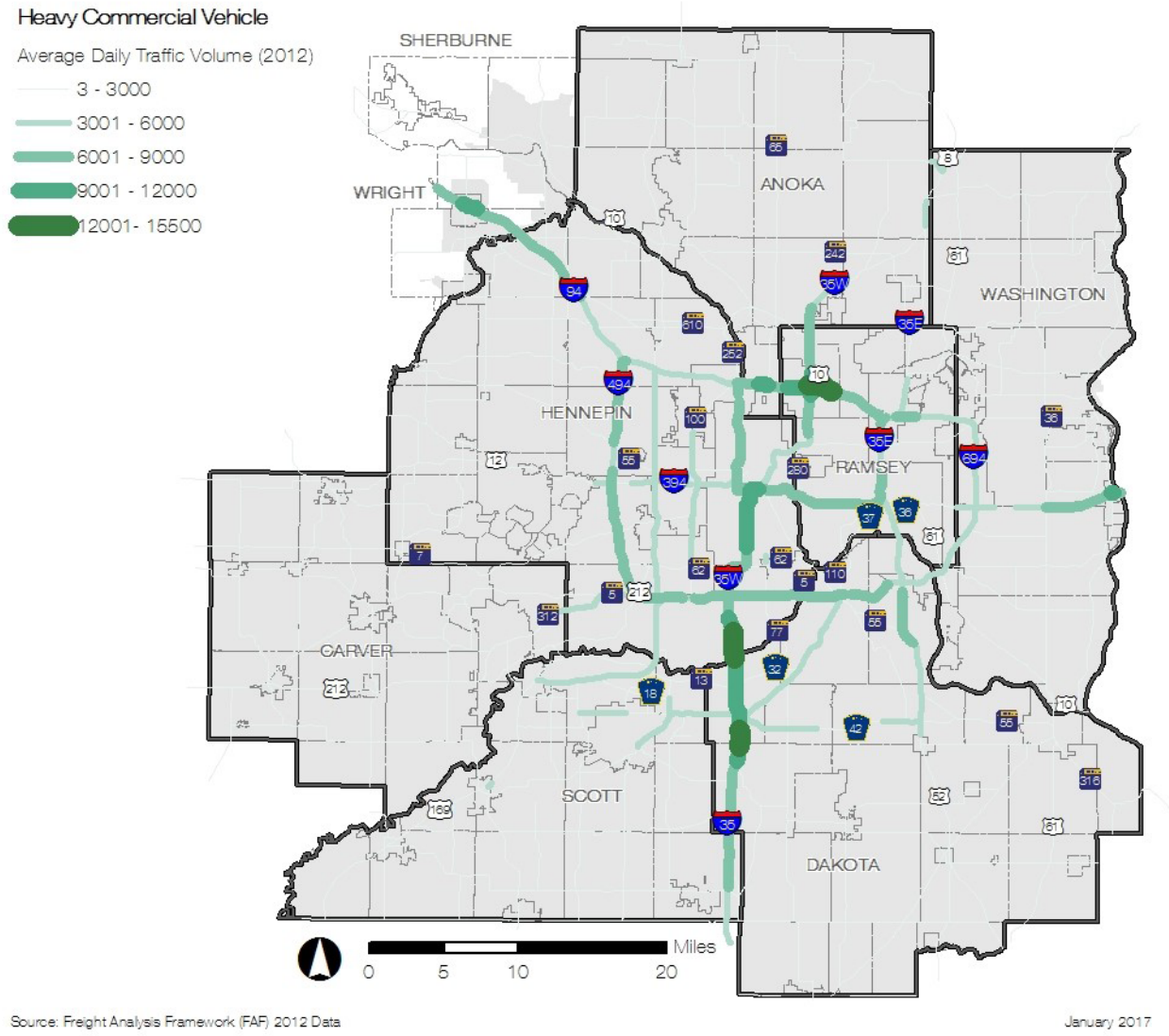


Figure 5-3: Twin Cities Region Estimated Daily Truck Volumes (2012)

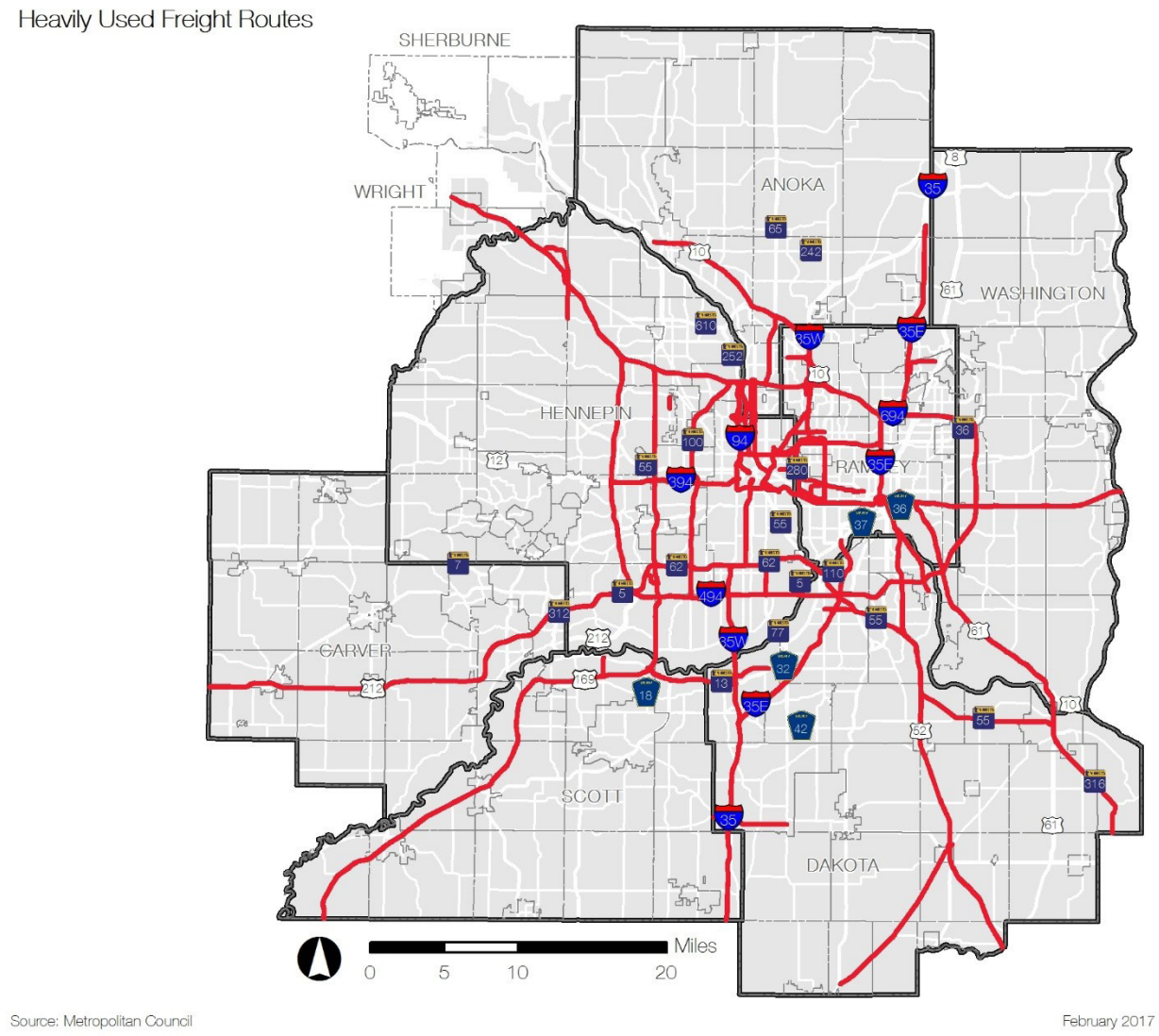


Figure 5-4: Twin Cities Region Heavily Used Freight Corridors

Highway Congestion

Highway congestion is often cited as a current and growing obstacle to efficient trucking operations in the Twin Cities. While other metropolitan regions have large freight activity centers with concentrated truck and rail activity focused in relatively few urban corridors, the Twin Cities' freight system typically has more and smaller freight centers distributed throughout the region. As a result, time delays from highway congestion may impact trucks to a similar degree as general traffic.

While other metropolitan regions have large freight activity centers with concentrated truck and rail activity focused in relatively few urban corridors, the Twin Cities' freight system typically has more and smaller freight centers distributed throughout the region.

Figure 5-5 shows 2015 average daily congestion on metropolitan freeways based on peak period congested hours per day where estimated median freeway speeds fall below 45 miles per hour for specific freeway segments.

Based on MnDOT's Metropolitan Freeway System Congestion Report, there were 354 AM and PM miles of directional congestion on metro interstates and freeway segments of state highways in 2015. This metric is a composite measure based on peak directional congestion for the AM peak period (5 AM to 10 AM) and the PM peak period (2 PM to 7 PM). This equates to approximately 23 percent of the region's freeway miles (assumed 758 AM miles and 758 PM miles).

Figures 5-6 and **5-7** show miles and percentage of Twin Cities freeway congestion since 2006, which overall has grown by about 33 percent over this time period.

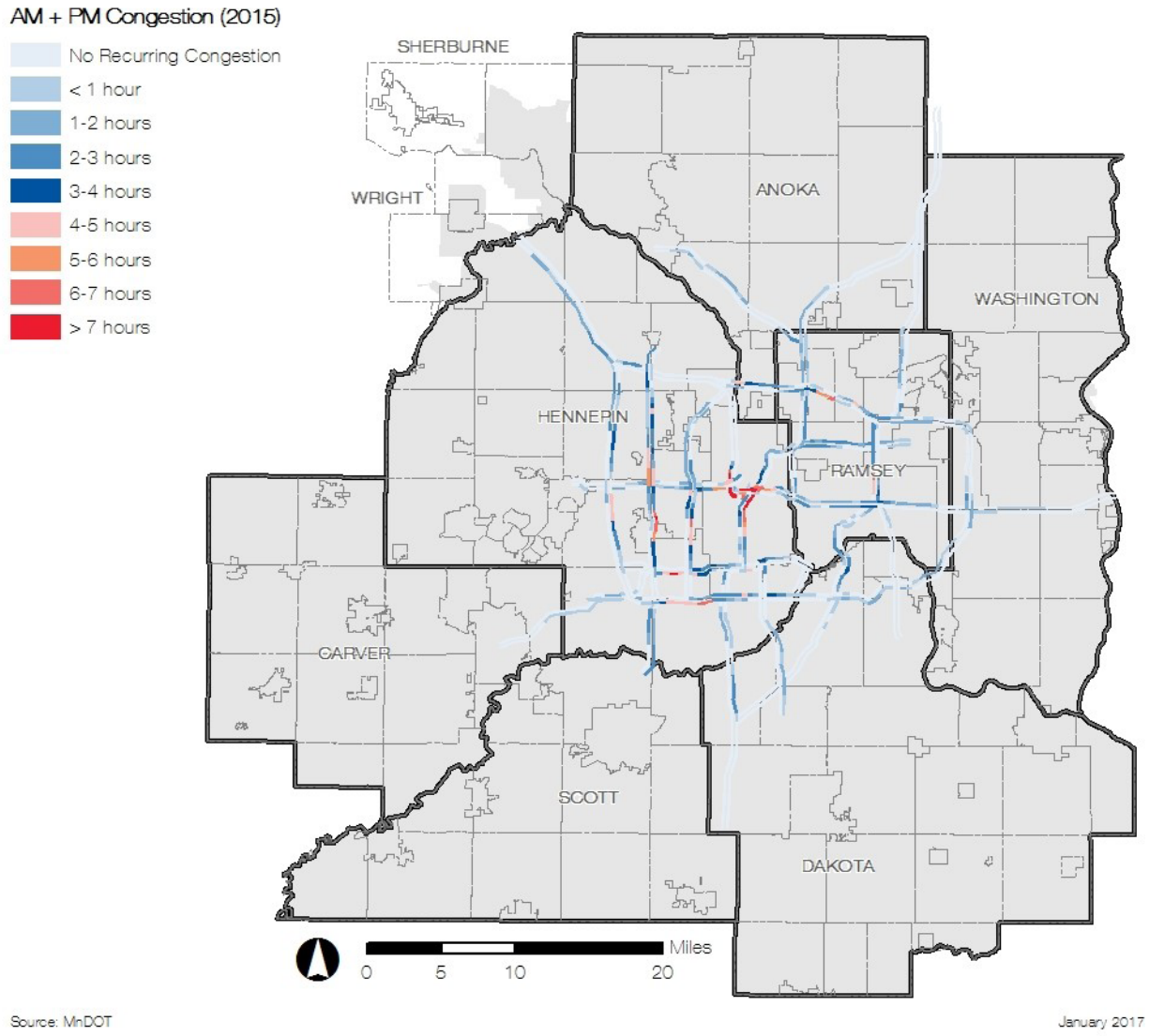


Figure 5-5: 2015 Congestion - AM and PM Combined

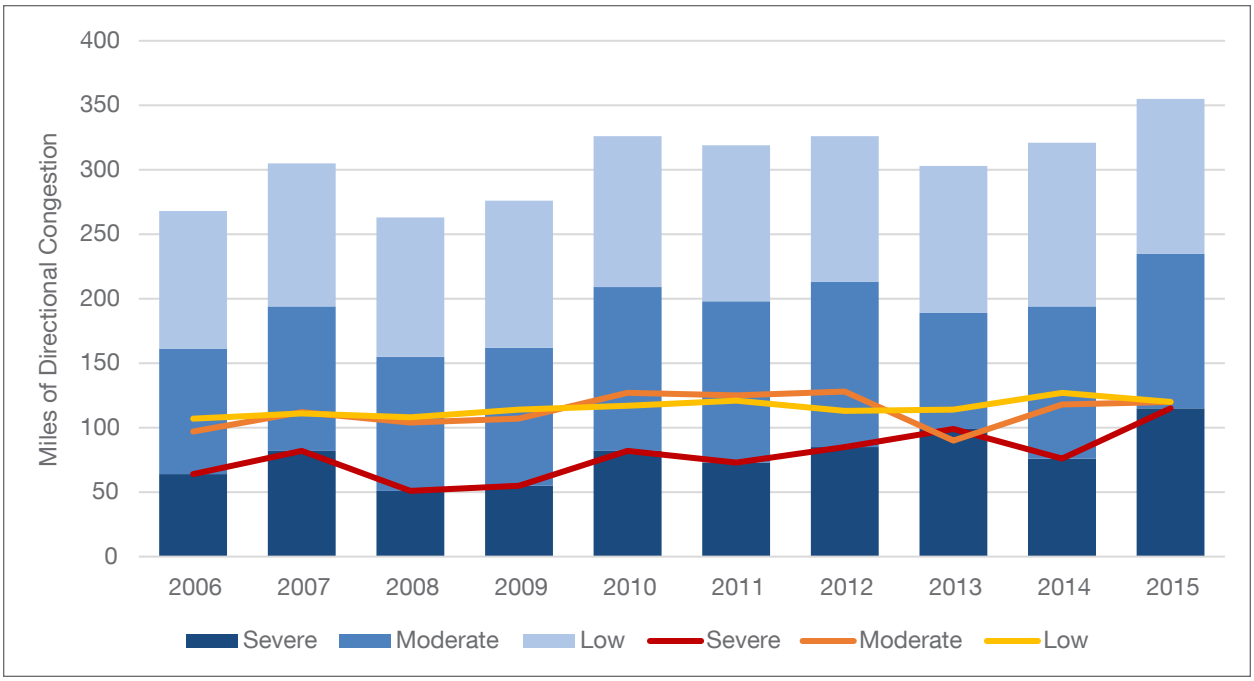


Figure 5-6: AM Plus PM Miles of Directional Congestion (2006-15)

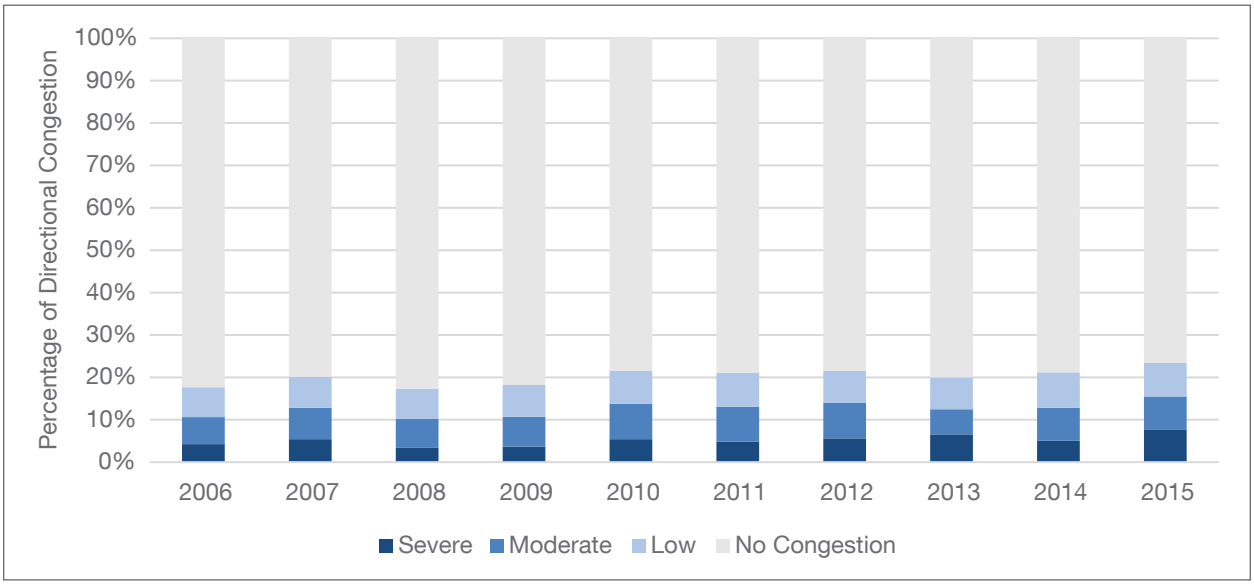


Figure 5-7: AM Plus PM Percentage of Directional Congestion (2006-15)

Truck Congestion Cost

Highway congestion not only decreases the reliability of freight shipments, but also increases costs. The Texas Transportation Institute's (TTI) Urban Mobility Scorecard calculates truck congestion costs as the value of increased travel time and other operating costs of large trucks (estimated at $94.04 per hour of truck time in 2014) and the extra diesel consumed (using state average cost per gallon).

Figure 5-8 shows that truck congestion costs the region around $327 million per year. This value puts the region in the middle of the range of selected peer cities. Overall, the region ranks 20th in this measure compared to 46 large (1 million+) and very large (3 million+) regions measured by TTI.

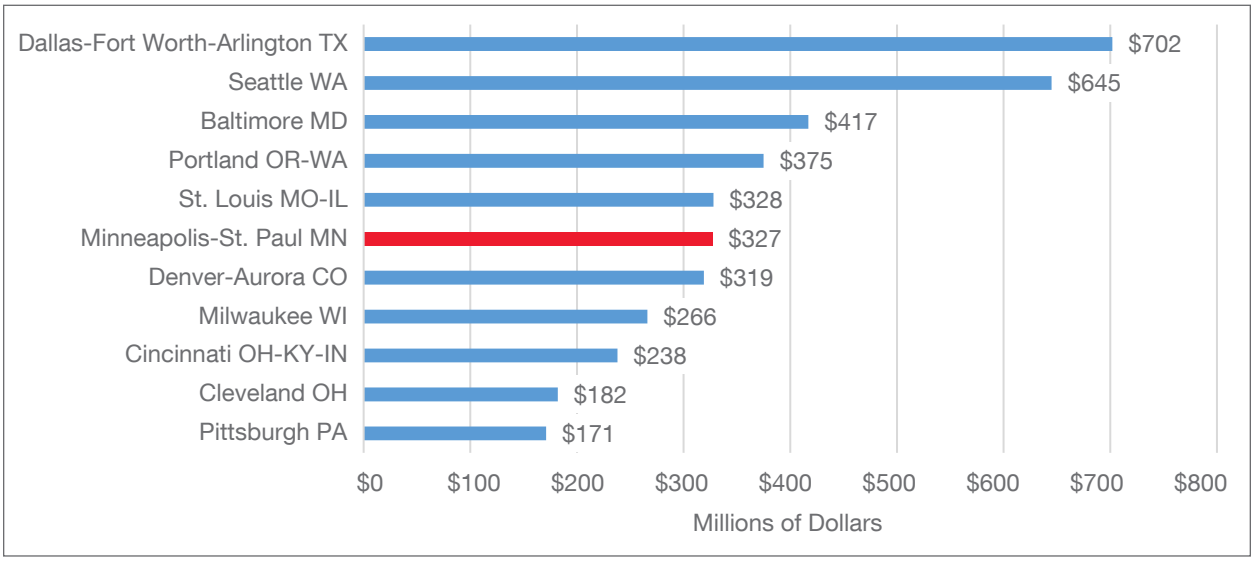


Figure 5-8: 2014 Truck Congestion Costs (Millions of Dollars)

Rail Freight System

There are four Class I railroads operating a total of more than 500 miles of track in the metropolitan region today (see **Figure 5-9**). These include the Burlington Northern Santa Fe Railway, Canadian National, Canadian Pacific Railway, and the Union Pacific Railroad Company. In addition, there are four short line (Class III) railroads including Progressive Rail, Twin Cities & Western, Minnesota Prairie Line, and Minnesota Commercial Rail¬road. These Class III railroads collectively operate about 160 miles of track in the region and provide direct access to many local manufacturers and distributors.

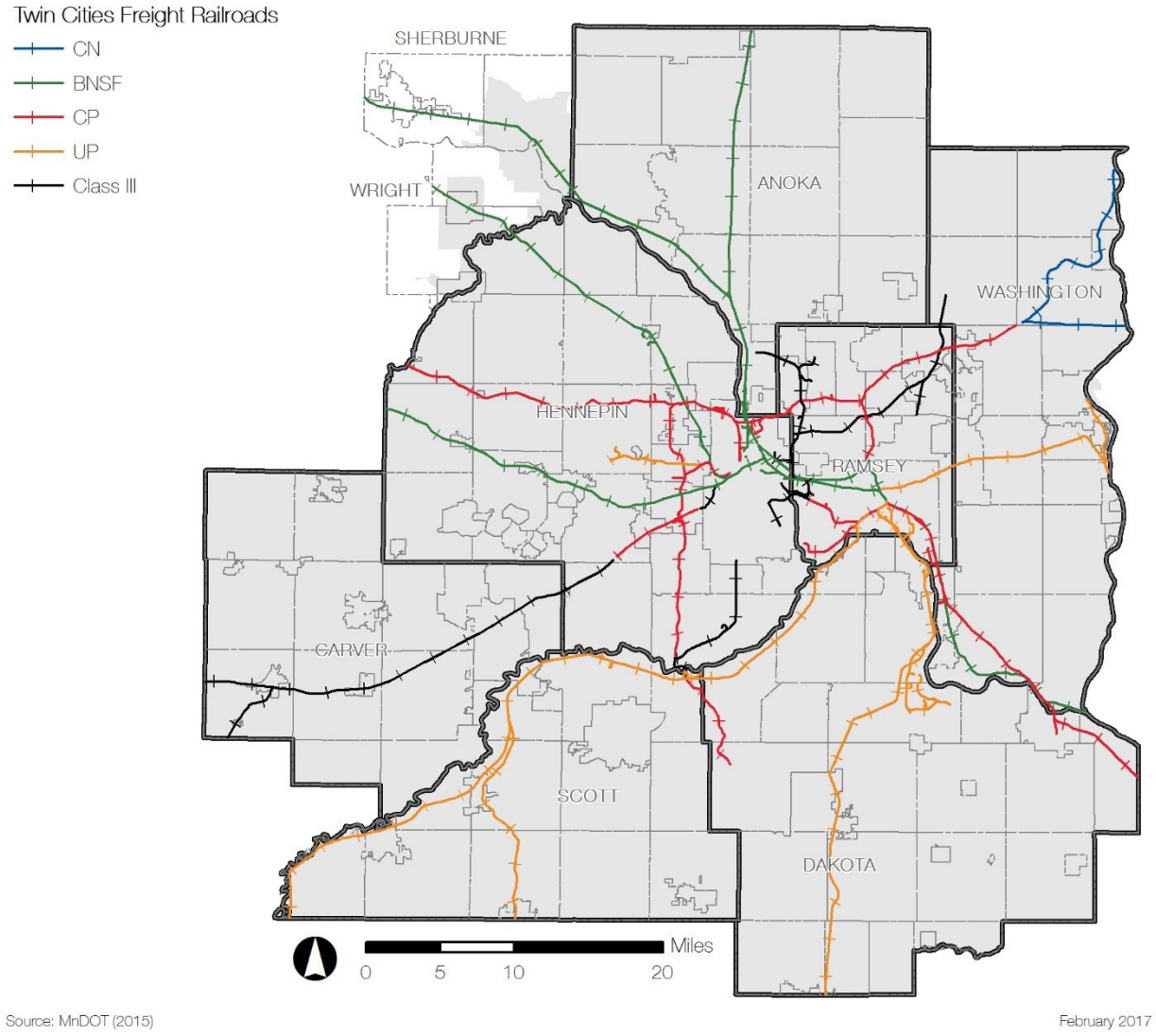


Figure 5-9: Twin Cities Freight Rail Lines

Intermodal Freight Terminals

These intermodal rail terminals connect the Twin Cities to the Puget Sound and Canadian West Coast ports for trans-Pacific shipments and to Chicago for other domestic destinations, including East Coast ports for international shipments to Europe and other markets.

In addition to the system of freight rail lines through the Twin Cities, two major intermodal container terminals, serving all of Minnesota and parts of western Wisconsin, are owned and operated by the BNSF Railroad and Canadian Pacific Railway. These intermodal rail terminals connect the Twin Cities to the Puget Sound and Canadian West Coast ports for trans-Pacific shipments and to Chicago for other domestic destinations, including East Coast ports for international shipments to Europe and other markets. Currently, no direct intermodal rail service exists between the Twin Cities and the California Ports of Oakland and Los Angeles/Long Beach. About 20 independently-operated truck-rail transload/warehouse centers support the intermodal distribution of freight in the metro area. The regional rail system with major regional intermodal freight terminals is shown in **Figure 5-10**.

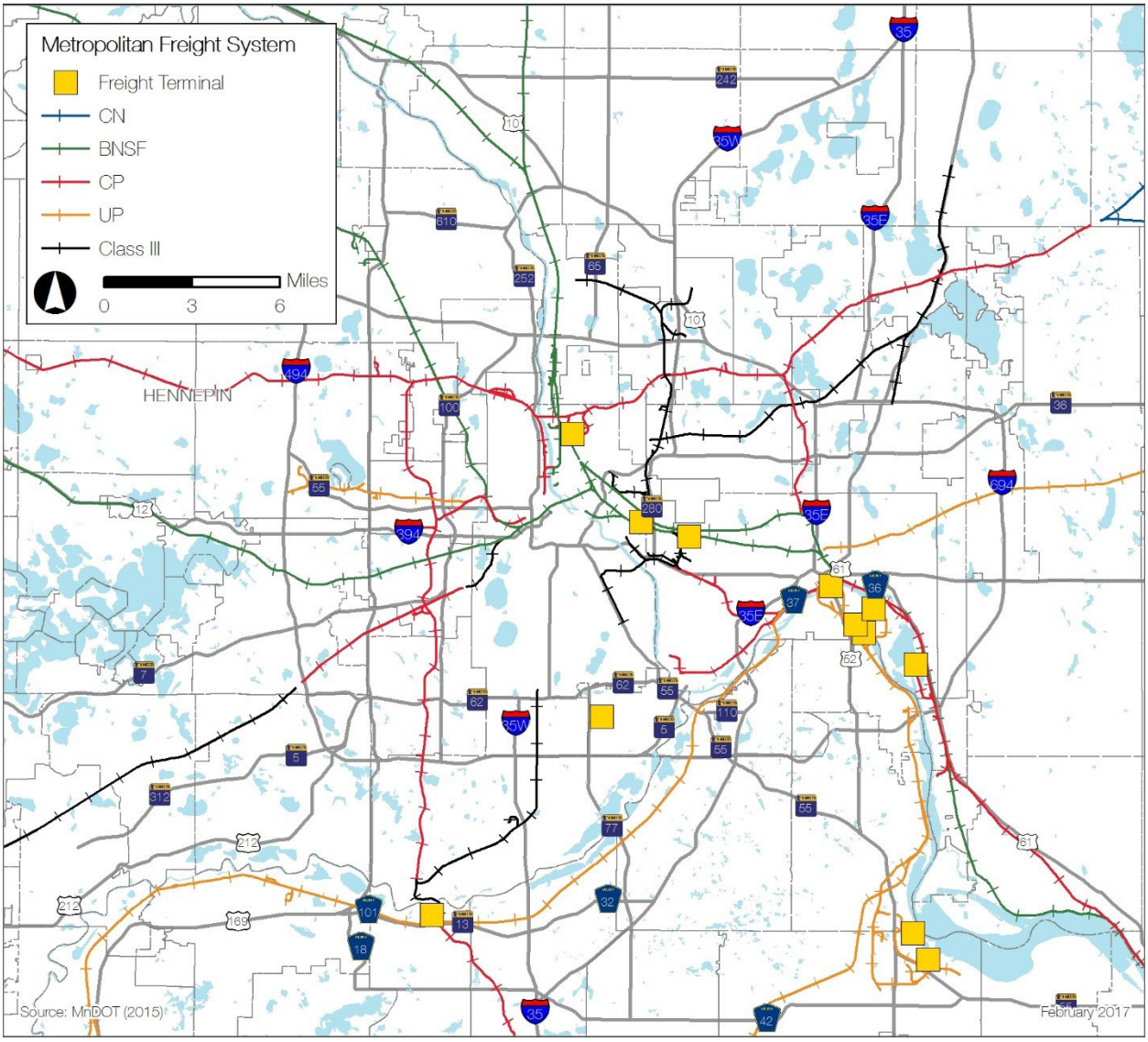


Figure 5-10: Twin Cities Railroads and Intermodal Terminals

Rail System Bottlenecks

Portions of the regional rail system experience congestion, and MnDOT's State Rail Plan (March 2015) identified several major rail bottlenecks in the region.

The region's freight railroads collectively moved approximately 26 million tons of freight to and from the 19-county Twin Cities CSA region in 2012 (not including through shipments), which represents about 15 percent of all freight moved to, from, or within the region. Portions of the regional rail system experience congestion, and MnDOT's State Rail Plan (March 2015) identified several major rail bottlenecks in the region including:

1. Hoffman Junction and interlocking east of downtown St. Paul
2. Coon Creek Junction/BNSF Northtown Yard
3. Minneapolis Junction & BNSF Wayzata Sub
4. Savage Interchange
5. St. Louis Park Interchange
6. Canadian Pacific and BNSF southeast metro river crossings
7. City of Shakopee Track Realignment
8. University Interlocking
9. Hudson Bridge over the St. Croix River
10. Mendota Heights Bridge over the Mississippi River
11. Pigs Eye Bridge over the Mississippi River
12. Robert Street Bridge over the Mississippi

These rail system bottlenecks are shown by number in **Figure 5-11**. Many of these system bottlenecks will only become critical with the introduction of new or expanded intercity passenger rail service, including Amtrak expan¬sion, expanded commuter rail service, and/or the increase of passenger rail service between the Twin Cities and Chicago. One existing rail congestion point that may reach a critical threshold prior to the advent of new or expanded passenger rail service is the Hoffman Junction and interlocking east of downtown St. Paul.

Hoffman Junction, the most congested bottleneck in the metro area, is where the mainline tracks of three major Class I railroads intersect, causing congestion and conflicts for the rail operators on a near daily basis. More specifically, the Union Pacific line crosses both the Canadian Pacific and Burlington Northern Santa Fe mainlines to access its Hoffman yard, thus limiting capacity for all three rail carriers. Access points to the CP and BNSF rail yards are also impacted due to the fact that as much as 5 percent of the nation's freight rail operations (10,000 rail cars per day) transect this junction.

Figure 5-12 shows 2007 annual tonnage by rail carrier facility for the Twin Cities metropolitan area.

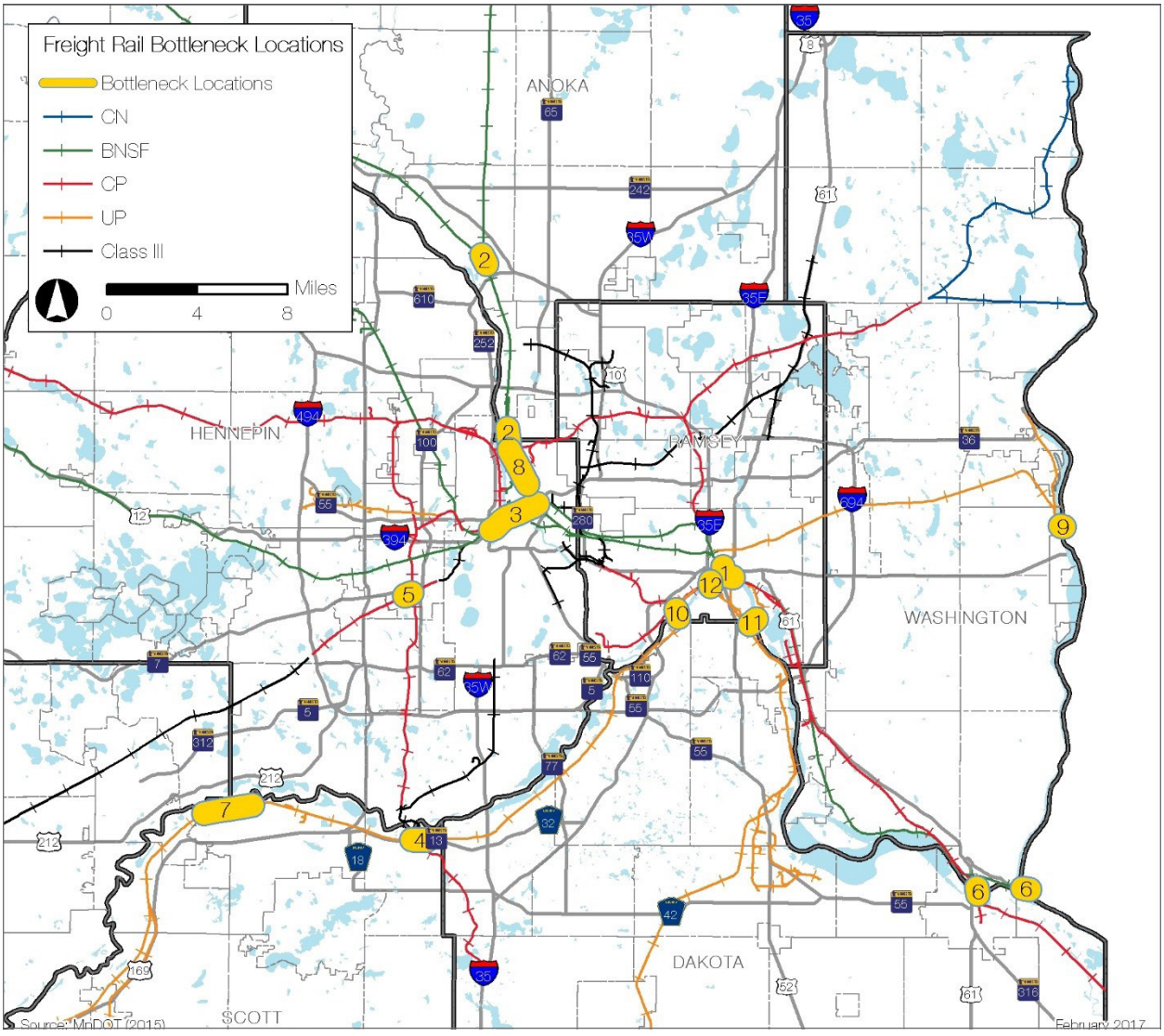


Figure 5-11: Freight Rail Bottleneck Locations

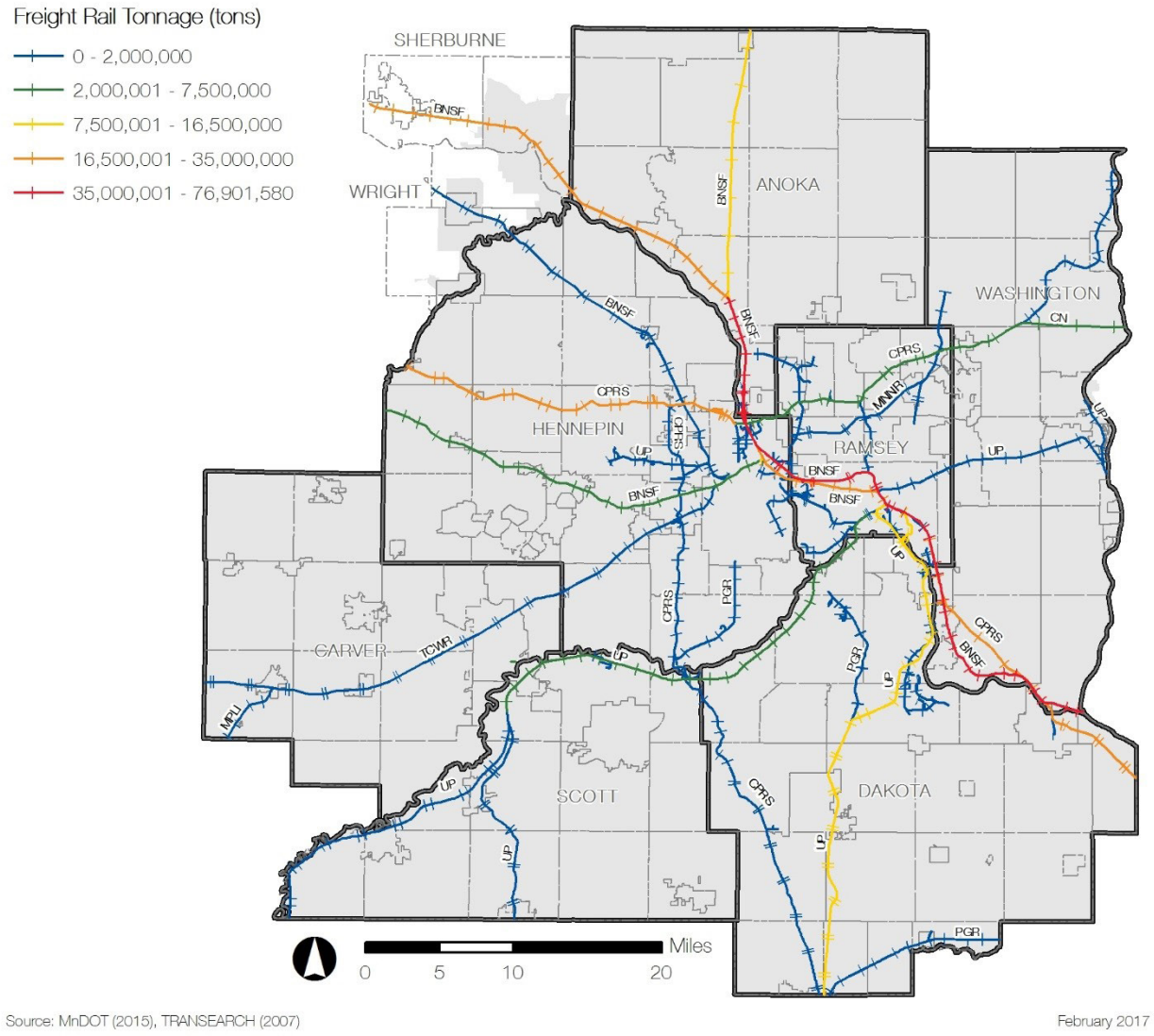


Figure 5-12: Twin Cities Annual Rail Freight Tonnage (2007)

Rail-Roadway At-Grade Crossings

In addition to rail system bottlenecks, the status of rail-roadway at-grade crossings has implications for the efficiency and safety of the region's rail and highway systems. **Table 5-3** shows rail-highway crossing data for the region. Approximately 36 percent of public rail crossings are grade-separated in the metropolitan region. Based on observation, this is especially apparent inside the region's urbanized core (i.e., inside the I-494/I-694 ring) where more intense conflicts would exist between highway and rail users with fewer grade separations. Approximately 39 percent of public at-grade crossings have passive crossing warning devices while the remaining 61 percent of public at-grade crossings have active crossing warning devices such as gates, cantilevers, and flashing light signals.

Table 5-3: Metropolitan Rail System Crossing Data

Measure	Number	Percent
Overall Track Miles	606	
Public Crossings	998	
Grade Separated	364	36.5%
At-Grade	634	63.5%
Active Warning Devices	389	61.4%
Passive Warning Devices	245	38.6%
Private Crossings	337	
Grade Separated	5	1.5%
At-Grade	332	98.5%
Active Warning Devices	4	1.2%
Passive Warning Devices	328	98.8%
Total At-Grade Crossings per Mile	1.6	
Passive Crossings per Mile	0.95	

Intermodal Yard Utilization

Most of the region's intermodal container lift capacity is provided by two large intermodal yards owned and operated by the Burlington Northern Santa Fe Railway and Canadian Pacific Railroad, two of the four major Class I railroad in the Twin Cities. In 2011, the two intermodal yards were operating at approximately 84 percent of capacity in terms of potential container lifts. Both regional facilities are located proximate to residential neighborhoods and constrained by physical barriers (namely highways, physical structures, or storm water ponds) on all sides. Given their central urban locations, there is also somewhat limited roadway access to both sites with limited opportunities for future rail yard expansion.

No new data were available for this report, but it is noted that container activity tends to mirror overall fluctuations in the regional economy. It would appear that intermodal activity at these terminals has been relatively flat since 2012, and some satellite container holding lots have seen a reduction in activity during this time.

Aviation

Air Freight System

Minneapolis-St. Paul International Airport (MSP) handles the predominant volume of air freight, not only for the Twin Cities metropolitan area, but for the entire state of Minnesota and adjacent parts of Wisconsin and the Dakotas.

High-value and/or time-sensitive goods are shipped via the air freight system, especially when moving over long distances. MSP Airport became the world headquarters and a major regional hub for Northwest Airways in the 1960s. MSP remains a significant passenger hub for Delta Airlines, which merged with Northwest Airlines in 2009, with direct flights to many worldwide destinations. This has made it possible for the region to continue taking advantage of "belly freight" shipping opportunities for freight carried in the baggage compartments of passenger aircraft.

Minneapolis-St. Paul International Airport (MSP) handles the predominant volume of air freight, not only for the Twin Cities metropolitan area, but for the entire state of Minnesota and adjacent parts of Wisconsin and the Dakotas.

Annual Tons of Air Cargo

In 2015, MSP Airport handled about 193,000 tons of air cargo via dedicated air freight carriers and in the cargo holds of passenger airlines. Air freight carriers carried around 80 percent of this cargo, with the remaining portion carried by passenger airlines. The relative proportions of freight shipped via these carrier classes between 2006 and 2015 are shown in **Figure 5-13** and **Table 5-4**.

On average between 2010 and 2015, MSP Airport handled around 200,000 tons of air freight annually. This represents around 0.1 percent of the region's total tonnage. Although air cargo represents a small fraction of total freight movements, air freight is a key component of the freight transportation system, carrying around 5 percent of the region's freight value (see **Figure 5-1**). Industries such as bio-tech and high-tech manufacturing that tend to ship high-value and time-critical components depend on a robust and efficient air freight system on a daily basis.

Since 2006, air freight shipped through MPS Airport has decreased by 34 percent, or approximately 4 percent per year. The decline has been more moderate since 2010, decreasing by 14 percent, or approximately 3 percent per year.

Since 2006, air freight shipped through MPS Airport has decreased by 34 percent, or approximately 4 percent per year. The decline has been more moderate since 2010, decreasing by 14 percent, or approximately 3 percent per year. The declining shipments correspond to the onset of the economic recession in 2008, followed by a low point in 2009 and modest recovery in 2010 and 2011. A portion of this decline can also be attributed to one of the major air freight carriers (DHL) eliminating international service at MSP in 2009. Related to this action, there has also been an increasing amount of freight exports designated for air transport that leaves the region via truck bound for Chicago O'Hare Airport. This practice has experienced a continual trend because it allows shippers to take advantage of larger shipping blocks, better access to international markets, and lower average transportation costs.

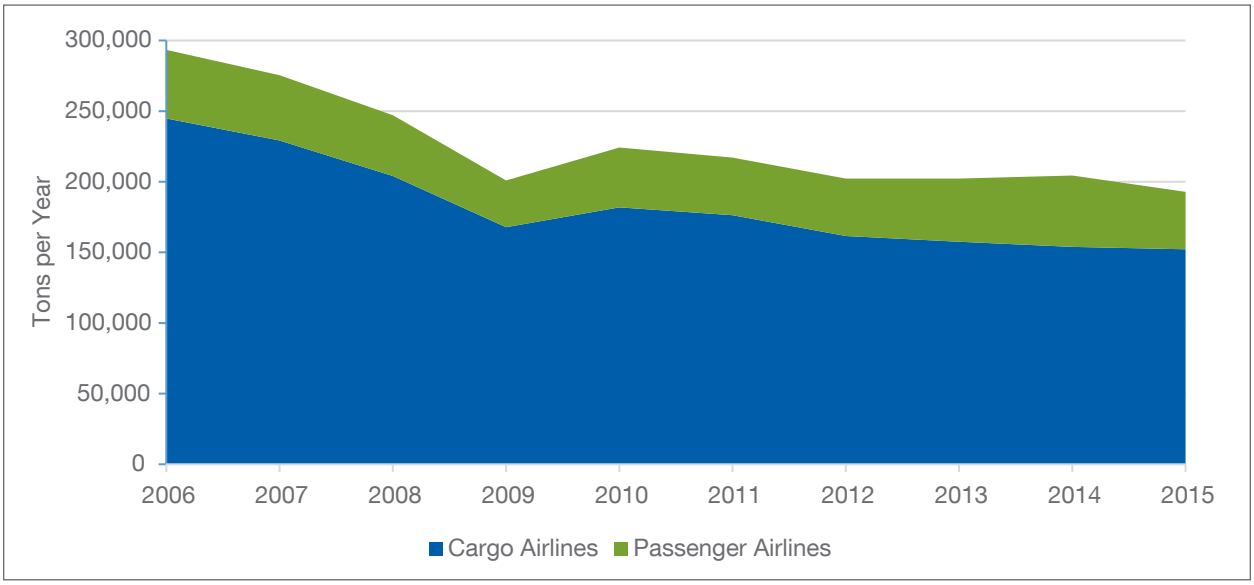


Figure 5-13: Air Freight through MSP Airport Trend (2006-15)

Table 5-4: Air Freight through MSP Airport in 1,000 Tons per Year (2006-15)

	Thousand Tons per Year									
Carrier	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Cargo Airlines	245	229	204	168	182	176	162	158	154	152
Passenger Airlines	49	46	43	33	42	41	41	45	50	41
Total	**293**	**275**	**247**	**201**	**224**	**217**	**202**	**202**	**204**	**193**

Water

Waterway System

Today, there are two primary river ports in the Twin Cities metro region, the Port of St. Paul on the Mississippi River and the Ports of Savage on the Minnesota River. Additional river terminals in the south metro area are located in South St. Paul, Cottage Grove (Grey Cloud Island), and Rosemount. Freight is hauled by barge more than 1,800 miles downriver from the Twin Cities to the Port of New Orleans where it is loaded onto oceangoing ships for export to global, oversea markets. Most recently, sand for fracture mining of natural gas has begun to be transported by barge down the Mississippi and up the Ohio River to Pennsylvania. The region's two primary river ports contain approximately 32 active freight terminals.

The region's two primary river ports contain approximately 32 active freight terminals.

In June 2015, the Upper St. Anthony Falls Lock ceased operations, permanently terminating barge access to the upper Mississippi River. In 2014, the lock carried approximately 700,000 tons of freight, and all remaining freight demands following the closure were shifted to other modes.

River Port Freight Tonnage

As shown in **Figure 5-14**, Twin Cities area river port freight volumes have decreased from approximately 9.8 million tons in 2006 to about 9.2 million tons in 2015, or a reduction of about 6 percent. There was a significant reduction in river port freight between 2007 and 2011 due to the economic downturn as well as some modal diversions to rail and truck. Since the low point during the recession, the region's overall barge tonnage has increased by around 55 percent compared to 2008 levels.

Since the low point during the recession, the region's overall barge tonnage has increased by around 55 percent compared to 2008 levels.

Since 2006, inbound freight barged to Twin Cities river ports has decreased by approximately 16 percent; however, inbound freight tonnage has generally increased since 2010. Outbound freight shipments are up 9 percent over 2006 levels, with 2015 tonnage only slightly less than the peak in 2007.

Outbound freight activity has been much more volatile than inbound freight during this time, and was severely impacted by the economic recession in 2008.

Outbound freight activity has been much more volatile than inbound freight during this time, and was severely impacted by the economic recession in 2008. Outbound flows destined to foreign markets via New Orleans also tend to be more volatile as they are sensitive to global economic and corresponding grain trade fluctuations.

Overall, the Port of St. Paul and south metro river terminals handle the vast majority of barged freight moved in the region, carrying about 75 percent of all barged freight in 2015. By comparison, the Ports of Savage handled about 23 percent and private terminals in Minneapolis handled about 2 percent in 2015, prior to the closing of the Upper St. Anthony Falls Lock that summer.

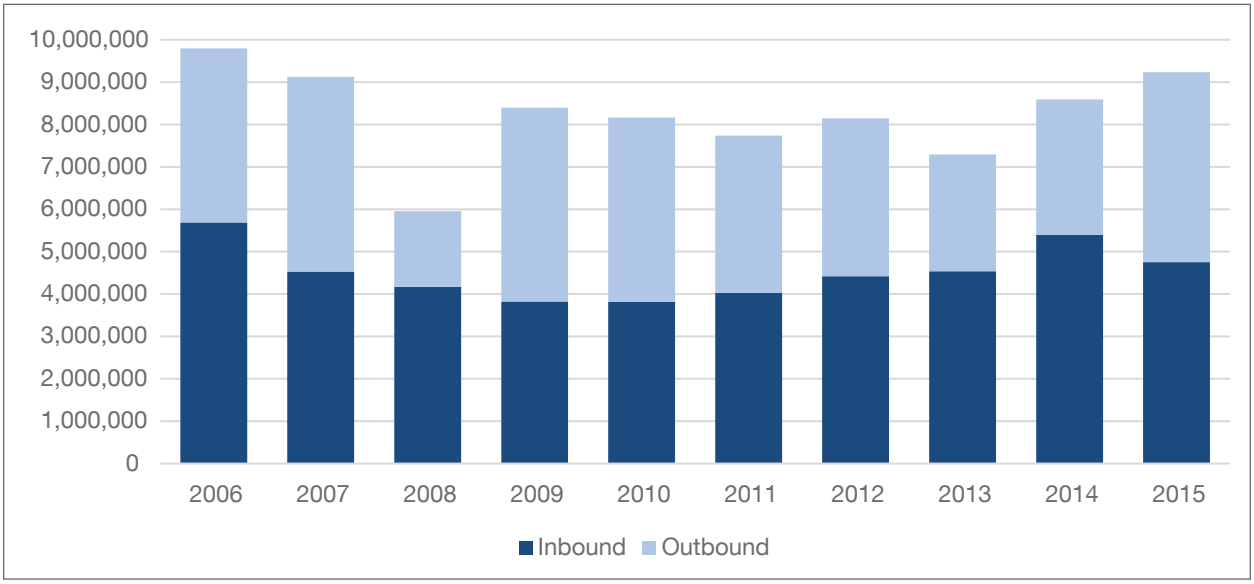


Figure 5-14: Twin Cities Metro River Port Freight Tonnage Trend (2006-15)

Table 5-5: Twin Cities Metro River Port Freight Tonnage (2006-15)

	Thousand Tons per Year									
Direction	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Inbound	5,687	4,531	4,171	3,822	3,814	4,022	4,422	4,536	5,399	4,751
Outbound	4,108	4,593	1,785	4,573	4,350	3,716	3,723	2,758	3,194	4,484
Total	**9,795**	**9,124**	**5,956**	**8,395**	**8,164**	**7,738**	**8,145**	**7,294**	**8,593**	**9,235**

Findings and Conclusions

Freight shipments to and from the region have recovered from recession levels, and total tons of freight shipping to and from the region in 2012 exceeded 2007 levels. The following findings and trends provide an overview of the freight system from 2006 through 2015:

- Tonnage of freight shipments into the region increased by a greater percentage than freight shipments out of the region between 2007 and 2012 (+42 percent vs. +15 percent)
- In 2012, total tonnage of freight shipments into the region was 25 percent greater than freight shipments out of the region
- Tonnage of freight shipments within the region (shipments that both originated and ended within the region) decreased by 24 percent between 2007 and 2012
- Trucking remains the dominate mode for freight, with trucks carrying 68 percent of total freight tonnage into and out of the region in 2012
- Annual truck congestion costs, which measures the costs of added travel time and operational costs to trucks due to congestion, approached nearly $330 million in 2014, which ranks the region 20th nationally against other metro regions
- Rail continues to carry a significant percentage of freight, moving approximately 25 percent of all freight tonnage into and out of the region in 2012
- Total tonnage of freight shipped by cargo airlines has decreased by more than 16 percent since 2010, while cargo shipped using excess capacity in the cargo holds of passenger airlines remained relatively steady over this same time period
- Freight hauled by barge dropped significantly during the recession, but total tonnage of barge shipments have returned to near pre-recession levels (95 percent of the high in 2006)

Freight shipments to and from the region have recovered from recession levels, and total tons of freight shipping to and from the region in 2012 exceeded 2007 levels.

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Chapter 6: The Bicycle and Pedestrian System

Bicycling and walking have become increasingly important in the Twin Cities for commuting to work or school, running personal errands, and traveling to entertainment and activity venues. The potential for further expanding bicycling and walking in the region for transportation purposes is significant.

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The region has long recognized that bicycling and walking are essential modes of transportation. This recognition has developed significantly in recent years in response to development of the regional transitway system, completion of the Regional Bicycle System Study, and our growing awareness of the significance of first- and last-mile connections to regional transportation facilities and destinations. While planning for specific pedestrian improvements is still done at the county and municipal level, the region recognizes that everyday bicycle trips often cross municipal boundaries and warrant regional coordination in planning and implementation. The beginning of this chapter focuses largely on regional bicycle transportation, and the chapter concludes with discussion of both bicycling and walking.

Characteristics of the Regional Bicycle System

The culture of the Twin Cities has embraced bicycling to a larger degree than similar cities in North America, and the state and the region have made investment decisions that reflect a relatively strong level of support for this culture of bicycling.

The Minneapolis-St. Paul region is fortunate to have a well-developed network for bicycling. The culture of the Twin Cities has embraced bicycling to a larger degree than similar cities in North America, and the state and the region have made investment decisions that reflect a relatively strong level of support for this culture of bicycling.

The foundation for the region's extensive bicycle infrastructure is the system of off-road trails that connects regional parks, and traverses lakes and rivers and was made possible by the abundance of abandoned rail corridors. The support for the continuing development of this impressive system, much of it coordinated by the Metropolitan Council's parks department, is the result of the strong legacy of parks and trails that began more than 100 years ago, with the founding of the Minneapolis Park and Recreation Board. The most visited regional parks in the Twin Cities region are those that make up the Grand Rounds in Minneapolis including Minnehaha Creek and Falls, and the Chain of Lakes. These parks are unique in that they are primarily linear and connected by bicycle and walking paths. The first parks were built in the early 20th century, and the system of paved regional trails that developed to connect them remain among the most used bicycle facilities in the region. The region embarked on the development of the regional trail system in the 1980s and 1990s while new suburban communities built local trail systems as they developed. Since the beginning of the 2000s, the region has continued to build out the trail system and rebuild some of the older trails, including those in the Minneapolis parks system.

The region's bikeways include more than off-road trails. As local partners ran out of space for off-road facilities, some, including MnDOT, Hennepin County, Minneapolis, Saint Paul, and others, adopted Complete Streets policies and expanded on-road facilities. As a result, bikeways take on several characteristics in the region. There are limited access off-road paved trails that run along independent rights-of-way. Many of these trails are part of the regional trail system. These trails often follow abandoned railroad corridors, or in a few cases, run parallel to active rail lines. The region also has many local multi-use trails that run along and within highway rights-of-way.

The region's bikeways include more than off-road trails. These trails often follow abandoned railroad corridors, or in a few cases, run parallel to active rail lines. The region also has many local multi-use trails that run along and within highway rights-of-way.

On-street bikeways come in many forms as well. There are on-street bike lanes, designated bicycle shoulders (with or without signage), roads with shared road markings known as "sharrows", and bicycle boulevards which are low-volume, low-speed local streets often accompanied with vehicle traffic attenuators such as intersection "traffic islands." There are also bike routes without minimum standard bike lanes or shoulders, but are designated with signage to indicate their more bike-compatible, low traffic characteristics. Individuals who use their bicycle for transportation will find themselves on routes that include all of these types of bikeway.

Bikeways Infrastructure Planning and Development

The Metropolitan Council plays an important role in the development of the regional bikeway system through long range planning and coordination with the many local implementing agencies. The Council generally does not own or maintain any bicycle facilities; however, the Council's policies influence their development through its coordination and planning role for the Regional Parks system (including regional trails), and in its role as the region's federally-designated Metropolitan Planning Organization (MPO) responsible for long range transportation planning and programming of federal transportation funds. Through its MPO role, the Council updates the region's long range Transportation Policy Plan every four years, providing the framework policies for all surface modes of transportation plus aviation for the metropolitan region.

The Metropolitan Council plays an important role in the development of the regional bikeway system through long range planning and coordination with the many local implementing agencies.

Development of the Regional Bicycle Transportation Network

The *Regional Bicycle System Study* (2013) examined how on-street bikeways and off-road trails interact to serve regional transportation trips. The study used local data and public stakeholder input that:

- identified key regional destinations
- developed a set of guiding principles for identifying regional bicycle corridors, and
- proposed a *Regional Bicycle Transportation Network* (RBTN) with a set of prioritized corridors and alignments.

The resulting RBTN vision (as shown in **Figure 6-1**) was incorporated in the 2040 Transportation Policy Plan adopted in January 2015, and is included for the first time in this 2016 update of the Transportation System Performance Evaluation.

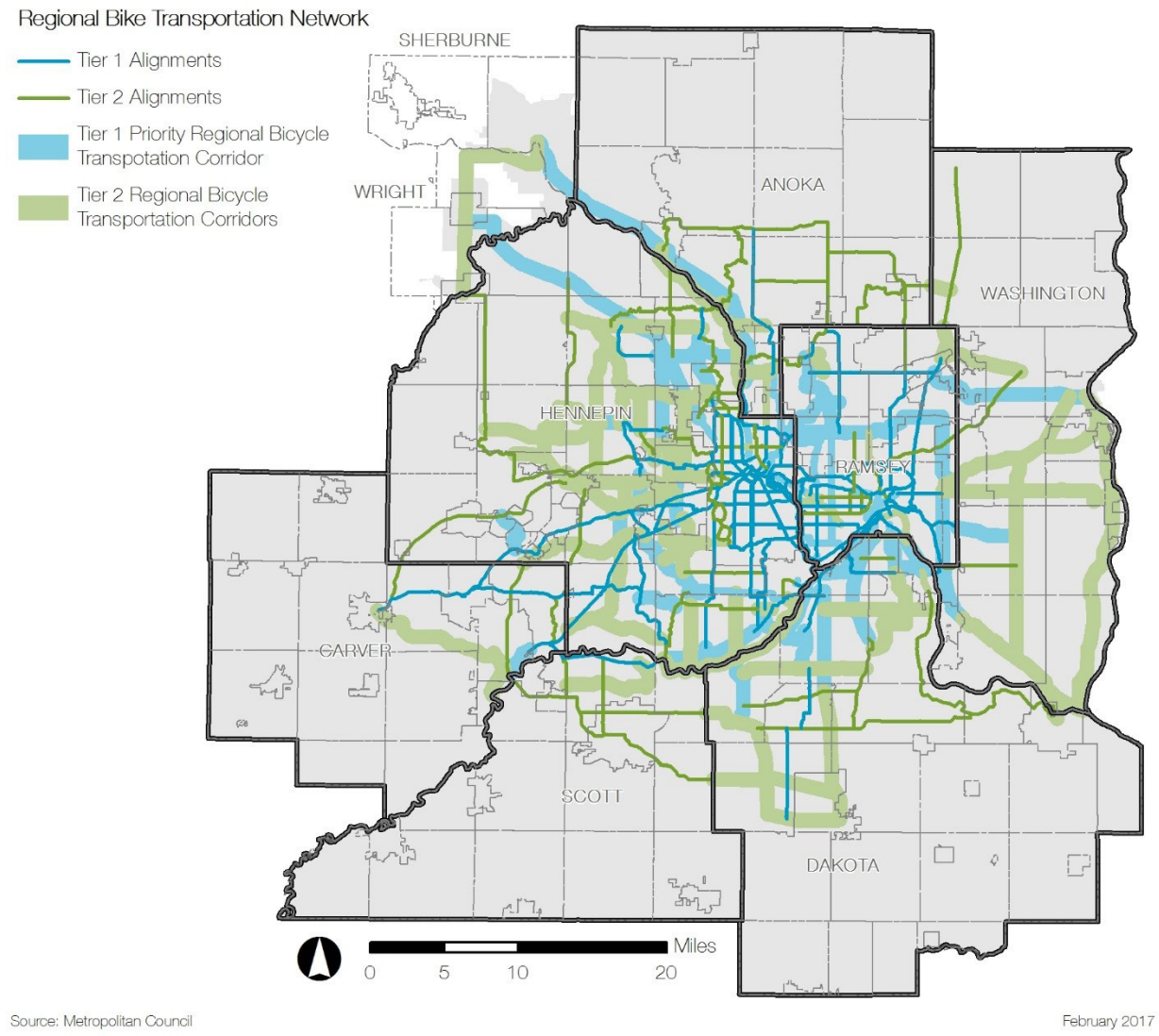

Figure 6-1. Regional Bicycle Transportation Network

This RBTN is made up of a series of specific alignments and broad planning corridors and includes regional destinations the network is intended to connect. The purpose of the RBTN is threefold:

- To establish an integrated/seamless network of on- and off-street bikeways
- To provide the vision for a “backbone” arterial network for daily bicycle transportation
- To encourage cities, counties, park agencies, and the state to plan and implement future bikeways.

The RBTN corridors are established where existing or potential high demand for transportation-related bicycle trips has been identified and where specific alignments have not been designated by local agencies. This network is intended to provide mid-to-long range connections to and between major regional destinations. RBTN alignments were established to represent where local plans have identified existing or planned off-street trails or on-street bikeways.

The network is further divided into Tier 1 and Tier 2 priority alignments and corridors based on potential bicycle demand levels as determined in the Regional Bicycle System Study. There are more than 1300 miles of designated regional bicycle network corridors and alignments across the Twin Cities Region. This compares very favorably with other metro regions around the nation that have established regional bicycle networks.

Regional Bicycle System Inventory

The Council has developed a Regional Bicycle System Inventory in collaboration with the counties who have coordinated with their municipalities to provide a region wide reference mapping platform. This database includes all the existing and planned trails and on-street facilities from most cities that have developed local bicycle networks. Summary statistics of the overall regional system are shown in **Table 6-1**.

Table 6-1: Regional Bikeway System Mileage Summary1[6-1]

Type	On-Street	Off-Street	Undefined	Total
Existing	1,878	2,030	1	3,909
Planned	1,032	820	1,013	2,865
Total	**2,910**	**2,850**	**1,014**	**6,774**

Regional Bicycle Barriers Study

At this report's writing, the Council is conducting an ongoing study of the region's major physical barriers to bicycling. These have been defined to consist of rivers and streams, rail corridors, and freeways/expressways. The final report will provide a ranked list of existing crossings needing improvement and potential locations for new barrier crossings to be developed. A subset of these barrier crossing locations will be identified in the next TPP update as "critical bicycle transportation links."

6-1 Based on Met Council's recently compiled Regional Bicycle System Inventory.

Walking and Bicycling for Transportation

Between 2000 and 2010, the share of walking trips within the region increased 0.4 percentage points and the share of bicycling trips in the region increased by 0.5 percentage points.

General Trends

Bicycling and walking have increased across the seven-county region. The 2010 Travel Behavior Inventory (TBI) conducted by the Metropolitan Council is the seventh in a series of studies done every 10 years by the Council to discover where, when, why and how people travel in the region. According to the 2010 TBI, 6.1 percent of all trips made within the seven-county region are done by walking, and 1.6 percent of all trips are made by bicycle. Between 2000 and 2010, the share of walking trips within the region increased 0.4 percentage points and the share of bicycling trips in the region increased by 0.5 percentage points.

The 2010 TBI data also show that residents in the central cities make more of their trips by walking and bicycling when compared to the seven-county region overall. Walking rates more than double in the central cities, where 14 percent of all trips are made on foot. Bicycling trips in the central cities also occur at twice the rate compared to the region as a whole: 4 percent of trips in the central cities are made by bicycle, compared to less than 2 percent regionally.

Commuting on Foot and by Bicycle

The TBI is important because the surveys account for all types of trips, regionwide; most other readily available mode share data is from the Census Bureau's home-to-work commute data, but commute trips are a small proportion of all daily trips.

For commutes, the Census Bureau's American Community Survey from 2015 for the larger 13-county MSA estimates that 1 percent of commuters bicycle and 2.3 percent walk to work, slight increases from 2011 ACS data.

Within the region, the Council's 2010 Travel Behavior Inventory showed that commute to work trips only account for 23 percent of all travel in the region, and more trips are made by walking and bicycling when all trips are accounted for, as noted above. The region is moving toward using a new performance indicator called "mode participation rate" defined as percent of population that make at least one trip by a certain mode on a given day. The current mode participation rate for pedestrians is 12.2 percent and for bikes is 2.9 percent.

The region is moving toward using a new performance indicator called "mode participation rate" defined as percent of population that make at least one trip by a certain mode on a given day.

Minneapolis leads the region by far in bicycle commute mode share. The American Community Survey estimates that 4.6 percent of commuters used a bicycle to commute to work in 2015. This puts Minneapolis tied for #15 among the top 20 cities for bike commuting, and at #2 among cities with a population of over 250,000 (after Portland, OR).

Walking and Bicycling Miles Traveled

According to the 2010 TBI, about 725,000 miles are traveled per day by bicycle, and roughly 335,000 miles are traveled per day walking.

Walking and Bicycling Volumes

As part of the federal Nonmotorized Transportation Pilot Program, Bike Walk Twin Cities collected counts of people walking and bicycling at 42 benchmark locations from 2007 through 2013 using a methodology in partnership with the USDOT. After this pilot program was completed, local governments have continued counts of walking and bicycling at these benchmark locations. According to this collected data, bicycling has increased 78.2 percent, and walking has increased by 15.7 percent at these locations between 2007 and 2013.

According to data collected by Bike Walk Twin Cities, bicycling has increased 78.2 percent, and walking has increased by 15.7 percent at these locations between 2007 and 2013.

The City of Minneapolis Public Works Department reports annually on its bicycle and pedestrian counts. According to the most recent report from 2015, bicycling at 30 benchmark locations throughout the city increased 53 percent and walking at 23 benchmark locations increased 26 percent from 2007 to 2015.

As part of its Minnesota Bicycle and Pedestrian Counting Initiative, MnDOT developed a Bicycle and Pedestrian Data Collection Manual to supplement the FHWA Traffic Monitoring Guide.

In addition to these data collection efforts, more guidance has been developed to support local communities in collecting this data. The Federal Highway Administration (FHWA) updated its Traffic Monitoring Guide to include guidance for counting bicyclists and pedestrians. As part of its Minnesota Bicycle and Pedestrian Counting Initiative, MnDOT developed a Bicycle and Pedestrian Data Collection Manual to supplement the FHWA Traffic Monitoring Guide.

Between 2014 and 2016, MnDOT's Bicycle and Pedestrian Counting Initiative further expanded the work within the state to institutionalize this data collection. Some of the highlights of this work included annual training programs; the installation of 25 permanent monitoring stations throughout the state, including three in the Twin Cities region; and the development of a MnDOT district-based portable counting equipment loan program to support MnDOT districts and local governments in conducting bicycle and pedestrian counts.

Safety of Pedestrians and Bicyclists

Increases in the number of people walking and bicycling can help improve safety by creating greater visibility and driver awareness. Research has shown that as more people bike and walk, crash rates tend to decline.

Pedestrian and Bicyclist Crashes

According to 2010-2015 data from MnDOT, an average of 611 pedestrian crashes and 653 bicycle crashes occurred in the seven-county Twin Cities region. This is compared to an average of 857 pedestrian crashes and 886 bicyclist crashes per year statewide. In 2015, 70.6 percent of total statewide pedestrian crashes, and 74.9 percent of total statewide bicyclist crashes occurred in the region.

Pedestrian and Bicyclist Injuries and Fatalities

According to crash data from the Minnesota Department of Public Safety, between 2013 and 2015, there were 1,159 total traffic fatalities in Minnesota, over 26 percent of which occurred in the region, or 304. Of these 304 traffic fatalities in the region, 51 were pedestrian fatalities, and 9 were bicyclist fatalities.

Pedestrians and bicyclists are the most vulnerable users on the road. The seven-county Twin Cities region had an average of 17 pedestrian deaths and 3 bicyclist deaths from traffic crashes each year from 2013-2015. In the same period across the region, an average of 642 pedestrian occur per year, in addition to 614 bicyclist injuries.

Comparison with all traffic crashes in Minnesota puts these bicycle and pedestrian crashes in context. A little over 58 percent of all traffic crashes in the state are in the Twin Cities region, and 28 percent of the overall traffic fatalities occur here. The region's share of crashes looks much different for pedestrians and bicyclists because of its more urbanized area compared to other parts of the state, according to 2013-2015 figures from the Minnesota Department of Public Safety. Although the region on average has 26.2 percent of the overall traffic fatalities within the state, nearly 55 percent of statewide pedestrian fatalities and almost 43 percent of statewide bicyclist fatalities occurred within the region. While walking trips are 6 percent of all trips made within the region, pedestrian fatalities are a disproportionately larger percentage of the region's traffic deaths; almost 17 percent of all traffic fatalities in the Twin Cities region are pedestrians. The numbers are not as disproportionate for bicyclists in the region, but they still make up 3 percent of all Twin Cities traffic fatalities, compared to making 2 percent of all trips. Additional future analysis of MnDOT crash data for pedestrians and bicyclists in the region would provide more information about the nature of these crashes and safety issues.

Although the region on average has 26.2 percent of the overall traffic fatalities within the state, nearly 55 percent of statewide pedestrian facilities and almost 43 percent of statewide bicyclist fatalities occurred within the region. Pedestrian fatalities are a disproportionately larger percentage of the region's traffic deaths. The numbers are not as disproportionate or bicyclists in the region.

Local Bicycle and Pedestrian Planning Statistics

Based on the local comprehensive plans updated in 2008 and 2009, Metropolitan Council noted that of 182 communities, the following addressed bicycle and pedestrian transportation in the plan.

- 41 communities address trail access to all neighborhoods in their community
- 19 communities have separate trail master plans
- 24 communities address bicycle and pedestrian safety on roadways with traffic calming techniques and policies in the transportation element of their comprehensive plans

The next update of the Transportation System Performance Evaluation will include statistics on local comprehensive plan updates, which are due to the Metropolitan Council by December 2018.

Findings and Conclusions

The region has a strong policy foundation for enhancing the already well-established regional bicycle and pedestrian systems, and there is significant potential for further expanding bicycling and walking in the region for transportation and recreation.

Bicycling and walking have become increasingly important in the Twin Cities for commuting to work or school, running personal errands, and traveling to entertainment and activity venues. The region has a strong policy foundation for enhancing the already well-established regional bicycle and pedestrian systems, and there is significant potential for further expanding bicycling and walking in the region for transportation and recreation.

- The region has recognized for many years that bicycling and walking are essential modes of transportation. This understanding has grown significantly in recent years in response to development of the regional transitway system, establishment of the RBTN, and our increased understanding of the importance of first- and last-mile connections to these major regional transportation networks.
- The Regional Bicycle Transportation Network consists of more than 1,300 miles of existing, planned, or anticipated on- and off-road bicycle facilities; this vast network is among the top two regions in its overall coverage and density among other regions around the nation that have developed regional bicycle networks.
- According to the 2010 TBI, 6.1 percent of all trips made within the seven-county region are done by walking, and 1.6 percent of all trips are made by bicycle. Between 2000 and 2010, the share of walking trips within the region increased 0.4 percentage points and the share of bicycling trips in the region increased by 0.5 percentage points.
- The Census Bureau's American Community Survey from 2015 estimated that for the larger 13-county Metropolitan Statistical Area, 1 percent of commuters bicycled and 2.3 percent walked to work; these figures represent a slight increase since 2011.

- According to the 2010 TBI, about 725,000 miles were traveled per day by bicycle, and roughly 335,000 miles were traveled per day walking; (these reported miles walked include only those trips that were completed entirely on foot, and do not include walking segments of trips completed over multiple transportation modes).
- Bicycling and walking volumes are increasing in the Twin Cities. According to the Bike Walk Twin Cities 2013 Count Report, in the years between 2007 and 2013, bicycling increased 78 percent, and walking increased 16 percent. The Minneapolis Public Works Department's most recent count report indicates bicycling at 30 benchmark locations throughout the city increased 53 percent and walking at 23 benchmark locations increased 26 percent from 2007 to 2015.
- Although the region on average has 26.2 percent of the overall traffic fatalities within the state, nearly 55 percent of statewide pedestrian fatalities and almost 43 percent of statewide bicyclist fatalities occurred within the region.
- City, county, and regional transportation plans significantly support biking and walking as practical choices for daily travel within the region.

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Chapter 7: The Aviation System

Characteristics of the Regional Aviation System

Infrastructure

The Twin Cities region has eleven airports, 1 commercial airport and 10 general aviation airports, that provide aviation services to the region. Most of these facilities are owned and operated by the Metropolitan Airports Commission (MAC), although Forest Lake and South St. Paul are city owned. The airports in the Twin Cities Regional Aviation System have roles assigned by various classification systems (Regional, State, and Federal), each tailored to the specific needs of the particular system. The airport and airspace interaction within the regional system and its relationships to the state and national systems is somewhat like a chess board in that what changes at one facility can have ramifications in terms of user behavior, business decisions, airport management actions, and government policy decisions for any number of other facilities in the system.

The airport and airspace interaction within the regional system and its relationships to the state and national systems is somewhat like a chess board in that what changes at one facility can have ramifications in terms of user behavior, business decisions, airport management actions, and government policy decisions for any number of other facilities in the system.

Table 7-1 shows the system airports and the respective classifications in the national, state, and regional systems. These airports are classified according to their system role as a Major, Intermediate, Minor, or Special Purpose facility. (see **Figure 7-1**).

Table 7-1: System Airports by National, State, and Regional System

Airport	National Plan of Integrated Airports System (NPIAS) Status	MN State Aviation System Classification	Met Council Regional System Plan
Minneapolis-St. Paul International Airport (MSP)	Commercial Service Primary	Key	Major
St. Paul Downtown (STP)	Reliever	Key	Intermediate
Flying Cloud (FCM)	Reliever	Key	Minor
Airlake (LVN)	Reliever	Intermediate	Minor
Anoka County/Blaine (ANE)	Reliever	Intermediate	Minor
Crystal (MIC)	Reliever	Intermediate	Minor
Lake Elmo (21D)	Reliever	Intermediate	Minor
South St. Paul (SGS)	Reliever	Intermediate	Minor
Forest Lake (25D)	Not in NPIAS	Landing Strip	Special Purpose
Surfside Seaplane Base (8Y4)	Not in NPIAS	Landing Strip	Special Purpose
Wipline Seaplane Base (09Y)	Not in NPIAS	Landing Strip	Special Purpose

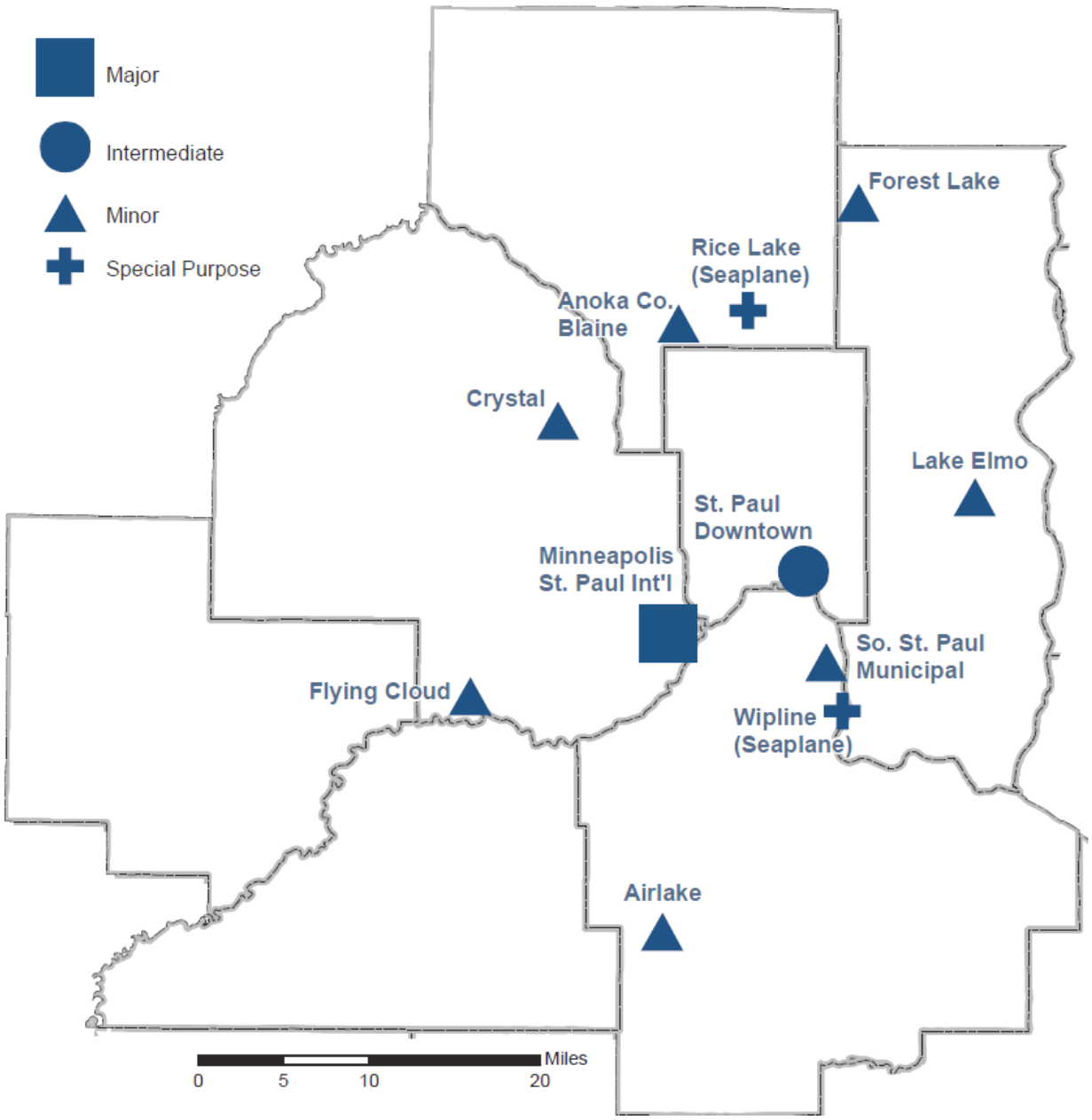

Figure 7-1: Regional Airports by System Role

Pavement Conditions

Three runways at Crystal and St. Paul Downtown have at least some portion with a PCI of 40 or less, which will likely require reconstruction.

MAC maintains an ongoing pavement management program at each of the six MAC-owned reliever airports. MnDOT maintains a pavement management program at the South St. Paul reliever airport. Pavement conditions are assessed using the Pavement Condition Index (PCI) procedure for airfield pavement. **Table 7-2** shows the PCI rating for all runways at each of the seven reliever airports.

Table 7-2: Pavement Condition Ratings for Reliever Airport Runways

Airport	Year of Condition Rating	Runway	PCI Range
Anoka County/Blaine (ANE)	2013	Runway 09/27	61-80
		Runway 18/36	61-80
Flying Cloud (FCM)	2016	Runway 10L/28R	41-100
		Runway 10R/28L	61-80
Airlake (LVN)	2016	Runway 12/30	41-60
Crystal (MIC)	2013	Runway 6L/24R	61-80
		Runway 14R/32L	21-40
		Runway 14L/32R	81-100
St. Paul Downtown (STP)	2016	Runway 14/32	41-100
		Runway 9/27	21-80
		Runway 13/31	21-100
Lake Elmo (21D)	2016	Runway 14/32	41-60
		Runway 4/22	41-60
South St. Paul (SGS)	2014	Runway 16/34	56-70

Of the 14 reliever runways, six have PCI ratings of 60 or greater over the entire length of the runway (assuming the South St. Paul runway falls within this range), indicating that only preventative maintenance is needed. Five runways at Flying Cloud, Airlake, St. Paul Downtown, and Lake Elmo have runways where at least some portion has a rating between 40 and 60, which may require major rehabilitation. Three runways at Crystal and St. Paul Downtown have at least some portion with a PCI of 40 or less, which will likely require reconstruction.

Facility and Service Evaluation

An integral part of system planning is the periodic review of the roles each airport serves in the system. There are many aspects to system planning and performance evaluation. First, the roles of an airport need to be identified within the system. Then the airport's performance can be evaluated in terms of facility and services that the airport provides in relation to the system. Furthermore, the airport facilities and services can be benchmarked against a set of defined facility and service criteria. The airports in the Twin Cities Regional Aviation System have roles assigned by various (Federal, State, and Regional) classification systems, each tailored to the specific needs of the particular system. For each airport role, a set of facility and service objectives were developed, based upon the types of aviation users the airport predominantly serves. These recommended objectives covered the following airside facilities, landside facilities, and services. These objectives can be found in the *Regional Aviation System Plan* prepared in 2009. Using the recommended objectives identified in the *Regional Aviation System Plan*, each airport is evaluated based on the role assigned to it under the classification system.

An integral part of system planning is the periodic review of the roles each airport serves in the system. The four airport role classifications are major, intermediate, minor, and special purpose.

The four airport role classifications are: Major, Intermediate, Minor, and Special Purpose. These functional roles within the regional airport system also provide a baseline for evaluating the performance of the Twin Cities' existing airport system. It should be noted that the Twin Cities regional airport system is a well-developed aviation system that has been properly managed and maintained. As a result, the airports within the system already meet most of the recommended facility and service performance measures, and that future changes or developments at these airports would only result from a change in aviation demand.

The Twin Cities regional airport system is a well-developed aviation system that has been properly managed and maintained.

This evaluation provides the foundation for subsequent recommendations for the Twin Cities Regional Aviation System, as well as for individual study airports. In addition to improvements at individual airports, the issue of which airports should be included in the National Plan of Integrated Airports Systems (NPIAS) should be addressed, as this can be an important factor in funding for airport improvements.

Each airport has mechanisms in place that provide for long-term planning of the airport facilities, use, and airspace.

Each airport has mechanisms in place that provide for long-term planning of the airport facilities, use, and airspace. Minnesota state law requires an update of long-term community, county, and special district plans every 10 years; the last updates occurred in 2008 and 2009 for most of the system airports.

There are three metropolitan region airports that are not part of the NPIAS—Forest Lake, Surfside Sea Plane Base, and Wipline Sea Plane Base—would need a benefit-cost analysis to substantiate their addition to the NPIAS. The facility and service objective evaluation found few shortfalls in the system—consistent with a mature and well-developed airport system.

Only a few proposed facility and service objectives were not met, and these were generally not items of major significance. The system's *Major Airport*, Minneapolis-St. Paul International, meets all of its proposed measures.

The system's *Intermediate Airport*, St. Paul Downtown, meets 94 percent of its proposed measures. The only proposed measure it failed to meet was the food service objective because of the lack of an airport restaurant.

Collectively, the *Minor Airports* meet nearly all of the proposed facility and service measures. Lake Elmo fails to meet only one of its proposed measures, ground transportation, by lacking courtesy car service. South St. Paul Airport falls short of a single proposed measure. It does not meet the approach lighting system measure, since it does not have any approach lights or runway end identifier lights.

The *Special Purpose Airports* meet 100 percent of their proposed measures.

In terms of planning and zoning, all of the airports have or are developing long-term plans. Many have joint zoning boards and associated zoning regu¬lations in place.

Overall, the system airports meet 98 percent of their proposed measures. This illustrates that the Twin Cities Regional Aviation System is a mature, well developed airport system made up of airports that do not lack in any significant development areas for the proposed roles they have been assigned. Those few areas where shortfalls have been identified will be addressed in the future, and Council staff will detail recommended improvements to the avia¬tion system.

Ground Travel and Airport Service Area Evaluation

Accessibility to an airport can be defined in terms of access both from the ground and from the air, effectively defining its service area.

The provision of convenient access to the region's airports is an important goal for the Metropolitan Council Regional Airport System. Accessibility to an airport can be defined in terms of access both from the ground and from the air, effectively defining its service area. The Federal Aviation Administration (FAA), through NPIAS has established guidelines to evaluate the accessibility of airports by ground. These measures will help to identify the percentage of the region's population and land area that is within a typical drive time of each category of airport.

The proximity of airports that accommodate a full range of the general aviation fleet to metropolitan populated areas is key.

The support in the development of an airport system that serves the largest possible number of citizens and businesses is an important goal. The primary benchmark by which airport accessibility is measured is by proximity to population centers. This is true not only of the Twin Cities' commercial service airport, which is important to businesses and individuals for airline travel worldwide, but also of its general aviation airports, which accommodate a far wider set of aviation activities. Thus, the proximity of airports that accommodate a full range of the general aviation fleet to metropolitan populated areas is key.

To evaluate the adequacy of Metropolitan Council's aviation system as it relates to its ability to provide adequate ground access, the following benchmarks are used:

- Percent of population and area within 60 and 90 minutes of a Major Airport
- Percent of population and area within 45 minutes of an Intermediate Airport
- Percent of population and area within 30 minutes of a Minor Airport
- Percent of population and area within 30 minutes of a Special Use Airport

Special Use Airports, due to the nature of their operations, draw users from an indeterminate area. For analysis purposes, this study used an area encompassed by a 30-minute drive time.

Nearly the entire metropolitan region is within the service area of a system airport, with 83 percent of the metropolitan region covered.

The coverage provided by all airports (except Special Purpose Airports) in the Twin Cities region is based on 45-minute drive times from MSP and 30-minute drive times from all other airports. Nearly the entire metropolitan region is within the service area of a system airport, with 83 percent of the metropolitan region covered. The vast majority of the region's projected 3.7 million population falls within the service area of the system airports. Based upon the 2030 population projection for the metropolitan region, 76 percent of the population is expected to be within the service area of a system airport.

The general aviation airports cumulatively, along with coverage provided by MSP, provide 76 percent of convenient ground travel time coverage to the 2030 projected population of the region.

The ground drive time coverage for MSP, the single Major Airport in the regional system, provides adequate access for commercial passenger travel for the region's citizens during non-peak travel times and provides 97 percent population coverage during the afternoon peak period. The general aviation airports—*Intermediate, Minor, and Special Purpose Airports*—provide varying ground travel time coverage to different portions of the metropolitan region. However, cumulatively, these airports, along with coverage provided by MSP, provide 76 percent of convenient ground travel time coverage to the 2030 projected population of the region. The areas not covered are portions of western Hennepin County, Anoka County, and Scott County, along with some of the downtown Minneapolis area and the southeastern corner of Dakota County. The collar county airports provide some additional coverage for these areas with 30-minute ground travel time access.

Operations

Annual Aircraft Operations

Airport activity levels are typically measured by total aircraft operations. An operation is either an arrival or a departure, and therefore one arrival and one departure represent two operations. Annual operations at MSP were obtained from the FAA Air Traffic Activity System (ATADS). Annual operations at the six MAC-owned reliever airports were obtained from MAC's *Annual Report* to the Legislature. For the four reliever airports with towers (ANE, MIC, FCM, and STP), aircraft operations are counted only while the towers at those airports are operational. It should be noted that these airports are open 24 hours per day, but the control towers are closed during late night and early morning hours. The aircraft operations totals therefore do not include operations that occurred while the towers were closed. At MAC airports where there is no air traffic control tower (LVN and 21D) the operations totals are estimates compiled by MAC. Operations reported for South St. Paul (SGS) represent a combination of FAA estimates and forecast data. No operations are reported for the Special Purpose airports (25D, 8Y4, and 09Y).

Table 7-3: Annual Aircraft Operations for MAC Airports (2010-15)

	Total Annual Aircraft Operations						Percent Change
Airport	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**(2010-15)**
Minneapolis – St. Paul (MSP)	435,583	435,076	424,928	431,573	411,760	404,374	-7%
Airlake (LVN)	35,662	34,270	34,560	31,346	33,178	42,341	+19%
Anoka County – Blaine (ANE)	79,589	73,292	79,190	76,721	68,157	89,708	+13%
Crystal (MIC)	44,229	43,986	48,220	42,308	41,117	39,641	-10%
Flying Cloud (FCM)	94,244	114,574	88,663	79,511	73,634	87,493	-7%
Lake Elmo (21D)	34,374	33,032	33,319	33,220	25,727	32,842	-4%
St. Paul Downtown (STP)	88,995	87,229	79,238	69,277	64,539	56,676	-36%
South St. Paul (SGS)	61,999	62,000	62,640	63,600	64,800	65,760	+6%
Total	**874,675**	**883,459**	**850,758**	**827,556**	**782,912**	**818,835**	**-6%**

Operations are classified as either Air Carrier, Air Taxi, General Aviation (GA), or Military. At MSP, commercial operations (Air Carrier and Air Taxi operations) make up approximately 96 percent of all operations. In 2015, GA operations at MSP accounted for 2.9 percent of all activity and military operations accounted for 0.7 percent of all activity, which is consistent with previous years.

On-Time Performance

Factors that can cause a flight to be delayed may be related to mechanical problems, lack of crew, weather, or airfield capacity constraints. MSP has operated above the national average every year since 2010.

The Office of Airline Information, Bureau of Transportation Statistics (BTS) tracks on-time performance for both arrivals and departures across all commercial airports in the U.S. **Table 7-4** shows the percentage of flights that arrived on-time at MSP for each year from 2010 through 2015. Within this data set, aircraft must be airborne enroute to their scheduled destination in order for them to be considered delayed; therefore, cancelled and/or diverted flights are not considered late in this system. A flight is considered on-time when it arrives less than 15 minutes after its published arrival time. Factors that can cause a flight to be delayed may be related to mechanical problems, lack of crew, weather, or airfield capacity constraints. As shown, MSP has operated above the national average every year since 2010.

Table 7-4: On-Time Performance for Arrivals at MSP (2010-15)

	On-Time Performance for Arrivals					
Airport	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Minneapolis – St. Paul (MSP)	78.6	82.8	87.2	83.2	81.4	82.8
National Average	**79.8**	**79.6**	**81.9**	**78.3**	**76.3**	**79.9**

The BTS also tracks the percentage of flights that depart on time, defined as flights that depart within 15 minutes of their scheduled departure time. As shown in **Table 7-5**, MSP has operated above the national average every year since 2010 for this measure as well.

Table 7-5: On-Time Performance for Departures from MSP (2010-15)

	On-Time Performance for Departures					
Airport	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Minneapolis – St. Paul (MSP)	79.7	83.9	87.8	84.0	82.6	84.8
National Average	**81.0**	**81.0**	**82.4**	**79.2**	**77.3**	**80.3**

Aircraft Delay per Operation

In additional to on-time performance, the FAA also tracks average delay per aircraft per operation (in minutes of delay). When calculating the average delay per aircraft operation, airport-attributable delay is estimated by comparing a flight's actual air and taxi times with estimated unconstrained times. The total cumulative amount of delay experienced by all scheduled flights in the database is then divided by the total number of flights in the database for the same time period. MAC reports this information in their Annual Report to the Legislature, ranking MSP against other large hub airports in the U.S. As shown in **Table 7-6**, with 4.3 minutes of delay per operation, MSP performed better than 24 other major hub airports in the U.S. in 2015.

MSP performed better than 24 other major hub airports in the U.S. in 2015.

Table 7-6: Average Delay per Aircraft Operation at MSP in Minutes (2010-15)

Measure	2010	2011	2012	2013	2014	2015
Average Delay per Aircraft Operation	5.1	4.6	4.0	5.1	4.5	4.3
Rank Among Large Hub Airports	11	14	17	10	16	25

Passenger Enplanements

In support of the FAA's Airport Improvement Program (AIP), the FAA maintains a database of revenue passenger boarding information in their Air Carrier Activity Information System (ACAIS). MAC reports that approximately 55 percent of all enplanements in 2015 were attributed to originating passengers, with the remaining 45 percent coming from connecting passengers. As shown in **Table 7-7**, enplanements at MSP are up 14 percent compared to 2010, which trends slightly above the U.S. total increase in enplanements during this time.

Enplanements at MSP are up 14 percent compared to 2010, which trends slightly above the U.S. total increase in enplanements during this time.

Table 7-7: Total Annual Passenger Enplanements at MSP (2010-15)

	Total Annual Passenger Enplanements						Percent Change
Airport	2010	2011	2012	2013	2014	2015	(2010-15)
MSP	15,512,487	15,895,653	15,943,878	16,280,835	16,972,678	17,634,273	+14%
US Total	**712,025,632**	**724,158,444**	**731,800,470**	**738,935,380**	**761,288,443**	**799,311,160**	**+12%**

Airline Cost per Enplaned Passenger

Airlines operating out of MSP pay a lower rate per enplaned passenger compared to the large hub average, and the CPE percentage increase from 2010 to 2015 was less at MSP compared to the large hub average.

In order to track Congressionally-mandated airport financial information, the FAA maintains a database of financial reports of some 520 commercial service airports in their Compliance Activity Tracking Systems (CATS). CATS financial information is standardized to allow for comparison across airports using the same methodology. As a result, CATS data differs from MAC-reported data for MSP in some cases. One key financial metric contained within the database is Airline Cost per Enplaned Passenger (CPE), which is a measure of the average passenger airline payments per enplaned passenger at a given airport. **Table 7-8** shows MAC-reported CPE data along with the average CPE for the 30 Large Hub airports in the U.S. from the CATS database. As shown, airlines operating out of MSP pay a lower rate per enplaned passenger compared to the large hub average, and the CPE percentage increase from 2010 to 2015 was less at MSP compared to the large hub average.

Table 7-8: Airline Cost per Enplaned Passenger at MSP (2010-15)

	Airline Cost per Enplaned Passenger						Percent Change
Airport	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**(2010-15)**
MSP (MAC Data)	$6.03	$6.32	$6.42	$6.76	$6.81	$6.44	+7%
MSP (CATS Data)	$5.71	$6.00	$6.50	$6.83	$6.60	$6.17	+8%
Large Hub Average (CATS Data)	**$10.74**	**$10.74**	**$10.91**	**$11.54**	**$12.05**	**$11.78**	**+10%**

Peer Region Comparison

To put the Twin Cities Regional Aviation System in perspective, a comparative analysis was conducted to provide insight into how other regional systems function when compared with MSP and its regional airport system. As part of the 2012 TSPE, six peer airport systems were identified for the comparative analysis with the Twin Cities Regional Airport System based on several factors using 2000 as the baseline year, including:

- Only one major hub airport serves the metropolitan area
- Low cost airline service was present at some time at the major hub air¬port
- The airports rank in the top 20 in terms of activity

Based on these criteria, the following peer regions were selected:

- Atlanta
- Charlotte
- Denver
- Detroit
- Philadelphia
- Pittsburgh

Since the year 2000, activity levels at Pittsburgh International Airport have steadily declined, and US Airways no longer uses Pittsburgh as a hub. Although Pittsburgh is no longer a large hub, it has been maintained as a peer airport for consistency across TSPE updates. All other cities continue to meet the screening criteria outlined above.

Annual Aircraft Operations

Table 7-9 summarizes total annual aircraft operations for 2010 through 2015 for MSP and the selected peer airports. Between 2010 and 2015, aircraft operations at MSP decreased by a similar percentage to the peer average; only Charlotte saw an increase in annual aircraft operations during this time. Despite the decrease in operations, Atlanta remains the world's busiest airport in 2015 in terms of annual aircraft operations.

Table 7-9: Annual Aircraft Operations for MSP and Peer Airports (2010-15)

	Total Annual Aircraft Operations						Percent Change
Airport	2010	2011	2012	2013	2014	2015	(2010-15)
Atlanta (ATL)	950,119	923,991	930,098	911,074	868,359	882,497	-7%
Denver (DEN)	635,458	634,684	618,257	586,860	575,161	547,648	-14%
Charlotte (CLT)	529,107	539,842	552,515	557,955	545,294	543,944	+3%
Philadelphia (PHL)	460,779	448,129	443,236	432,884	419,253	411,368	-11%
Minneapolis – St. Paul (MSP)	435,583	435,076	424,928	431,573	411,760	404,374	-7%
Detroit (DTW)	452,616	443,028	427,814	425,732	392,635	379,376	-16%
Pittsburgh (PIT)	144,563	148,782	139,217	139,300	135,293	141,674	-2%
Peer Average	**515,461**	**510,505**	**505,152**	**497,911**	**478,251**	**472,983**	**-8%**

The operations reported in **Table 7-9** include commercial service, general aviation, and military operations. For reference, **Figure 7-2** shows total air carrier, air taxi, general aviation, and military aircraft operations in 2015 for MSP and the peer airports. With approximately 3.6 percent non-commercial operations, MSP ranks near the middle compared to the peer airports. Charlotte has the highest total number of annual general aviation and military operations, while Pittsburgh has the highest percentage of general aviation and military operations.

The two busiest peer airports in terms of operations (Atlanta and Denver) both have less than 1 percent of total operations from general aviation and military activity. This helps support the need for reliever airports to accommodate additional general aviation operations within the Twin Cities Regional Aviation System. MSP has limited space for general aviation aircraft, including corporate jets; however, it has more general aviation facilities located on-airport than Atlanta. And similar to Atlanta, there are several airports near MSP that cater to corporate aviation, such as St. Paul Downtown. As MSP air carrier operations increase, so does airfield congestion, thus shifting general aviation operations to reliever airports, which helps reduce airfield congestion and associated delay costs.

The two busiest peer airports in terms of operations (Atlanta and Denver) both have less than 1 percent of total operations from general aviation and military activity. This helps support the need for reliever airports to accommodate additional general aviation operations within the Twin Cities Regional Aviation System.

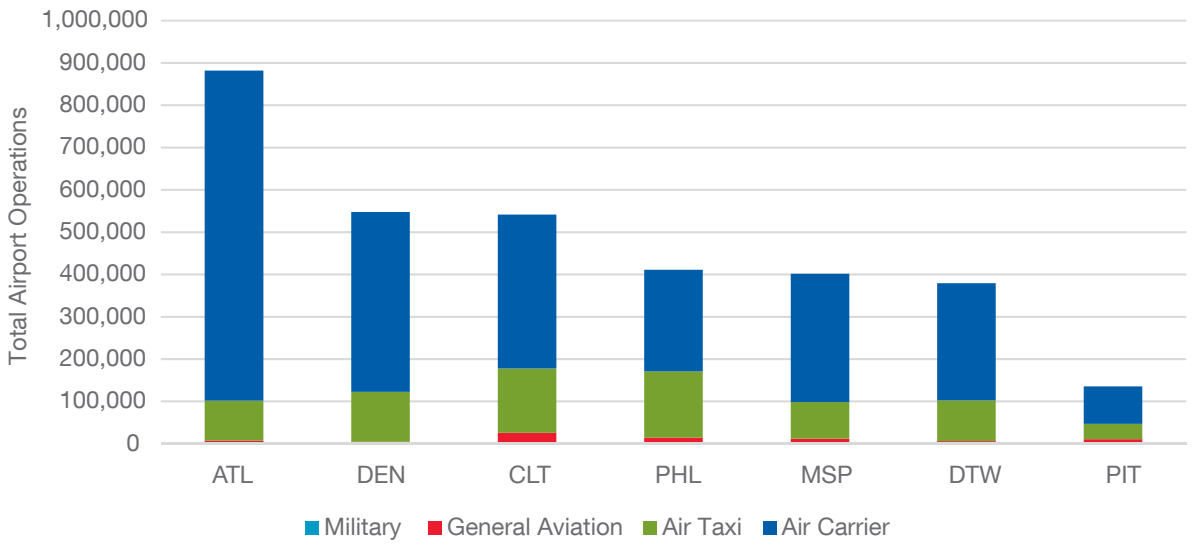

Figure 7-2: Total Annual Airport Operations by Type for MSP and Peer Airports (2015)

On-Time Performance

Since 2010, MSP has consistently performed well against its peers in terms of on-time performance. In 2015, only Pittsburgh had a higher percentage of on-time departures, and only Atlanta and Charlotte had a higher percentage of on-time arrivals. MSP ranked ahead of its peers for both on-time departures and on-time arrivals in 2011, 2012, and 2013.

Table 7-10: On-Time Performance for Arrivals for MSP and Peer Airports (2010-15)

	On-Time Performance for Arrivals					
Airport	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Atlanta (ATL)	78.8	80.3	84.7	80.9	81.2	84.4
Charlotte (CLT)	82.9	79.4	86.2	80.7	81.4	83.4
Minneapolis – St. Paul (MSP)	78.6	82.8	87.2	83.2	81.4	82.8
Detroit (DTW)	77.8	81.4	84.9	82.9	82.3	82.8
Pittsburgh (PIT)	79.4	79.0	81.3	78.5	77.4	80.7
Denver (DEN)	83.6	82.2	83.2	76.8	76.5	79.8
Philadelphia (PHL)	78.1	76.2	81.1	76.0	76.2	78.1
National Average	**79.8**	**79.6**	**81.9**	**78.3**	**76.3**	**79.9**

Table 7-11: On-Time Performance for Departures for MSP and Peer Airports (2010-15)

	On-Time Performance for Departures					
Airport	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Pittsburgh (PIT)	83.2	83.2	86.1	83.3	82.9	85.0
Minneapolis – St. Paul (MSP)	79.7	83.9	87.8	84.0	82.6	84.8
Detroit (DTW)	78.4	81.4	84.4	82.4	81.6	82.6
Charlotte (CLT)	83.4	80.5	86.7	81.7	80.9	82.3
Atlanta (ATL)	79.1	79.9	83.9	79.3	78.9	82.1
Philadelphia (PHL)	80.4	79.0	84.7	80.7	78.9	80.1
Denver (DEN)	80.3	78.9	78.8	72.5	72.4	77.1
National Average	**81.0**	**81.0**	**82.4**	**79.2**	**77.3**	**80.3**

Passenger Enplanements

Although total aircraft operations have generally declined since 2010, passenger enplanements have steadily increased at MSP and the peer airports. **Table 7-12** shows that compared to the peer average, MSP has experience more growth since 2010. Atlanta and Charlotte experienced similar growth over this time, while Denver, Detroit, and Philadelphia had more modest growth. Only Pittsburgh experienced a decline in passenger enplanements between 2010 and 2015.

Table 7-12: Total Annual Passenger Enplanements at MSP and Peer Airports (2010-15)

	Total Annual Passenger Enplanements						Percent Change
Airport	2010	2011	2012	2013	2014	2015	(2010-15)
ATL	43,130,585	44,414,121	45,798,928	45,308,407	46,604,273	49,340,732	+14%
DEN	25,241,962	25,667,499	25,799,841	25,496,885	26,000,591	26,280,043	+4%
CLT	18,629,181	19,022,535	20,033,816	21,346,601	21,537,725	21,913,166	+18%
MSP	15,512,487	15,895,653	15,943,878	16,280,835	16,972,678	17,634,273	+14%
DTW	15,643,890	15,716,865	15,599,879	15,683,523	15,775,941	16,255,520	+4%
PHL	14,951,254	14,883,180	14,589,337	14,727,945	14,792,339	15,101,349	+1%
PIT	3,996,656	4,070,614	3,892,338	3,812,460	3,827,860	3,890,681	-3%
Peer Average	**19,586,574**	**19,952,924**	**20,236,860**	**20,379,522**	**20,787,344**	**21,487,966**	**+10%**

Airline Cost per Enplaned Passenger

While cost per enplaned passenger increases at MSP are generally consistent with trends among these peers and other large hubs, in 2015 Charlotte and Atlanta charged less than half of what MSP charged airlines per passenger.

Operating expenses vary widely between airports, as shown in **Table 7-13**. In general, the busiest airports are able to achieve lower costs per enplaned passenger, but this is not always the case, as demonstrated by Denver. While Pittsburgh has achieved a steady decrease in CPE since 2010, given the significant reduction in passenger traffic over the last ten years it is not surprising that it performs lowest among these peer airports. While CPE increases at MSP are generally consistent with trends among these peers and other large hubs, in 2015 Charlotte and Atlanta charged less than half of what MSP charged airlines per passenger.

Table 7-13: Airline Cost per Enplaned Passenger at MSP and Peer Airports (2010-15)

	Airline Cost per Enplaned Passenger						Percent Change
Airport	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**(2010-15)**
Atlanta (ATL)	$3.05	$2.87	$2.36	$3.52	$3.36	$2.86	-6%
Charlotte (CLT)	$2.72	$2.26	$2.33	$2.89	$2.65	$3.04	+12%
Minneapolis – St. Paul (MSP)*	$5.71	$6.00	$6.50	$6.83	$6.60	$6.17	+8%
Detroit (DTW)	$8.95	$8.85	$9.54	$9.39	$10.06	$9.86	+10%
Denver (DEN)	$12.64	$11.64	$11.90	$12.52	$13.92	$11.97	-5%
Philadelphia (PHL)	$9.19	$9.47	$9.99	$12.37	$13.34	$13.87	+51%
Pittsburgh (PIT)	$18.20	$18.62	$18.02	$18.51	$17.84	$16.73	-8%
Peer Average	**$8.64**	**$8.53**	**$8.66**	**$9.43**	**$9.68**	**$9.21**	**+7%**
Large Hub Average	**$10.74**	**$10.74**	**$10.91**	**$11.54**	**$12.05**	**$11.78**	**+10%**

**CATS data used for comparison purposes*

Future Performance Measures

As data becomes more accessible and transparent, the following areas could be used for future performance measures. These measures are not related to federal requirements, but staff understands that data collection is possible, and could be measured in the future. These measures are divided into six categories, or Performance Areas (Core, Safety and Security, Service Quality, Cost Effectiveness, Financial, and Environmental). The following is a summary of what these measures could consist of:

- Core – these are the core measures used to characterize and categorize airports, such as the number of passengers and operations. Although airports may have little control over these core indicators, especially in the short term, they are important indicators of overall airport activity, and important drivers and components of other indicators
- Safety and Security – these are the most important airport responsibilities, and therefore they are categorized separately
- Service Quality – this increasingly important area reflects the evolution of airport management from having a primary focus on facilities and operations to having a strong customer service focus in an increasingly com¬petitive environment
- Productivity/Efficiency – these measures are closely related/overlapping measures of an airport's performance. They sometimes are separated into productivity measures, which track output (passengers per airport employee or departures per gate), and efficiency measures, which track output on a cost basis—(total or operating cost per passenger)
- Financial – this includes measures relating to airport charges, airport financial strength and sustainability, and the performance of individual commercial functions
- Environmental – this evolving area has become a strong focus for airport managements striving to minimize environmental impacts

Findings and Conclusions

Since 2010, MSP has experienced a steady increase in passenger enplanements, while maintaining cost-effective operations.

Since 2010, MSP has experienced a steady increase in passenger enplanements, while maintaining cost-effective operations. The following findings and trends provide an overview of the aviation system from 2010 through 2015:

- Total annual aircraft operations, including commercial and general aviation, decreased by approximately 7 percent between 2010 and 2015. At MSP, operations have decreased by 7 percent, and at the six MAC-owned airports, total operations have decreased by 8 percent. The decline in operations at MSP is consistent with the peer average over this time period (-8 percent)
- Although total operations have decreased, total annual passenger enplanements at MSP increased by 14 percent between 2010 and 2015. This increase tracks above both the national (+12 percent) and the peer airport average (+10 percent)
- The reduction in total annual operations with an increase in total annual passenger enplanements is consistent with the airline industry trend to focus on productivity and use fewer flights with greater capacity (larger airplanes or simply putting more seats on existing airplanes) to serve major destinations
- The average cost per enplaned passenger at MSP increased by around 7 to 8 percent between 2010 and 2015, which is similar to the large hub average (+7 percent) and less than the peer airport average (+10 percent)
- On-time performance for both arrivals and departures at MSP fluctuates year to year, but MSP consistently performs above the national average for large hubs. MSP generally performs in the top half of the selected peer airports, peaking in 2012 when MSP outperformed all of the selected peer airports
- Similarly, average delay per aircraft operations at MPS fluctuates year to year, but MSP consistently performs very well compared to the average for large hub airports. While MSP achieved the least amount of delay per aircraft operation in 2012 over this time period, 2015 was MSP's best year relative to other large airports, when it performed better than 24 other large hub airports

Appendix

This section describes future measures for the Transportation System Performance Evaluation (TSPE) that were not included in the 2016 TSPE due to lack of data or clarity on measurement parameters. These measures come from Metropolitan Council staff recommendations, the 2040 Transportation Policy Plan (TPP) adopted performance measures, and input from Metropolitan Council modal work groups.

The Region and Travel

Number of Jobs Accessible in X Minutes (Auto)

CURRENT VALUE (2010):

- In 20 minutes, 639,314 jobs are accessible via car by the average worker (41% of total jobs)
- In 30 minutes, 1.51 million jobs are accessible via car by the average worker (96% of total jobs)
- In 40 minutes, 1.57 million jobs (100% of total jobs)
- Overall, the Twin Cities are ranked fifth in job accessibility by car (12th in total jobs)

PREVIOUS VALUES (2000):

Has not been calculated

DISCUSSION

The job accessibility measure would align with the competitive economy goal in the TPP and incorporate land use, at least indirectly. Met Council staff are working to identify the time threshold to measure. Highway Performance Measures Modal Group members support presenting both the total number of jobs accessible and the percent of overall jobs accessible. The percentage was viewed as more understandable by the public.

Number of Jobs Accessible in X Minutes (Transit)

CURRENT VALUE (2014):

- In 30 minutes, 17,651 jobs are accessible via transit by the average worker (1% of total jobs)
- In 40 minutes, 44,355 jobs (3% of total jobs)
- In 50 minutes, 83,646 (5% of total jobs)
- In 60 minutes, 134,173 jobs (8% of total jobs)

Notes: Transit travel time includes walk time to and from the transit stop. It does not include drive to transit trips. Calculated based on published weekday schedules for 7:00 AM – 9:00 AM.1

PREVIOUS VALUES:

Has not been calculated

DISCUSSION:

There was broad support among the Transit Performance Measures Modal Group members for using jobs accessible in x minutes via transit as a performance measure, however there were differences of opinion over how it should be measured. The majority of the discussion focused on what is the appropriate time threshold to use for this measure. There was some discussion regarding the different values of time for drivers versus transit commuters.

One member noted that other regions have established a ratio of job accessibility via transit versus job accessibility via auto with different time thresholds for each. It was also noted that time is only one factor in a person's choice to use a mode and other factors may account for the difference in time, such as cost of parking, stress of driving, and ability to multitask.

Many members suggested changes to the way access to jobs is measured. In particular, there was support for broadening the intent of the measure to access to destinations or opportunity. This could be explored by weighting the measure by total population instead of total workers, as it is currently calculated. Similarly, members felt that measuring access to jobs only during the morning peak period did not adequately capture all jobs, particularly jobs for low-income or under-represented groups. Met Council staff will explore access to jobs methodologies by different time periods throughout the day.

Number of Jobs Accessible in X Minutes (Pedestrian)

CURRENT VALUE (2014):

- In 20 minutes, 2,392 jobs are accessible via walking by the average worker (0.1% of total jobs)
- In 30 minutes, 6,063 jobs are accessible via walking by the average worker (0.4% of total jobs)
- In 40 minutes, 11,427 jobs are accessible via walking by the average worker (0.7% of total jobs)
- Overall, the Twin Cities are ranked eighteenth in job accessibility by walking (14th in total jobs)

PREVIOUS VALUES (2010):

Has not been calculated

Note: This measure as currently calculated is weighted by workers, not all people.

DISCUSSION:

The Bike/Ped Performance Measures Modal Group was concerned that without good information on the sidewalk network in the system, this measure is solely a land use measure which does not reflect investments in the TPP. In the end, the group decided to bring this measure forward while Met Council staff explores the methodology of the measure. If the sidewalk network used to calculate this measure is not sufficient, this measure will not be included in the TPP.

The Highway System

Roadway Mileage per Capita

Roadway mileage per capita is a ratio of mileage of roadways to people within the planning area. This measure was not calculated for the 2016 TSPE due to the recent addition of portions of Wright and Sherburne County to the planning area. There was concern regarding appropriating the population of Wright and Sherburne Counties to this measure. Prior to the next version of the TSPE, a methodology will be developed to calculate the population living in the portion of these two counties within the planning area.

The Transit System

Federal State of Good Repair Measure

Federal Transit Administration (FTA) has published a notice of proposed rulemaking that includes draft asset management performance measures for transit but these measures are not yet final. The Council will report on the required FTA asset management performance measures. Percent of Forecasted Job and Population Growth Near High-Frequency Transit Service

CURRENT VALUE (2010-2040):

49% of regional forecasted job growth near high-frequency transit; 14% of regional forecasted population growth near high-frequency transit

PREVIOUS VALUES:

Not applicable

DISCUSSION:

The Transit Performance Measures Modal Group supported including this measure as a more qualitative assessment of the investments and policies in the TPP that tie directly to objectives under the Goal of Leveraging Transportation Investments to Guide Land Use.

Transit Contribution to Reduction in Regional Vehicle Miles Traveled (VMT)

CURRENT VALUE:

Reduction of x% of daily VMT due to transit service

PREVIOUS VALUES:

Has not been calculated

Note: There would need to be an estimate of what mode the transit rider would use if he/she was not using transit. For example, someone without access to a car may not make the trip.

DISCUSSION:

Change in VMT and emissions may be included as measures in the next TPP due to federal requirements. Some members of the Transit Performance Measures Modal Group felt that assumptions made in order to calculate this measure specifically for transit's impact were less reliable than the other measures. Other members felt that it didn't make sense to track VMT reduction from transit individually and would be better as an overall measure of VMT.

Number of Communities with Adopted Comprehensive Plans or Policies that Support Transit and Multimodal Travel

CURRENT VALUE:

Would be tracked with 2018 Comprehensive Plan Updates

PREVIOUS VALUES (2000):

Not measured

DISCUSSION:

Transit Performance Measures Modal Group members pointed out that this measure couldn't be forecasted and wouldn't be able to measure investments in the TPP. Some members expressed concern that stated policies supporting transit do not necessarily represent transit-supportive plans overall and most plans in the region likely have transit-supportive policies. Council staff noted that they may track this information for other purposes but agreed that as a performance measure for the plan, it likely isn't a good fit.

Level of Transit Service by Transit Market Area

Metropolitan Council staff is currently working to develop a measure to analyze the level of transit service by transit market area. Transit market areas are described in the TPP and are defined by demographic and urban design factors that are associated with successful transit service. Appendix G of the TPP describes the transit market areas in more detail and the typical transit service in each area.

Equity of Transit Waiting Facilities

Metro Transit has recently been working on a Better Bus Stops project to improve transit waiting facilities in a more equitable manner. Metropolitan Council staff is working to create a measure to analyze if transit waiting facilities are being improved in an equitable manner moving forward.

Transit On-Time Performance

The transit on-time performance measure would assess the reliability of transit service in the region. Metropolitan Council and Metro Transit staff are currently working on a measure to use for transit on-time performance in future version of the TSPE.

The Freight System

Truck Travel Time Index

CURRENT VALUE (2014):

1.26 (all vehicles; not freight-specific)

PREVIOUS VALUES (2010):

1.25 (all vehicles; not freight specific)

DISCUSSION:

Congestion and mobility issues were the most important areas to measure according to the Freight Performance Measures Modal Group. As with most congestion and mobility measures for freight, Met Council has travel time data for the National Highway System (NHS) only. Additional data would need to be purchased to expand the measure to the A-minor arterial system. It was suggested that the measure could be focused on the key truck corridors that will be identified as part of the on-going Regional Truck Highway Corridor Study. Group members liked the idea of focusing the measure on the most important corridors for freight.

The Bicycle and Pedestrian System

Accessibility at Transit Stops/Stations

CURRENT VALUE (2014):

x% of inventoried Metro Transit stops are preliminarily considered to be accessible

PREVIOUS VALUES (2010):

Has not been calculated

Notes: This data comes from Metro Transit only. The suburban providers are not included. The data only includes pavement to curb at the stop itself and does not consider connecting sidewalk. This data is intended as a preliminary review for follow-up assessments by engineering staff.

DISCUSSION:

The accessibility at transit stops/stations measure wasn't supported by the Bike/Ped Performance Measures Modal Group because the data for the measure was not robust enough to accurately capture what the group wanted to measure. The measure, as it is currently being tracked by Metro Transit, does not measure connecting sidewalks to the bus stops or whether the bus stops meet ADA standards. The group supported an accessibility measure that measured ADA ramp or sidewalk connectivity but acknowledged that the data is not currently available.

Reduction in Transportation Related Emissions Due to Biking/Walking

CURRENT VALUE (2014):

x tons reduced of NOx, CO, PMs, GHGs

PREVIOUS VALUES (2010):

x tons reduced of NOx, CO, PMs, GHGs

DISCUSSION:

The Bike/Ped Performance Measures Modal Group felt that too many assumptions were needed to calculate this measure. In order to accurately calculate this measure, one has to assume what type of trip the person biking or walking would have made if they didn't bike or walk. Council staff surveyed peer MPOs to determine if they calculate emissions reduction from biking or walking. However, there doesn't seem to be an accepted methodology for calculating this type of measure for biking or walking.

Existence of Sidewalks/Pedestrian Ramps

There is not currently a comprehensive dataset of the sidewalk network in the Twin Cities and one is not likely before the next TPP is to begin. Due to the lack of data, this measure is not recommended as a measure for the next TPP. However, the Bike/Ped Performance Measures Modal Group supported building a sidewalk inventory for the region. Met Council staff will explore this with cities and counties.

Equity of Bicycle System Connectivity

Bike/Ped Performance Measures Modal Group members agreed that a more holistic equity analysis is preferable to specific equity measures. It is very difficult for one measure to adequately address equity issues. Council staff will move forward with developing an equity measures analysis on the highest priority performance measures.

The Aviation System

Air pollution due to aviation in the region

The Aviation Performance Measures Modal Group agreed that investments in the TPP do not have much bearing on this measure which is ultimately why the group decided against including it as a highest priority measure in the TPP. Air pollution from aviation is a result of the number of flights and the types of planes used by the airlines. The Metropolitan Airports Commission and other governmental agencies cannot influence those factors. The group concluded that this measure, while important, would be best as a tracking measure. Met Council staff is exploring a methodology for calculating air pollution due to aviation in the region.

Adequate Safety Zoning Ordinances

CURRENT VALUE:

1 out of 9 airports have a joint airport zoning board

PREVIOUS VALUES:

Has not been calculated

DISCUSSION:

The Aviation Performance Measures Modal Group felt that this was an important issue but could be incorporated into the TPP as a policy statement or strategy. Instead of number of airports with a joint airport zoning board, members felt that tracking the number of adequate zoning ordinances was more important.

Noise Pollution/Exposure

CURRENT VALUE (2014):

Approximately, 9,583 households within 60 DnL decibel contour

DISCUSSION:

The city of Minneapolis supports including some discussion of the negative impacts of airport service in the TPP, particularly regarding noise pollution. Staff felt that this measure is not correlated with investments in the TPP. Much like the proposed air pollution measure, noise pollution levels are related types of planes used by airlines, number of flights, and the takeoff/landing approaches. The Metropolitan Airports Commission is not able to influence these factors. Met Council will further examine how the state statute language regarding the Metropolitan Airports Commission influences the aviation measures under discussion.

Mode	Data desired	Title of Dataset	Fiscal Years of Dataset	Dataset Owner
Aviation	System airports by national, state and regional system	MN State Aviation System Classification	2016	MnDOT
Aviation	Peer airport operations comparison-aircraft operations, percent commercial operations, percent general aviation operations	MAC Operations; FAA's Air Traffic Activity System	2010-2015	MAC, FAA
Aviation	Peer airport enplanement comparison	MAC Enplanements; FAA's Certification Activity Tracking System	2010-2015	MAC, FAA
Aviation	Peer airport aircraft operations comparison	MAC; FAA's Air Traffic Activity System	2010-2015	MAC, FAA
Aviation	On-time performance	MAC On-Time Performacne; Office of Airline Information, Bureau of Transportation Statistics	2010-2015	MAC, USDOT
Aviation	Airline Cost per Enplaned Passenger	MAC CPE; FAA's Certification Activity Tracking System	2010-2015	MAC, FAA
Aviation	Average Aircraft Delay at MSP	MAC Average Aircraft Delay	2010-2015	MAC
Aviation	Runway Pavement Condition	MnDOT PCI	2013, 2014, 2016	MnDOT
Aviation	Air pollution due to aviation in the region (All)	N/A (Future Measure)	N/A (Future Measure)	N/A (Future Measure)
Aviation	Adequate safety zoning ordinances (All)	N/A (Future Measure)	N/A (Future Measure)	N/A (Future Measure)
Aviation	Noise pollution/exposure	N/A (Future Measure)	N/A (Future Measure)	N/A (Future Measure)
Bike and Ped	Accessibility at transit stops/stations (Metro Transit)	N/A (Future Measure)	N/A (Future Measure)	N/A (Future Measure)
Bike and Ped	Reduction in transportation related emissions due to biking/walking	N/A (Future Measure)	N/A (Future Measure)	N/A (Future Measure)
Bike and Ped	Existence of sidewalks/ped ramps	N/A (Future Measure)	N/A (Future Measure)	N/A (Future Measure)
Bike and Ped	Equity of bicycle system connectivity	N/A (Future Measure)	N/A (Future Measure)	N/A (Future Measure)

Mode	Data desired	Title of Dataset	Fiscal Years of Dataset	Dataset Owner
Bike and Ped	Bike/ped commute mode share	2014 ACS 5 Year	2010, 2014	Census
Bike and Ped	Total miles of bikeways by type, local bike/ped planning statistics	Bicycle Planning Statistics	2016	Metropolitan Council
Bike and Ped	Regional Bicycle Transportation network (RBTN) Implementation	Regional Bicycle Transportation Network	2016	Metropolitan Council
Bike and Ped	Bicycle/Pedestrian miles traveled	TBI	2010	Metropolitan Council
Bike and Ped	Bike/ped volumes	Bicycle and Pedestrian	2014-2016	City of Minneapolis
Bike and Ped	Number of crashes involving bicycles	MnDOT Crash Data & Department of Public Safety Data	2010-2015; 2013-2015	MnDOT
Bike and Ped	Number of crashes involving pedestrians	MnDOT Crash Data & Department of Public Safety Data	2010-2015; 2013-2016	MnDOT
Bike and Ped	Bike/ped crash injuries and fatalities	MnDOT Crash Data & Department of Public Safety Data	2010-2015; 2013-2017	MnDOT
Bike and Ped	Bike/ped mode share	TBI	2010	Metropolitan Council
Freight	Truck travel time index	N/A (Future Measure)	N/A (Future Measure)	N/A (Future Measure)
Freight	Container lifts between rail and truck	(No Change)	2011	(No Change)
Freight	Heavily Used Freight Corridors	DRAFT Metropolitan Council Tier 1 Truck Corridors	2016	Metropolitan Council
Freight	Metropolitan rail system crossing data	(No Change)	2012	(No Change)
Freight	Freight terminals- railroad, air and river	(Modifications to 2012 Map based on known changes)	2016	MnDOT
Freight	Heavy commercial vehicle average daily traffic volume	Freight Analysis Framework	2012	USDOT, FHWA
Freight	Freight modal distribution by value and tonnage	Commodity Flow Survey	2012	Census Bureau; Bureau of Transportation Statistics

Mode	Data desired	Title of Dataset	Fiscal Years of Dataset	Dataset Owner
Freight	Annual rail freight tonnage	(No Change)	2007	(No Change)
Freight	Twin Cities freight rail Lines by operator	MnDOT Rail Lines	2015	MnDOT
Freight	Air freight and major passenger plane tonnage shares	MAC Air Freight Tonnage	2006-2015	MAC
Freight	River port freight tonnage (inbound and outbound)	MnDOT River Freight Tonnage	2006-2015	MnDOT
Freight	AM and PM congestion on highways	MnDOT's Metropolitan Freeway System Congestion Report	2015	MnDOT
Freight	Truck Congestion Costs	TTI's Urban Mobility Scorecard, Truck Congestion Costs	2014	Texas Transportation Institute
General	Percent households by framework area	2014 ACS 5 Year	2010, 2014	Census
General	Regional employment by framework area	2014 ACS 5 Year	2010, 2014	Census
General	Number of intersections per square mile			
General	Regional, peer cities and national median income, % of households in poverty, and % of households below $40,000, between $40,000 and $99,999 and above $100,000	2014 ACS 5 Year	2010, 2014	Census
General	Regional and peer cities female workforce participation rate	2014 ACS 5 Year	2010, 2014	Census
General	Regional and national employment	Bureau of labor statistics annual employment seasonally adjusted non-farm	2000-2016	Bureau of Labor Statistics
General	Total population and total households	2014 ACS 5 Year	2014	Census
General	Population size of peer cities	2014 ACS 5 Year	2010, 2014	Census
General	Race, ethnicity, foreign born, household size and population age for region	2014 ACS 5 Year	2010, 2014	Census
General	Employment change by industry sector	Quarterly Census of Employment and Wages	2005, 2015	MN DEED
General	Metropolitan Development Guide planning areas	Thrive MSP 2040 Community Designations		Metropolitan Council

Mode	Data desired	Title of Dataset	Fiscal Years of Dataset	Dataset Owner
General	Change in population and/or employment that are between 1/4 to 1/2 miles of a transit stop	2014 ACS 5 Year; Metro Transit Hi-Frequency Network	2014	Census; Metro Transit
General	Cost of Transportation			
Highway	Truck vehicle miles traveled	MnDOT Heavy Commercial VMT	2013	MnDOT
Highway	Buses, people in buses, vehicles moved and people moved in autos by MnPass and General Purpose lanes, at peak period at seven sites (I35W Southbound at MN River PM Peak, I-35W Northbound at Lake Street PM Peak, I-35W Northbound at Lake Street AM Peak, I-394 Westbound at Winnetka PM Peak, I-394 Eastbound at Louisiana Ave AM Peak, I-394 Westbound at Penn PM Peak, I-394 Eastbound at Penn AM Peak)	N/A (Future Measure)	N/A (Future Measure)	N/A (Future Measure)
Highway	Number of miles of managed lanes (MnPASS)	(Modifications to 2012 mileage based on known changes)	2016	MnDOT
Highway	Region, highway peer cities, and TTI Large Urban average roadway system mileage per capita	N/A (Future Measure)	N/A (Future Measure)	N/A (Future Measure)
Highway	Annual hours of delay	TTI's Urban Mobility Scorecard, Annual Hours of Delay	2014	Texas Transportation Institute
Highway	Metro and statewide bridge conditions, bridge structural condition rating by principal and non-principal arterial	MnDOT Bridge Condition Ratings (by Deck Area)	2015	MnDOT
Highway	Roadway miles by functional classification	MnDOT Lane-Miles by Functional Classification	2014	MnDOT
Highway	MnPASS Reliability	2016 3rd Quarter Report - MnPASS Percentage of Congested Time	2016	MnDOT
Highway	Speed difference HOV to general purpose lane average speeds (I-394 Westbound at Penn PM Peak, I-394 Eastbound at Penn AM Peak)	N/A (Future Measure)	N/A (Future Measure)	N/A (Future Measure)

Mode	Data desired	Title of Dataset	Fiscal Years of Dataset	Dataset Owner
Highway	VMT by functional classification for metro planning area	MnDOT VMT by Functional Classification	2014	MnDOT
Highway	Number of ramp meters	(No Change)	2012	(No Change)
Highway	Metro freeway congestion	MnDOT's Metropolitan Freeway System Congestion Report	2015	MnDOT
Highway	Miles of directional congestion	MnDOT's Metropolitan Freeway System Congestion Report	2015	MnDOT
Highway	Ramp meter effectiveness	(Updated to previous ramp meter effectiveness discussion based on 2012 study by University of Minnesota-Duluth professor Eil Kwon)	2012	MnDOT
Highway	Metro and statewide Ride Quality Index (RQI) by principal and non-principal arterials	2012-2015 RQI by Principal Arterial (PA) & Non-Principal Arterial (NPA) based on 2015 Data by M-record	2012-2015	MnDOT
Highway	Annual hours of delay per peak auto commuter for region, peer city, large city	TTI's Urban Mobility Scorecard, Annual Hours of Delay per Commuter	2014	Texas Transportation Institute
Highway	Twin Cities daily VMT by functional classificationification for Twin Cities, peer cities, large cities	TTI's Urban Mobility Scorecard, VMT	2014	Texas Transportation Institute
Highway	Peak period travelers	TTI's Urban Mobility Scorecard, Peak Period Travelers	2014	Texas Transportation Institute
Highway	Travel time index pattern for region, peer city, large city	TTI's Urban Mobility Scorecard, Peak Period Travelers	2014	Texas Transportation Institute
Highway	Annual congestion cost per commuter for region and peer cities	TTI's Urban Mobility Scorecard, Travel Time Index	2014	Texas Transportation Institute
Highway	Daily VMT per person for Twin Cities, peer cities, large cities	TTI's Urban Mobility Scorecard, VMT per Capita	2014	Texas Transportation Institute
Multimodal	Fatal crashes for seven county metro	MnDOT Crash Data	2006-2015	MnDOT

Mode	Data desired	Title of Dataset	Fiscal Years of Dataset	Dataset Owner
Multimodal	Average travel time to reach job concentrations during rush hour	N/A (Future Measure)	N/A (Future Measure)	N/A (Future Measure)
Multimodal	Transportation-related emissions such as carbon monoxide and particulate matter			
Multimodal	VMT per capita	2010 Travel Behavior Inventory	2010	TBI
Multimodal	Average commute time	2010 Travel Behavior Inventory	2010	TBI
Multimodal	Number of Jobs Accessible in X Minutes (Auto/Transit/Pedestrian)			
Multimodal	Greenhouse gas and criteria pollutant emissions			
Multimodal	Number and rate of crashes	MnDOT Crash Data	2015	MnDOT
Multimodal	Number and rate of serious injuries and fatalities	MnDOT Crash Data	2015	MnDOT
Multimodal	Number of Fatalities and Fatality Rate	MnDOT Crash Data	2015	MnDOT
Multimodal	Number of Serious Injuries and Serious Injury Rate	MnDOT Crash Data	2015	MnDOT
Multimodal	Transit ridership, roadway lane miles, mode split of trips by number of trips and percentage of trips	2010 Travel Behavior Inventory	2010	TBI
Multimodal	Daily trips, daily trips per capita, vehicle occupancy rates for all trips and home-work trips	2010 Travel Behavior Inventory	2010	TBI
Multimodal	Travel time per home-work trip and all trips	2010 Travel Behavior Inventory	2010	TBI
Multimodal	Length of trip per home-work trip and all trips	2010 Travel Behavior Inventory	2010	TBI
Multimodal	Mode Share/ Mode Participation Rate (Bicycle/Pedestrian/Transit)	2010 Travel Behavior Inventory; U.S. Census ACS 2015	2010; 2015	TBI; U.S. Census
Multimodal	Reliability Index (Auto/Freight)	TTI's Urban Mobility Scorecard, Reliability Index	2014	Texas Transportation Institute
Transit	Transit contribution to reduction in regional vehicle miles traveled	N/A (Future Measure)	N/A (Future Measure)	N/A (Future Measure)

Mode	Data desired	Title of Dataset	Fiscal Years of Dataset	Dataset Owner
Transit	Number of communities with adopted comprehensive plans or policies that support transit and multimodal travel (MSP)	N/A (Future Measure)	N/A (Future Measure)	N/A (Future Measure)
Transit	Transit farebox recovery	N/A (Future Measure)	N/A (Future Measure)	N/A (Future Measure)
Transit	Level of transit service by transit market area	N/A (Future Measure)	N/A (Future Measure)	N/A (Future Measure)
Transit	Equity of transit waiting facilities	N/A (Future Measure)	N/A (Future Measure)	N/A (Future Measure)
Transit	Speed/reliability	N/A (Future Measure)	N/A (Future Measure)	N/A (Future Measure)
Transit	Federal State of Good Repair Measure	N/A (Future Measure)	N/A (Future Measure)	N/A (Future Measure)
Transit	Percent of the population with access to high-frequency transit service	N/A (Future Measure)	N/A (Future Measure)	N/A (Future Measure)
Transit	Percent of forecasted job and population growth near high frequency transit service	N/A (Future Measure)	N/A (Future Measure)	N/A (Future Measure)
Transit	Transit link service areas	Transit Link Dial-a-Ride Service Areas	2011	Metropolitan Council
Transit	Metro Mobility service areas by provider	Metro Mobility Americans with Diabilities Act (ADA) Service Provider Areas	2016	Metropolitan Council
Transit	Paratransit ridership	Paratransit Ridership	2014	Metropolitan Council
Transit	Benefit case studies	Case Study Information	2016	Metro Transit
Transit	Operating statistics by mode/type for Metro Transit Bus, LRT, Commuter Rail, MTS Contracted Regular Routes, Metro Mobility, Vanpools, Transit Link Dial-a-Ride, MVTA, SW Transit, Maple Grove Transit, Plymouth Metrolink, BlueXpress, Suburban local, Rush line express, Ramsey Star Express, U of MN	Twin Cities Transit Operating Statistics	2014	Metropolitan Council
Transit	Regional transit ridership, revenue miles, and revenue hours by provider	Twin Cities Transit Operating Statistics	2015	Metropolitan Council
Transit	Active park-and-rides by capacity and operator	Park-and-Ride Annual System Report	2014	Metro Transit

Mode	Data desired	Title of Dataset	Fiscal Years of Dataset	Dataset Owner
Transit	Park-and-ride usage and capacity	Park-and-Ride Annual System Report	2014	Metro Transit
Transit	Existing transit advantages- HOT lane miles, ramp meter bypasses, busway lane miles, local bus lane miles	Transit Advantages	2014	Metro Transit; MnDOT
Transit	Transitways complete, under construction, and in design/ engineering phase with mileage and stations, and transitways under study	MnDOT Guideway Status Report	2015	MnDOT
Transit	Peer region densities	Census Urbanized Area	2005-2015	Census
Transit	Peer transit systems	National Transit Database	2005-2015	National Transit Database
Transit	Peer region transit modes	National Transit Database	2005-2015	National Transit Database
Transit	Peer region annual transit ridership by mode, subsidy by passenger trip, annual transit trips per capita, fare recovery percentage, annual operating and 10-year average capital subsidy per capita	National Transit Database	2005-2015	National Transit Database
Transit	Metro Transit/MTS routes by type, transitways, transitway stations, active park-and-rides by capacity, transit centers, transit capital levy communities, Metro Transit/MTS service area,	Metro Transit	2014	Metro Transit
Transit	Suburban transit provider service areas and routes by type	Metropolitan Council	2014	Metropolitan Council
Transit	Peer region annual transit ridership, annual transit operating costs	National Transit Database	2005-2015	National Transit Database
Transit	Subsidy per passenger, passengers per hour, passengers per mile, fare recovery by mode type	Metropolitan Council	2011-2014	Metropolitan Council
Transit	Park-and-ride user home origin	Park-and-Ride Survey	2014	Metropolitan Council

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