2023 TRANSPORTATION SYSTEM PERFORMANCE EVALUATION

5/31/23

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Preface

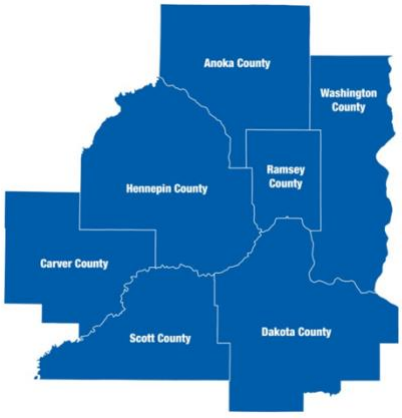
This report is a comprehensive review of the Twin Cities transportation system as prepared by Metropolitan Council in 2023. The Minnesota State Legislature adopted statutes in 1996 requiring the Metropolitan Council to produce this report (previously called the Transportation System Audit). This report was prepared to inform the 2024 update to the region's long-range transportation plan, the 2050 Transportation Policy Plan (2050 TPP).

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

Chair: Charlie Zelle

Table 1: Metropolitan Council Members

District 1	Judy Johnson	District 10	Peter Lindstrom
District 2	Reva Chamblis	District 11	Susan Vento
District 3	Tyronne Carter	District 12	Gail Cederberg
District 4	Deb Barber	District 13	Chai Lee
District 5	Anjuli Cameron	District 14	Willetha (Toni) Carter
District 6	John Pacheco Jr.	District 15	Tenzin Dolkar
District 7	Robert Lilligren	District 16	Wendy Wulff



The Metropolitan Council is the regional planning organization for the seven-county Twin Cities region. The Council operates the regional bus and rail system, collects and treats wastewater, 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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Stewardship

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

Objectives

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

Strategies summarized

- The transportation system is extensive and represents a significant investment over multiple generations. Most resources in this plan will be dedicated to operating, maintaining, and rebuilding what already exists.
- To maximize investments, this plan supports making the system more efficient and effective and providing for the best user experience the region can afford.
- The region needs to focus on investments that have the greatest benefit for all users of the transportation system: residents, businesses, and people of all ages, abilities, and backgrounds

A significant portion of funding is spent every year for maintenance, repair and replacement, and operation, of the existing system. Continued and enhanced system maintenance, repair, and preservation will increase the resiliency of regional transportation infrastructure.

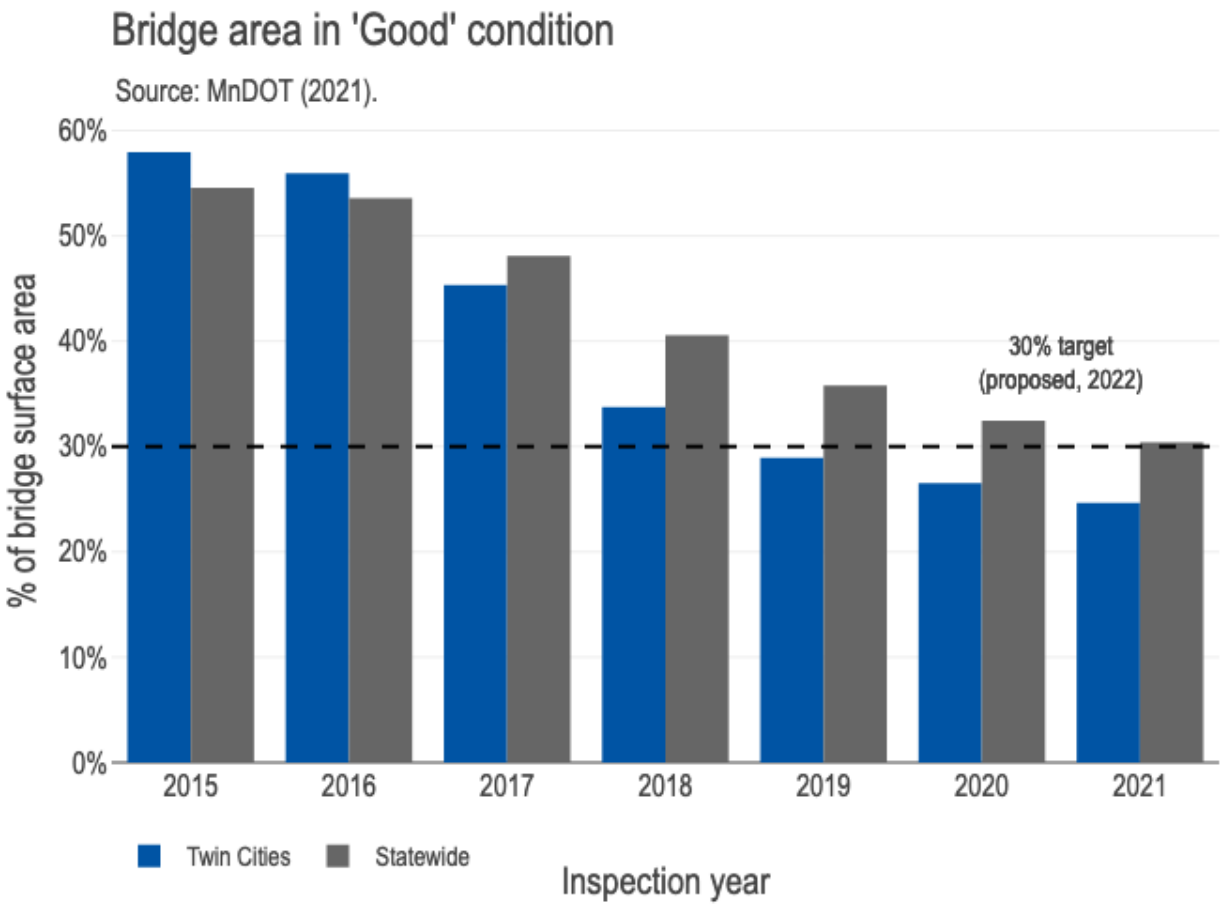
1. Efficiently preserve and maintain the transportation system

Efficiently preserve and maintain the regional transportation system in a state of good repair.

1.1 Bridge condition

The Minnesota Department of Transportation (MnDOT) uses a measure to assess system-wide trunk highway bridge performance. The measure is the Bridge Structural Condition Rating. Based on the National Bridge Inventory (NBI) scale from 0 to 9, this measure uses a combination of condition code and appraisal rating to assign a good, fair, or poor condition [1].

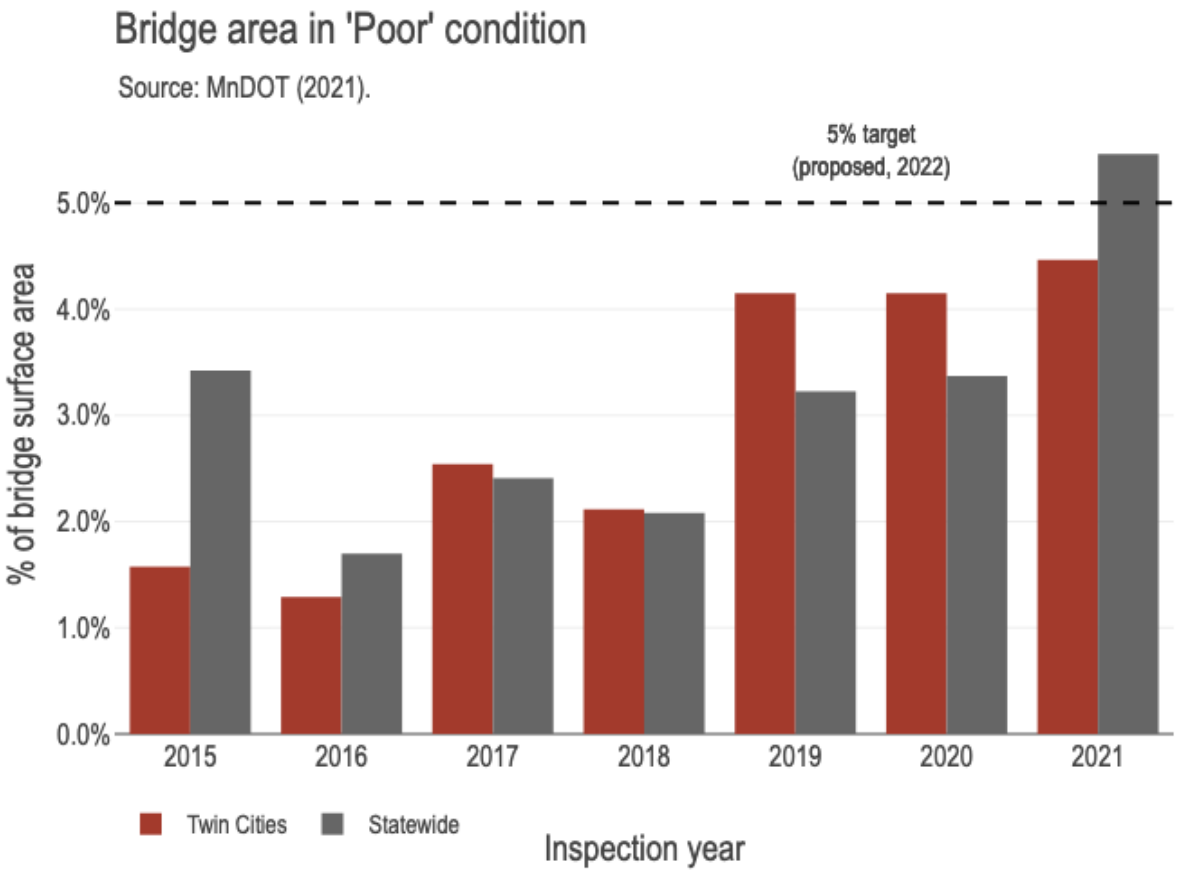
Figure 1.1: Percent of Twin Cities bridge surface area in 'Good' condition



Bridge condition in the Twin Cities Metropolitan Planning Organization (MPO) area, as well as Statewide, has worsened since 2015, with the percentage of bridges (weighted by surface area) falling into the "poor" category increasing by 0.6% per year on average. In the most recent year of measurement (2021), the percent of bridges in poor condition was 4.5%, just under the MnDOT-set target of 5%.

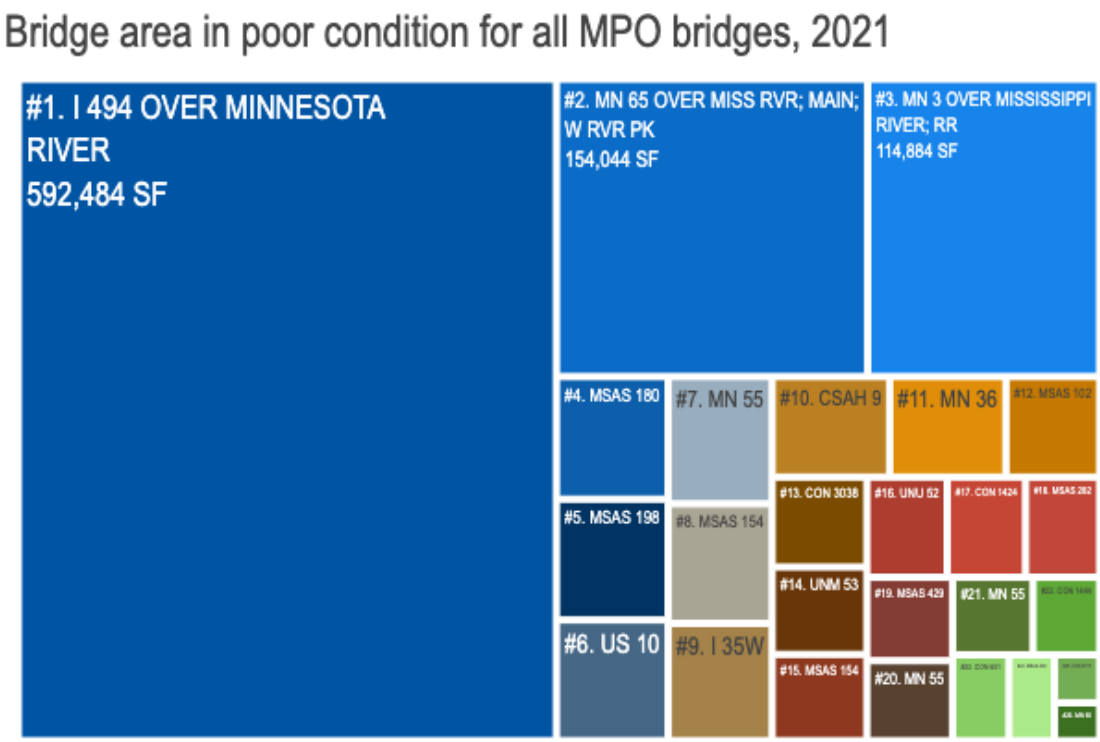
[1] Regional bridge condition is weighted by total deck surface area, meaning that larger bridges account for more of the total percentage than smaller bridges.

Figure 1.2: Percent of Twin Cities bridge surface area in 'Poor' condition



Of the bridges in poor condition, there are three bridges that make up the bulk of this surface area in 2022: I-494 over the Minnesota River, MN-65, and MN-3 over the Mississippi River. The graphic below shows the MPO bridge surface area in poor condition by bridge. The I-494 bridge over the Minnesota River alone comprised 2.2% of total regional bridge surface area. This bridge is set to be rehabilitated in the 2023-2026 MnDOT Capital Highway Investment Plan (CHIP) and is anticipated to materially affect this measure.

Figure 1.3: MPO bridge surface area in poor condition by bridge, 2021



1.2 Pavement condition

Pavement condition reflects the overall ride quality of the highway system. The Met Council, in coordination with MnDOT, sets two and four year targets for both the interstate highway system and all other highways that are on the National Highway System (NHS). During the most recent performance period (2023), the Met Council adopted the same pavement condition targets as MnDOT.

The pavement condition targets are set based upon the forecasted ride quality of roadways derived from the expected condition and any programmed projects that address pavement. The measure includes overall roughness, rutting, faulting, and cracking calculations. MnDOT predicts when certain roadways no longer meet the acceptable standard and sets targets based upon these predictions. Pavement condition is anticipated to become worse over the next five years.

Generally, more non-interstate NHS roadways within the metro region fall within the poor category than in the state as a whole. Similarly, less pavement in the metro region meets the good condition rating. Overall, both MnDOT and the Met Council have placed greater emphasis on ensuring that pavement does not fall into poor condition, particularly on the Interstate System. This tends to fluctuate from year to year based on programmed projects, but generally an overall small percentage of pavement is categorized as poor annually.

Figure 1.4: Percent of pavement in 'Poor' category, divided by location

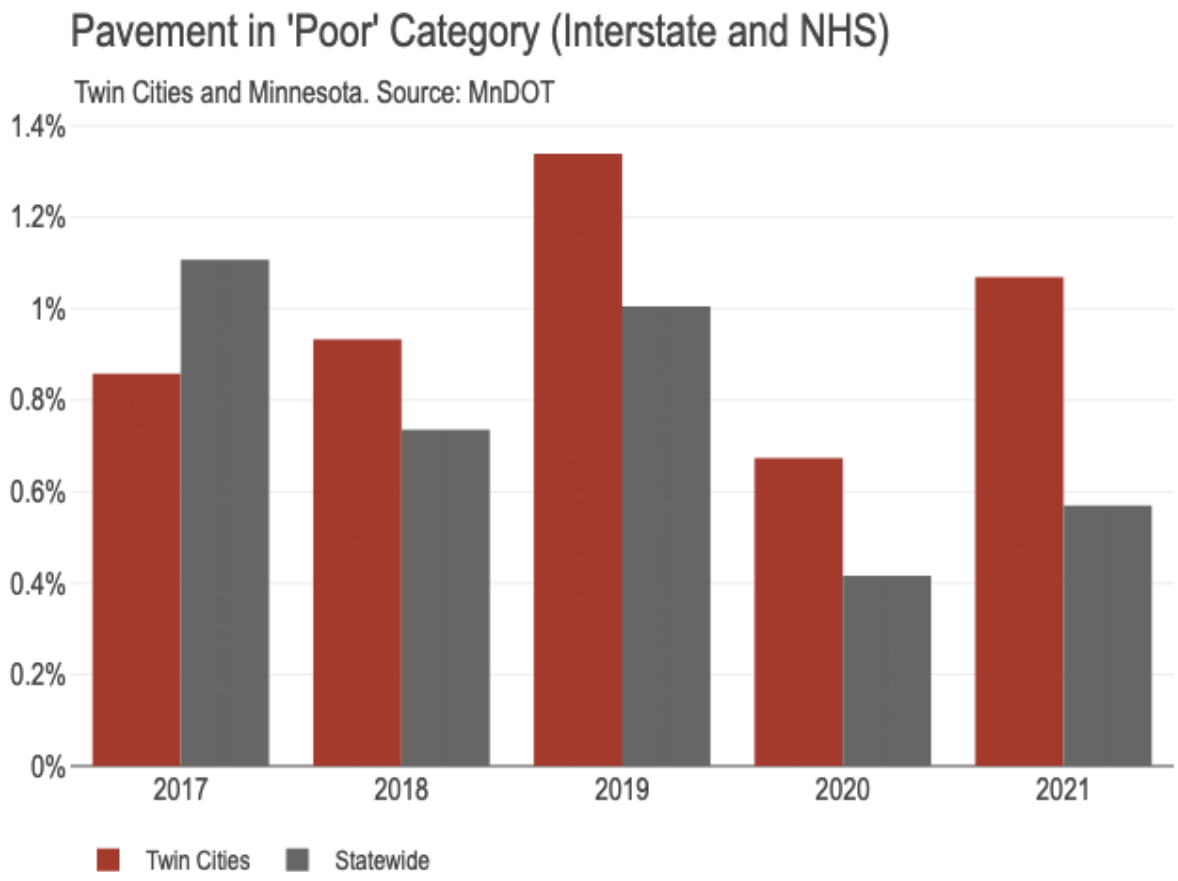
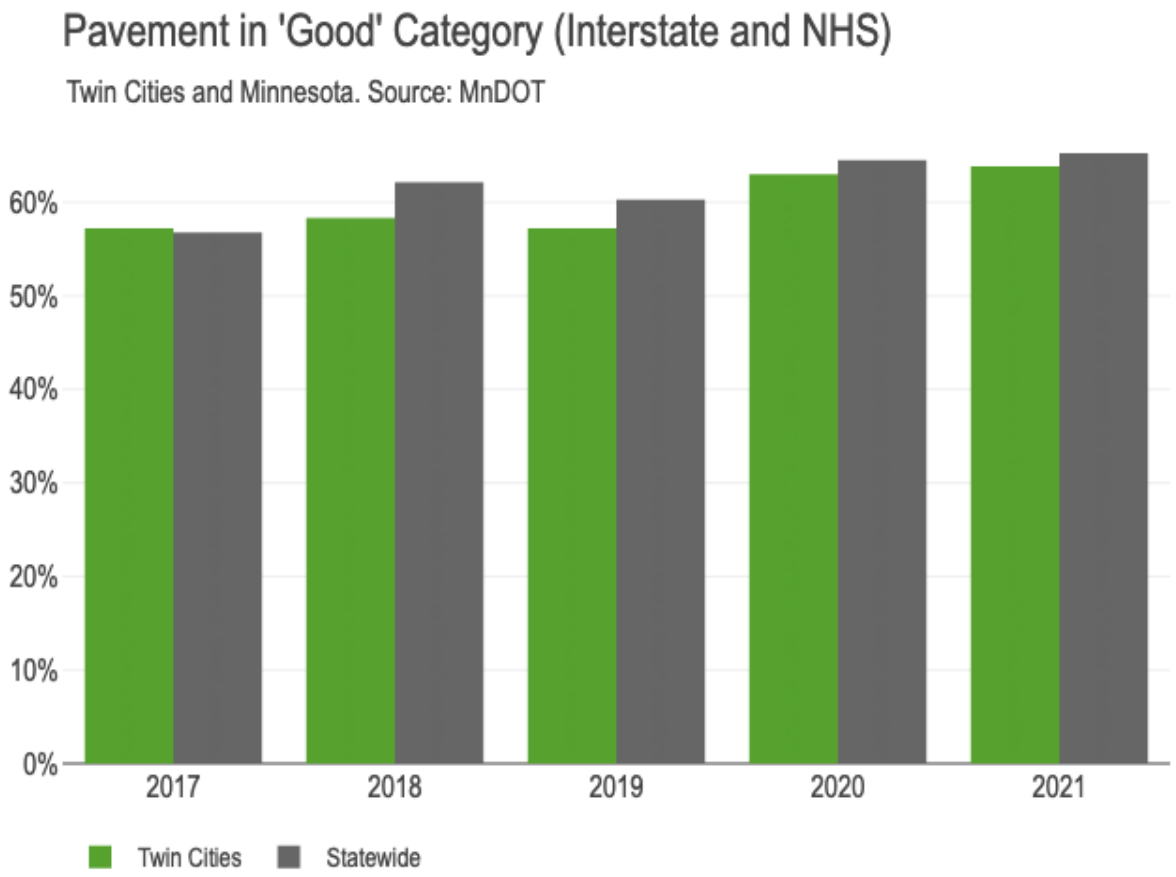


Figure 1.5: Percent of pavement in ‘Good’ category, divided by location



1.2.1 Pavement condition by road type

Figure 1.6: Twin Cities interstate pavement in ‘Poor’ condition

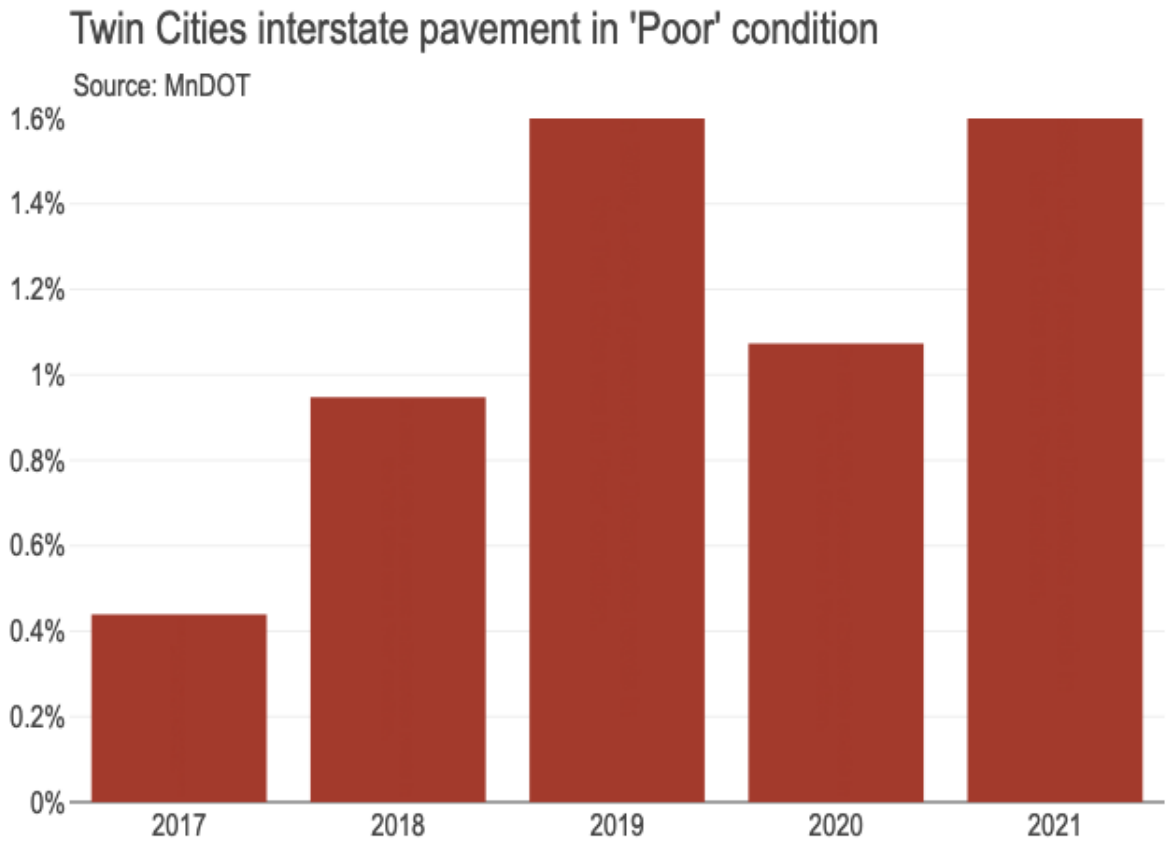


Figure 1.7: Twin Cites non-interstate pavement in ‘Poor’ condition

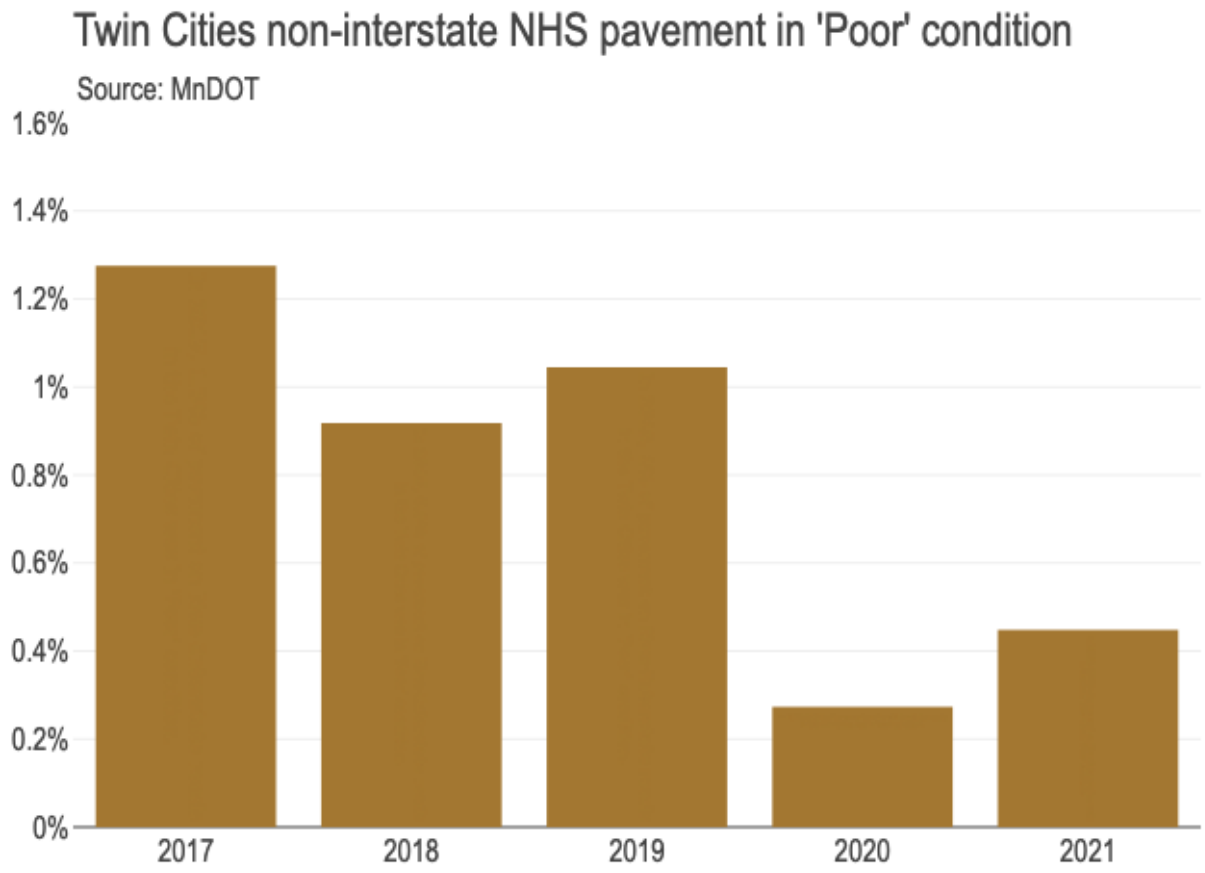


Figure 1.8: Twin Cites interstate pavement in ‘Good’ condition

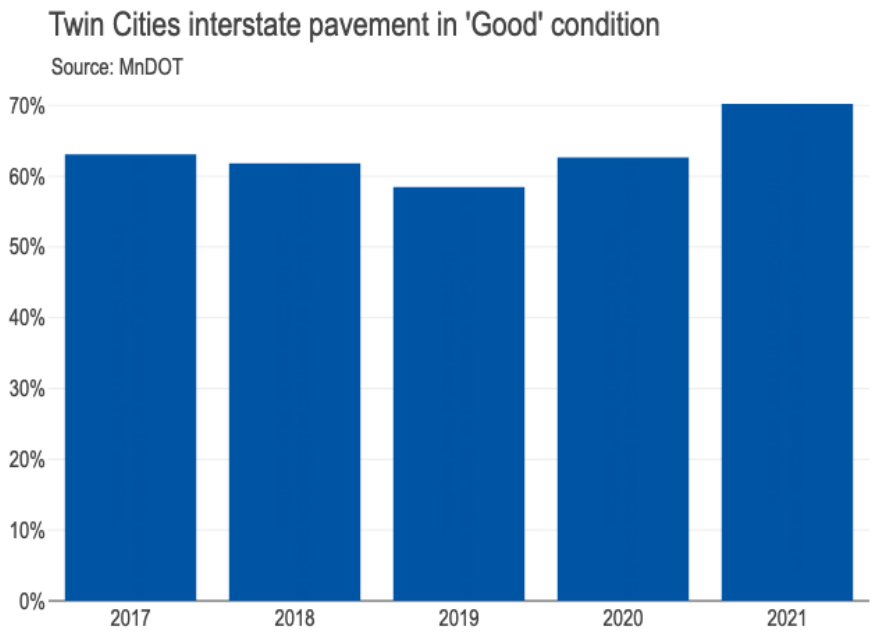


Figure 1.9: Twin Cites non-interstate pavement in ‘Good’ condition

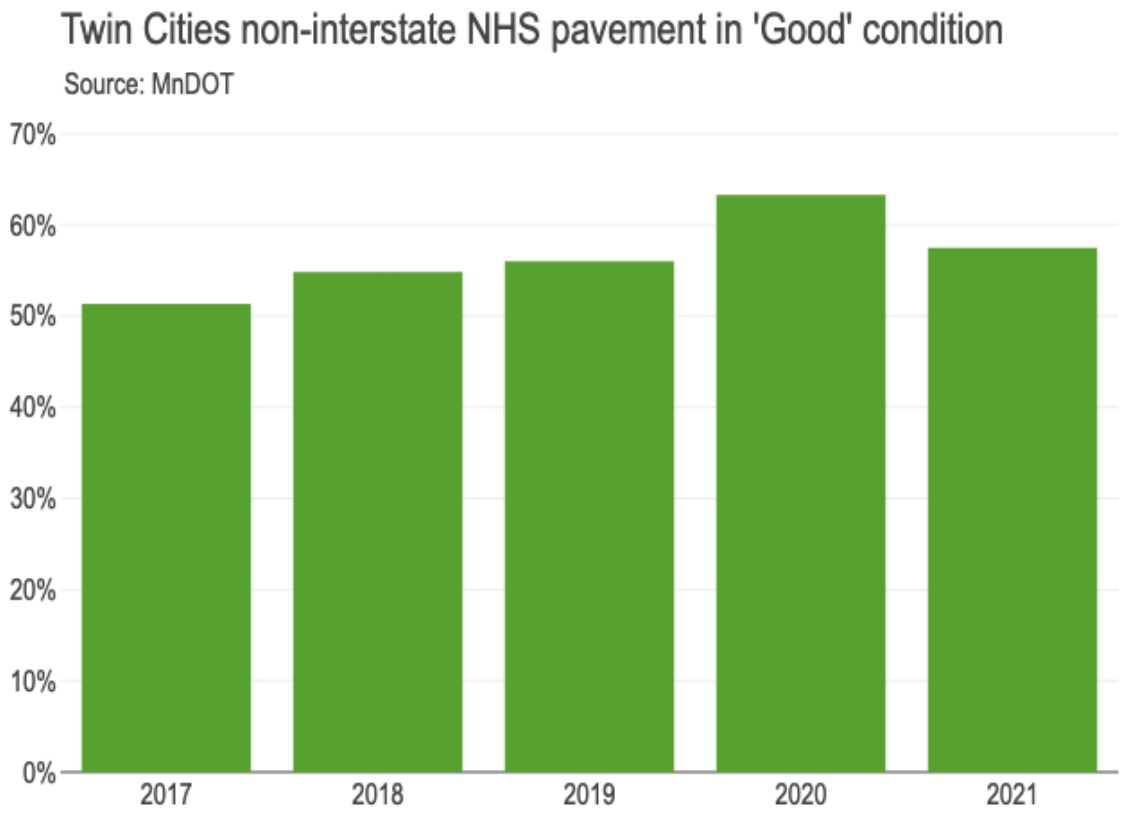
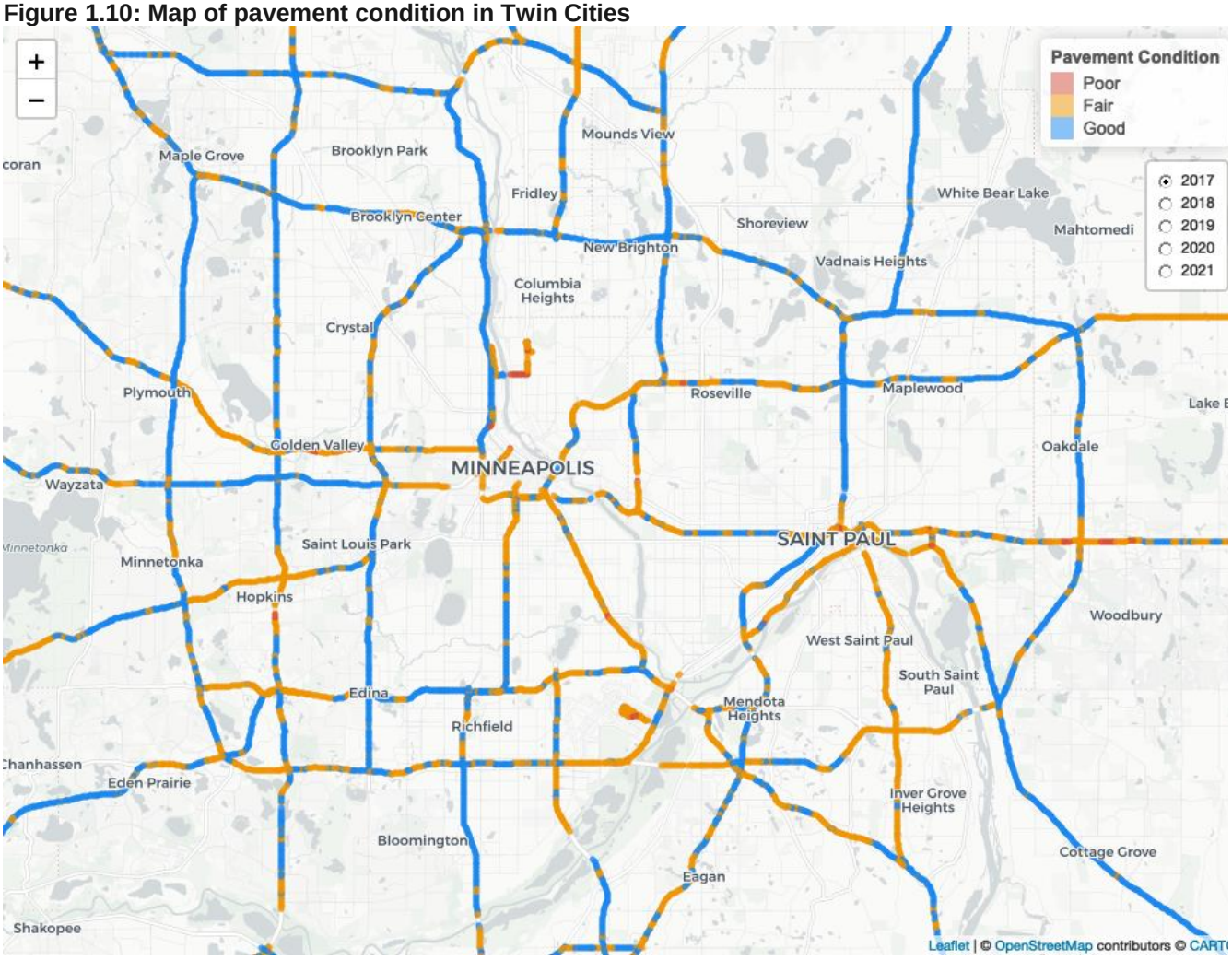


Figure 1.10: Map of pavement condition in Twin Cities

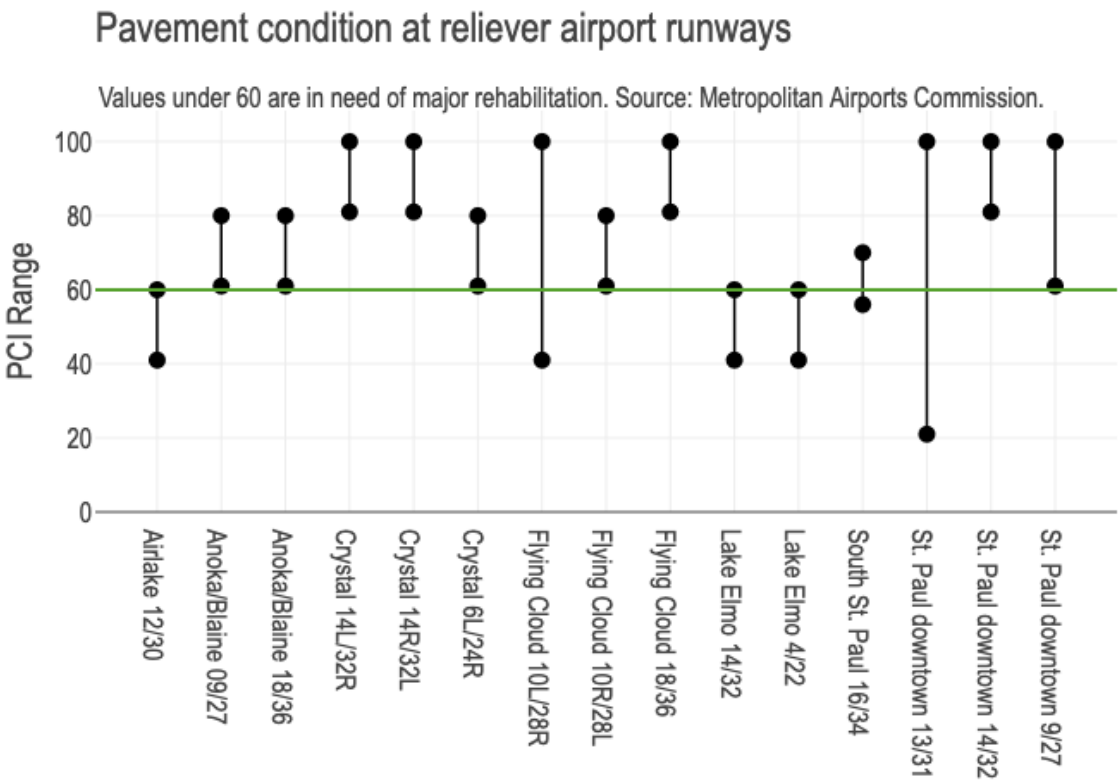


1.3 Runway condition

The graph in Figure 1.11 depicts the Pavement Condition Index (PCI) for each of the six reliever airports owned by the Metropolitan Airports Commission (MAC). PCI measures the overall quality of the runway pavement. PCI values less than 40 will likely require reconstruction, while values above 60 indicate that a runway only needs preventive maintenance. Values between 40 and 60 may require major rehabilitation.

The green line in Figure 1.11 represents the PCI value of 60. Runways with values beneath this threshold are the highest priority for improvement. Crystal Lake, Lake Elmo, and the Saint Paul Downtown Airport all have runways that will likely require reconstruction.

Figure 1.11: Pavement Condition Index (PCI) for reliever airport runways



1.4 Transit asset management

Transit providers in the Twin Cities metro region manage a substantial number of facilities and fleet vehicles of multiple types that provide services to the region. For example, Metro Transit operates a fleet of 598 buses, 118 light rail cars, 18 commuter rail cars, and 6 commuter rail locomotives. Minnesota Valley Transit Authority (MVTA) maintains a fleet of roughly 160 buses.

The Federal Transit Administration (FTA) requires that transit agencies measure and set goals for the status of four capital asset classes:

- **Rolling stock** vehicles used to provide transit services
- **Facilities** like garages
- **Infrastructure** like rail tracks if used by the agency
- **Service vehicles** used by the agency for non-revenue service purposes.

The Met Council is a Tier 1 provider and must provide all elements that the FTA calls for in a transit asset management plan.

Transit agencies manage their vehicle fleets, including rolling-stock and service vehicles, based on their useful life in years. Vehicles that have met or exceeded their useful life benchmark are not unsafe to operate but are at a point where the agency should begin working to replace them in order to maintain service reliability. Generally, transit agencies look to keep the proportion of their fleet that meets or exceeds useful life benchmark under a certain percentage. For example, Metro Transit's 2022 goal for articulated buses was no more than 18% of the fleet meeting or exceeding the useful life benchmark.

Table 1.1: Equipment - Percent of service vehicles that have met or exceeded their useful life benchmark.

VEHICLE TYPE	2021 % OF SERVICE VEHICLES	2022 % OF SERVICE VEHICLES
Metro Transit		
Automobiles	32%	29%
Trucks and other Rubber Tire Vehicles	30%	21%
Metropolitan Council		
Trucks and other Rubber Tire Vehicles	0%	0%
SouthWest Transit		
Trucks and other Rubber Tire Vehicles	0%	0%
Minnesota Valley Transit Authority		
Automobiles	23%	44%

Table 1.2: Facility - Percent of facilities rated below 3 on the condition scale

VEHICLE TYPE	2021 % OF FACILITIES	2022 % OF FACILITIES
Metro Transit		
Administrative / Maintenance Facilities	3%	0%
Passenger / Parking Facilities	3%	0%
SouthWest Transit		
Administrative / Maintenance Facilities	0%	0%
Passenger / Parking Facilities	0%	0%
Minnesota Valley Transit Authority		
Administrative / Maintenance Facilities	50%	50%
Passenger / Parking Facilities	0%	0%

Table 1.3: Infrastructure - Percent of track segments with performance restrictions

VEHICLE TYPE	2021 % OF TRACK SEGEMENTS	2022 % OF TRACK SEGMENTS
Metro Transit		
LR - Light Rail	1%	1%

Table 1.4: Rolling Stock - Percent of revenue vehicles that have met or exceeded their useful life benchmark

VEHICLE TYPE	2021 % OF REVENUE VEHICLES	2022 % OF REVENUE VEHICLES
Metro Transit		
AB - Articulated Bus	19%	18%
BR - Over-the-road Bus	0%	0%
BU - Bus	8%	14%
LR - Light Rail Vehicle	0%	0%
RL - Commuter Rail Locomotive	0%	0%
RP - Commuter Rail Passenger Coach	0%	0%
Metropolitan Council		
BU - Bus	0%	0%
CU - Cutaway	0%	40%
SouthWest Transit		
BR - Over-the-road Bus	0%	0%
BU - Bus	0%	0%
CU - Cutaway	0%	0%
VN - Van	0%	0%
Minnesota Valley Transit Authority		
BR - Over-the-road Bus	26%	14%

BU - Bus	14%	18%
CU - Cutaway	37%	29%

2. Operate the regional transportation system efficiently and cost-effectively

Operate the regional transportation system to efficiently and cost-effectively connect people and freight to destinations.

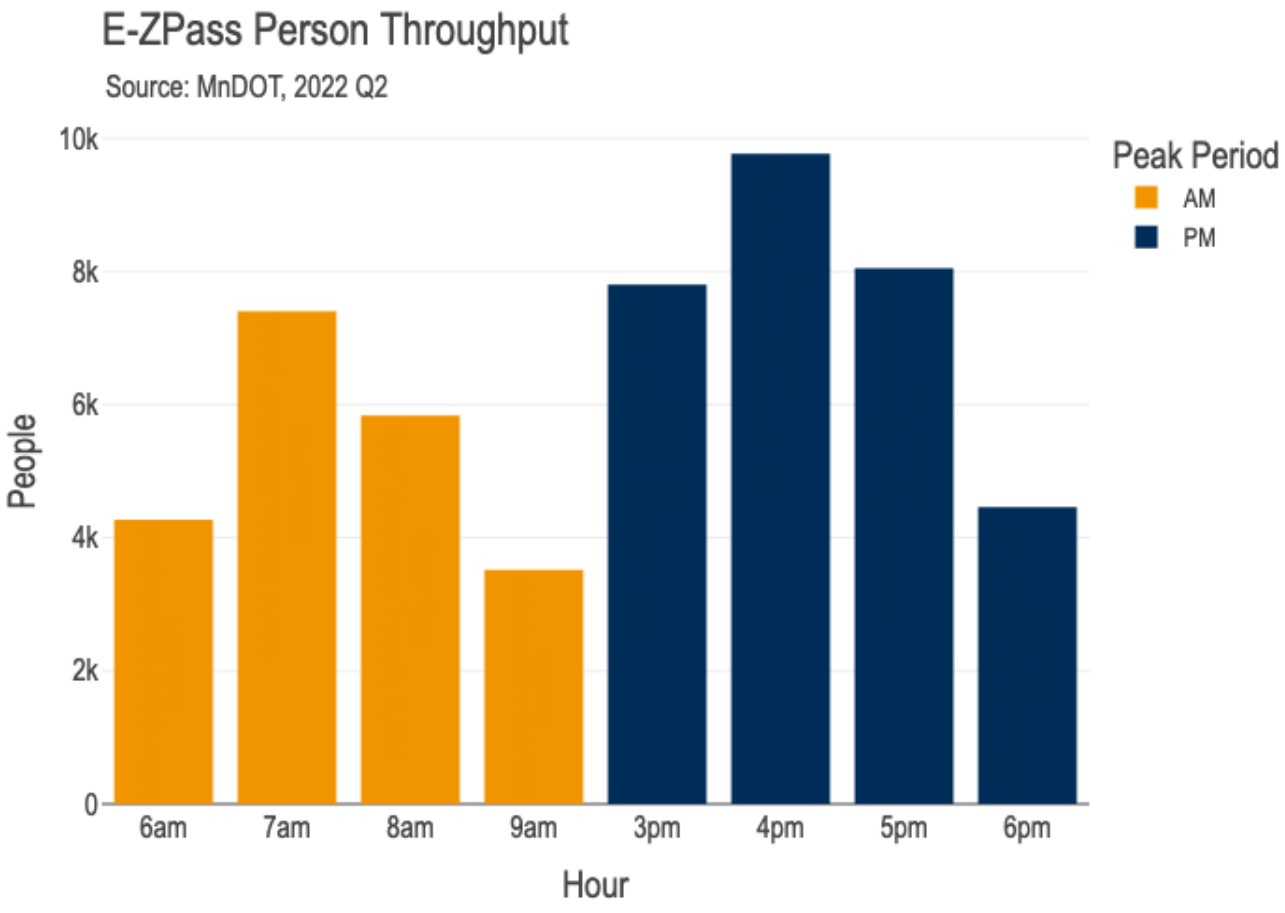
2.1 E-ZPass Lanes

The E-ZPass (formerly MnPASS) system is a series of express lanes (also known as high occupancy toll lanes) located on select freeway facilities within the metro region. During peak hours, these lanes are dedicated to and free for high-occupancy vehicles (vehicles carrying more than one person) and open to single occupant vehicles for a fee. Approximately 80% of people using E-ZPass lanes are carpooling or riding in a bus during peak conditions. On off-peak hours and weekends, these lanes are free and open to all vehicles (MnDOT 2023).

E-ZPass lanes work to improve the efficiency of freeways during the busiest commuting times, prioritizing transit ridership and carpooling. While single occupant vehicles represent 22% of the total vehicles using the lanes, they move only 12% of the people. The system operates effectively, with vehicles travelling at speeds above 45 miles per hour about 98% of the time (MnDOT 2023).

Figure 2.1 displays the average number of people in E-ZPass lanes during the morning and evening rush hours.

Figure 2.1: Average daily number of people in E-ZPass lanes



2.2 Public Transit

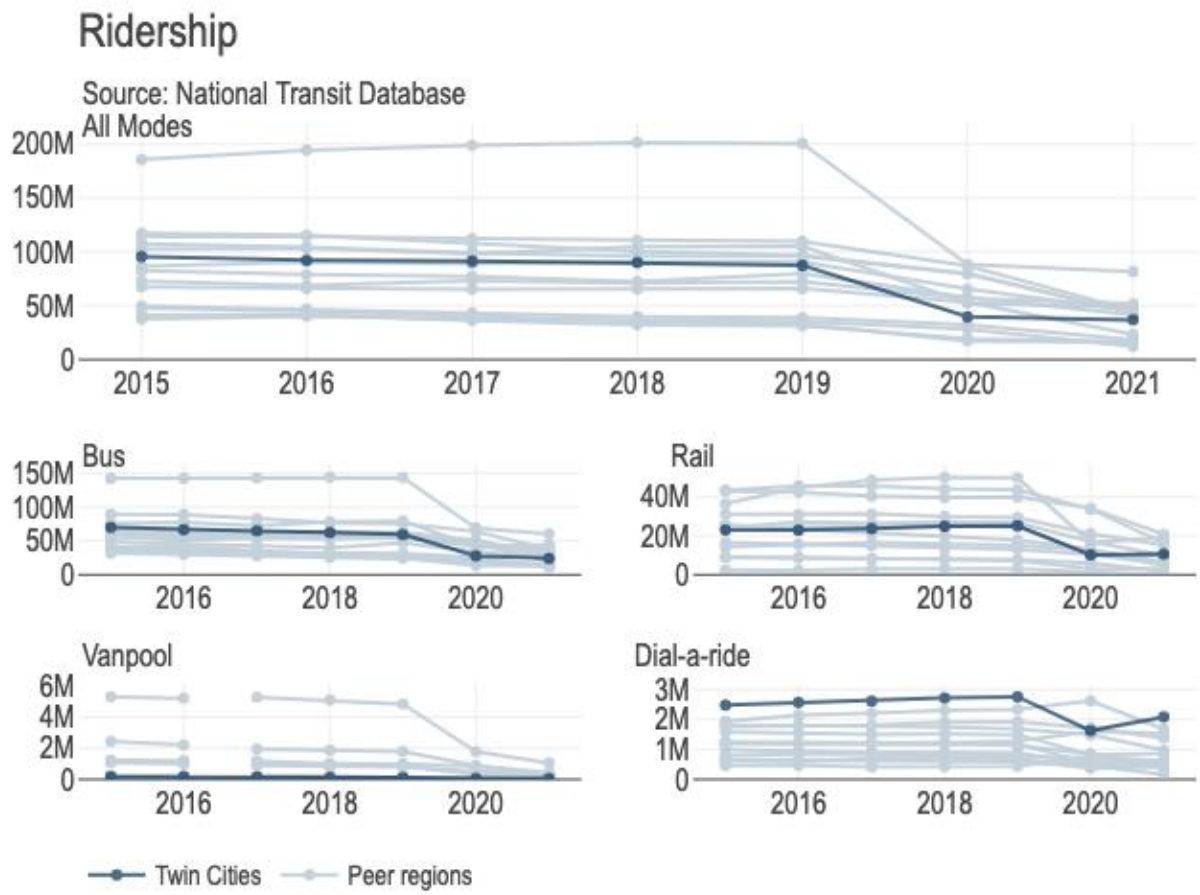
2.2.1 Transit trips

Unlinked passenger trips are the number times of passengers board public transportation vehicles. Passengers are counted each time they board vehicles no matter how many vehicles they use to travel from their origin to their destination.

Recent trends in transit ridership are defined by the significant decline in demand due to the COVID-19 pandemic. As overall travel demand fell, transit ridership fell as well. Between 2019 and 2021 transit ridership in the metro region dropped by 58% from 87 million trips in 2019 to 37 million trips in 2021. As can be seen when comparing the Twin Cities with our peer regions, this significant decline in transit ridership affected transit systems throughout the country.

Declines in transit ridership were similar among fixed-route modes; between 2019 and 2021 bus ridership declined 59% from 59 million in 2019 to 24 million in 2021, while during the same period light rail ridership declined 58% from 25 million in 2019 to 11 million in 2021. Decline in dial-a-ride service, primarily Metro Mobility, were less pronounced with ridership declining 24% between 2019 and 2021. Dial-a-ride service, unlinked bus, and rail service, saw an increase in ridership between 2020 and 2021.

Figure 2.2: Passengers by region and mode



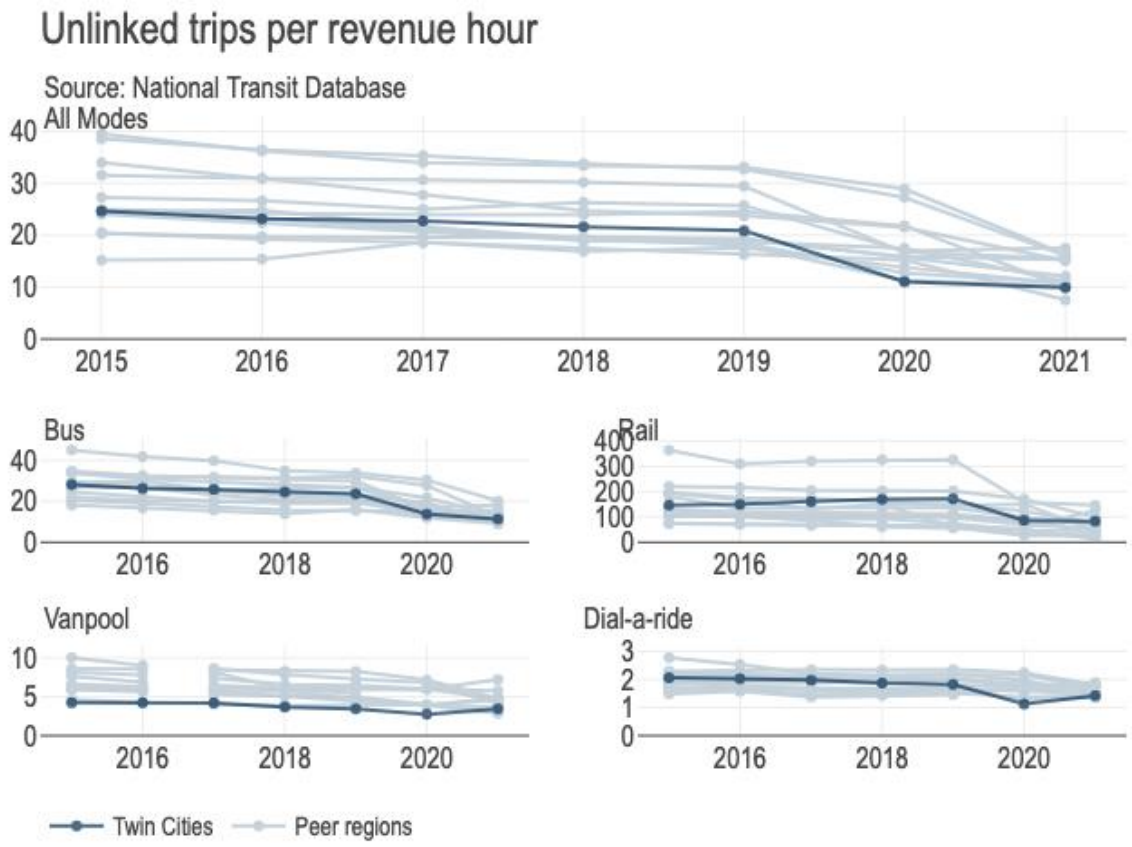
2.2.2 Productivity

The productivity of a transit service is defined as the number of trips that it serves per revenue hour. Revenue hours are the hours that vehicles are scheduled to or actually travel while in revenue service. Vehicle revenue hours include layover and recovery time, but exclude deadhead trips, like travel to garages or changing routes, training, vehicle maintenance training, and other non-revenue use of vehicles.

The major decline in ridership triggered a corresponding major decline in transit productivity. Since transit service providers responded to the decline in ridership with service cuts, the rate at which productivity declined was slightly less than the rate at which ridership declined.

Bus productivity dropped 53% between 2019 and 2021 from 20.9 trips per revenue hour to 9.9 trips per revenue hour; rail productivity dropped 52% during the same period from 171.8 trips per revenue hour to 83.3 trips per revenue hour; dial-a-ride remained the least productive service with productivity declining 22% between 2019 and 2021 from 1.8 trips per revenue hour to 1.4 trips per revenue hour.

Figure 2.3: Passengers per revenue hour by region and mode

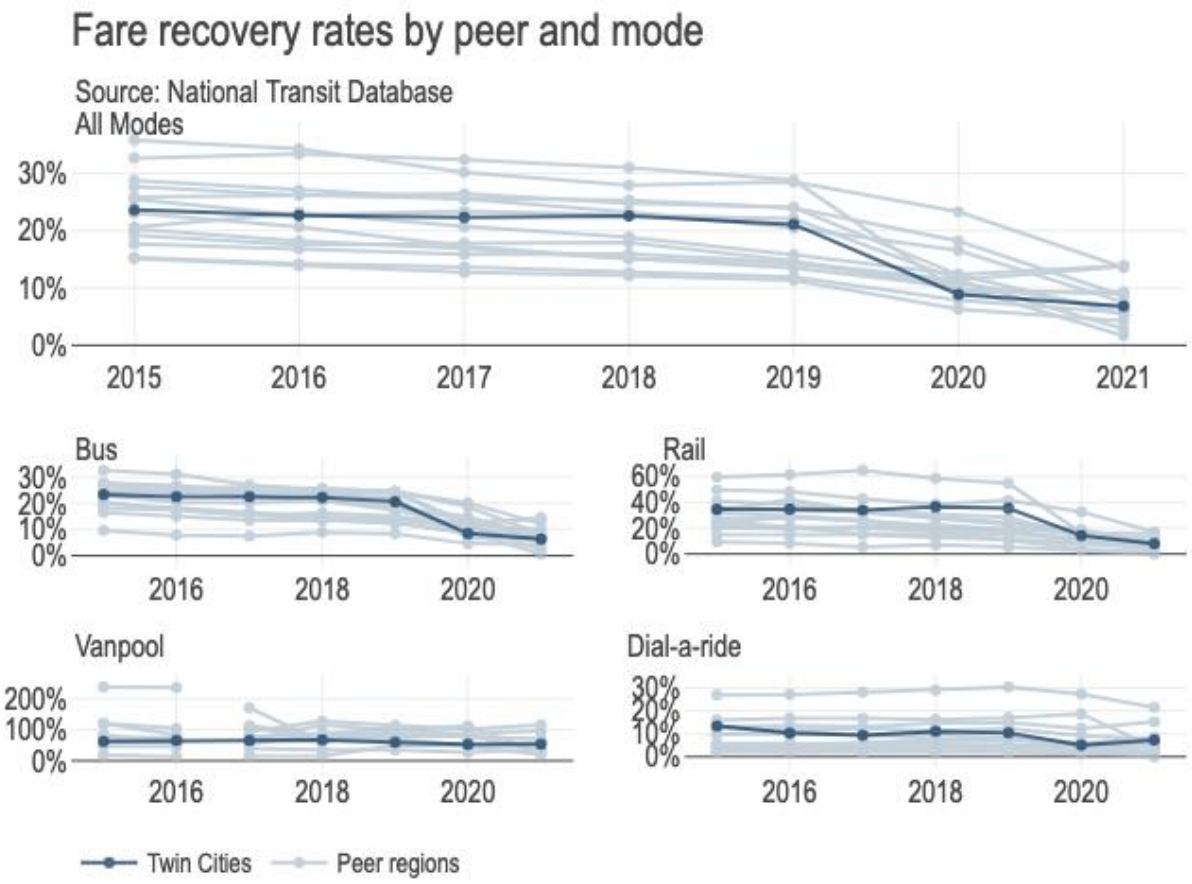


2.2.3 Fare recovery

Farebox recovery is the proportion of total revenue from fares paid by passengers divided by the total operating expenses. A fare recovery ratio of 100% indicates that all operating expenses are covered by fare revenue. A ratio of less than one indicates that operating costs exceed passenger fares.

As with all the Twin Cities' peer regions, fare recovery suffered from the collapse of ridership caused by the COVID-19 pandemic. Between 2019 and 2021, overall fare recovery fell 67% from 21% of operating expenses being covered by fare revenues in 2019 to only 7% in 2021.

Figure 2.4: Fare recovery rates by region and mode

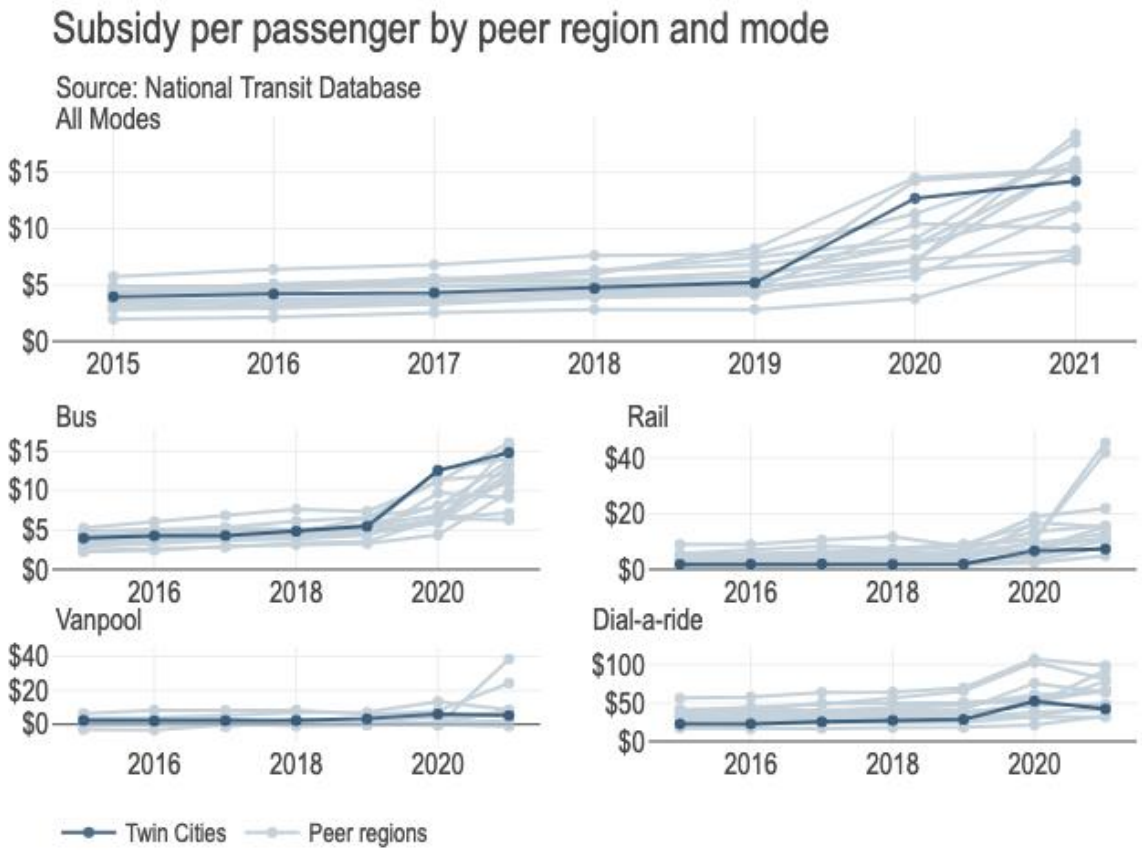


2.2.4 Subsidy per passenger

Transit subsidy per passenger is the total operating expenses, less the total revenue from passenger fare, divided by the total number of unlinked trips. This can be interpreted as the cost incurred for each trip provided on transit. As ridership declined during the COVID-19 pandemic, the subsidy per passenger also rose. Overall, the subsidy provided per trip between 2019 and 2021 rose from $5.19 per trip to $14.21 per trip.

Subsidies were lowest for rail trips at $7.34 per trip in 2021, they were highest for dial-a-ride trips at $42.31 per trip in 2021 Subsides for bus trips were $14.84 in 2021

Figure 2.5: Subsidy per passenger by region and mode



2.3 Spare freeway capacity

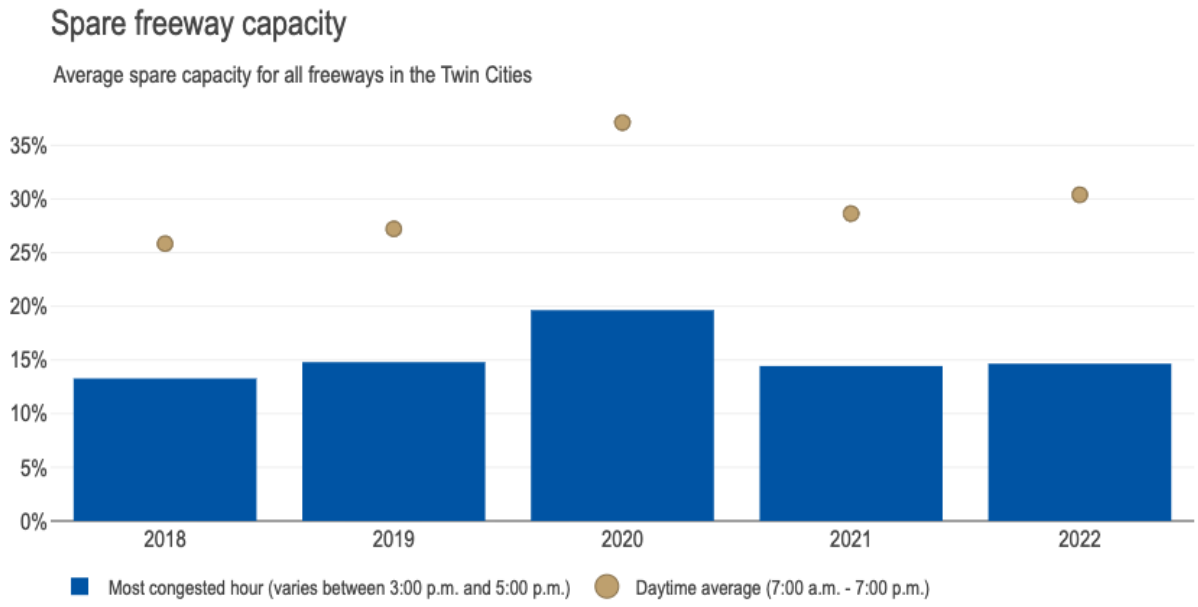
Before COVID-19 impacts on travel in 2020, MnDOT reported that during a typical peak period, up to 24% of Twin Cities freeways saw some congestion (MnDOT 2022a). This complementary analysis[2] shows that during a typical afternoon peak hour that, even while part of the freeway system was congested, other parts of the freeways saw 15% less traffic than their overall capacity could accommodate. This figure rose to 20% in 2020, but has most recently returned to 15% in 2022.

[2] MnDOT continuously collects vehicle counts on most freeways in the Twin Cities at locations usually between 1/2 and 1 mile apart. For each year, we pulled loop detector data for all freeway stations in the MPO area on weekdays (Monday through Thursday) in October. We then calculated the average hourly speed, total number of vehicles that passed through the detector node during that hour (vehicle flow), and vehicle density (number of vehicles per mile) during the most congested hour (4:00 p.m. to 5:00 p.m.) at each detector node. We calculated spare capacity using MnDOT's traffic data extract formulas. If flow exceeds 1,800 vehicles per hour, the node is considered well performing. If flow is under 1,800 vehicles per hour and vehicle density is greater than 43 vehicles per mile, the node is at lost capacity; there is more traffic than the road can accommodate at free-flow speed. If the flow is under 1,800 vehicles per hour and vehicle density is less than 43 vehicles per mile, the node has spare capacity; there is less traffic than the road is built to handle.The daytime average is the percentage of all hours and nodes that operate at spare capacity, starting at 7:00 a.m. and ending at 7:00 p.m.

In contrast, the average daytime spare capacity 2019 was 27%. This rose to 37% in 2020 and returned to 30% in 2022.

While congested roads receive a lot of attention, there is unused capacity on Twin Cities freeways that will help accommodate future population growth and economic development. There are opportunities to lessen the costs of congestion by moving trips to different times and places.

Figure 2.6: Percent spare capacity of Twin Cities freeway system during the most congested hour



Safety and Security

Safety and security are at the heart of providing a comfortable, dependable transportation system.

Objectives

a. Reduce fatal and serious injury crashes and improve safety and security for all modes of passenger travel and freight transport.
b. Reduce the transportation system's vulnerability to natural- and human-caused incidents and threats, including climate change and terrorism.

Strategies summarized

- Safety and security are at the heart of providing a comfortable, trustworthy system and will be a focus in all areas of transportation investments.
- Safety and security include identifying and addressing existing safety and security concerns and building a transportation system that avoids future problems.

Increasing the safety and security of people who use the region's transportation system is paramount across all agencies that plan and operate the system. To do that requires an understanding of what areas are vulnerable and why. Using data and analysis to identify these areas helps the region focus on the greatest risks and proactively avoid creating new vulnerabilities.

3. Reduce vulnerability

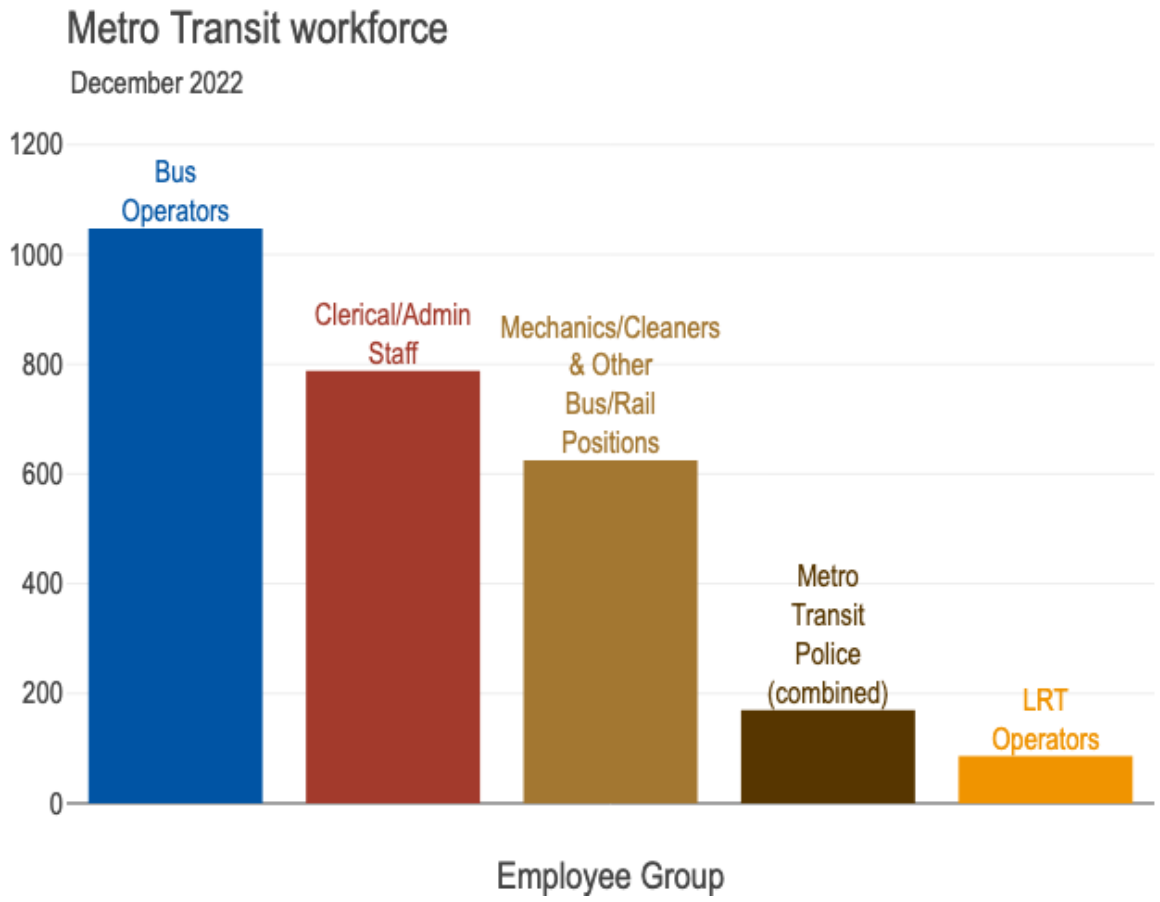
Reduce the transportation system's vulnerability to natural and human-caused incidents and threats, including climate change and terrorism.

3.1 Metro Transit workforce

Transit providers need to have a certain number of drivers, maintenance crew, and administrative staff to reliably provide services. A deficit in workforce can result in service reliability issues in the short-term and service cuts in the longer-term. Metro Transit reduced its platform hours, a common measure of how much transit service provided, from 44,451 platform hours to 30,973 platform hours between March 2020 and December 2022 largely due to loss of the operator workforce during the COVID-19 pandemic (Harrington 2023). As of March 2023, Metro Transit was able to begin increasing platform hours as it recruited and trained enough new operators to increase the total number in its workforce.

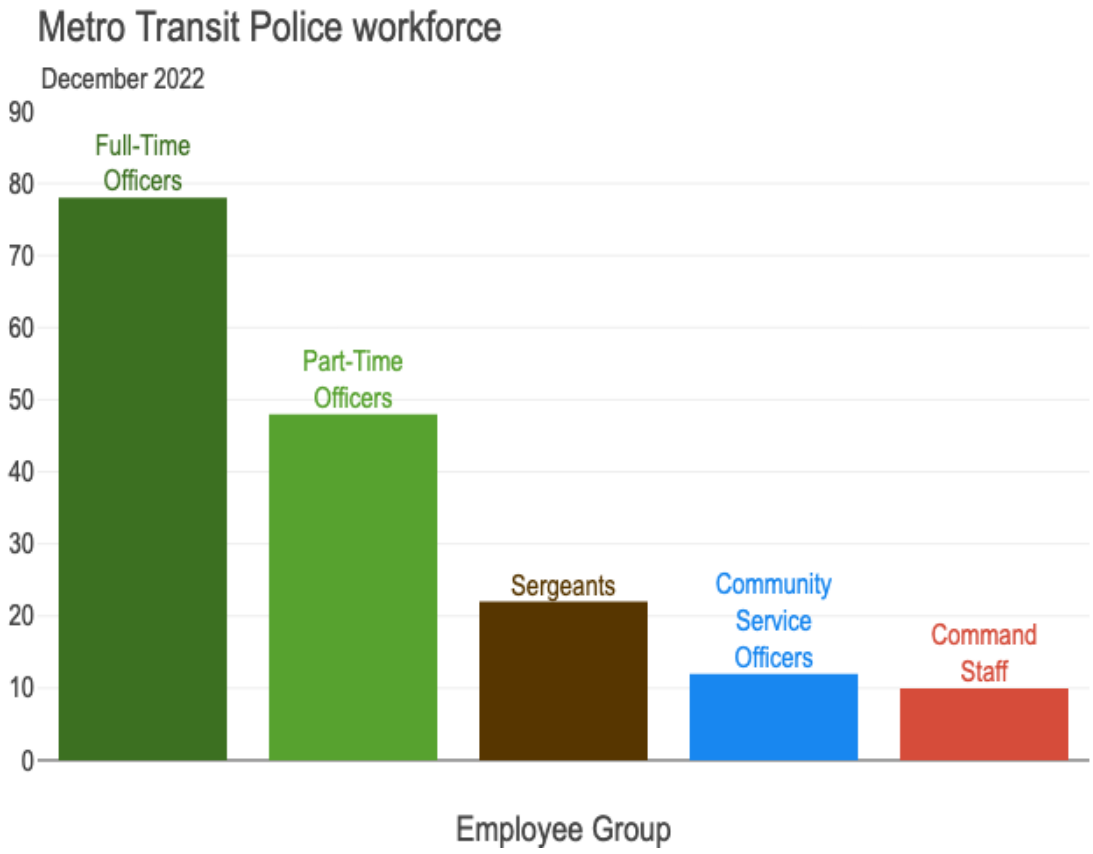
Learn more about the Metro Transit workforce on the Metro Transit website

Figure 3.1: Metro Transit operations workforce. Source: Metro Transit Facts, December 2022



Learn more about the Metro Transit Police Department workforce, including full-time officers and community service officers (CSOs) on the Metro Transit website.

Figure 3.2: Metro Transit Police workforce. Source: Metro Transit Facts, December 2022



3.2 Climate change vulnerability

Evidence is mounting that Minnesota's climate is changing, including in the seven-county metro region. Minnesota Governor Tim Walz is urging bold action across the state to address climate change: "Climate change threatens the very things that make Minnesota a great place to live, from our magnificent 10,000 lakes to our farmable land and clean air… we are taking action to reduce carbon emissions, protect public health, create jobs, and ensure our state is at the forefront of the Green Economy." ("Governor Tim Walz Announces Clean Car Standards in Minnesota" 2019)

With the aim of enhancing the lifespan of Met Council assets through a strategic and proactive planning approach, the Sustainability and Equity outcomes (PDF) within Thrive MSP 2040 (PDF), as well as the Building in Resilience land use policy (PDF), directed staff to produce a regional Climate Vulnerability Assessment.

The most recent National Climate Assessment (NCA), produced by the U.S. Global Change Research Program (2018), synthesizes climate change impacts by sector and by region. The Midwest regional chapter of the NCA report highlights current and future impacts related to climate change within Minnesota.

As shown in Table 3.1 below, state climatologists are confident that Minnesota's warming temperatures and increasingly severe flood events will trend upwards in the coming decades. For this reason, the Met Council's Climate Vulnerability Assessment (CVA) focuses on regional climate hazards related to localized flooding and extreme heat.

Table 3.1: Expected Minnesota climate trends

HAZARD	PROJECTIONS THROUGH 2099	CONFIDENCE IN PROJECTED CHANGES
Warming Winters	Continued loss of cold extremes and dramatic warming of coldest conditions	Highest
Extreme Rainfall	Continued increase in frequency and magnitude; unprecedented flash-floods	Highest
Heave Waves	More hot days with increases in severity, coverage, and duration of heat waves	High
Drought	More days between precipitation events, leading to increased drought severity, coverage, and duration	Moderately High
Heavy Snowfall	Large events less frequent as winter warms, but occasional very large snowfalls	Moderately Low
Severe Thunderstorms and Tornados	More 'super events' possible, even if frequency decreases	Moderately Low

Source: MN DNR State Climatology Office. Projected and expected trends among common weather hazards in Minnesota, and confidence that those hazards will change through 2099 in response to climate change. Graphic based on information from the 2014 National Climate Assessment.

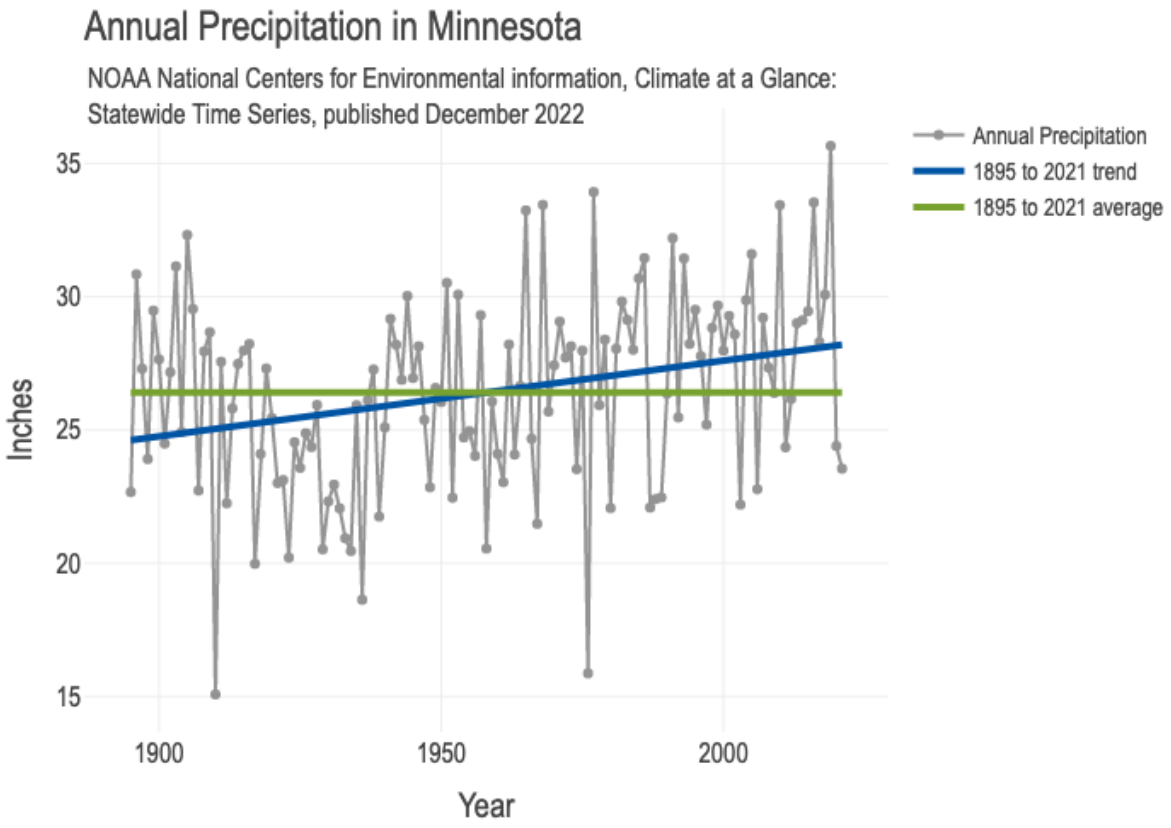
Climate hazards can take a toll on regional investments, from transit infrastructure to our wastewater assets. As an agency, the Met Council is responsible for maintaining regional assets and managing investments with climate change in mind. The CVA is a tool that can assist in Met Council and community planning efforts to prepare and adapt to climate change because the CVA can reveal system vulnerabilities to currently occurring and, to some extent, expected climatic changes.

3.2.1 Flooding

A changing Minnesota climate has shown that more energy and more moisture in the atmosphere has the potential to create more rainfall.

Precipitation has been increasing in Minnesota over the last century, as shown in Figure 3.3, which illustrates historic annual precipitation, from 1895-2021.

Figure 3.3: Annual precipitation in Minnesota, 1895 to 2021



The blue trend line in Figure 3.3 shows that annual precipitation amounts have been steadily increasing, which is compounded by increasing rainfall totals for specific, isolated storms. The green line shows the average annual precipitation.

These extreme rainfall trends put a strain on stormwater infrastructure and other surface water conveyance or retention efforts. Given the fact that much of the stormwater infrastructure within the Twin Cities metro region was designed to convey surface water based on technical standards and rainfall estimations adopted in 1960, the increasingly short, intense rainfalls present a challenge for communities and for the Met Council.

The Fourth National Climate Assessment states that precipitation in the Midwest is projected to increase by 30% by the end of this century. Between 1958 and 2012, the Midwest had already experienced a 37% increase in larger rain events of 2.5 inches or greater. (USGCRP et al. 2018)

3.2.2 Extreme heat

Minnesota is already getting warmer and state climatologists are highly confident that heat waves are likely to trend upwards in future summers in the state, from 2025 onwards (MPCA 2022a).

To create strategies to address extreme heat, researchers seek to identify the factors that exacerbate extreme heat. This research has shown that higher temperatures are amplified in areas with higher concentrations of pavement and other artificial surfaces that are covered by water-resistant materials. These areas tend to absorb residual heat and hold that heat longer than vegetation would. This effect is called the urban heat island effect, or UHI. Buildings can block the wind, reducing a mitigating effect on the extreme heat. The four components that make up the UHI are lack of vegetation, a high percentage of water-resistant surfaces, residual heat from cars and mechanical cooling, and building shape and size.

Using remote sensing and satellite imagery, the Met Council has mapped an extreme heat event in the region, showing the land surface temperature during a three-day heat wave, at noon on July 22, 2016. The map shows areas of extreme heat within the urban core area of the metro, while it also shows that areas near parks and water bodies are significantly cooler. It is important to emphasize that the data consists of land surface temperature, as opposed to air temperature. Air temperature data can provide a better measure of potential extreme heat impacts on human health. The use of land surface temperature has ensured that this analysis has full metro region coverage. In addition, the use of land surface temperature can be helpful in identifying land use and built environment strategies to mitigate extreme heat in specific locations through a variety of site-specific interventions.

The extreme heat map tool shows land surface temperature data for the Twin Cities metro region. The tool allows users the opportunity to toggle on/off the Land Surface Temperature data, land use, and land cover data. Users can also set transparency, use a swipe tool, and the map includes the same data displayed by standard deviation temperature range, both as a layer and by clicking on a specific location.

Additionally, the Met Council published a companion StoryMap *Keeping Our Cool: Extreme Heat in the Twin Cities Region*.

4. Reduce crashes and improve safety and security

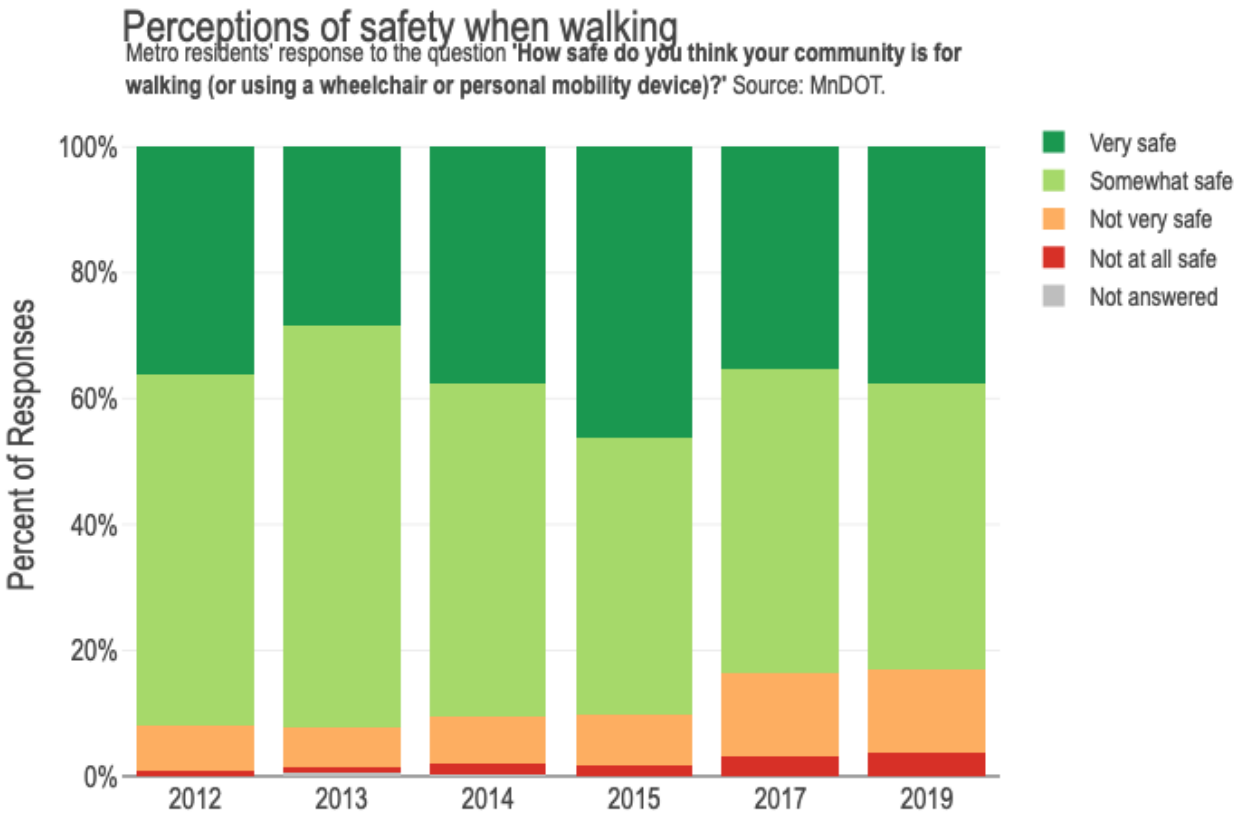
Reduce fatal and serious injury crashes and improve safety and security for all modes of passenger travel and freight transport.

4.1 Perception of Safety When Walking and Bicycling

metro region respondents to MnDOT's public opinion survey are asked to rate perceptions of safety for bicycling and walking in their communities using a four point scale - 1 corresponds to a perception that bicycling and walking is not at all safe and 4 corresponds to a perception that bicycling and walking is very safe. MnDOT tracks the percentage of respondents who perceive their environment as safe by totaling those who respond with 3 (somewhat safe) or 4 (very safe). The survey is typically done every two years.

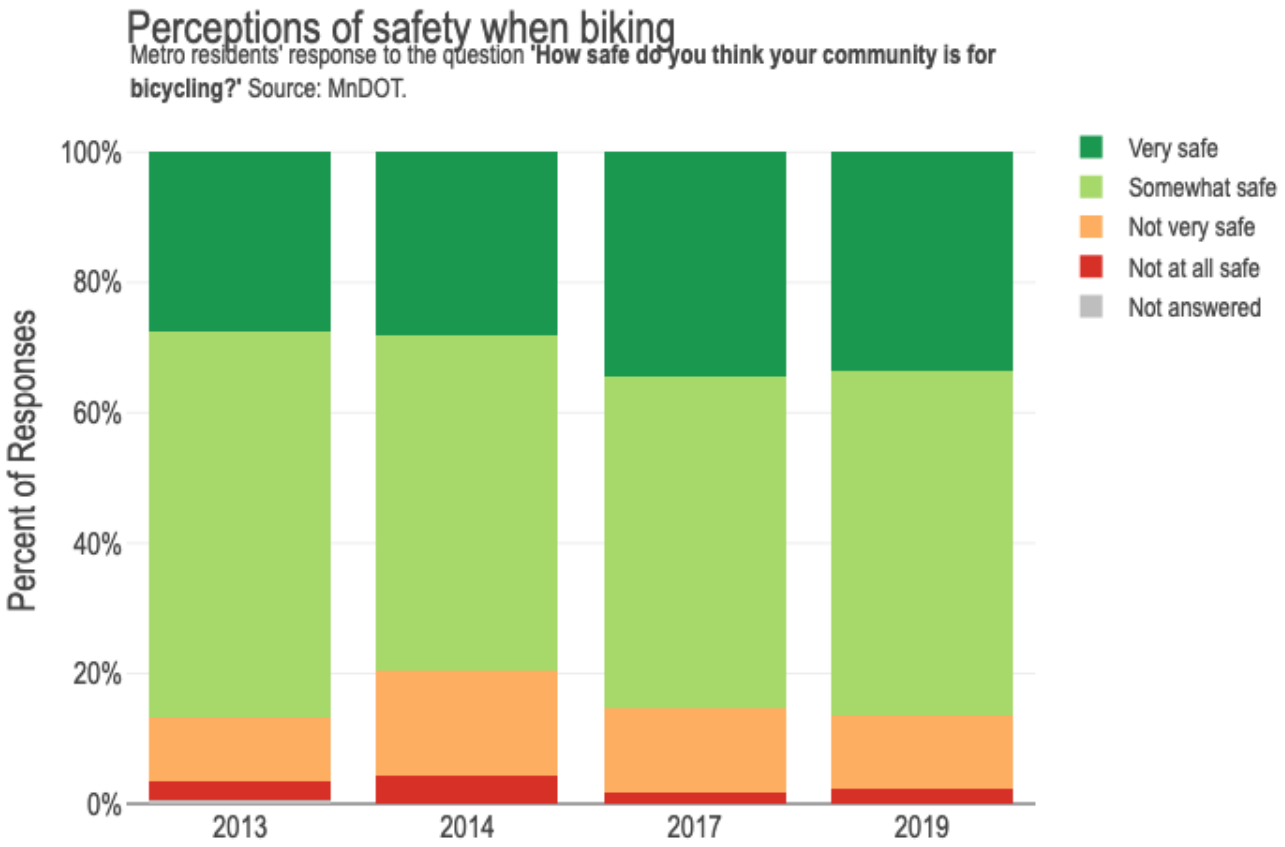
Figure 4.1 shows how people's responses to the question **How safe do you think your community is for walking (or using a wheelchair or personal mobility device)?** over time. In recent years, the amount of people who felt not very safe or not at all safe has increased. For instance, those who felt not at all safe increased from 2% in 2015 to 4% in 2019.

Figure 4.1: Perceptions of safety when walking



Perception of safety while biking increases over time [3]

Figure 4.2: Perceptions of safety when biking



4.2 Transit safety

Transit providers track and report on multiple aspects of safety to the Federal Transit Administration (FTA). In general, transit is a very safe mode of travel both for people using it and for other transportation system users like automobile drivers, pedestrians, and bicyclists. There were no fatalities reported involving any of the regional transit providers in 2022. Other measures of safety such as injuries are also very low, especially when compared to the number and rate of injuries from other traffic-related crashes.

Transit agencies also track and report to the FTA on aspects of safety other than crashes including the broader category of safety events and the frequency of major mechanical issues that affect delivery of transit service. Metro transit bus service had a safety event rate of less than 1 for every 25,000 vehicle revenue miles (VRM) provided. Mechanical issues affecting Metro Transit bus service occurred on average per every 7,731 miles of service provided.

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[3] "How safe do you think your community is for bicycling?" was not asked in the 2015 survey. 2012 responses to this question were inconsistent and so omitted from this plot.

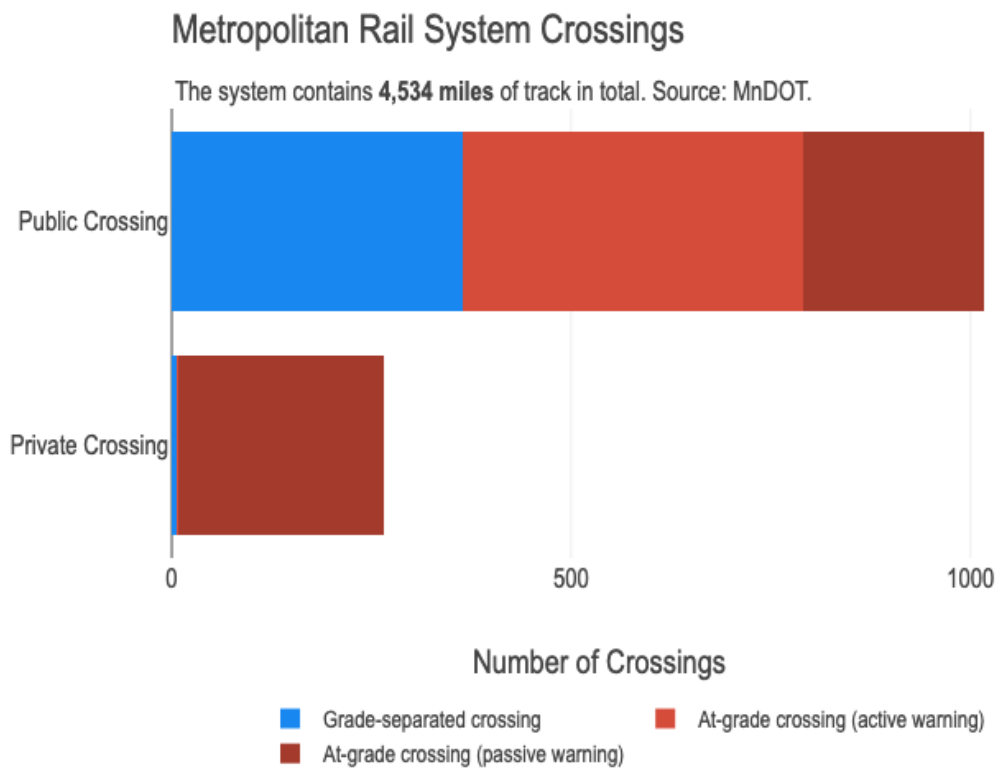
Table 4.1 Transit Safety by mode and provider

MODE	FATALITIES (TOTAL)	FATALITIES (RATE)	INJURIES (TOTAL)	INJURIES (RATE)	SAFETY EVENTS (TOTAL)	SAFETY EVENTS (RATE)	SYSTEM RELIABILITY
METRO TRANSIT							
BUS	0	0/100k VRM	175	N/A	N/A	3.8/100k VRM	7,731 VRM/Failures
LIGHT RAIL	0	0/100k VRM	145	N/A	N/A	0.6/100k VRM	25,000 VRM/Failures
METROPOLITAN COUNCIL							
BUS	0	0/100k VRM	3	0.097/100k VRM	50	1.47/100k VRM	26,154 VRM/Failures
DEMAND RESPONSE	0	0/100k VRM	50	0.19/100k VRM	45	0.17/100k VRM	57,777 VRM/Failures
VANPOOL	0	0/100k VRM	0	0/100k VRM	0	0	0
MINNESOTA VALLEY TRANSIT AUTHORITY							
BUS	0	0/100k VRM	8	0.236 / 100k VRM	11.6	0.326 / 100k VRM	9,000 VRM/Failures
SOUTHWEST TRANSIT							
BUS	0	0/100k VRM	1	1/100k VRM	2	1/100k VRM	25,000 VRM/Failures
DEMAND RESPONSE	0	0/100k VRM	1	1/100k VRM	1	1/100k VRM	53,000 VRM/Failures
[A] METRO TRANSIT REPORTS ONLY TOTAL ANNUAL INJURIES							

4.3 Status of At-Grade Rail/Roadway Crossing Safety Features

There are currently 1,283 railroad crossings along 4,534 miles of track in the metropolitan region. The status of these roadway or pedestrian-only crossings has implications for the efficiency and safety of the region's rail and highway systems. Figure 4.3 shows rail-highway crossing safety feature data for the region. In the metro area approximately 29%of all rail crossings have a bridge overpass or tunnel underpass providing unimpeded and protected vehicle and/or pedestrian traffic along the roadway. Of the remaining 912 crossings without a bridge or underpass, only about 47% have active crossing warning devices that include gates, cantilevers, and flashing light signals. Nearly 38%% of all crossings in the region (483 in total) have only passive warning signs.

Figure 4.3: Metropolitan area rail system crossings by status. Source: MnDOT Office of Freight and Commercial Vehicle Operations.

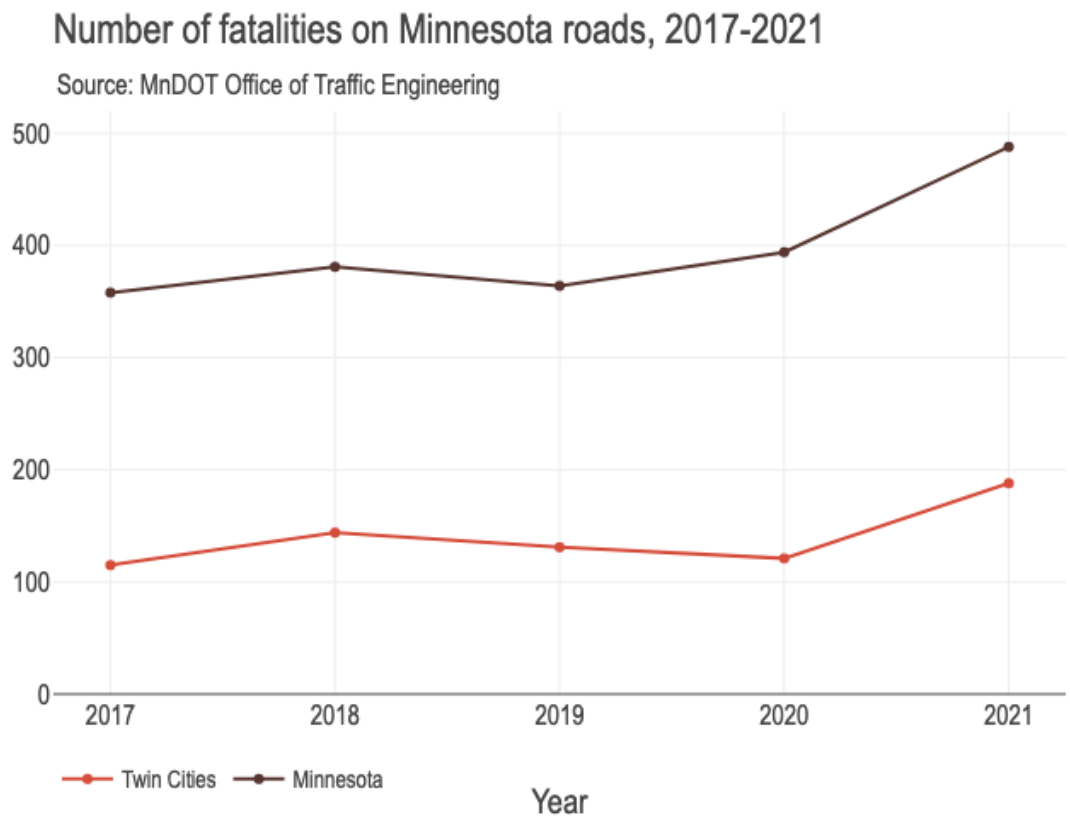


4.4 Traffic Fatalities and Injuries

4.4.1 Fatalities

The region supports the state goal of working toward zero deaths or serious injuries from traffic crashes. No one should die or be seriously injured while traveling in their daily lives, regardless which mode they use. Tracking crash data information is an important tool in evaluating how we are doing as a region in making progress toward this goal. According to data from the Minnesota Department of Transportation Safety, between 2017 and 2021, there were 1,985 total traffic fatalities in Minnesota, 699 of which occurred in the region. Twin Cities traffic fatalities make up 35% of the state traffic fatalities.

Figure 4.4: Number of people killed by drivers each year, 2017-2021, for the Twin Cities MPO and statewide. Source: MnDOT Office of Traffic Engineering



Although the region has 35% of all traffic fatalities, 59% of statewide pedestrian fatalities and 57% of statewide bicyclist fatalities occurred within the region between 2017 and 2021.

Of all traffic deaths in the region during this time, 20% were pedestrians.

Of these 699 traffic fatalities in the region, 140 were pedestrian fatalities and 24 were bicyclist fatalities.

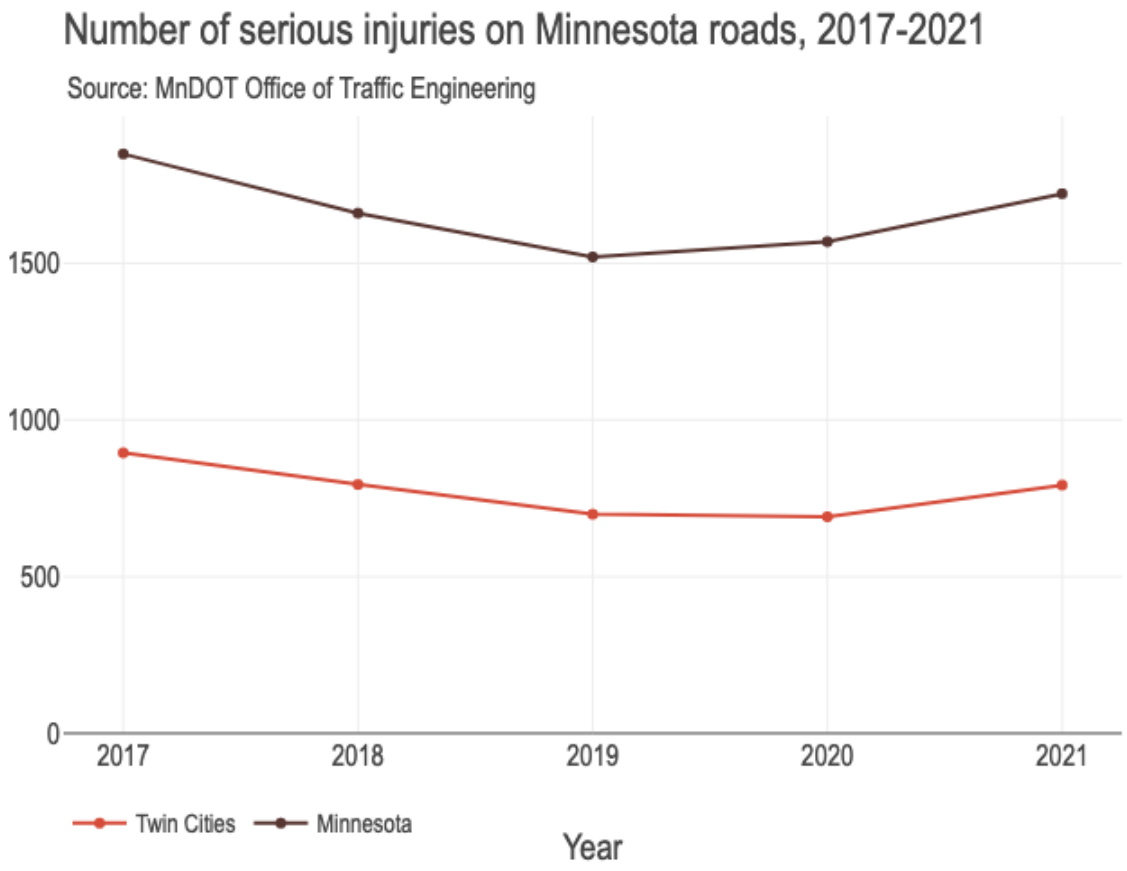
In addition, 590 pedestrian serious injuries and 195 bicyclist serious injuries occurred in the region.

> Note
>
> Pedestrian fatalities are a disproportionately larger percentage of the region's traffic deaths. The numbers are not as disproportionate for bicyclists in the region but remain a concern as more vulnerable users of our transportation system.

4.4.2 Serious Injuries

Safety planning focuses on reducing the most severe types of crashes, those in which someone is killed or is seriously injured. While serious injuries had been decreasing, the numbers of people suffering serious injuries from traffic crashes increased in 2021.

Figure 4.5: Number of people seriously injured by drivers per year, 2017-2021, for the Twin Cities MPO and statewide. Source: MnDOT Office of Traffic Engineering

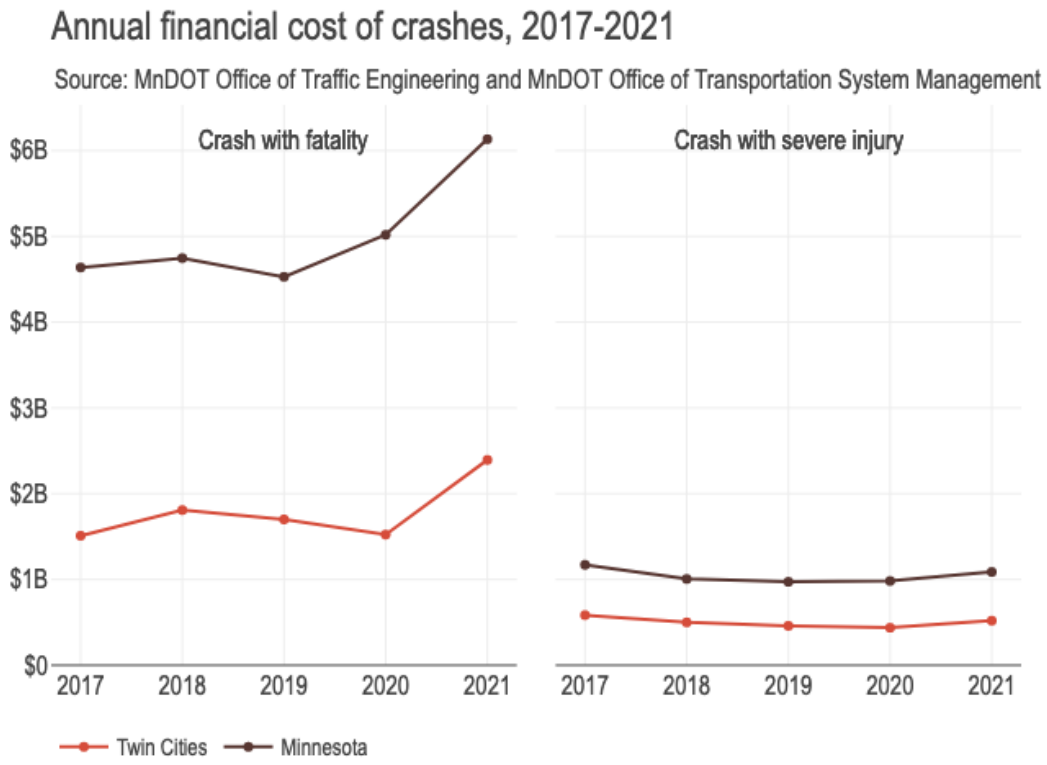


4.4.3 Financial crash costs

While no costs can ever truly reflect the emotional loss of losing a loved one in a traffic crash, there are comprehensive costs estimated related to crashes. Comprehensive costs include both financial impacts such as medical services, insurance claims processing, and legal fees, as well as estimates of the intangible effects from diminished quality of life following injury crashes. Using comprehensive costs for traffic crashes can help understand the economic impacts of crashes overall in addition to the human losses.

Learn more about per-crash comprehensive costs in Section C.1.

Figure 4.6: Average cost of fatal and serious injury crashes per year, 2017-2021, for the Twin Cities MPO and statewide. Sources: MnDOT Office of Traffic Engineering (crash data) and Office of Transportation System Management (per crash comprehensive costs)



4.4.4 Fatal and Serious Injury Crash Rate

Crash rates are used to look at the numbers of people being killed or seriously injured in traffic crashes divided by the exposure people have by traveling. In these crash rates, the exposure used is per 100 million miles traveled in vehicles. Both the fatality and serious injury crash rates have increased.

Figure 4.7: Number of disabling crash injuries per 100 million miles traveled, for the Twin Cities MPO and statewide, 2017-2021. Source: MnDOT Office of Traffic Engineering

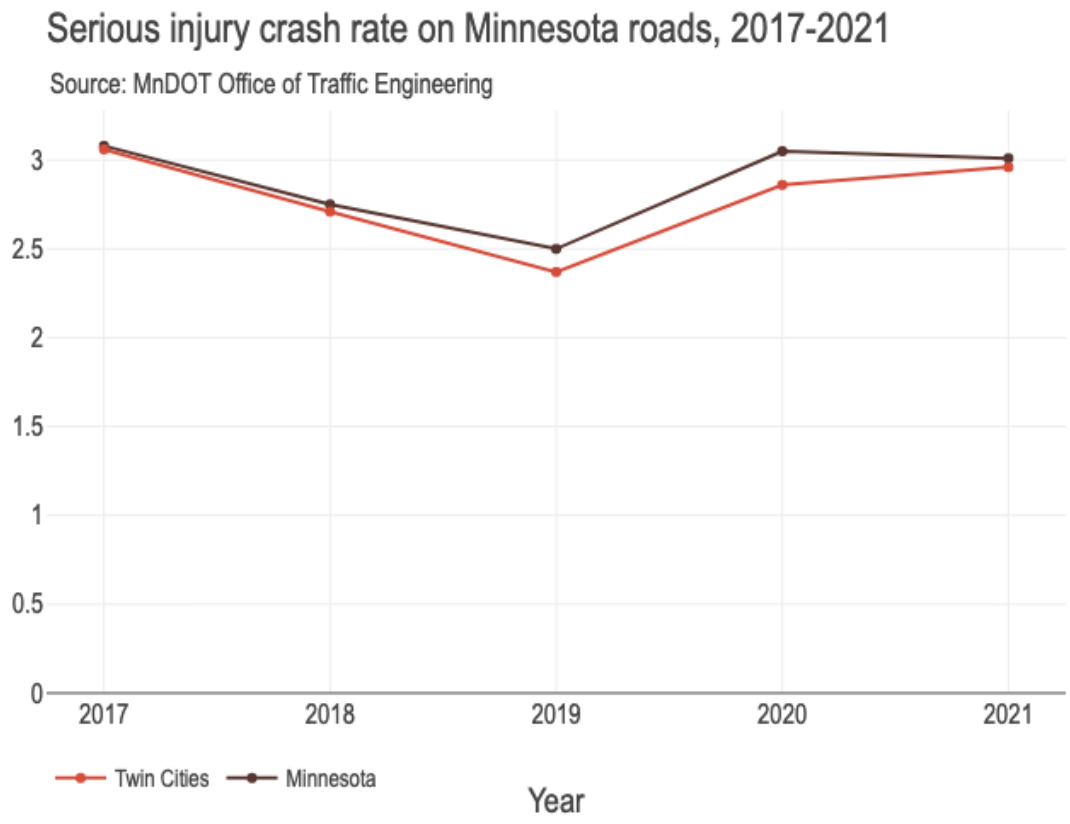
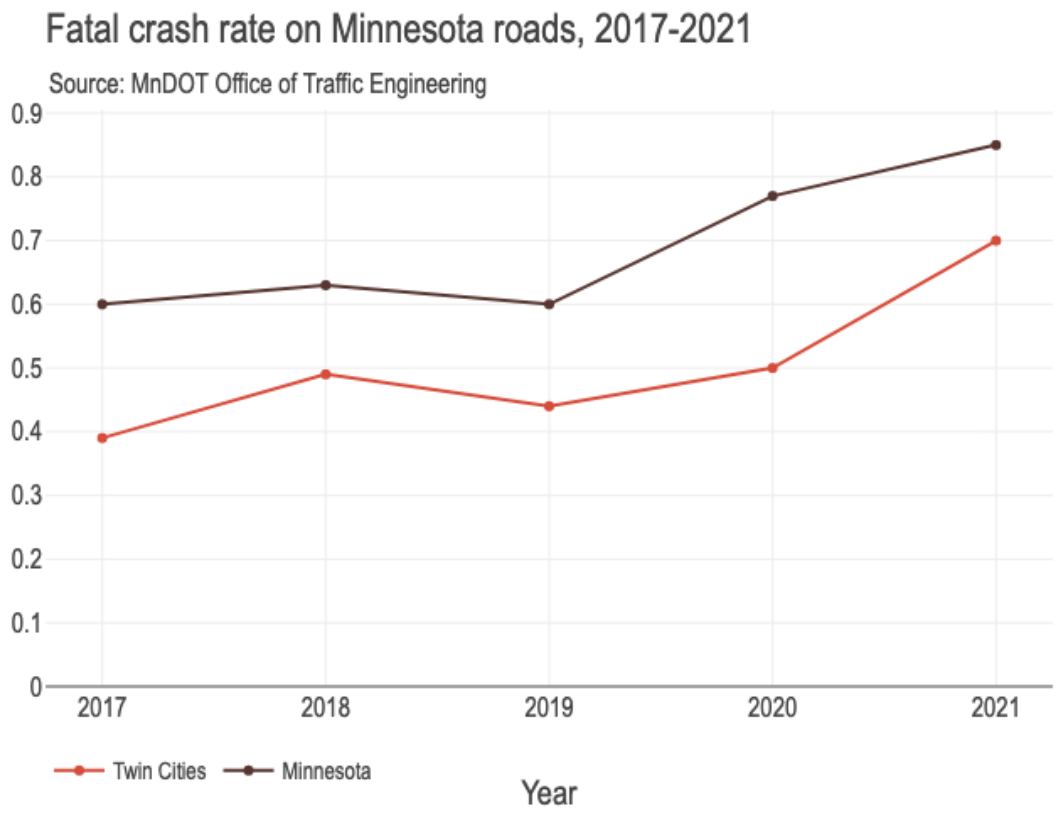


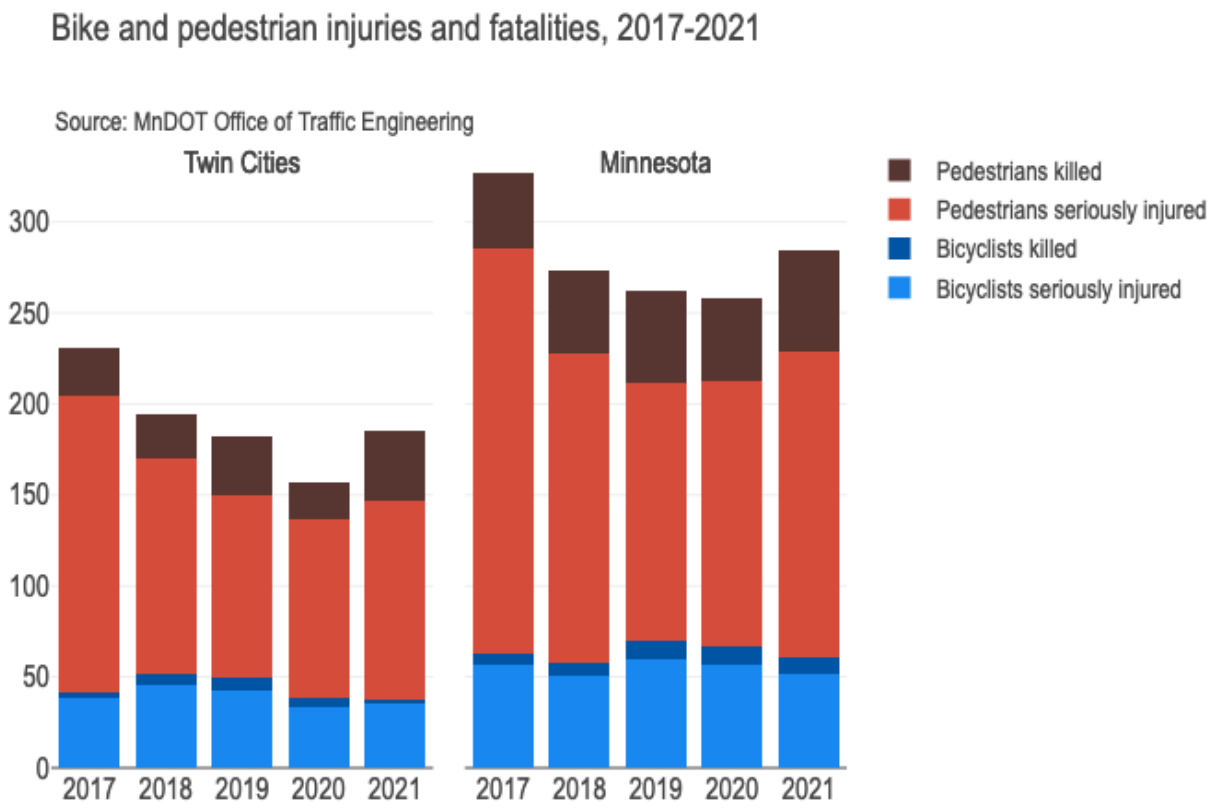
Figure 4.8: Number of people killed per 100 million miles traveled, for the Twin Cities MPO and statewide, 2017-2021. Source: MnDOT Office of Traffic Engineering



4.4.5 Safety of Pedestrians and Bicyclists

People who are walking or biking are the most vulnerable travelers in our transportation system. In 2021, more people using these modes were seriously injured. 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. However, more work is needed to create a safer system to support people walking and biking in our region and reverse the increases in these serious injuries.

Figure 4.9: Number of crashes that kill or seriously injure bikers or pedestrians per year, 2017-2021, for the Twin Cities MPO and statewide. Source: MnDOT Office of Traffic Engineering



Access to Destinations

Supporting prosperity by connecting people and businesses to destinations.

Objectives

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

Strategies summarized

- The region will focus on providing a transportation system that offers practical and affordable options, so all users, regardless of their social or economic background, can get to the places they need to go.
- This plan emphasizes the importance of improving and expanding transportation options through investments in a multimodal system with regional bicycle access and local pedestrian amenities; transitways, local and express bus services; and highways with E-ZPass options.
- The plan emphasizes connecting people to destinations, like grocery stores, work, parks, and childcare, and investments that lead to prosperity for all people.

Providing access is transportation's fundamental purpose. There are ways access can be better provided, and there are barriers to good access that need to be managed or eliminated.

Both population and employment are forecasted to increase in the coming years. Maintaining good regional access to destinations requires putting in place a variety of strategies and tools to address congestion, including offering multimodal options, implementing travel demand and congestion management, and making highway improvements.

5. Improve the availability and quality of multimodal travel

Improve the availability and quality of multimodal travel options for people of all ages and abilities to connect to jobs and other opportunities, particularly for historically under-represented populations.

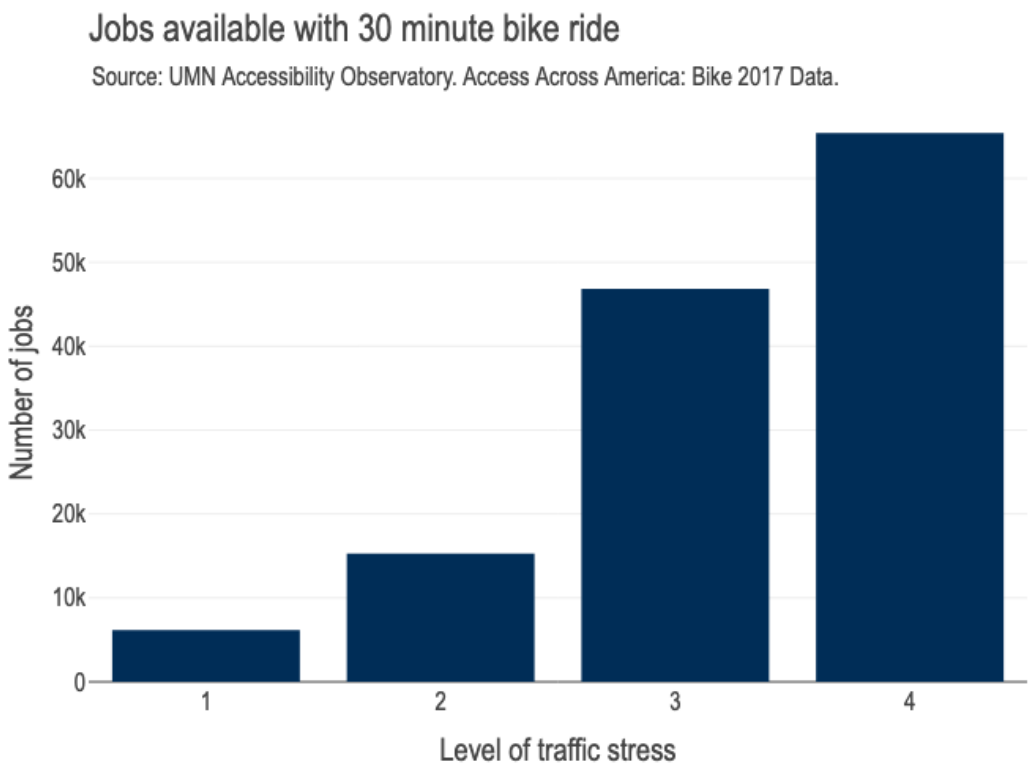
5.1 Job accessibility by mode

Developed by the University of Minnesota Accessibility Observatory, the Bicycle Level of Traffic Stress (LTS) evaluation is a method for classifying street segments' suitability for bicycling based on the physical characteristics of the roadway, such as speed limits, lane configurations, and the types of bicycle facilities present, if any. A value of 1 (lowest stress) to 4 (highest stress) is assigned to each street segment based on these characteristics. In this study, roadway characteristics are determined by street segment tags in the OpenStreetMap® network data used for routing computations. We define the LTS 1 network as lowest-stress, LTS 2 network as low-stress, the LTS 3 network as medium-stress, and the LTS 4 network as the open streets network — i.e. if a person feels comfortable riding a bicycle on all streets (except limited-access highways, such as interstates and freeways), including arterials, they would experience open streets access (Owen and Murphy 2021).

In 2016, there were about 741,265 jobs available within 30 minutes by auto (Murphy and Owen 2020).

In 2017, there were about 14,435 jobs available within 30 minutes by transit (Murphy and Owen 2021).

Figure 5.1: Job availability within 30 minutes by bike and level of traffic stress, based on a departure time of 12:00 noon. Source: UMN Accessibility Observatory.



5.2 Transit availability by route type

Table 5.1: People served by transit by service type, 2022

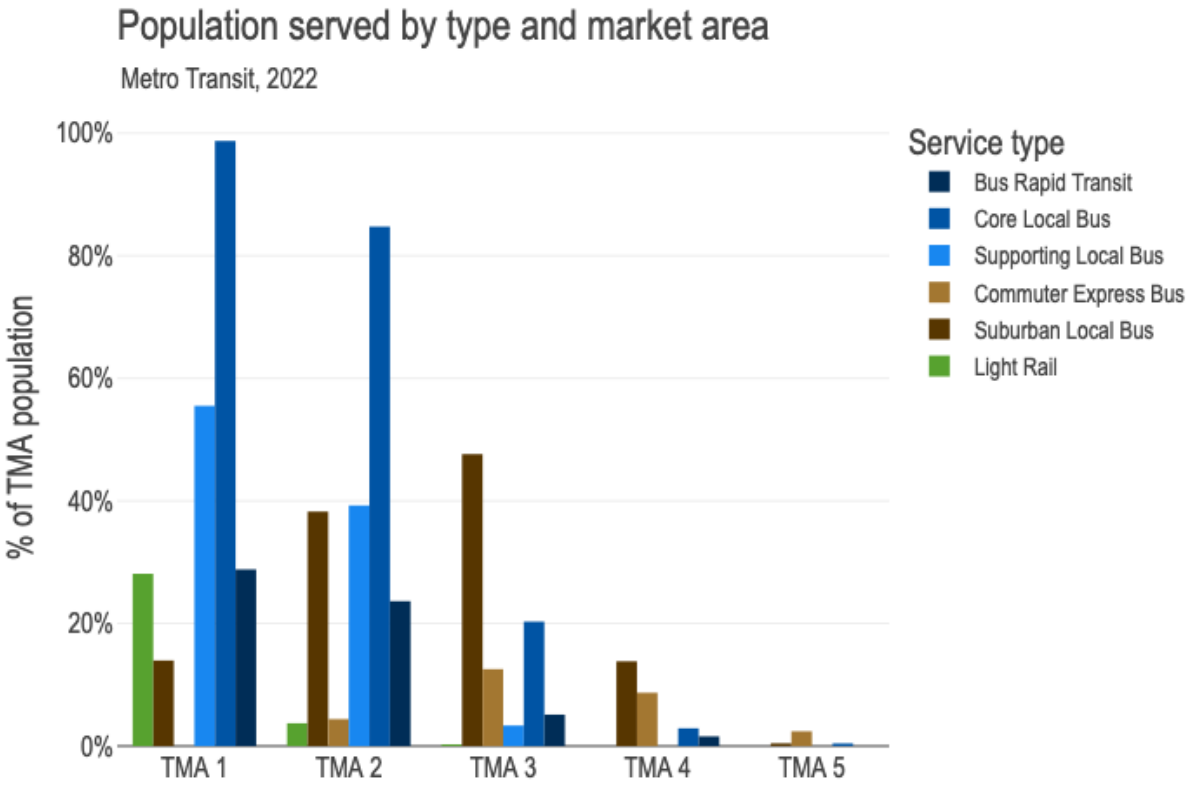
SERVICE	PEOPLE SERVED	PERCENT OF REGION POPULATION
Bus Rapid Transit	333,817	10.9%
Core Local Bus	1,188,502	38.9%
Supporting Local Bus	509,734	16.7%
Commuter Express Bus	230,350	7.5%
Suburban Local Bus	942,588	30.8%
Light Rail	140,668	4.6%

Source: Metro Transit, 2022. Population based on area 1/4 mile surrounding stops or park-and-ride lots for each service type.

The Met Council and its partners work together to categorize all areas in the region into Transit Market Areas (TMA) that approximate the level of transit service an area can support. These categories are based on four factors including population and job density, roadway intersection density, and automobile availability. Transit Market Area 1 is made up of the most urban parts of the Twin Cities such as downtown Minneapolis and Saint Paul, their adjacent neighborhoods and the University Avenue corridor between the two. Conversely, Transit Market Area 5 is the most rural communities in the region with low population densities and more agricultural land uses. More detail on Transit Market Areas is available in Section D.1.

In Transit Market Areas 1 and 2, the highest density and most able to support high levels of transit service, 99% and 85% of residents live within a quarter mile of core local bus services, respectively. This translates to about a five-minute walk. These Transit Market Areas also have the best access to the widest variety of transit services including light rail, bus rapid transit, and supporting local bus. In Transit Market Area 3, while more suburban in character with lower population and employment densities, 48% of residents live within suburban local bus service area. Transit Market Areas 4 and 5 have progressively more low-density and rural characteristics and have 14% and 2% of residents living within a quarter mile of fixed-route transit services.

Figure 5.2: Percent of area population with transit service, shown by service type and TMA.



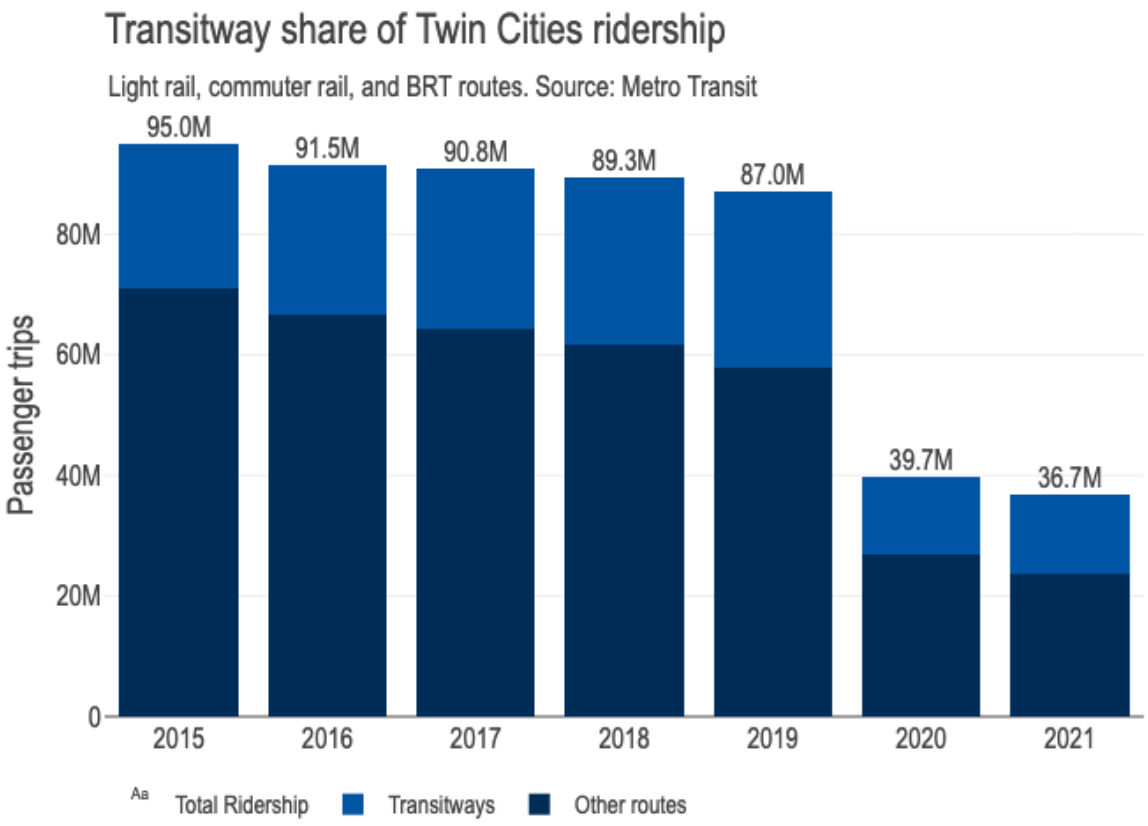
5.3 Transitway share of total ridership

Transitways include high-capacity, high-amenity services like light rail and bus rapid transit.[4] These services are important parts of the regional transit network that the region has been focusing investments in, particularly arterial bus rapid transit (BRT) projects like the D Line and C Line.

The proportion of transit ridership in the region on transitways increased from 25% of all ridership in 2015 to 34% in 2019. While total transit ridership decreased due to the pandemic, transit trips on transitways still made up 36% of all ridership in 2021. The share of ridership on transitways is expected to continue increasing as the region makes further investments in high-capacity transit services.

[4] Blue Line, Red Line, Green Line, Orange Line, Northstar, A Line, C Line, and D Line transit routes

Figure 5.3: Transitway share of total regional transit ridership. Source: Metro Transit



6. Increase carpools, transit, bicycling and walking

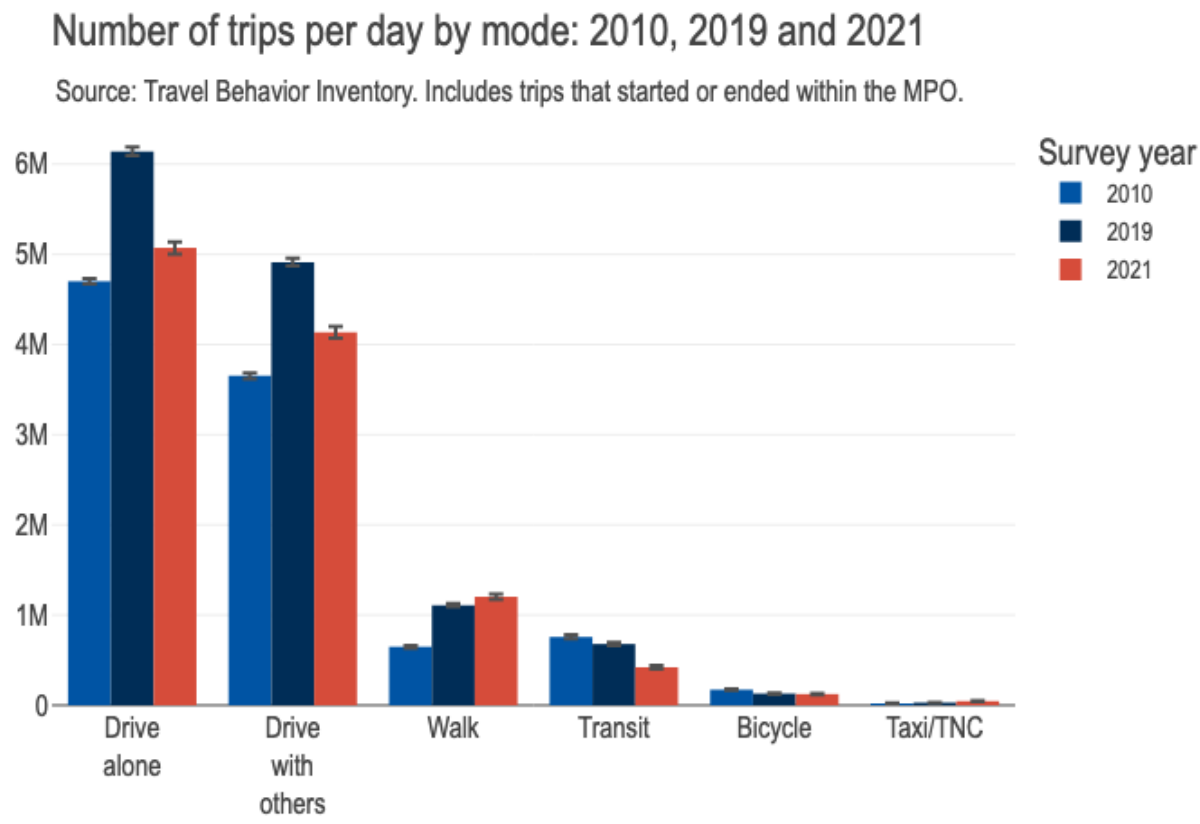
Increase the number and share of trips taken using carpools, transit, bicycling and walking

6.1 Travel by mode

From 2010 to 2019, the total number of trips made in the region increased by 29%, from 10.0 M trips per day in 2010 to 12.8 M trips per day in 2019. This was consistent with a 10% increase in population (see Figure 14.3), as well as the economic recovery after the 2008 recession. However, it is also important to note that changes to survey methodology in 2019 likely led to a greater ability to capture trips.

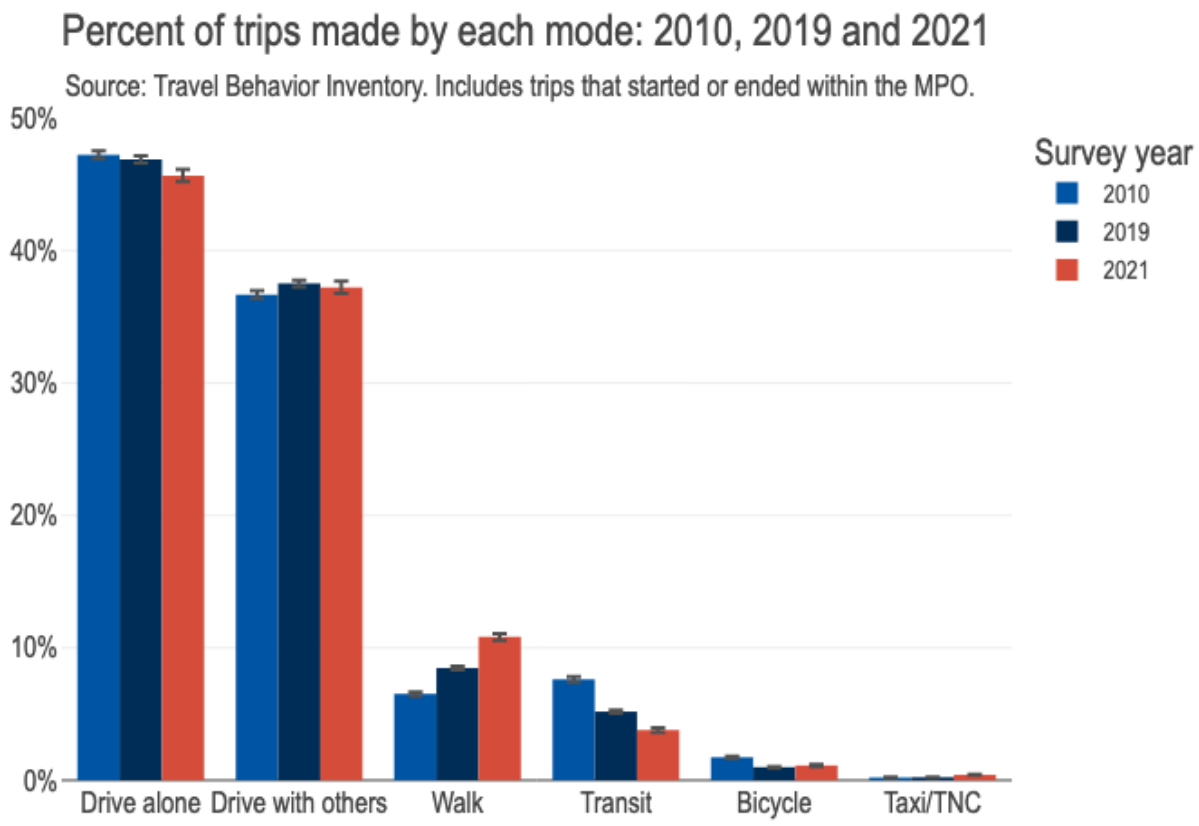
From 2019 to 2021, survey methodology stayed the same, but the total number of trips made in the region decreased by 14% – almost completely erasing the gains from the last 9 years. The COVID-19 pandemic was having effects on the total amount of travel people did in 2021. The total number of trips made each day declined from 13 million to 11 million. The decline in trips made was steepest for trips made by single-occupancy vehicle (a 11% decrease).

Figure 6.1: Number of trips per day by mode



Because the number of walk trips remained roughly constant while the number of drive trips fell, the mode share for walking increased.

Figure 6.2: Share of trips made per day by mode



Non-single occupancy vehicle (SOV) travel remains highest in urban center communities, but gains in walk mode share were observed in all community types except the emerging suburban edge from 2010 to 2021.

Figure 6.3: Share of trips made per day by mode and Thrive designation

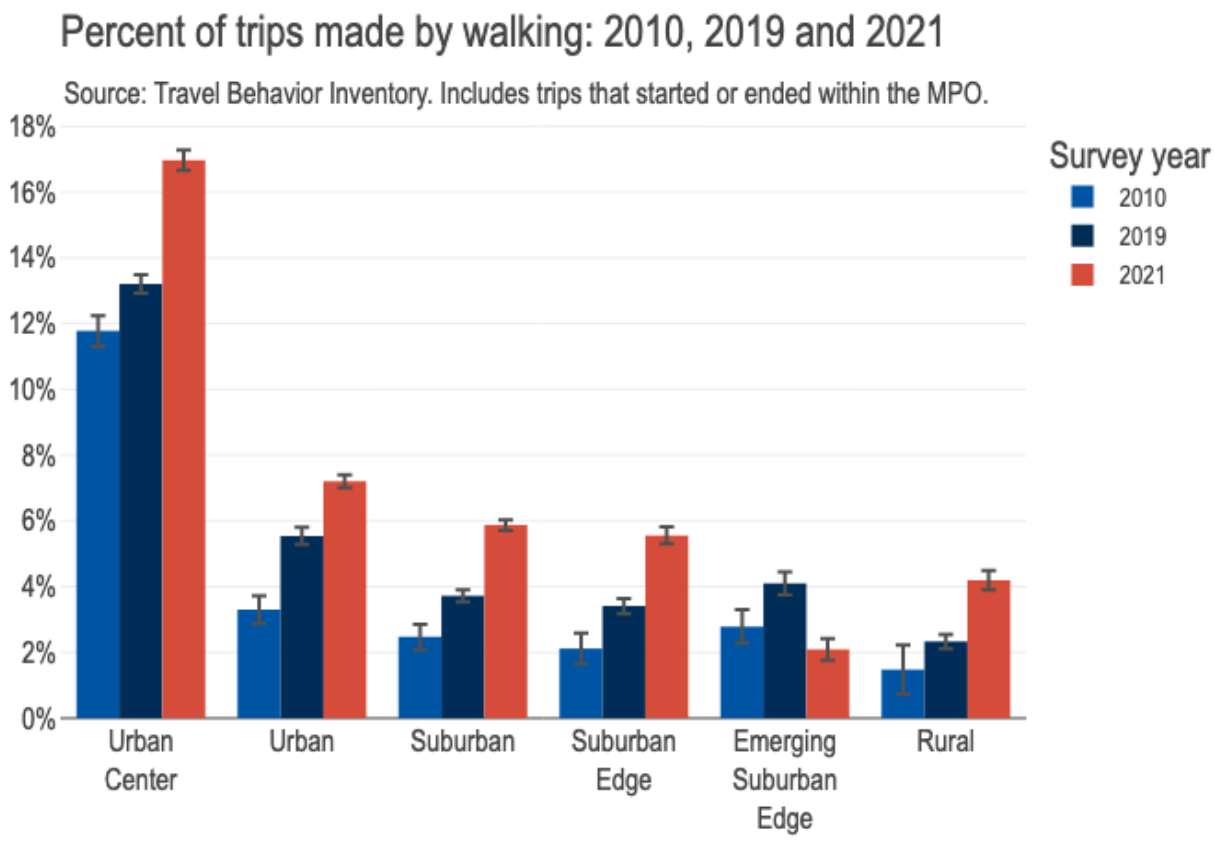
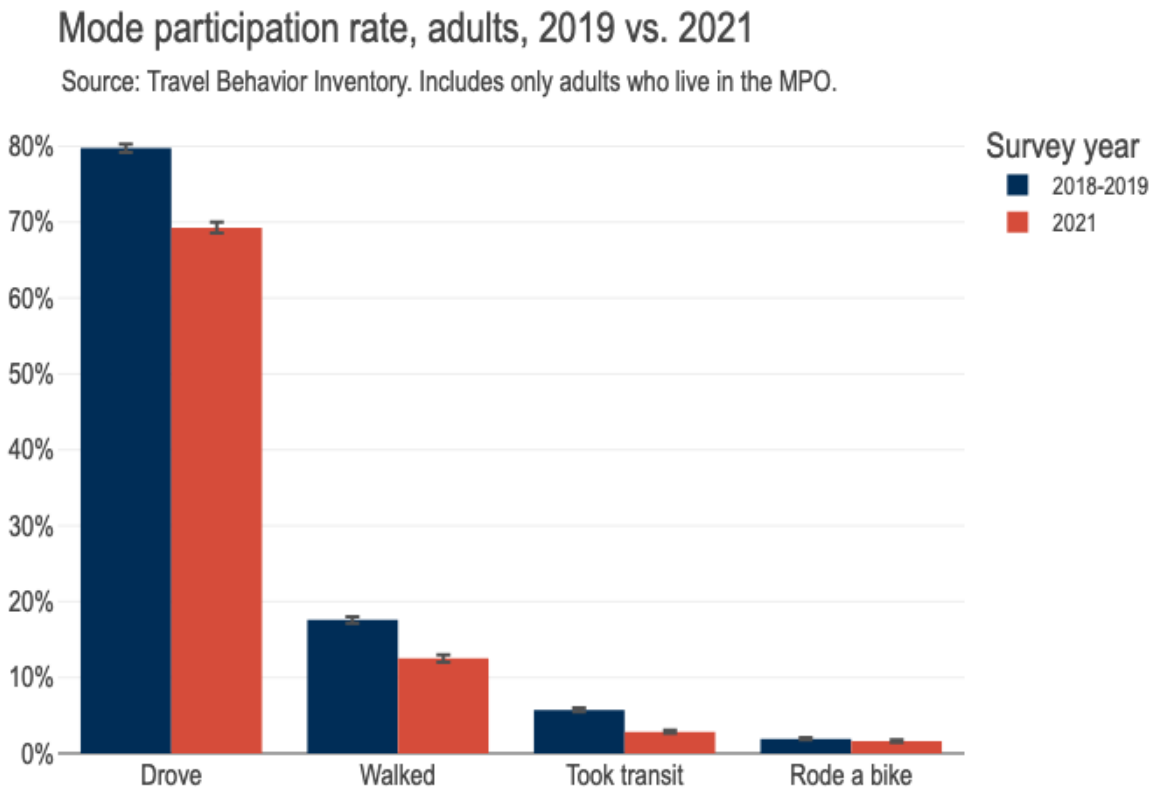
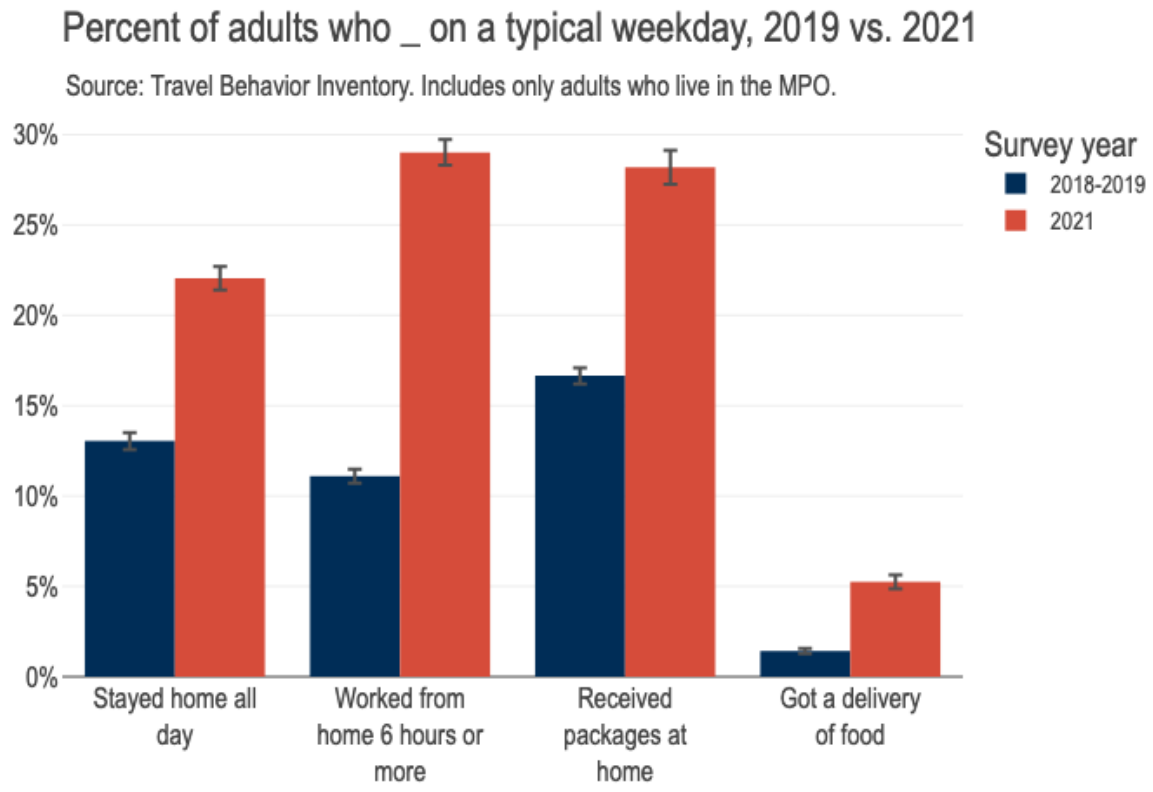


Figure 6.4: Modal participation rate



Changes to modal participation rates were driven largely by a decrease in days with travel, which was accompanied by an increase in trip replacement behaviors.

Figure 6.5: Percent of adults who participated in each trip replacement behavior



As the total number of trips each day declined during the COVID-19 pandemic, trip replacement behavior increased. The share of adults who stayed home on a typical weekday increased from 13% in 2019 and to 22% in 2021, a 70% increase. The share who worked from home 6 hours or more on a typical weekday increased from 11% to 29%, a 164% increase. Adults receiving deliveries on a typical weekday also increased over this period, with package deliveries up 84% and food deliveries up 304%.

6.2 Park and Ride Use

Roughly 13% of the 28,250 park and ride spaces across the region were utilized, according to the 2022 annual survey. While this represents a 315% increase from the 2020 survey, it is sharply down from 2019 when roughly 57% of spaces across the region were used. Since early 2020, the COVID-19 pandemic has significantly affected travel demand, resulting in a major decline in transit ridership, particularly for commuter express service. Express service comprises a significant portion of transit service associated with Park & Ride facilities. As of 2022, express service remained suspended at some facilities.

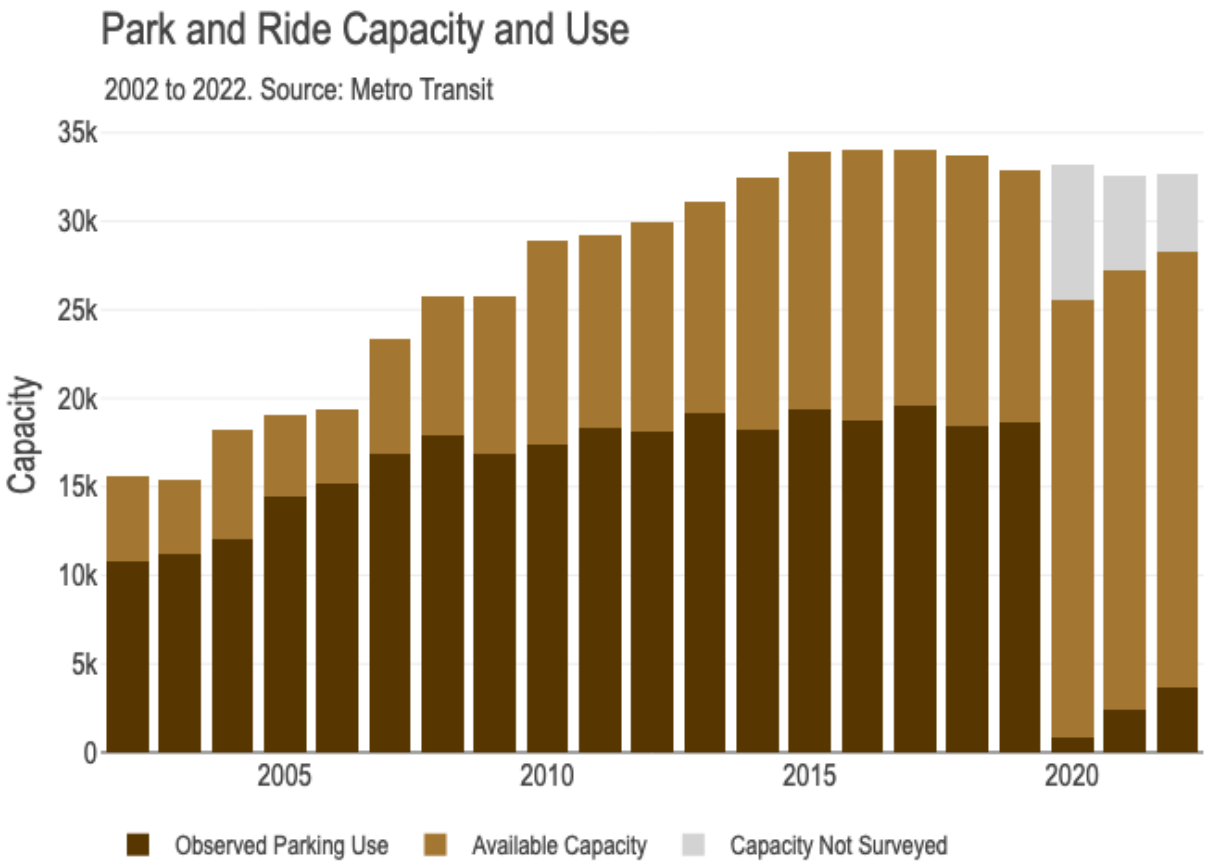
The 2022 Annual Regional Park & Ride System Report provides a summary of current trends in the Twin Cities regional park and ride system. A survey of the system was conducted in September and October 2022, which included a parked vehicle count with license plate data collection and bike count at all park and ride facilities.

Since early 2020, the COVID-19 pandemic has significantly affected travel demand, resulting in a major decline in transit ridership, particularly for commuter express service. Express service comprises a significant portion of transit service associated with Park & Ride facilities. At the time of the 2022 survey, express service remained suspended at some facilities. Facilities where commuter express service had been suspended at the time of the survey were excluded. As a result, the survey included

74 Park & Ride facilities with a capacity of 28,249 parking spaces and excluded 29 facilities with an additional 4,429 parking spaces where service was suspended, and Park & Ride use was not anticipated (Hinklin 2023). Historic Park & Ride use can be seen in Figure 6.6.

In addition to Park & Ride facilities, there were 44 active Park & Pool facilities. Park & Pool facilities are designated parking areas that provide individuals a gathering point from which they can carpool to a common destination, whereas Park & Ride facilities are defined as parking facilities that are served by transit (i.e. they have bus or rail service).

Figure 6.6: Park and Ride historical capacity and use, 2002 to 2022. All transit providers included.



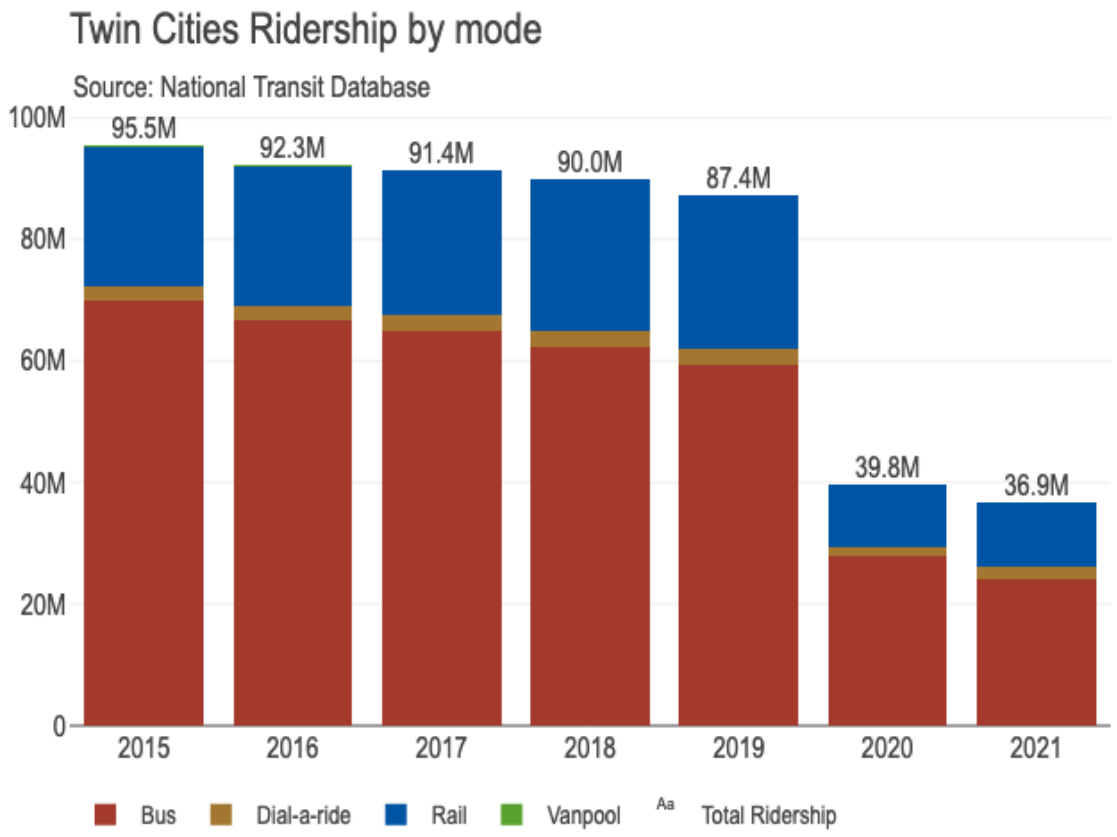
6.3 Transit Ridership

Total transit ridership decreased steadily between 2015 and 2019 from 95.5 million trips to 87.4 million trips, roughly a 1.8% decrease annually. Ridership then decreased dramatically in 2020 with the start of the COVID-19 pandemic. Total ridership in 2021 across the region was 36.9 million trips, or roughly 42% of 2019 levels.

There are currently six modes of public transit service in the Twin Cities region: light rail, commuter rail, bus rapid transit, core local bus routes, dial-a-ride[5], and van pool. The majority of transit trips in the region are on buses; between 73% of trips in 2015 and 65% in 2021. In general, the share of trips on rail increased over the same period from 24% in 2015 and 29% in 2021. Dial-a-ride usage, while a small portion of total trips, stayed relatively consistent compared with the other modes over the same period, from 3% in 2015 and 6% in 2021. This resulted in its share of regional trips increasing in 2020 and 2021 when other modes lost more ridership due to the pandemic.

SouthWest Transit began providing microtransit services through SW Prime in 2016 and other agencies have also been adding microtransit in recent years. Trips made on these services are included under the dial-a-ride category.

Figure 6.7: Twin Cities transit ridership by mode, 2015 to 2021



[5] Dial-a-ride includes microtransit services, like SW Prime and Metro Transit micro, and demand-response services like Metro Mobility, a shared ride public transportation service for certified riders who are unable to use regular fixed-route buses due to a disability or health condition

7. Ensure access to freight terminals

Ensure access to freight terminals such as river ports, airports, and intermodal rail yards

7.1 Regional Truck Freight Corridors and Facilities

The efficient movement of freight is vital to the economic competitiveness of the Twin Cities metropolitan region, and truck highway corridors comprise a key component of the regional freight transportation system. A Regional Truck Highway Corridors study was completed in 2017 to identify and prioritize the region's major highway corridors on which the trucking industry most relies. The study evaluated the metro area's highway corridors across four primary factors: average annual truck volume, truck percentage of overall traffic, proximity to freight-related economic centers, and proximity to regional freight terminals. The principal and minor arterial highways analyzed in the study were assigned to one of three priority tiers, using a data-driven scoring process. The tiered regional freight corridors shown in Figure 7.1 are used in the biennial Regional Solicitation project selection process for distributing federal transportation funds. The regional truck corridors were updated in 2021 through a MnDOT and county agencies technical review process.

Figure 7.1: Regional truck freight corridors, colored by corridor tier.

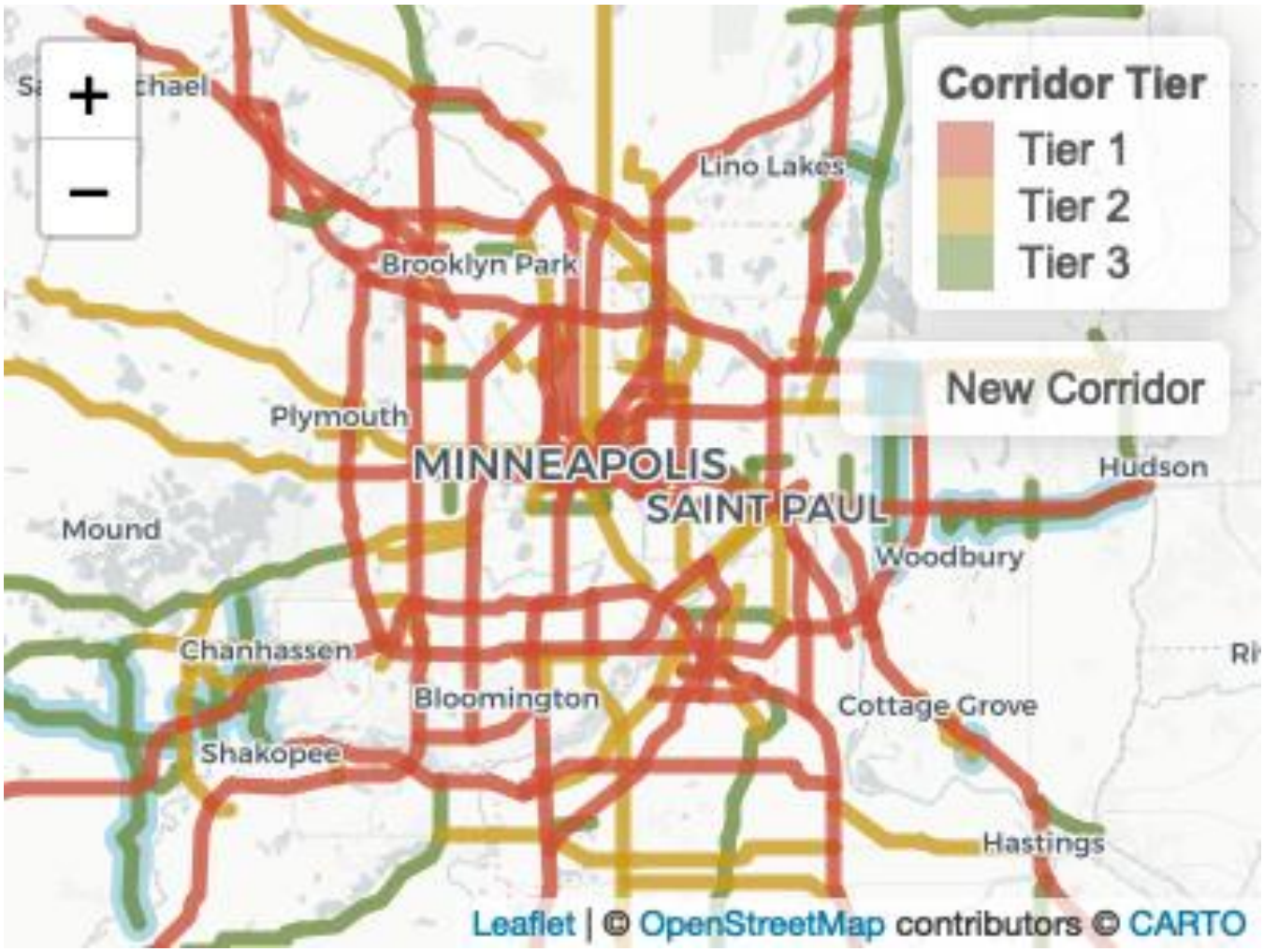
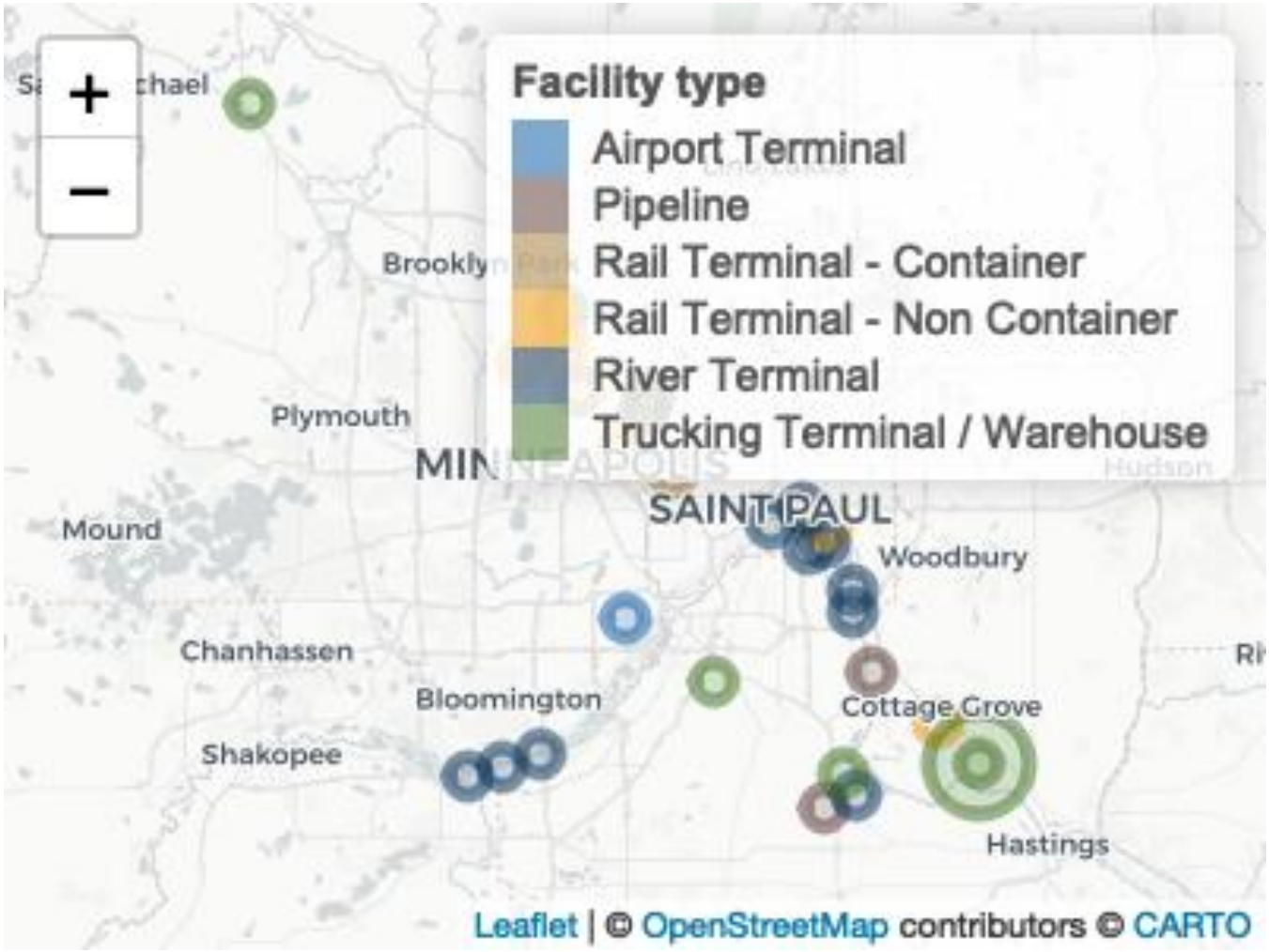


Figure 7.2: Regional freight facilities. A new facility was added in 2021 and is distinguished by a large circle.



8. Increase travel time reliability and predictability

Increase travel time reliability and predictability for travel on highway and transit systems.

8.1 Transit on-time performance

Metro Transit buses departed on-time 84% of the time in 2022. Light rail and Northstar commuter rail, departed on-time 75% and 95% of the time in the same year, respectively. On-time performance is one way to communicate transit reliability. Metro Transit considers a bus or train on time if it departs up to one minute before or five minutes after its scheduled time. On-time performance is measured at a set of stops, called time points, along each route rather than at every stop.

Metro Transit's goal for on-time performance is generally to improve compared to the previous year. This has been challenging post-pandemic and performance decreased for buses and light rail compared to 2021. Many factors influence on-time performance, similar to those that affect roads and highways like weather conditions, large events, and roadway or rail conditions and maintenance. In addition, the operator shortage continues to limit Metro Transit's ability to mitigate disruptions or delays to service. Learn more about the Metro Transit workforce in Section 3.1.

Figure 8.1: Annual bus and bus rapid transit on-time performance by service type and route, 2019 to 2023.

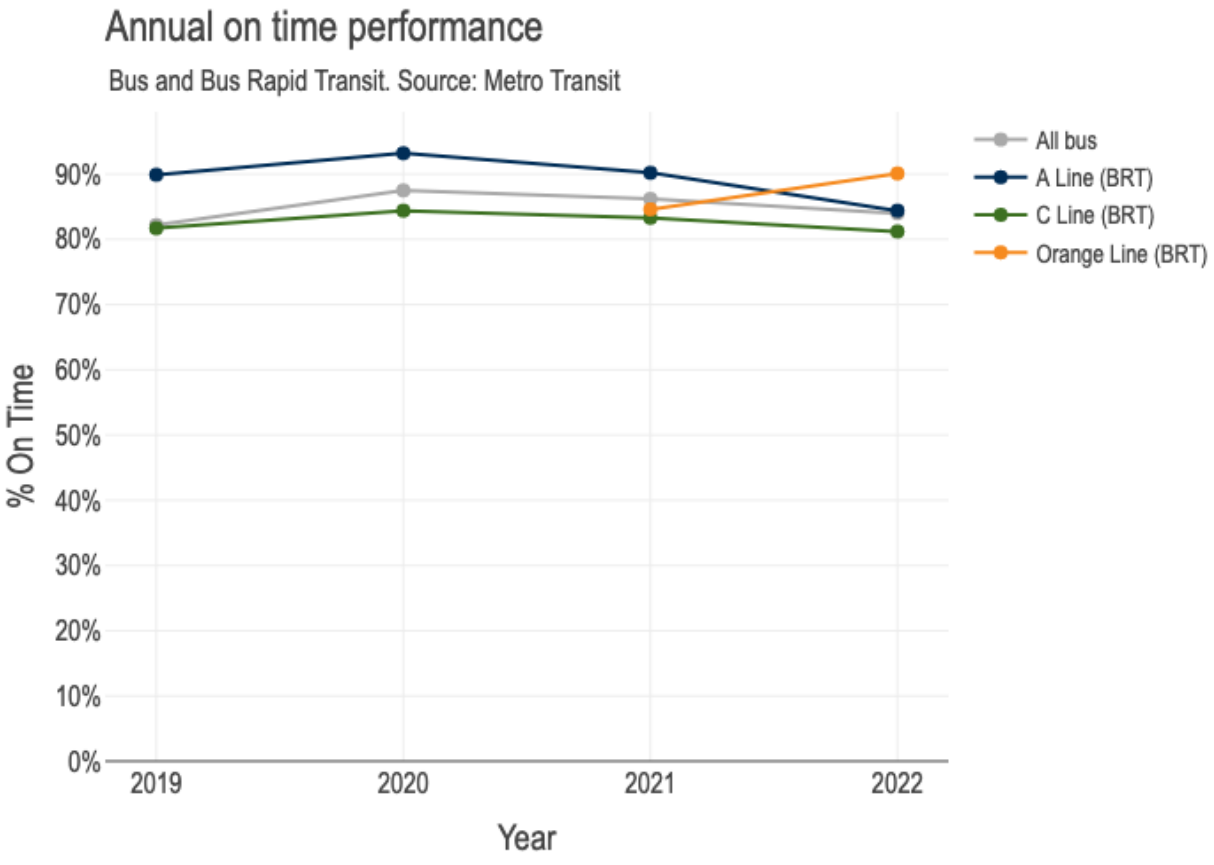
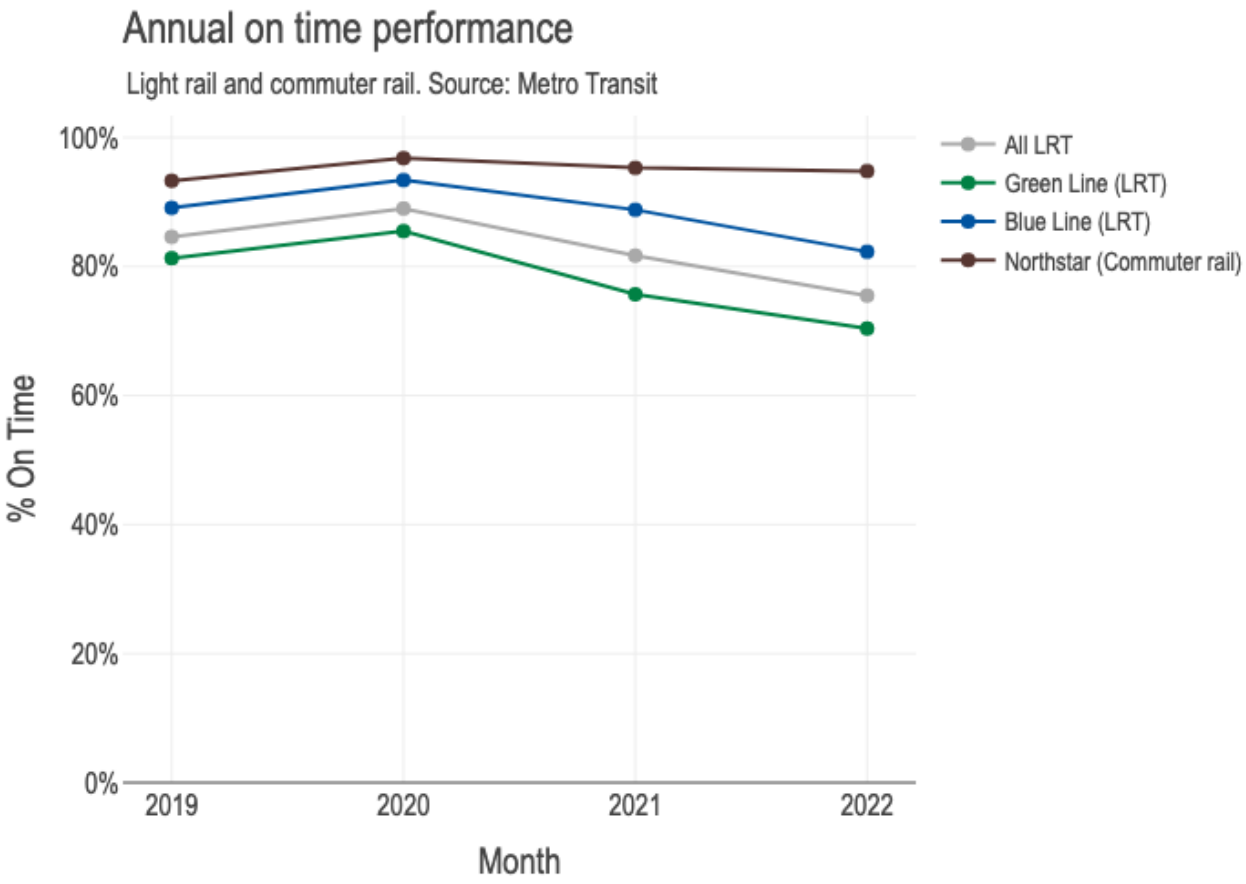


Figure 8.2: Annual light rail and commuter rail on-time performance by service type and route, 2019 to 2023.



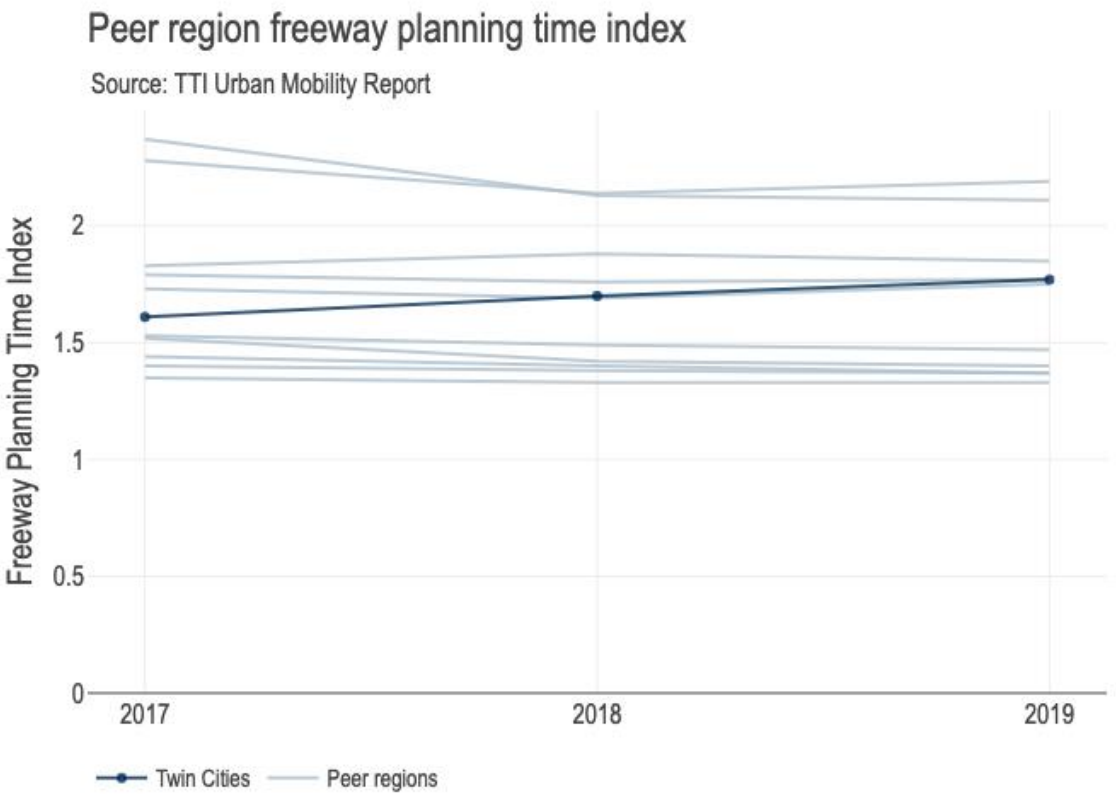
8.2 Freeway planning time index

The Texas Transportation Institute's (TTI) Urban Mobility Report compiles data on transportation system performance for metropolitan areas throughout the United States. These data can be used to measure changes in the performance of the Twin Cities' highway system over time and provide a rough comparison with similar peer urban areas in the United States. These peer urban areas are Baltimore, Cincinnati, Cleveland, Dallas, Denver, Milwaukee, Pittsburgh, Portland, Seattle and St. Louis. TTI published their most recent data (2020) in 2021.

Reliability serves as a proxy for congestion, and is measured with the planning time index, represents the total travel time that should be planned for a trip to be late on only one work trip per month (1 out of 20 days). A higher planning time index indicates a greater level of congestion. According to 2017 data from the Texas Transportation Institute, the freeway planning time index in 2019 for the Twin Cities region was 1.77 for automobiles, ranked 7th among urban areas evaluated. An index of 1.77 means that for one work trip per month the total travel time will exceed 1.77 times what it takes to make the same trip in light traffic.

Peak hour excessive delay, a federally required measure, can be found in the Appendix.

Figure 8.3: Freeway planning time index from 2017 to 2019 in the Twin Cities and peer regions. Source: TTI Urban Mobility Report, 2021

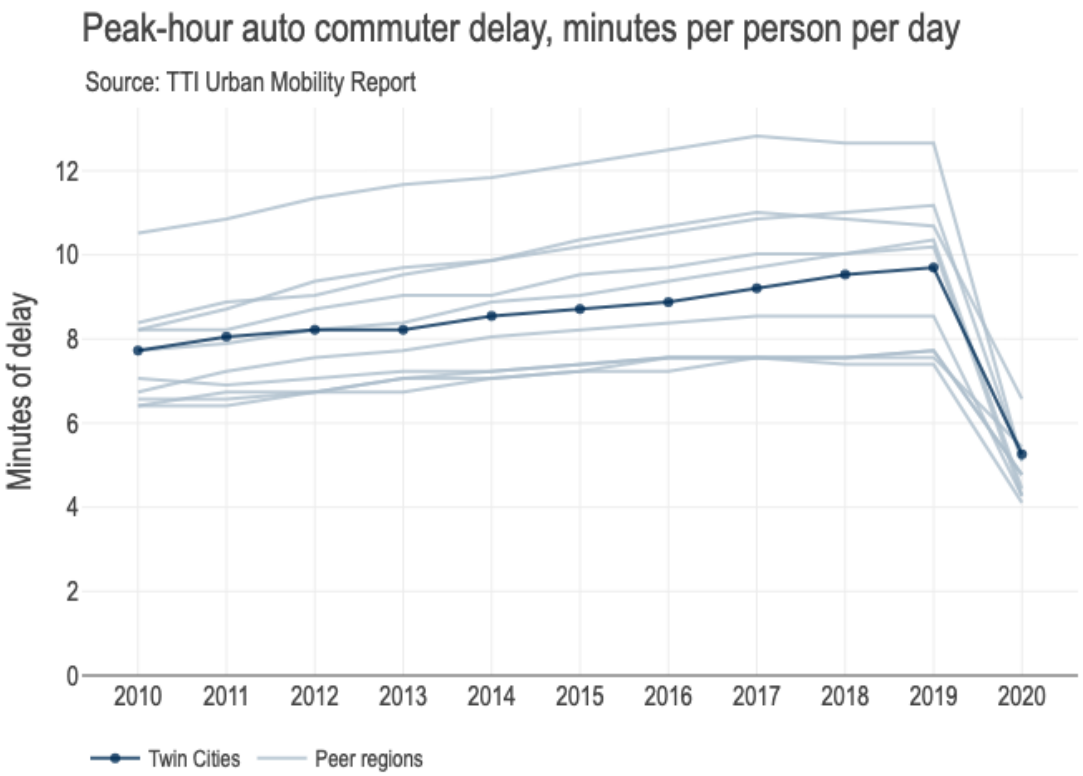


8.3 Daily delay per commuter

To the typical commuter, the amount of time spent in congestion is generally more important than the number of congested freeway miles. In 2019, the average Twin Cities auto commuter spent 10 minutes delayed in traffic on an average day. In 2020, average daily delay dropped to 5 minutes mainly due to the COVID-19 pandemic. These figures account only for the two peak travel time periods, which are weekdays from 6:00 a.m. to 10:00 a.m. and 3:00 p.m. to 7:00 p.m. While delay is anticipated to increase from 2020 levels, the region has less daily delay than similar sized metro areas.

Figure 8.4 depicts the delay by year. Like its peer regions, the metro area had experienced moderately increased annual delay until 2019, when the COVID-19 pandemic substantively changed travel.

Figure 8.4: Peak hour commuter delay 2010 to 2020 in the Twin Cities and across peer regions. Source: Texas Transportation Institute Urban Mobility Report, 2021



8.4 E-ZPass Express Lanes

The E-ZPass network (previously known as MnPASS) is a system of high occupancy toll (HOT) lanes that allow high-occupancy vehicles to travel for free during congested periods of the day. Solo motorists may also choose to pay a fee to use the lanes during these periods. The average fee for a solo motorists was $0.85 in 2022.

To learn more about the daily number of people in E-ZPass lanes, see Section 2.1.

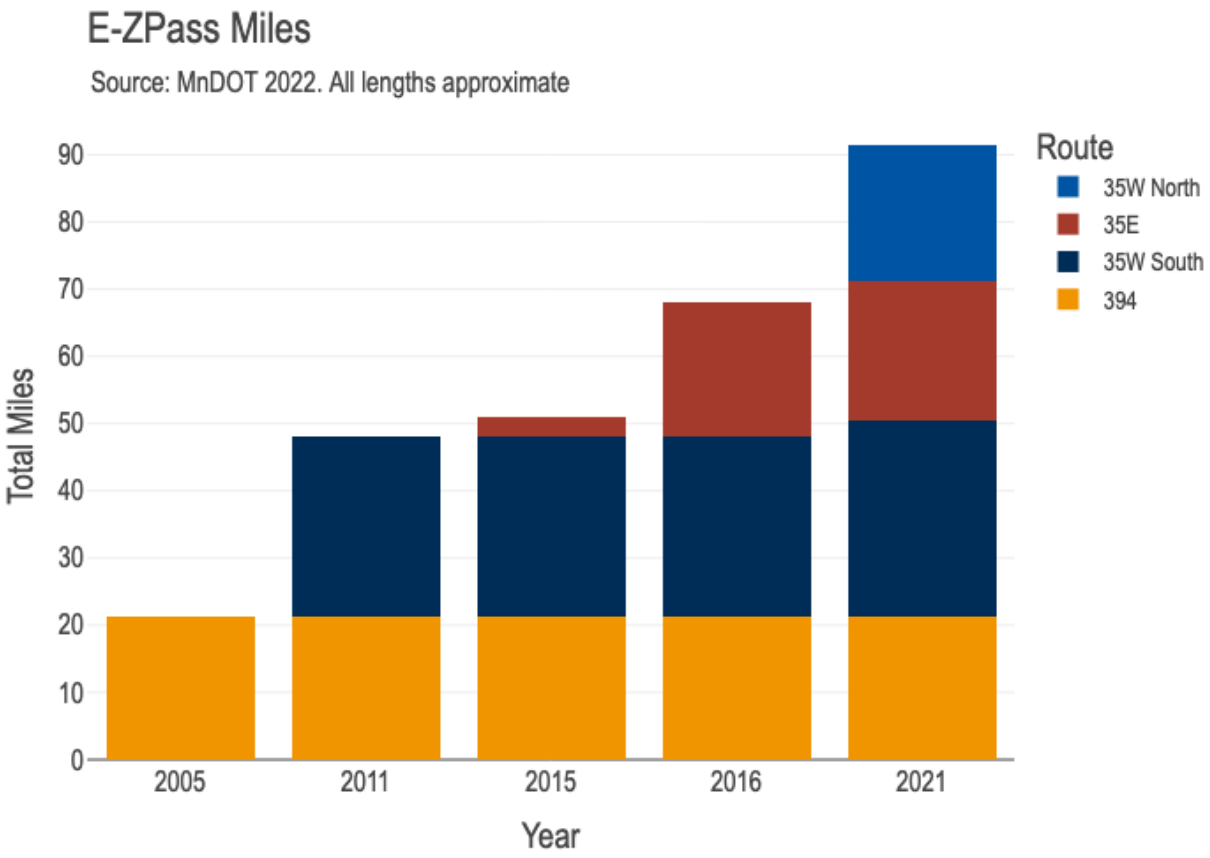
8.4.1 E-ZPass network expansion

The E-ZPass network is designed to reduce congestion during peak periods and incent carpooling and transit over single occupancy vehicles. Since its inception in 2005, the system has expanded and now includes a total of 92 lane-miles. The system is concentrated on key freeways that carry the highest volume of people. The most recent expansion is on I-35W north.

Due to its success, MnDOT is examining the feasibility of expanding the system. Corridors currently under the environmental review process include Highway 252/I-94 between Brooklyn Park and Minneapolis, and I-94 between downtown Minneapolis and downtown St. Paul. Longer-term expansion possibilities include

- Highway 169 between Golden Valley and Brooklyn Park
- I-35 between Lakeville and Burnsville
- Highway 36 between Roseville and Maplewood
- I-35W North Gateway between downtown Minneapolis and Roseville
- Highway 77 (Cedar Avenue) between Apple Valley and Richfield

Figure 8.5: E-ZPass Miles over time

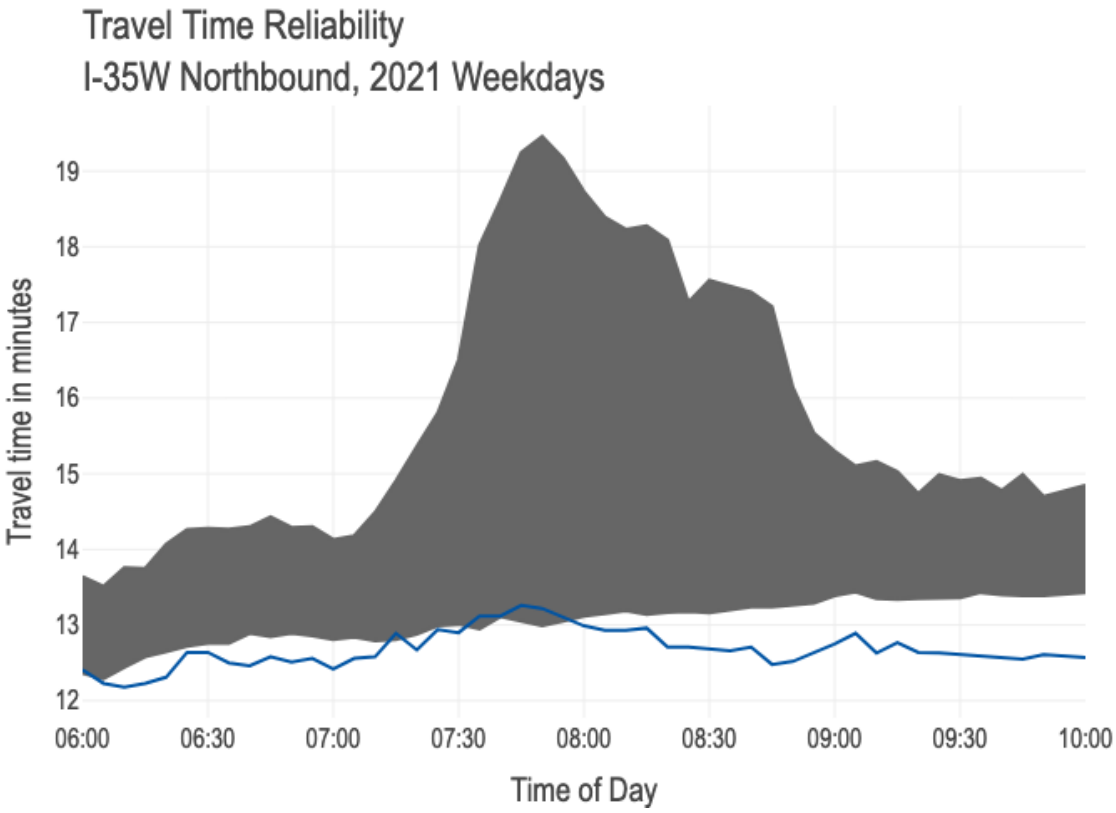


8.4.2 E-ZPass reliability

In the context of transportation, reliability refers to the consistency or dependability in travel times from day-to-day or hour-to-hour. Reliability is important to drivers and passengers as it accounts for extreme events and the intensity of congestion at particular times or on particular days, thus allowing travelers to better anticipate delays and plan accordingly.

E-ZPass lanes are far more reliable than general purpose lanes during peak periods and provide relatively consistent travel times at all times. Figure 8.6 illustrates the travel time reliability of E-ZPass lanes versus general purpose lanes along north-bound I-35W. Whereas a trip using general purpose lanes may vary in length from 12 minutes to over 18, E-ZPass lanes did not fluctuate more than minute during the course of an average day in 2021.

Figure 8.6: Travel time reliability on E-ZPass lane versus general purpose lanes



Competitive Economy

An integrated, multimodal transportation system helps to retain and grow existing businesses and industries and draws in new ones. It also retains and attracts talent in a market where people are increasingly seeking a less car-dependent lifestyle.

Objectives

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

Strategies summarized

- The plan directs investment so the transportation system will serve the generations of today and tomorrow and attract talent and businesses looking for a place to prosper.
- This plan expands the regional transit and bicycle systems and provides reliable options on the highway system to keep the region competitive.
- Our connections to places beyond the region that foster its growth and economic prosperity will be strengthened by corridors that connect us statewide and beyond, reducing the impacts of congestion on freight corridors and supporting a strong airport system with national and international connections.

A good transportation system is fundamental to a robust and thriving economy. To continue being competitive, the region must shift its focus to operating and maintaining what we have. At the same time, building a more multimodal system that provides all its residents and businesses choices in how they personally or their freight moves. Practical alternatives to the single-occupant vehicle benefits everyone, including those who only want to drive. Safe and convenient choices like walking, bicycling, and transit can remove cars from highways and streets and increase everyone's quality of life.

An integrated, multimodal transportation system helps retain and grow existing businesses and industries, while attracting new ones. The same applies to talent, and the market shows people are increasingly seeking a less car-dependent lifestyle. To support and strengthen the region's economy, investing in a multimodal system with better integrated transit, bicycling and walking builds on an already well-developed highway system.

9. Peer Region Introduction

This chapter presents information about our region's economy alongside information about peer regions for comparison. The definition of the Twin Cities region may differ by information availability. This chapter will use the following definitions:

- **Planning or Metropolitan Planning Organization (MPO) area** Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington Counties, the urban portions of Wright and Sherburne counties, and Houlton, Wisconsin.
- **7-County Metro** Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington Counties only.
- **Core-Based Statistical Area (CBSA)** a broader area defined by the United States Census that includes the 7 County Metro Area and the addition of Chisago, Isanti, Sherburne, and Wright counties in Minnesota and St. Croix and Pierce counties in Wisconsin. The Twin Cities CBSA is also the metropolitan statistical area (MSA) for the region.

Learn more about regional geographic definitions in Section D.2.

Each region is unique, so this chapter provides a variety of peer region comparisons for specific purposes. Additional data may be provided for the top 26 most populous Metropolitan Statistical Areas (MSAs) in the United States.[6] Table 9.1 marks which regions are used for transit, highway, and aviation comparisons.

Table 9.1: Peer metropolitan regions

PEER REGION	TRANSIT	HIGHWAY	AVIATION
Atlanta, GA			◆
Baltimore, MD	◆	◆	
Charlotte, NC			◆
Cincinnati, OH		◆	
Cleveland, OH	◆	◆	
Dallas, TX	◆	◆	
Denver, CO	◆	◆	◆
Detroit, MI			◆
Houston, TX	◆		
Milwaukee, WI	◆	◆	

[6] We specify 26 MSAs because the Los Angeles area metropolitan planning organization, Southern California Association of Governments (SCAG), includes both the Los Angeles and Riverside MSAs.

Philadelphia, PA			◆
Phoenix, AZ	◆		
Pittsburgh, PA	◆	◆	◆
Portland, OR	◆	◆	
Seattle, WA	◆	◆	
St. Louis, MO	◆	◆	

10. Invest in a multimodal transportation system

Invest in a multimodal transportation system to attract and retain businesses and residents

This section focuses on investments and peer region comparisons and rankings – measures that are similar to those in other sections are here compared to peer regions.

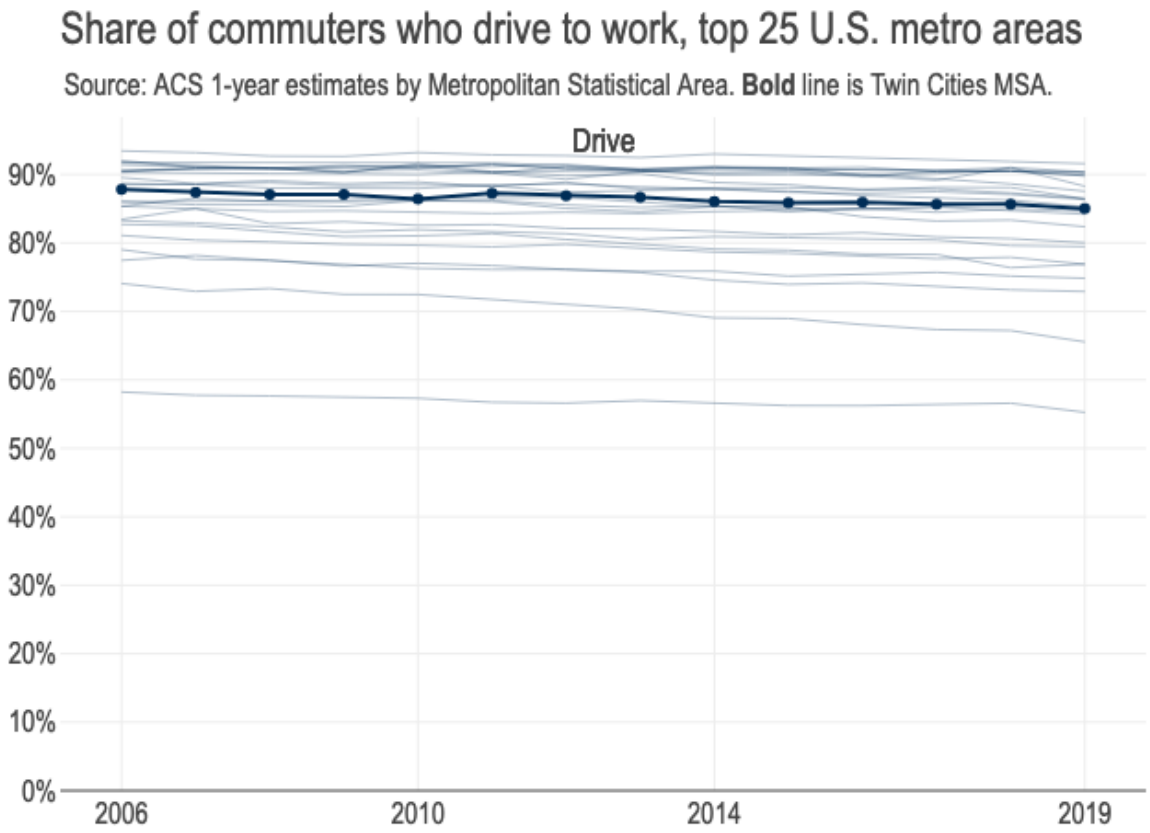
10.1 Commute travel modes

Providing residents and businesses with safe and reliable multimodal travel options apart from driving is one way to improve quality of life. In this section, we use national travel survey data to compare the travel choices people make in other peer regions to those made in the Twin Cities. The transportation decisions people make are shaped by the system available to them. A higher or lower proportion of trips made by non-auto mode indicates whether a system is more or less supportive of multimodal travel.

The best dataset for tracking mode share trends over time* ***and*** *across peer regions is the American Community Survey (ACS), a program of the United States Census. Conducted annually, the ACS asks one person in each surveyed household (usually the adult who completes the survey) to describe how they usually got to work in the preceding week. This is the only transportation mode-related question in the ACS. Though it only applies to employed adults, and a unique subset of trips (commutes), the consistency of the ACS across space and time allows for unique comparisons.

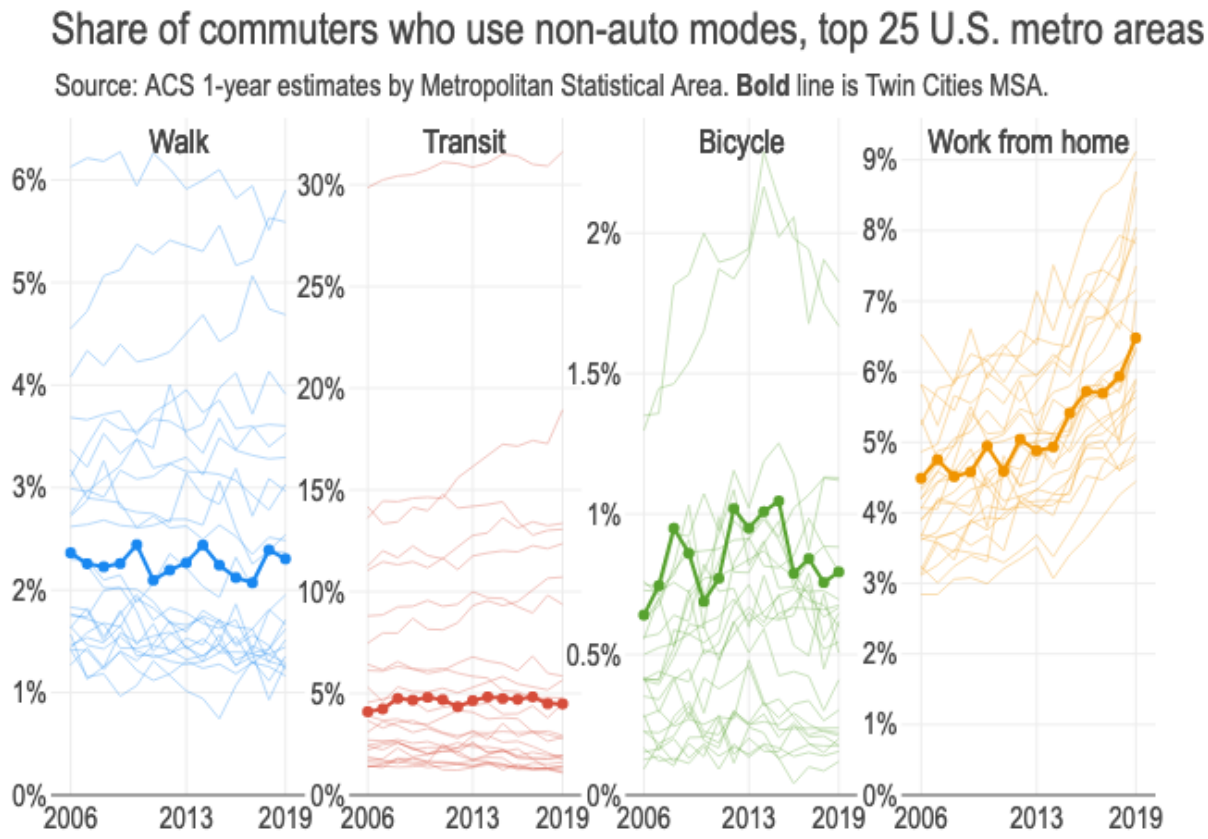
In most of the major metropolitan areas in the United States, the number and/or share of commutes made by driving significantly declined from 2006 to 2019. In San Francisco, Seattle, and Boston, the share of commutes by auto have dropped by an average of 0.4% or more each year since 2006. Auto commute share in the Twin Cities region has not declined as dramatically, but has fallen from 87.8% in 2006 to 85.0% in 2019, or at an average rate of about 0.2% per year.

Figure 10.1: Percent of commutes made by auto for the top 25 U.S. metro areas, by peer region, 2006-2019.



As auto commutes have declined, the share of workers reporting that they typically work from home has risen steadily across U.S. metro areas from 2006-2019. Note that these years are prior to the COVID-19 pandemic; future versions of the ACS will reveal new magnitudes of shifts in commute travel. At the time of this report, 2020 data at the MSA level were not available. National trends in walk, transit, and bicycle commute share have been less pronounced and uniform than for work-from-home.

Figure 10.2: Percent of commutes made by walk, bike, transit and work-from-home for the top 25 U.S. metro areas, by peer region, 2006-2019.

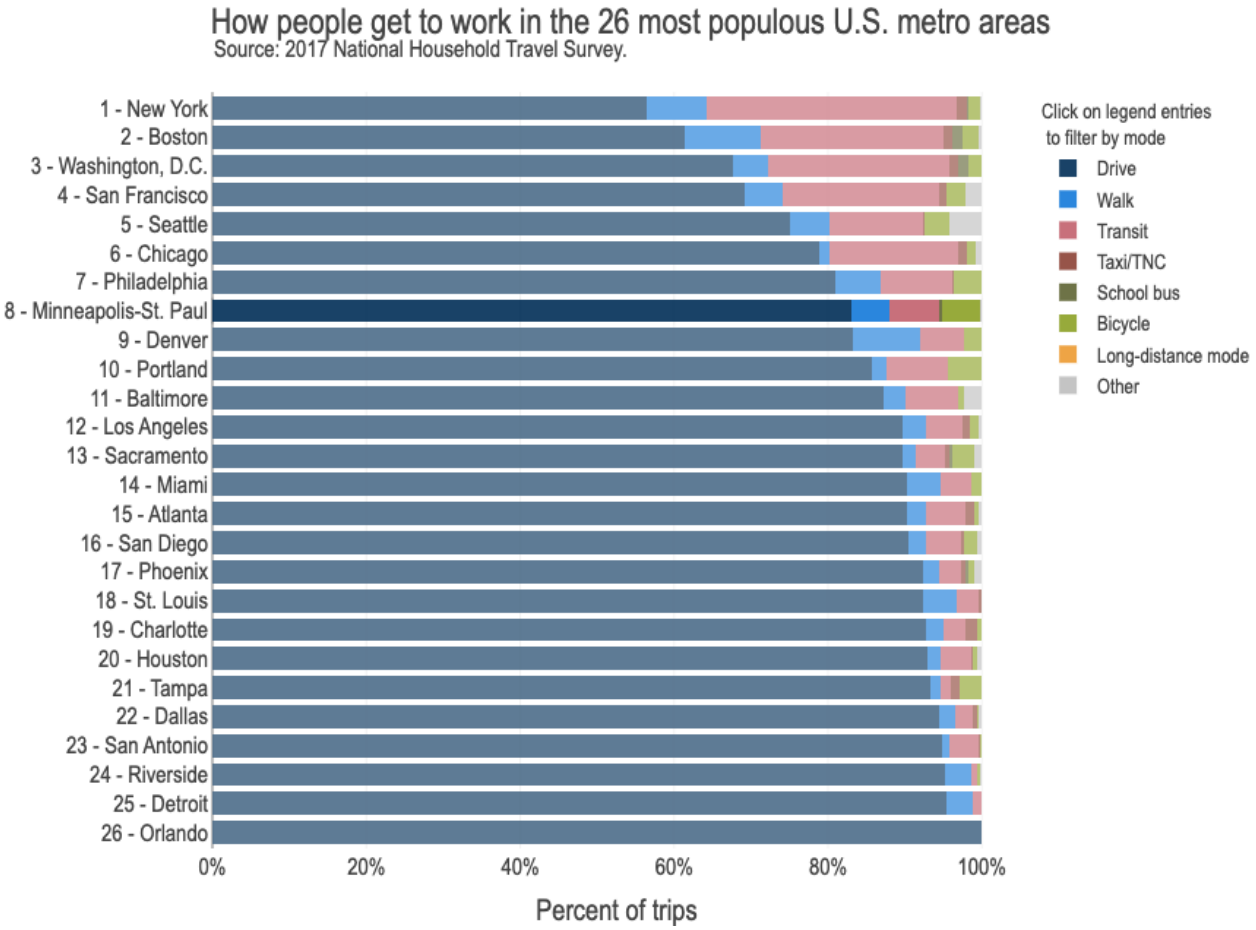


In 2019, The Twin Cities ranked 13th for walking commutes, 12th for transit commutes, and 13th for working-from-home, which is near the middle of the pack of 25 most populous MSAs. The Twin Cities region performs somewhat better in bicycle commute share, ranking 7th greatest in share of commutes by bicycle.

To compare peer regions' non-commute travel – which comprises roughly 75% to 80% of all trips made in the region – we rely on the National Household Travel Survey (NHTS). The NHTS asks respondents detailed questions about how, where, why, and with whom they travel throughout the day. Performed less often than the ACS, the NHTS was last conducted in 2017, with new data being collected as of this report (2022).

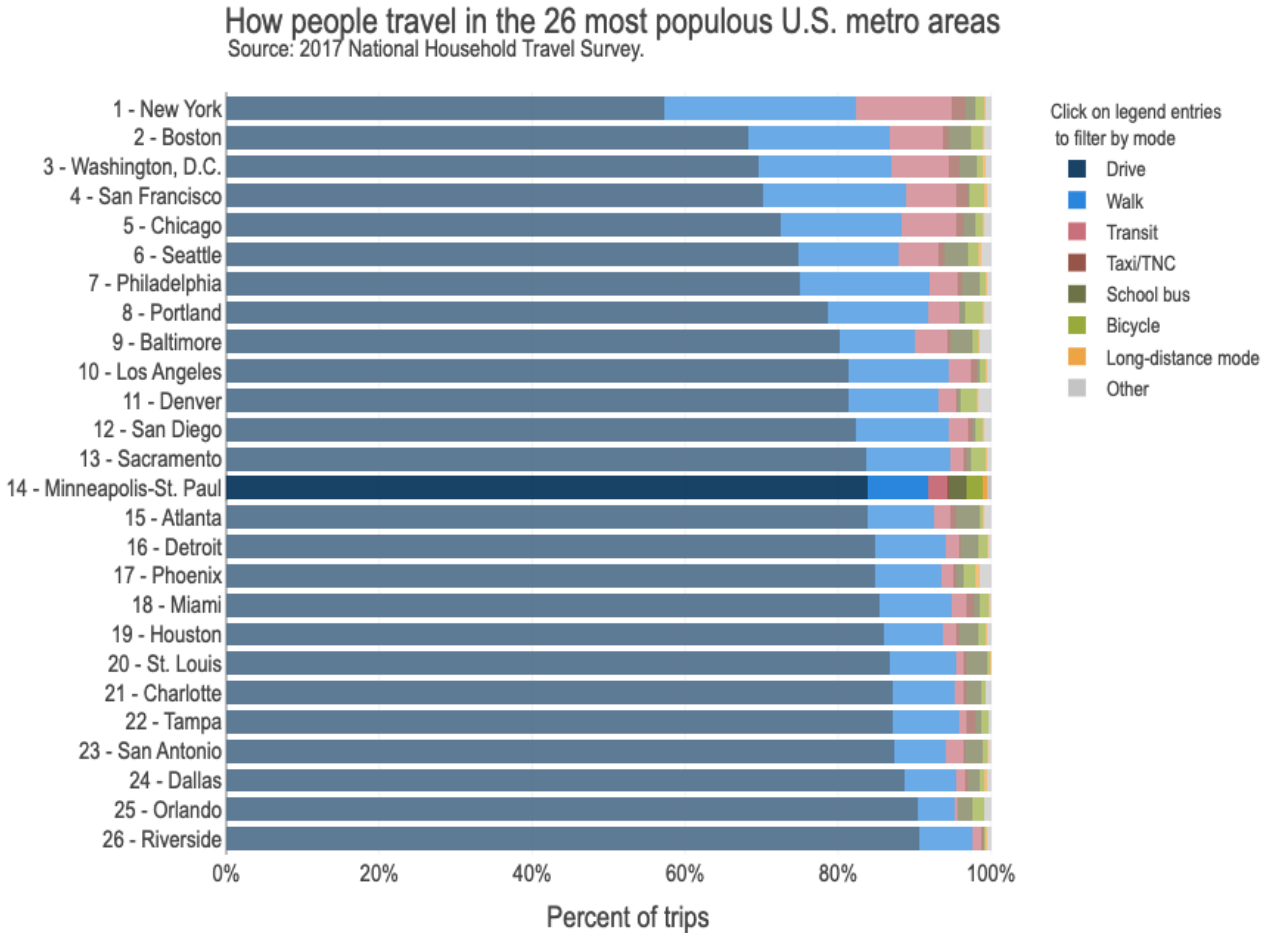
Because the ACS and NHTS differ in their methodology and survey questions, mode share numbers do not exactly match across the two surveys. For example, for the same survey year (2017), drive share for commutes was 85.7% in the ACS, compared to 83.1% in the NHTS; transit share for commutes was 4.8% in the ACS, compared to 6.4% in the NHTS. Additionally, the Twin Cities metro ranks a bit higher in terms of non-auto commute share (8 of 25) in the NHTS than in the ACS.

Figure 10.3: Mode share for commutes for the top 25 U.S. metro areas, by peer region. Includes only trips between home and work. Metro areas (2014 Metropolitan Statistical Areas) are arranged from left to right by driving mode share.



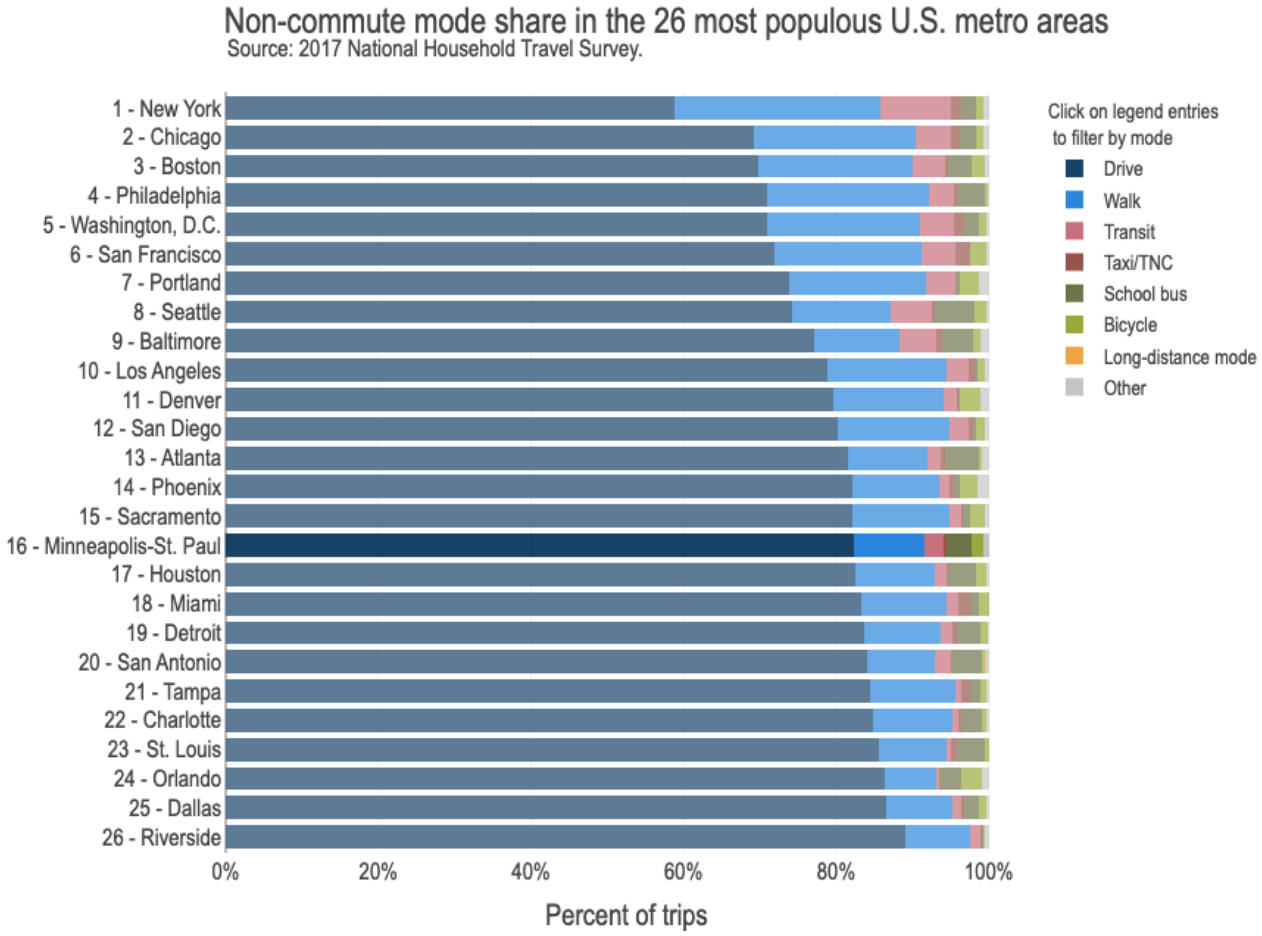
Nevertheless, the two surveys show similar broad trends and rankings across the 25 metro areas, and provide unique data on non-commute mode share across the United States. In general, people tend to use transit more for commutes than for other types of trips. This is true in the Twin Cities as well, but somewhat more than in other metro areas. As a result, the Twin Cities falls from 8th to 14th of 25 metros for non-auto mode share, for all trip types.

Figure 10.4: Mode share for all types of trips for the top 25 U.S. metro areas, by peer region. Metro areas (2014 Metropolitan Statistical Areas) are arranged from left to right by driving mode share.



Examining non-commute trip types alone (social, recreational, shopping, other) pushes the Twin Cities further down in the rankings for non-auto share, from 13th to 16th, on par with Atlanta, Phoenix, Houston, and Miami. Here, only 2.5% of trips between home and non-work destinations are made by transit and only 1.6% by bicycle, compared to 6.4% commutes by transit and 4.9% commutes by bicycle.

Figure 10.5: Mode share for non-commute home-based travel for the top 25 U.S. metro areas, by peer region Includes only trips between home and shopping, recreational, social and 'other' destinations. Metro areas (2014 Metropolitan Statistical Areas) are arranged from left to right by driving mode share.



10.1.1 Summary

The Twin Cities region consistently ranks near the middle of the top 25 peer regions for non-auto mode share, but the region is less competitive when examining non-commute travel that supports daily life: errands, shopping, social and recreational trips. Examining one type of trip only – commutes – we see a decline in auto mode share across most major metros from 2006-2019 that was mostly attributable to an increase in the share of workers who report working from home in that period. Pre-pandemic, the Twin Cities was tracking alongside most of its peers in a rise of work-from-home commutes. Whether that trend will be sustained in the post-COVID era is yet to be seen.

10.2 Aviation

Six peer airport systems were identified in previous Transportation System Performance Evaluations for comparison. Using the year 2000 as the baseline year, the evaluation identified peers where:

- only one major hub airport serves the metropolitan area,
- a low-cost airline service was present at some time at the major hub airport, and
- the airport ranks in the top 20 in terms of activity.

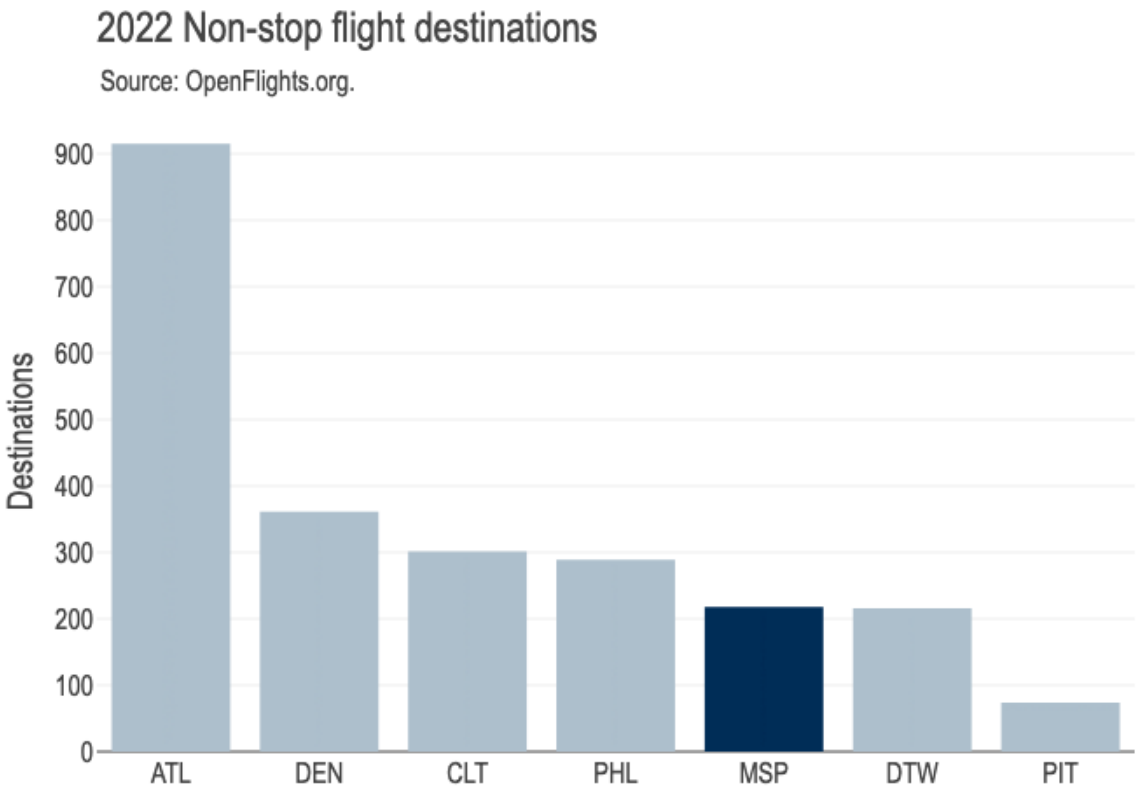
Based on these criteria, the following peer regions were selected:

- Atlanta, GA
- Charlotte, NC
- Denver, CO
- Detroit, MI
- Philadelphia, PA
- Pittsburgh, PA

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

Minneapolis-Saint Paul International Airport ranks 5th in non-stop destinations among the peer major hub airports, offering non-stop flights to 218 destinations in 2022.

Figure 10.6: Number of non-stop flight destinations, compared to peers



Airport activity levels are typically measured by total aircraft operations. An operation is either an arrival or departure, and therefore one arrival and one departure represent two operations.

Table 10.1: Total Annual Aircraft Operations for MAC Airports. Source: Metropolitan Airports Commission, Annual Reports, 2021 & 2022

AIRPORT	2018	2019	2020	2021	2022
Minneapolis -- St. Paul (MSP)	406,913	406,073	244,877	303,884	303,850
Airlake (LVN)	32,986	29,835	31,314	36,259	38,268
Anoka County -- Blaine (ANE)	75,465	71,740	70,852	74,657	65,688
Crystal (MIC)	38,109	41,541	39,509	37,845	42,592
Flying Cloud (FCM)	88,762	104,405	124,382	131,593	122,281
Lake Elmo (21D)	31,693	31,208	29,799	32,645	32,189
St. Paul Downtown (STP)	40,116	40,934	30,188	39,196	41,118
Total	714,044	725,736	570,921	656,079	645,986

Source: Metropolitan Airports Commission, Annual Reports, 2021 & 2022

The Bureau of Transportation Statistics (BTS) tracks on-time performance for arrivals and departures at all commercial airports in the U.S.

Table 10.2 shows the percentage of flights that arrived on-time at MSP airport for each year from 2018 through 2022. Aircraft must be airborne en route to their scheduled destination to be considered delayed. Cancelled and diverted flights are not considered late in this measure. 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 for each year listed.

Table 10.2: On-Time Performance for Arrivals at MSP

AIRPORT	2018	2019	2020	2021	2022
Minneapolis -- St. Paul (MSP)	84.5%	83.4%	87.9%	87.5%	81.9%
National Average	79.7%	79.2%	84.6%	81.2%	76.6%

Source: Bureau of Transportation Statistics, On-Time Performance - Reporting Operating Carrier Flight Delays at a Glance

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 10.3, MSP has also operated above the national average each year listed for this measure.

Table 10.3: On-Time Performance for Departures at MSP

AIRPORT	2018	2019	2020	2021	2022
Minneapolis -- St. Paul (MSP)	85.3%	83.9%	88.3%	87.9%	81.2%
National Average	80.4%	79.9%	85.5%	81.2%	76.6%

Source: Bureau of Transportation Statistics, On-Time Performance - Reporting Operating Carrier Flight Delays at a Glance

The Federal Aviation Administration (FAA) tracks average delay per aircraft per operation, measured in minutes of delay. The total amount of airport-attributable delay experienced by all scheduled flights in the database is divided by the total number of flights in the database for the same time period. The Metropolitan Airports Commission (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 10.4, with 5.3 minutes of delay per operation, MSP performed better than 30 other major hub airports in the U.S. in 2022.

Table 10.4: Average Delay Per Aircraft Operation at MSP In Minutes

MEASURE	2018	2019	2020	2021	2022
Average Delay per Aircraft Operation in Minutes	6.2	5.7	4	4.4	5.3
Rank Among Large Hub Airports	16	20	28	39	31

Source: Metropolitan Airports Commission, Annual Reports, 2019-2022

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). Passenger boardings at MSP declined in 2020 due to the COVID-19 pandemic and began to rebound in 2021.

Table 10.5: Total Annual Passenger Enplanements at MSP

AIRPORT	2017	2018	2019	2020	2021
Minneapolis -- St. Paul (MSP)	18,409,704	18,361,942	19,192,917	7,069,720	12,211,409

Source: Federal Aviation Administration, Passenger Boarding (Enplanement) Data for U.S. Airports, 2017-2021

The FAA maintains a database of financial reports of commercial service airports, known as their Compliance Activity Tracking Systems (CATS). CATS financial information is standardized to allow for comparison across airports using the same methodology. CATS data may differ 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 boarded passenger at a given airport. Table 10.6 shows FAA-reported CPE data for MSP along with the average CPE for large hub airports in the U.S. Airlines operating out of MSP pay a lower rate per boarded passenger compared to the large hub average.

Table 10.6: Airline Cost Per Enplaned Passenger at MSP

AIRPORT	2017	2018	2019	2020	2021
MSP	$6.13	$6.74	$6.96	$13.28	$9.84
Large Hub Average	$12.16	$12.55	$12.63	$18.68	$19.66

Source: Federal Aviation Administration, Certification Activity Tracking System, Form 127, line 16.5

Table 10.7 summarizes total annual aircraft operations for 2018 through 2022 for MSP and peer airports. During this period, aircraft operations at MSP and all peers except Charlotte declined. Operations sharply declined at MSP and all peer airports in 2020 due to the COVID-19 pandemic.

Table 10.7: Annual Aircraft Operations for MSP and Peer Airports

AIRPORT	2018	2019	2020	2021	2022	PERCENT CHANGE (2018-2022)
Charlotte (CLT)	603,403	640,098	442,571	588,855	615,734	2.0%
Denver (DEN)	550,013	579,147	397,983	514,782	499,037	-9.3%
Atlanta (ATL)	895,502	904,301	548,016	707,661	724,145	-19.1%
Pittsburgh (PIT)	151,414	148,119	91,797	108,472	121,688	-19.6%
Minneapolis -- St. Paul (MSP)	406,913	406,073	244,877	303,884	310,235	-23.8%
Detroit (DTW)	379,657	390,321	220,123	268,884	284,141	-25.2%
Philadelphia (PHL)	393,681	396,909	238,574	286,909	284,606	-27.7%

Source: Federal Aviation Administration, OPSNET, Airport Operations Standard Report, 2018-2022

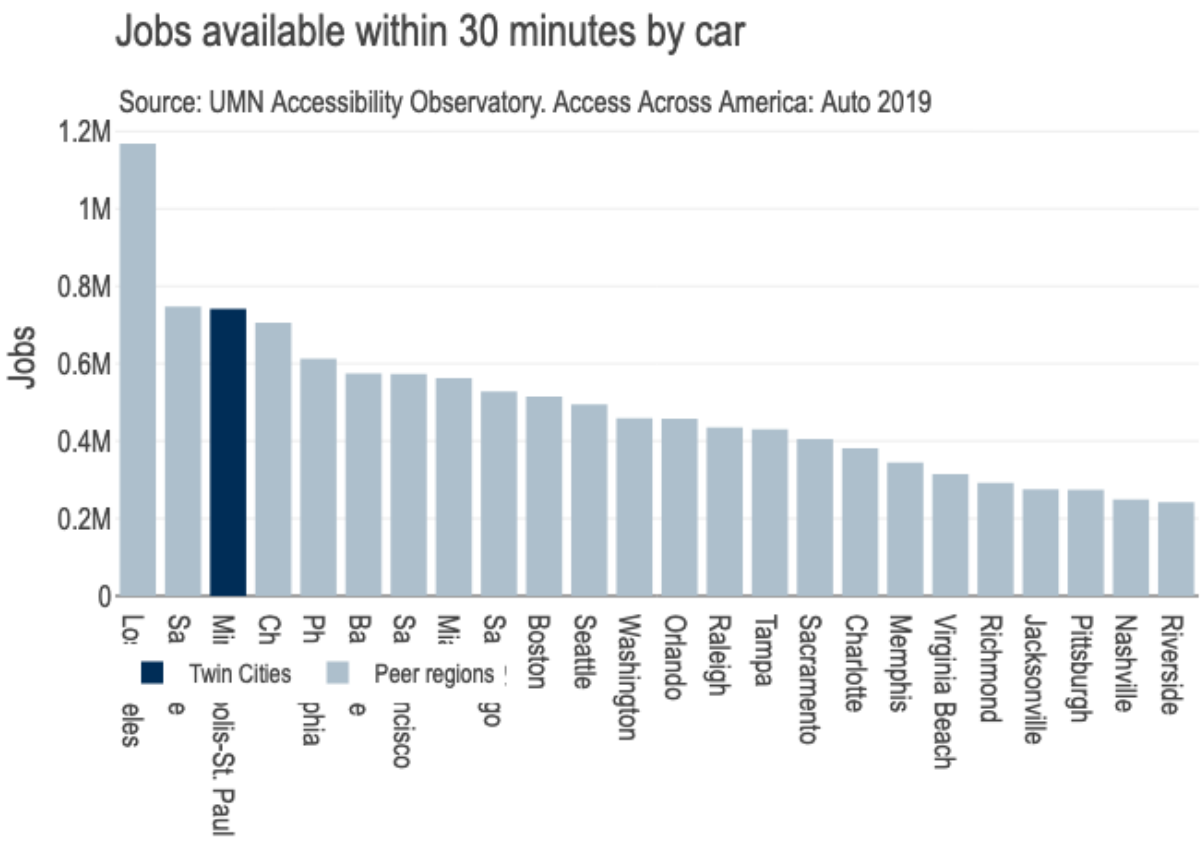
11. Improve multimodal access to regional jobs

Improve multimodal access to regional job concentrations identified in Thrive MSP 2040

11.1 Peer region multimodal job accessibility

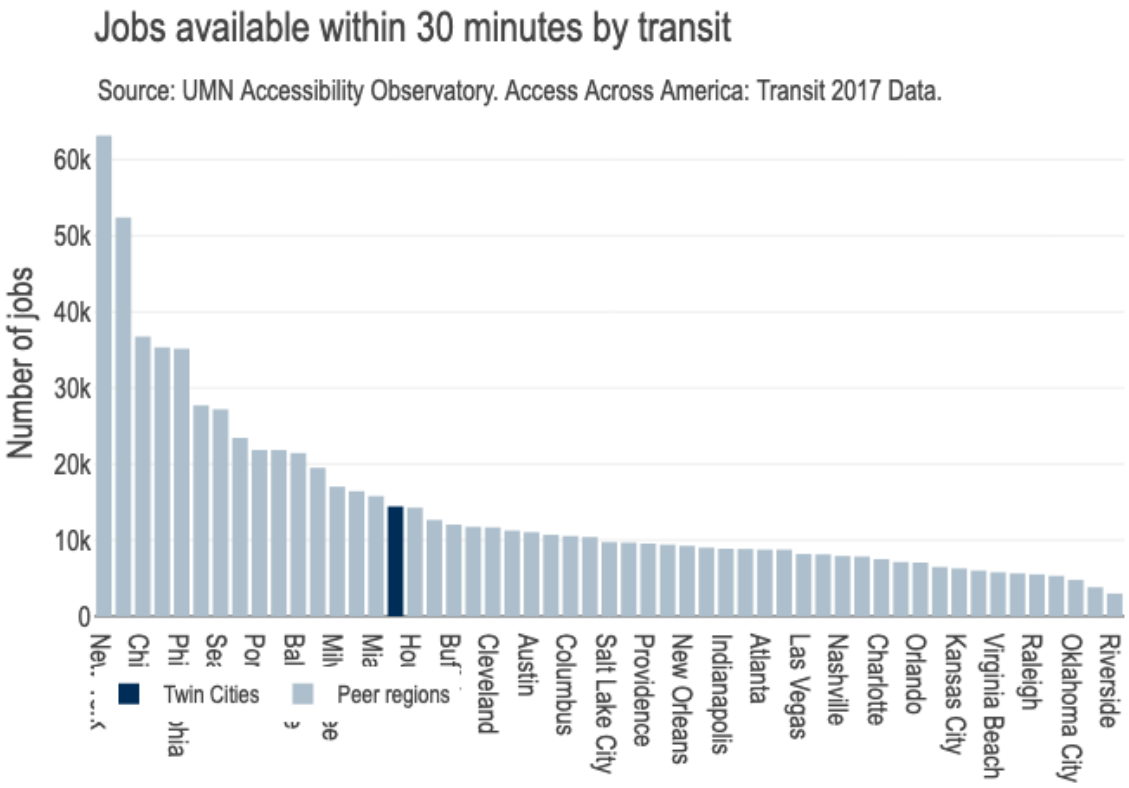
The Twin Cities region ranks 3rd among 24 highway peer regions for accessibility by auto. In 2016, the typical worker had access to about 741,000 jobs within 30 minutes by auto. Among large metropolitan areas, only Los Angeles and San Jose have access to more jobs within 30 minutes by auto.

Figure 11.1: Jobs available within 30 minutes by auto



The Twin Cities region ranks 16th among 53 peer regions for accessibility by transit. In 2017, the typical worker had access to about 14,000 jobs within 30 minutes by transit.

Figure 11.2: Jobs available within 30 minutes by transit

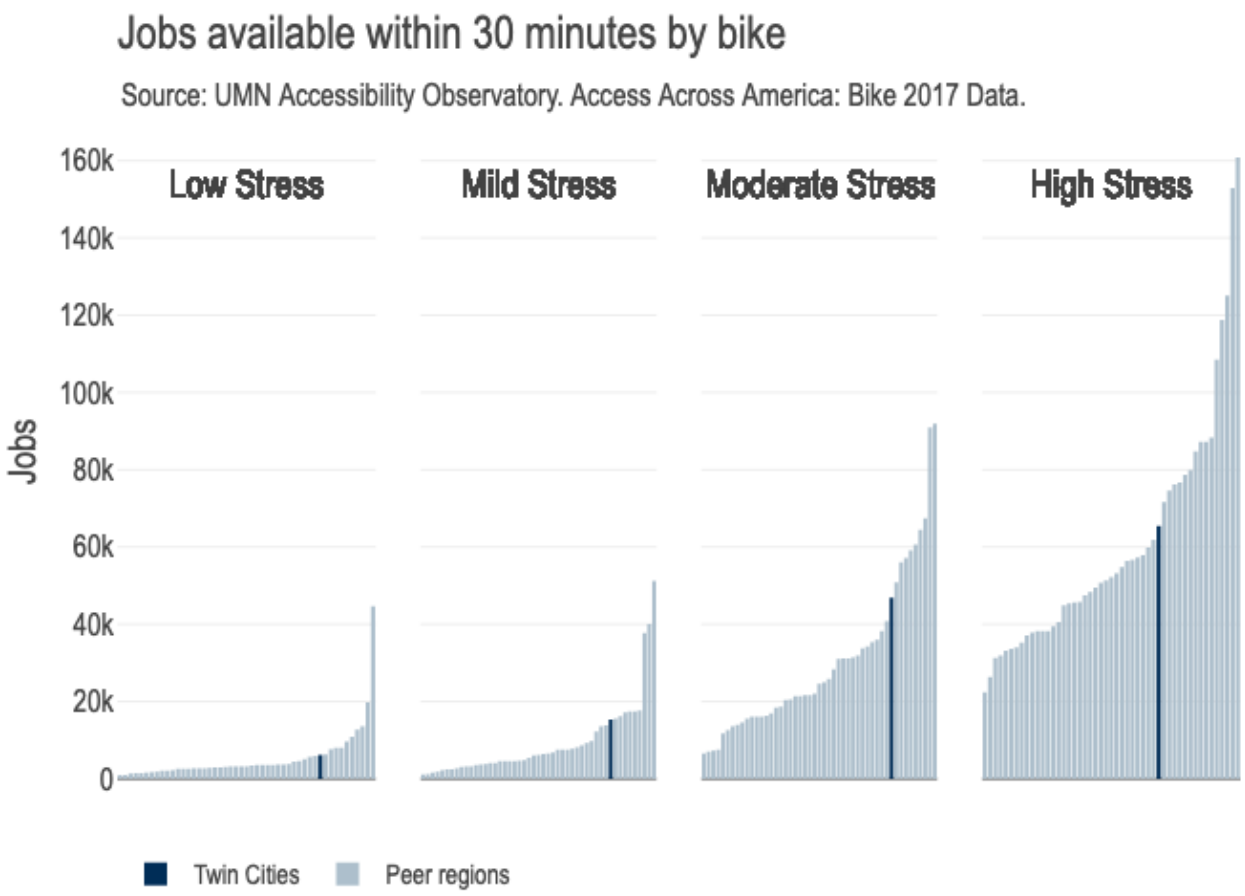


The Twin Cities region ranks 13th among 49 peer regions for overall accessibility by bike. In 2017, the typical worker had access to about 134,000 jobs within 30 minutes by bike.

The Twin Cities region ranks 11th among peer regions for accessibility by bike on low stress bike routes and 10th among peer regions for accessibility by bike on mild stress bike routes.

In 2017, the typical worker had 30 minute access to about 6,000 jobs on low stress bicycle routes and about 15,000 jobs on mild stress bicycle routes.

Figure 11.3: Jobs available within 30 minutes by bike



11.2 Regional telework

11.2.1 2020 Household Survey: COVID-19 Trends

The Met Council tapped into a panel of participants from the 2019 Travel Behavior Inventory (TBI) survey to study the short and long-term effects of the COVID-19 pandemic. These follow-up surveys are helping explain how COVID-19 has changed and is changing regional travel behavior by comparing current behaviors to participants' behavior in 2018-2019. Key findings include stark differences in commute by household income.

The survey responses showed how the respondents' commutes have changed after the pandemic took hold in March of 2020, and the responses generally stayed consistent over time. Results from the May 2020 survey showed across all incomes:

- **Workers who used to use public transit** are primarily teleworking (58%), driving (12%), or unemployed (16%). Only 11% continue to take transit to work.
- **Workers who used to drive to work** are teleworking (48%), or still driving to work (39%), with a smaller share who are unemployed or furloughed (13%).
- **Workers who used to telework** continue to do so (91%), with some now driving to work (7%) and very few unemployed (2%).
- **Workers who used to bike or walk to work** are most likely teleworking (62% and 31% respectively).

11.2.1.1 Travel impacts based on income

People in households earning more than $50,000 Before the pandemic 83% drove to work, 6% took transit, 5% were teleworking, and about 2% were unemployed. After the outbreak this shifted. The May survey showed about 33% of these people drove to work, 54% were teleworking and 10% were unemployed. Those who teleworked before the pandemic continued to work from home.

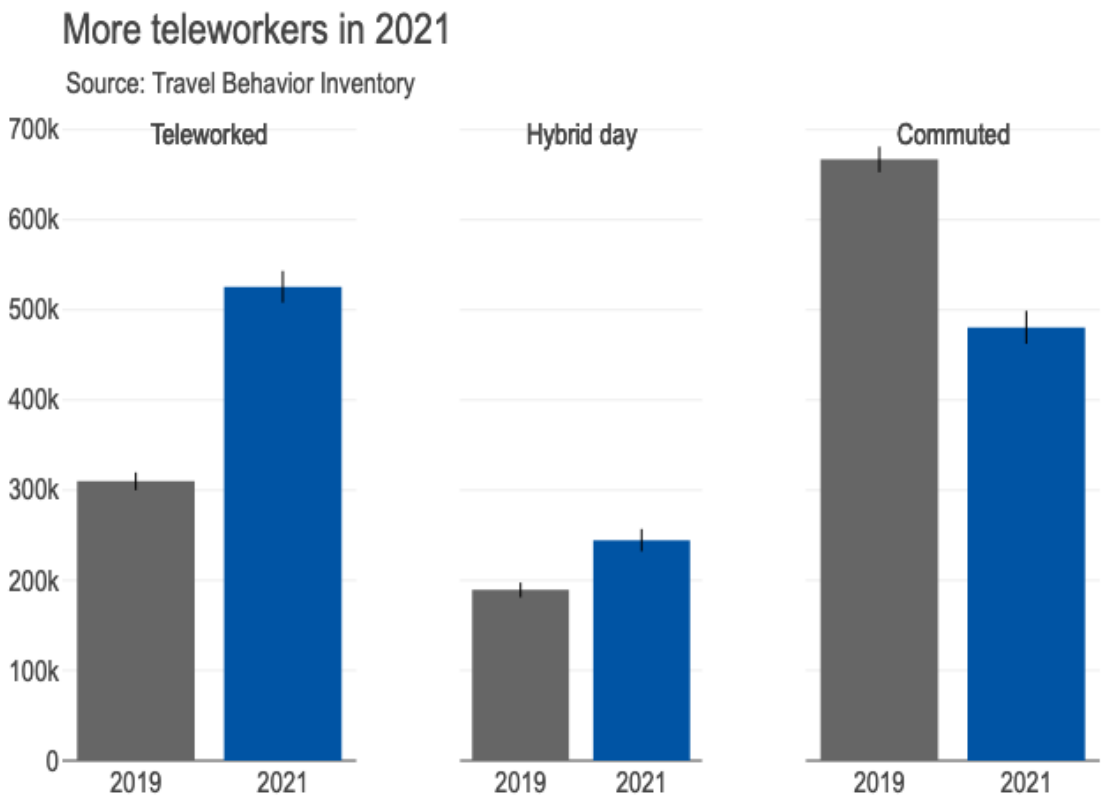
People in households earning less than $50,000 Before the pandemic 64% drove to work; 10% took transit, 5% teleworked, and about 6% were unemployed. In May 2020, commute travel looked very different: 36% drove to work, 24% teleworked, and people who were unemployed jumped to 34%. The survey data reflects that there was a disproportionate impact on unemployment for lower income workers.

You can read more about the 2020 household survey on the Metropolitan Council website.

11.2.2 Telework trends since 2020

From 2019 to 2021, Twin Cities workers drastically changed their commute. On a typical weekday in the Twin Cities metro area in 2021, 526,000, workers telecommuted or worked from home in 2021 - more than double the number in 2019.

Figure 11.4: Changes in work commute from 2019 to 2021. Source: Travel Behavior Inventory. Estimates and standard errors are derived using day-level weights. Only residents of the Twin Cities Metropolitan Planning Organization (MPO) region who worked are shown.



In 2019, just 74,900 reported that they teleworked 4 or more days per week. This value jumped to 216,400 in 2021.

Figure 11.5: Telework frequency in 2019 and 2021. Source: Travel Behavior Inventory, 2019 and 2021. Estimates and standard errors are derived using day-level weights. Only residents of the Twin Cities Metropolitan Planning Organization (MPO) region who worked are shown.

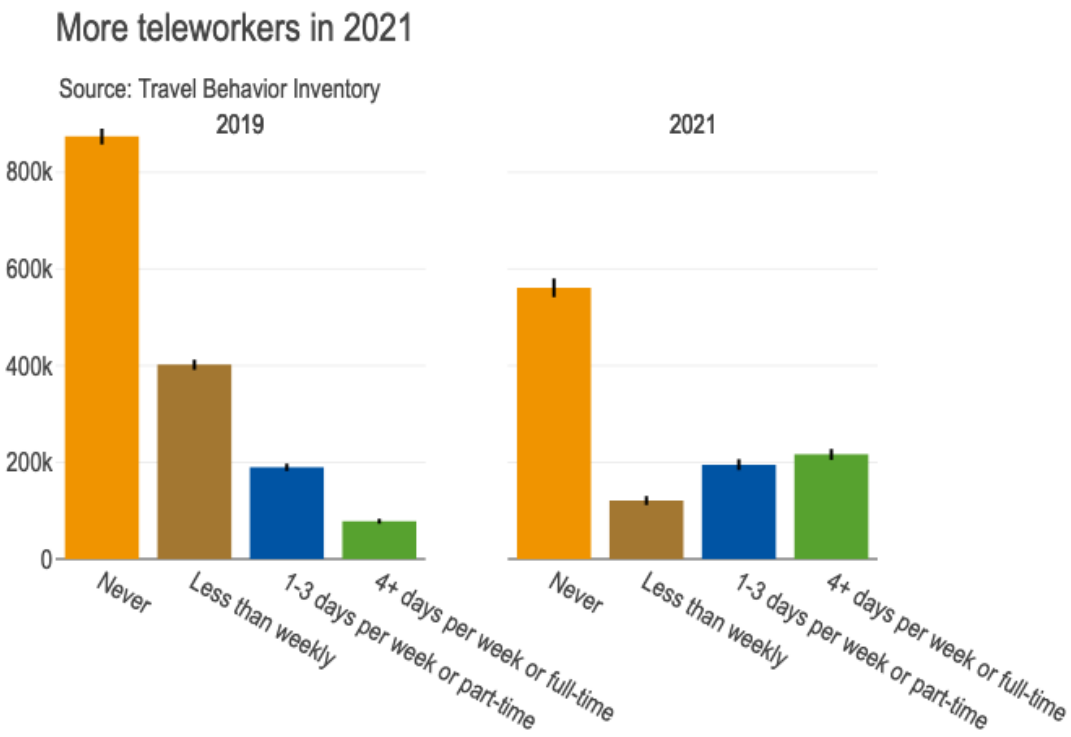
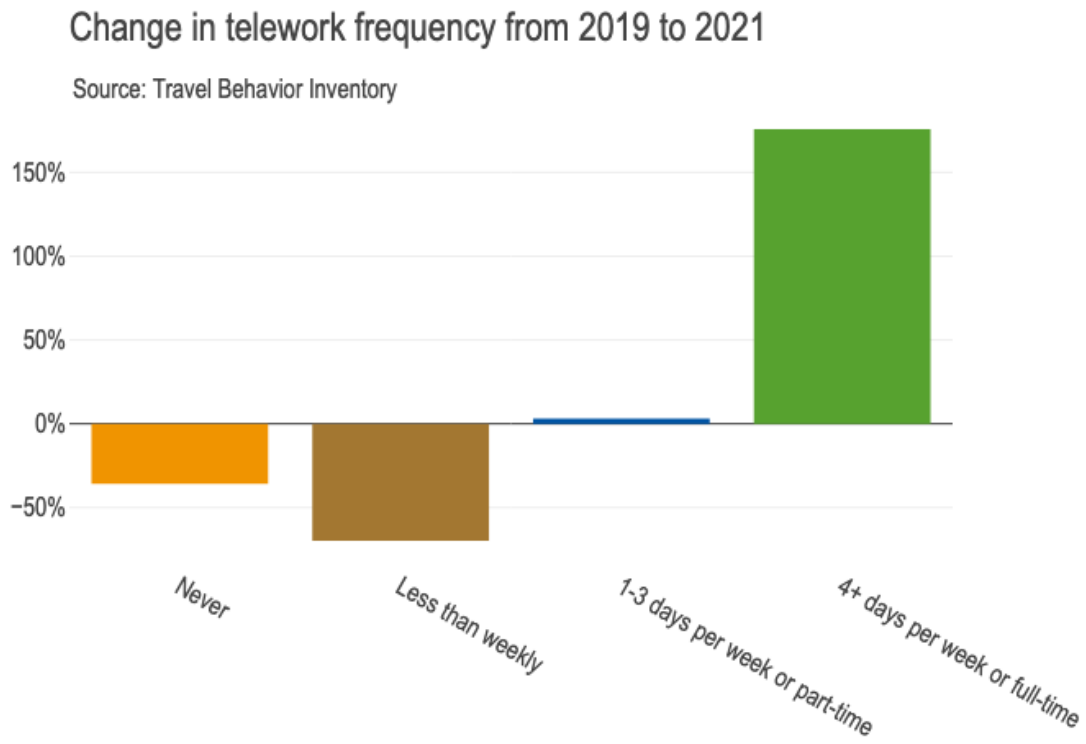


Figure 11.6: Change in telework frequency from 2019 to 2021. Source: Travel Behavior Inventory, 2019 and 2021. Estimates and standard errors are derived using day-level weights. Only residents of the Twin Cities Metropolitan Planning Organization (MPO) region who worked are shown.



12. Support competitiveness through the efficient movement of freight

Support the region's economic competitiveness through the efficient movement of freight.

In comparison to other regions – use TTI, MnDOT or Streetlight data.

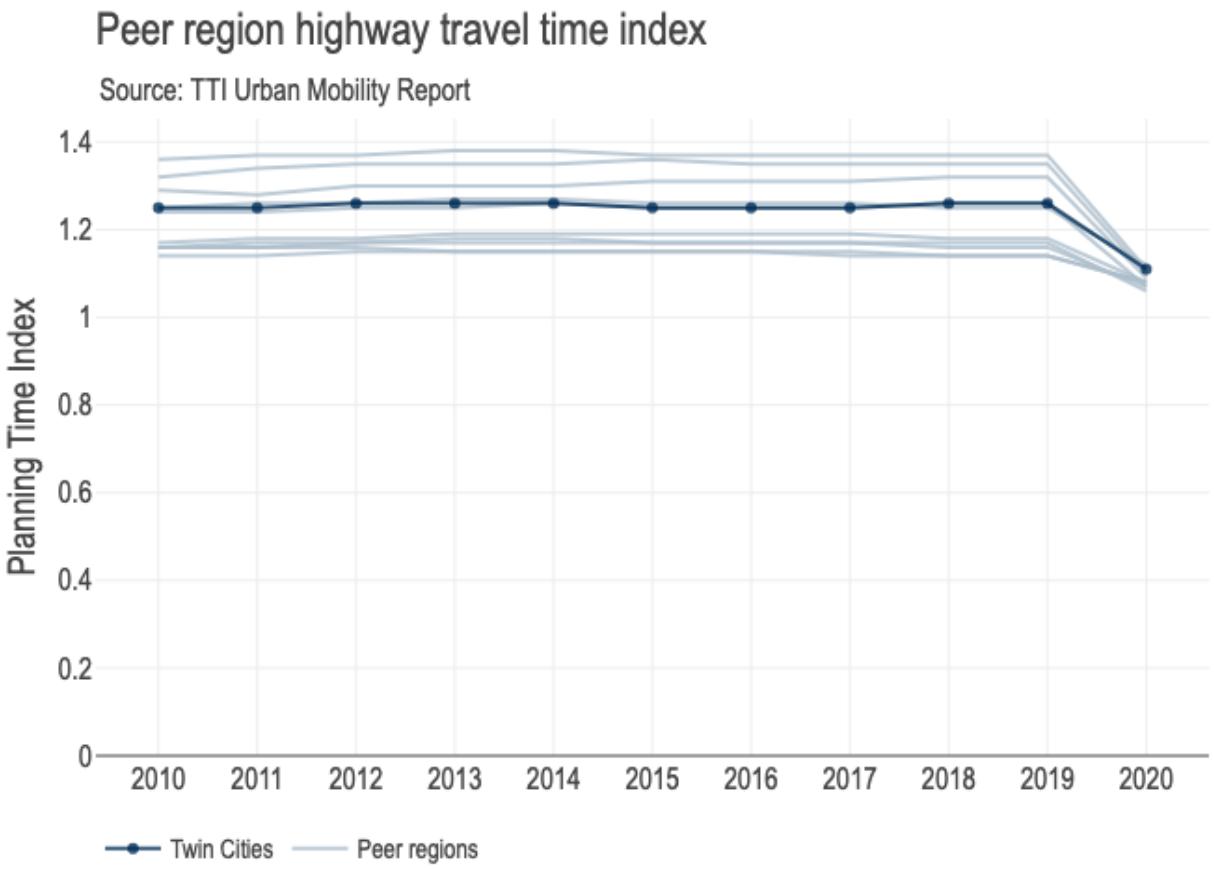
12.1 Travel time reliability

The Texas Transportation Institute's (TTI) Urban Mobility Report compiles data on transportation system performance for metropolitan areas throughout the United States. These data can be used to measure changes in the performance of the Twin Cities' highway system over time and provide a rough comparison with similar peer urban areas in the United States. These peer urban areas include Baltimore, MD; Cincinnati and Cleveland, OH;, Dallas, TX; Denver, CO; Milwaukee, WI; Pittsburgh, PA; Portland, OR; Seattle, WA; and St. Louis, MO. TTI published their most recent data (2020) in 2021.

One measure of highway performance is the time it takes to make trips in congested conditions versus the time it would take in uncongested or free-flow conditions. A travel time index is used to assess these impacts by measuring the proportion of additional time 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 (6:00 a.m. to 10:00 a.m. and 3:00 p.m. to 7:00 p.m.) than in off-peak conditions, when the motorist could travel at free-flow speeds.

Figure 12.1 shows the travel time index for the Twin Cities urban area was relatively flat from 2010 to 2019 at about 1.25 indicating it took the average motorist 25% more time to travel along interstate highways during peak period times than during off-peak times. In 2020, the last year for which we have data, the travel time index declined across all peer regions; in the Twin Cities, the travel time index dropped to 1.1, only a 10% increase in the peak period compared to off-peak times.

Figure 12.1: Travel time index from 2010 to 2020 in the Twin Cities and across peer regions. Source: TTI Urban Mobility Report, 2021



12.2 Cost of truck congestion and delay

Highway congestion not only decreases the reliability of freight shipments, but also increases costs. The Texas Transportation Institute's (TTI) Urban Mobility Report [7] calculates truck congestion costs to the freight sector as the value of increased travel time and other operating costs of large trucks and the extra diesel consumed. To compare these costs across regions and over time, we have expressed them as a percentage of gross domestic product (GDP). Like truck congestion costs, GDP (inflation-adjusted gross domestic production, US Bureau of Economic Analysis (BEA) (2023)) in this measurement is expressed in real dollars, adjusted for inflation.

Expressed as a percentage of regional GDP, the relative cost of delay to the freight sector was flat between 2010 and 2018, at about 0.08% (less than one-tenth of one percent of regional GDP). The Twin Cities consistently ranked below its peers for this measure until 2019, when the costs of congestion to the freight sector increased to $236 million, equivalent to 0.1% of GDP. These costs were markedly reduced across all peer regions in 2020, falling to $119 million in the Twin Cities region.

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[7] TTI's 2021 edition uses crowdsourced data from INRIX on urban streets and highways, along with highway inventory data from a Federal Highway Administration database. The report was sponsored by the Texas Department of Transportation and the National Institute for Congestion Reduction (Schrank et al. 2021).

Figure 12.2: Cost of congestion to the freight sector in 2020

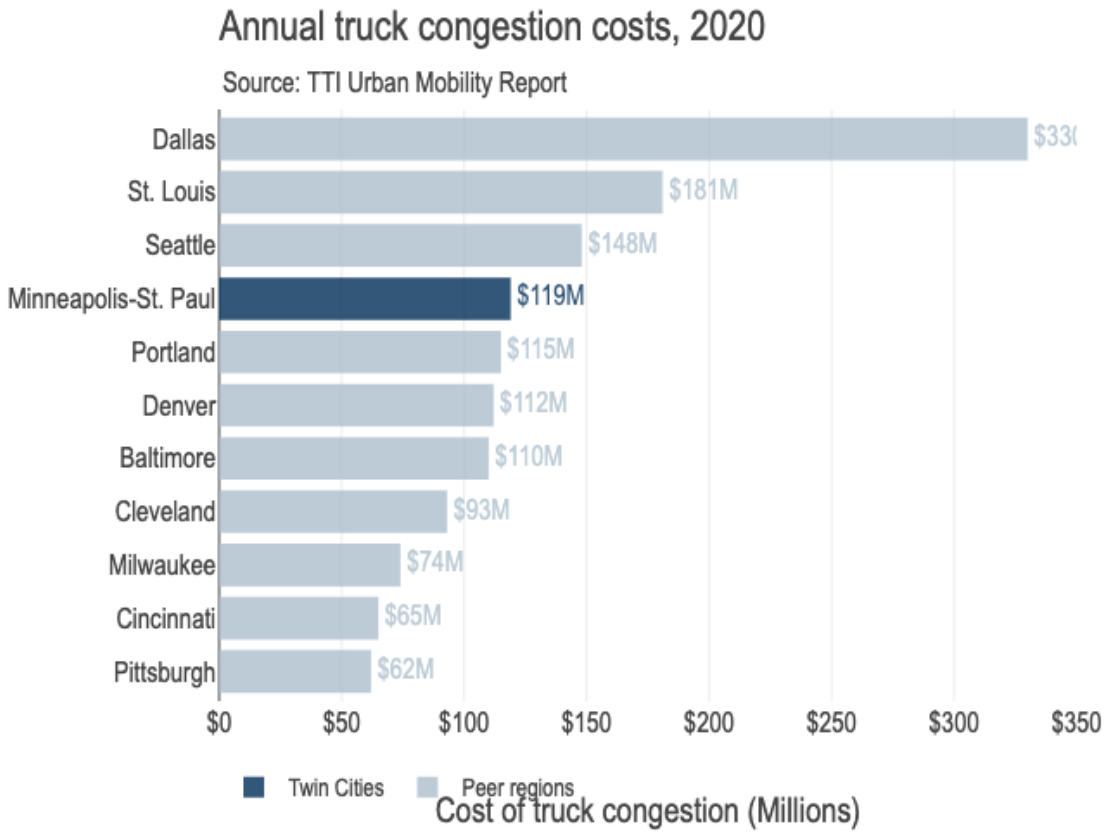


Figure 12.3: Cost of congestion to the freight sector from 2010 to 2020 in the Twin Cities and across peer regions

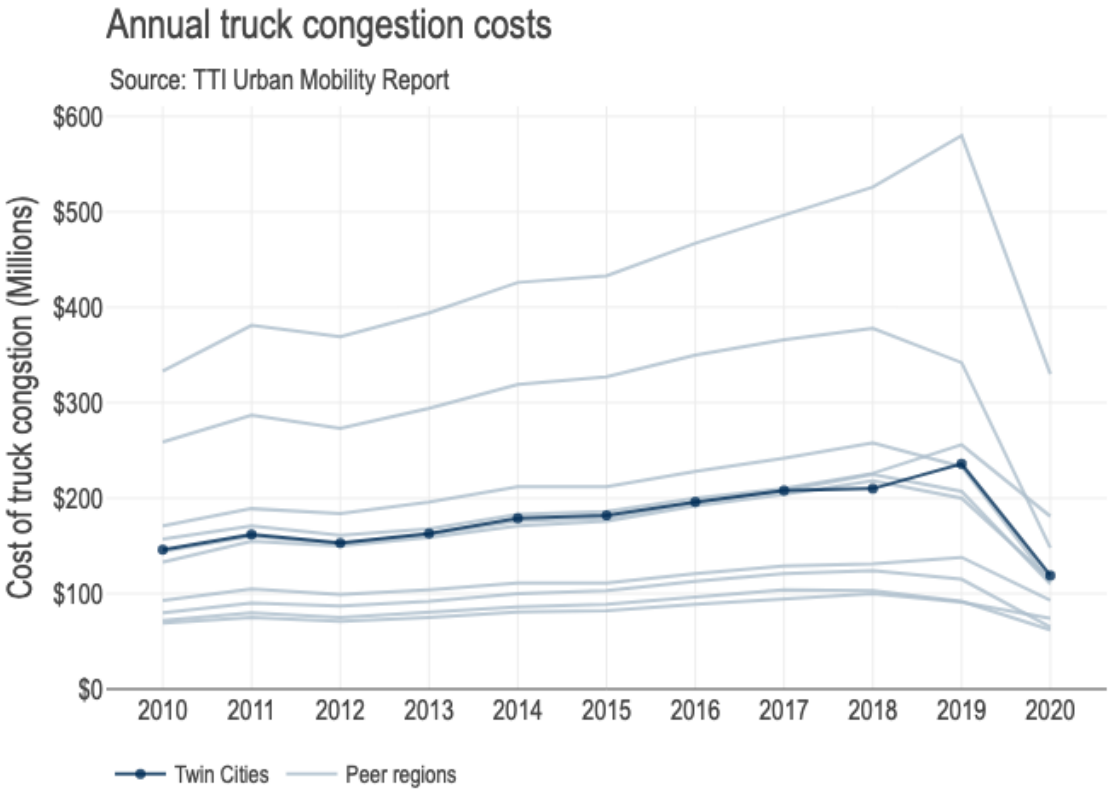
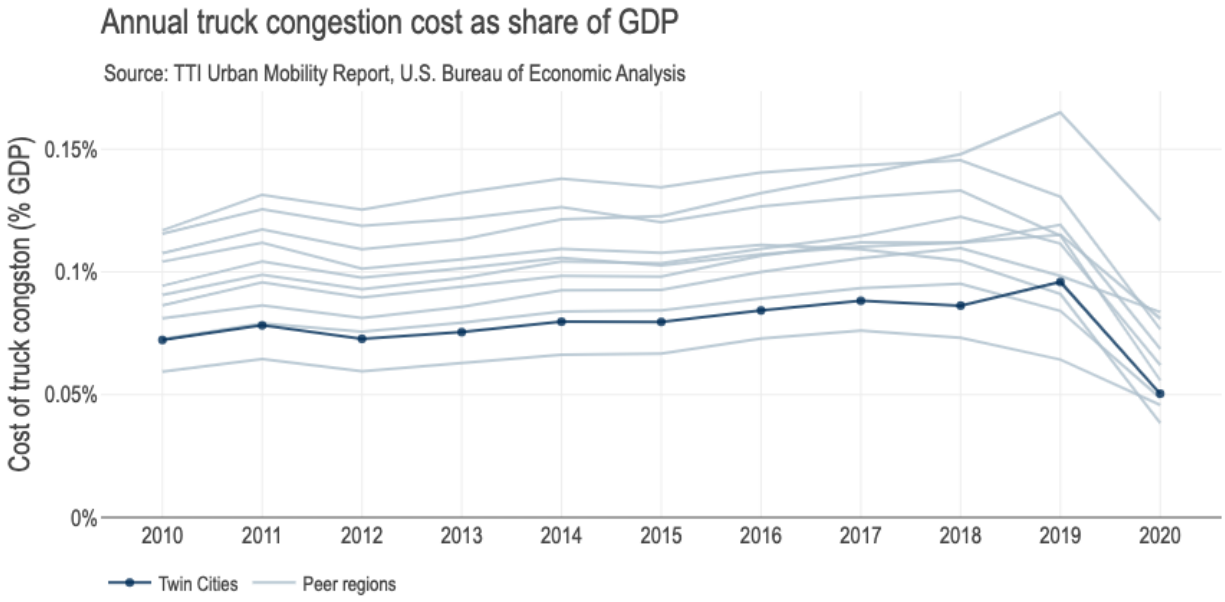


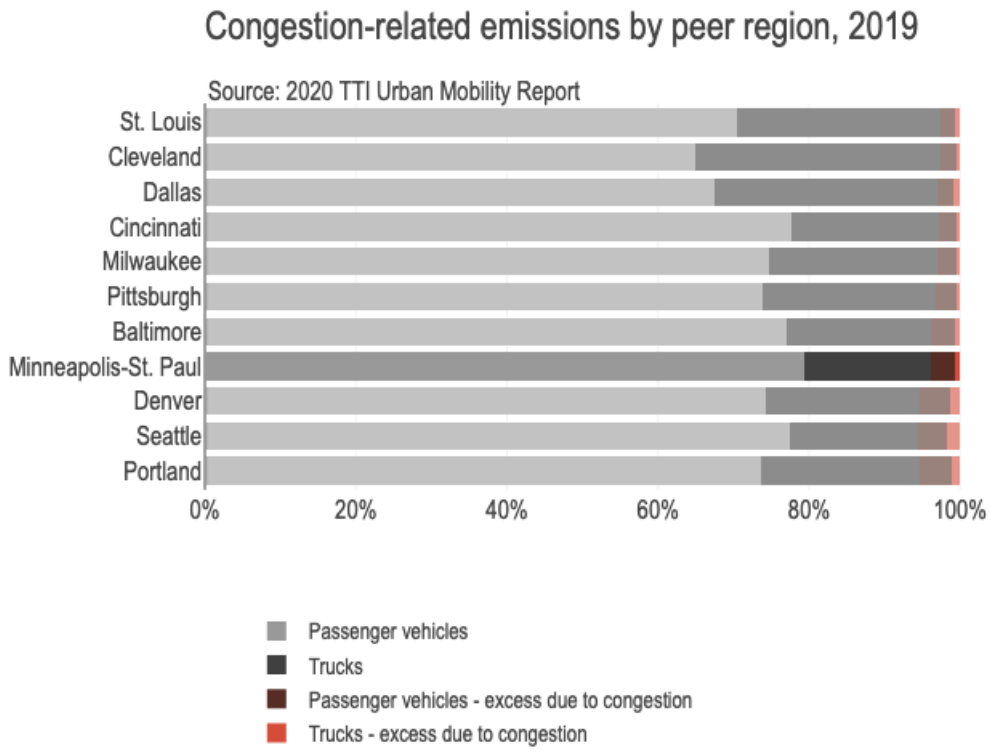
Figure 12.4: Cost of congestion to the freight sector, expressed as a percentage of GDP, from 2010 to 2020 in the Twin Cities and across peer regions



The cost of truck congestion can also be expressed in terms of greenhouse gas emissions: the amount of CO2 emitted in excess due to vehicles idling or moving slower in traffic. Figure 12.5 shows these excess emissions in 2019, the last year of pre-pandemic data. To aid peer-region comparisons and place them in their context, they are expressed as a share of total on-road emissions by region.

Across all peer regions, congestion-related emissions form a very small share of total on-road emissions: at their greatest – in the Portland metro – they comprise only 5.4% of total on-road emissions. In the Twin Cities, 3.9% of total on-road CO2 emissions in 2019 were emitted in excess due to congestion: 0.7% from trucks in congestion, and 3.2% from passenger vehicles in congestion.

Figure 12.5: On-road carbon dioxide emissions due to trucks, passenger vehicles, and emitted in excess due to congestion, expressed as a share of total on-road emissions, in 2019. Results for regions and the Twin Cities are shown.



Healthy and Equitable Communities

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

Objectives

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

Strategies summarized

- The plan works toward state and regional goals for greenhouse gas and air pollutant emissions by factoring these considerations into the Metropolitan Council's operations and investment priorities. The plan also starts a dialogue on how all the region's partners, including local governments, can contribute to these efforts.
- The plan supports a transportation system that considers the needs of all potential users while promoting the environmental and health benefits of transportation options like carpooling, transit, bicycling, and walking.
- Investments in the transportation system will protect and enhance the natural, cultural, and developed environments, and will be identified through effective engagement with affected communities.
- A special emphasis is placed on avoiding, minimizing, and easing impacts of the current and future transportation system on people and the environment, especially disproportionately harmful outcomes for people of color and American Indians, or people who have low incomes.

Health is defined in many ways, including the physical well-being of people, the quality of the environment, or the social capital of an entire community. The air we breathe; the water we drink and play in; the weather we experience; the neighborhood we live in; and the roads, bridges, and buildings in our built environment are all vital to a healthy environment. To achieve that environment, the region must carefully consider and mitigate transportation impacts.

13. Reduce impacts of transportation on natural, cultural, and developed environments.

Reduce impacts of transportation construction, operations, and use on the natural, cultural, and developed environments.

13.1 Impervious surface in the metro area

The plots below illustrate the amount of pavement per county in the Twin Cities. Roads and paved surfaces comprised 11% of surface area in the metro area, compared to 3% for buildings (Host, Rampi, and Knight 2016).

Paving surfaces for roads, buildings, and parking lots increases surface temperatures. Impervious surfaces prevent water from filtering into the ground and trap heat near the ground. Dark impervious surfaces, like asphalt, tend to absorb more heat than lighter colored ones do. As a result, they trap the most heat.

A trend of increasing impervious surface is concerning given climate change. Minnesota is projected to experience large warm-season temperature increases (Angel et al. 2018), specifically with five to 15 more days per summer with a maximum temperature above 95°F by mid-century 2041 - 2070 (Pryor et al. 2014). The Twin Cities region may have over 50 days with temperatures over 90 degrees by 2050, as compared to about 13 days on average today (Notaro, Bennington, and Lofgren 2015).

To learn more about how extreme heat and impervious surfaces relate, see Section 3.2.

Figure 13.1: Percent of each county covered by a paved surface parking lot

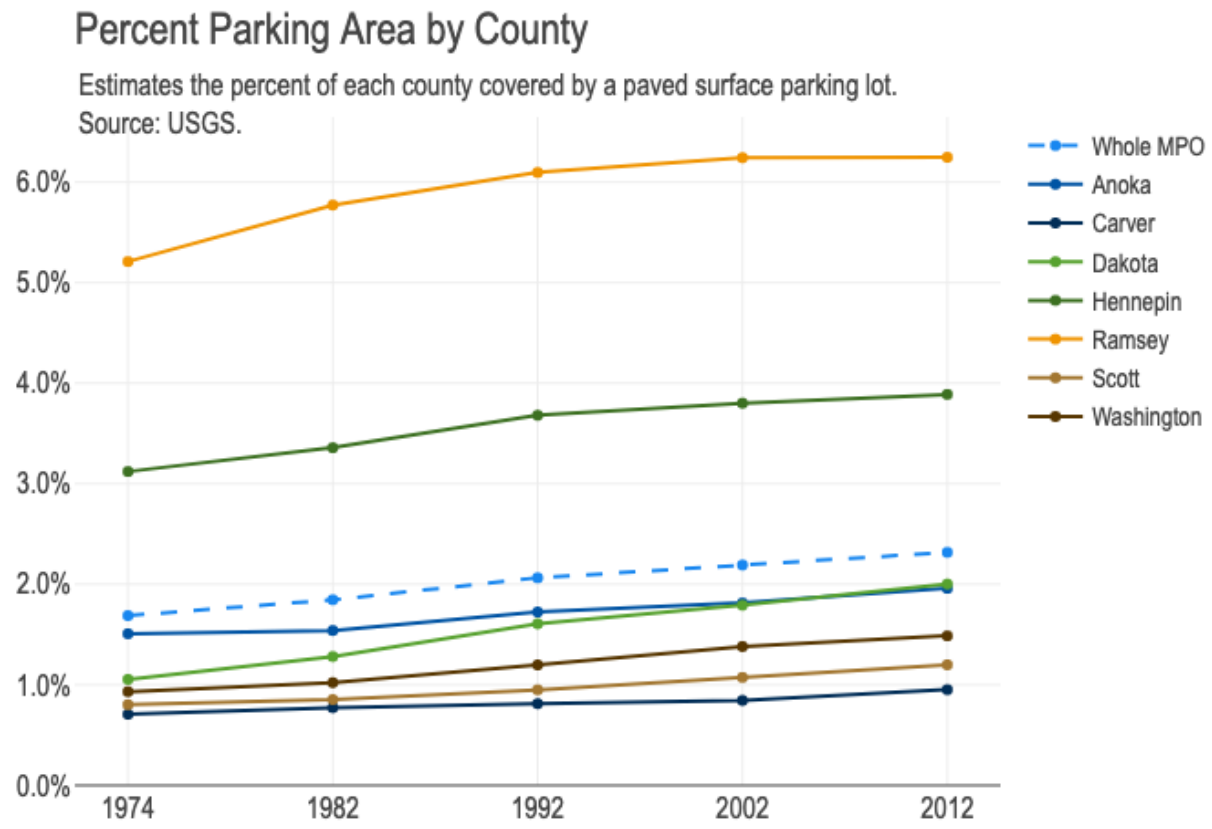
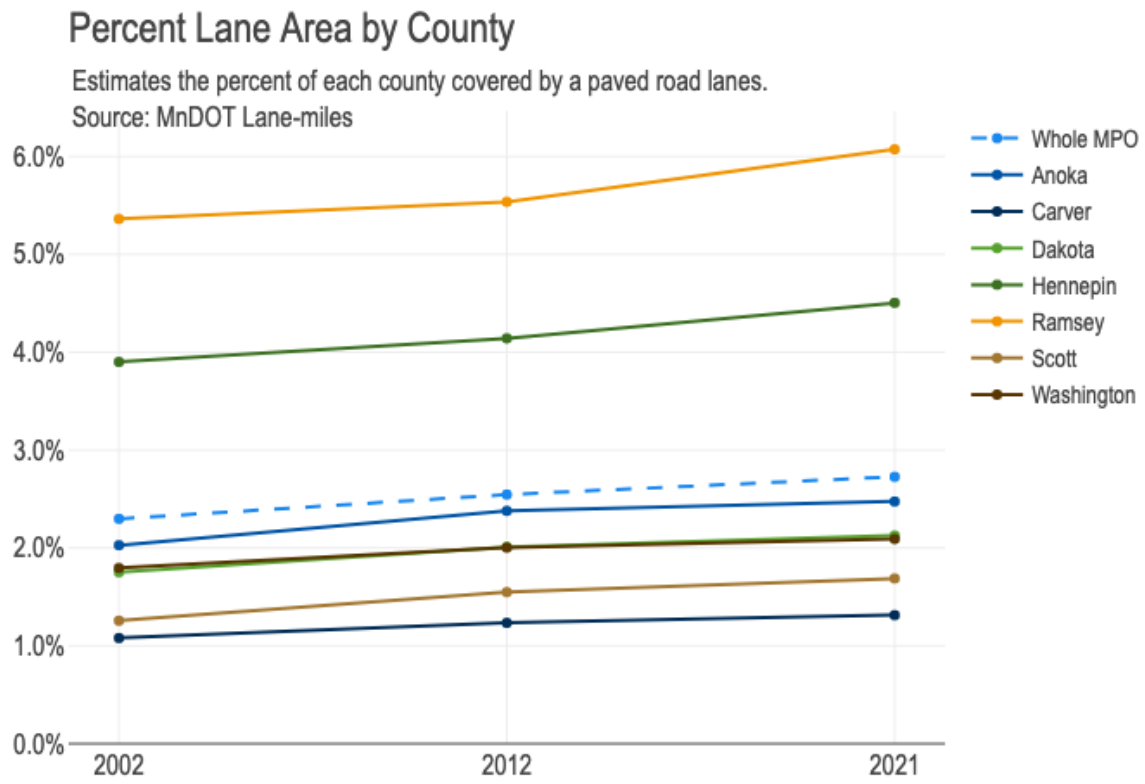


Figure 13.2 shows the proportion of each county covered by paved road lanes [8].

Figure 13.2: Percent of each county covered by paved road lanes



[8] Lane miles are converted to area by using a width of 11 feet, in accordance with (*Minnesota Administrative Rules: Minimum Design Standards, Urban; New or Reconstruction Projects* 2017). This may be an underestimate of the existing lane area because this doesn't include road shoulders or account for wider roads

14. Reduce transportation-related air emissions

14.1 Ambient air quality

In 1970, the Clean Air Act authorized the federal Environmental Protection Agency (EPA) to establish standards for six pollutants known to cause harm to human health and the environment; these were given the name criteria pollutants. The Clean Air Act requires each state to monitor these pollutants, then to report the findings to the EPA. In Minnesota, the Minnesota Pollution Control Agency (MPCA) is responsible for these actions (MPCA 2022b).

The criteria pollutants are

- particulate matter (currently $PM_{2.5}$ and PM_{10})
- lead (Pb)
- ozone (O_3)
- nitrogen dioxide (NO_2)
- sulfur dioxide (SO_2)
- carbon monoxide (CO)

For each of these pollutants, the EPA has developed National Ambient Air Quality Monitoring Standards (NAAQS). Primary standards are set to protect public health, while secondary standards are set to protect the environment and public welfare (i.e. visibility, crops, animals, vegetation, and buildings).

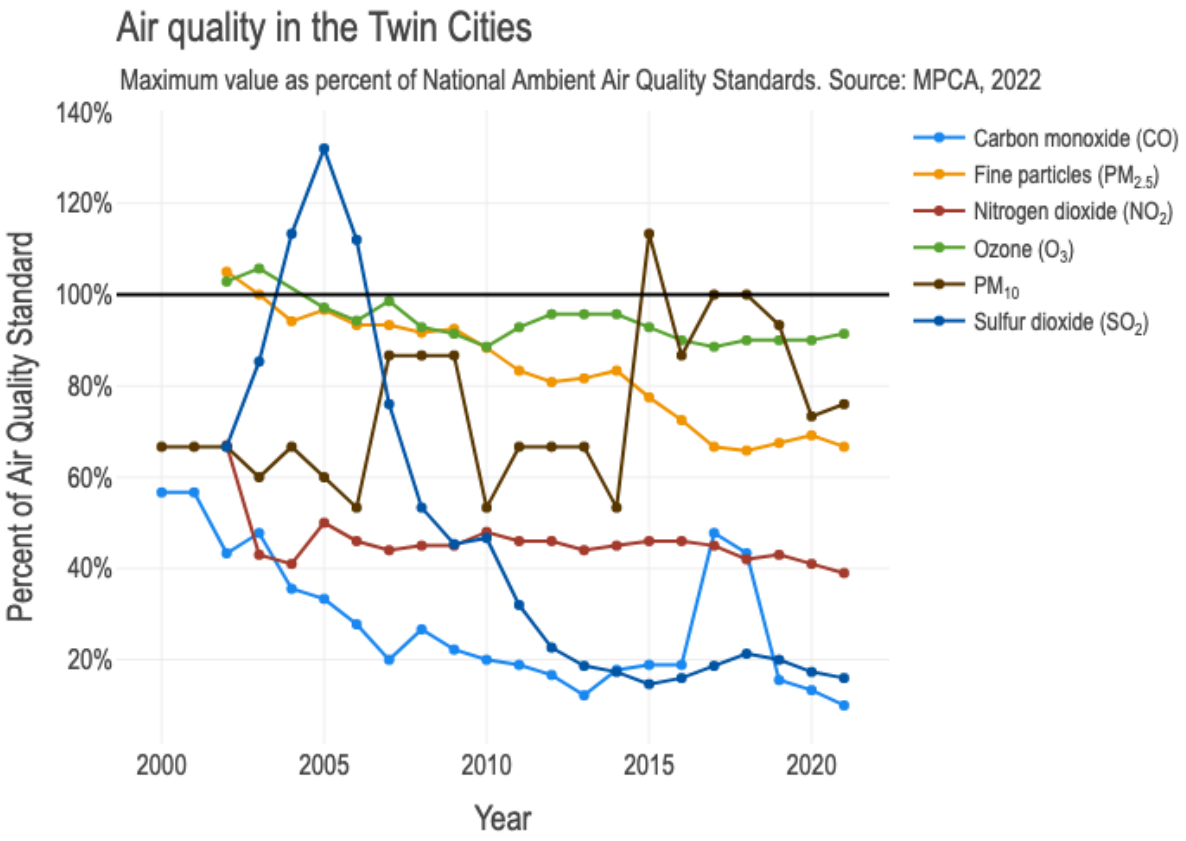
The region is currently in attainment for all the pollutants regulated by the EPA. PM_{10} was the most recent pollutant that was unacceptably high in a small portion of Ramsey County, mostly due to non-transportation related sources. Until 2022, the region was still in a 20-year maintenance period due to these past high PM_{10} levels. This PM_{10} maintenance period expired in September 2022, bringing the region in full NAAQS conformity.[9]

Figure 14.1 shows the maximum pollutant level for each year as a percentage of the National Ambient Air Quality Standards from all sources (not just transportation). Except for PM_{10}, the maximum level of pollutants shown in the chart have generally trended downward over the past 20 years. Many factors could contribute to these decreases in maximum pollutant level, including changes in energy production, industrial practices, building trends, land uses patterns, and transportation behavior. The weather also plays a big role in ambient air quality. Examples of transportation-related changes that might decrease pollutant levels include decreased vehicle travel, changes in vehicle emissions technology and increased consumer adoption of these newer vehicles, and growing use of alternative fuel sources.

To learn more about NAAQS, see Section C.2.Learn more about air quality monitoring on the Minnesota Pollution Control Agency (MPCA) air quality monitoring webpage.

[9] Air quality data based on nine metro ambient air quality monitoring sites: Apple Valley, Blaine, Inner Grove Heights, Lakeville, Minneapolis, Rosemount, Shakopee, St. Paul, and St. Paul Park. The maximum value is the maximum value as observed across all monitoring sites. The standard value is the lowest of the EPA-established primary and secondary standards. Averaging time and lowest standard can be found in Section C.2

Figure 14.1: Air pollution in Twin Cities (maximum value as percent of air quality standard)

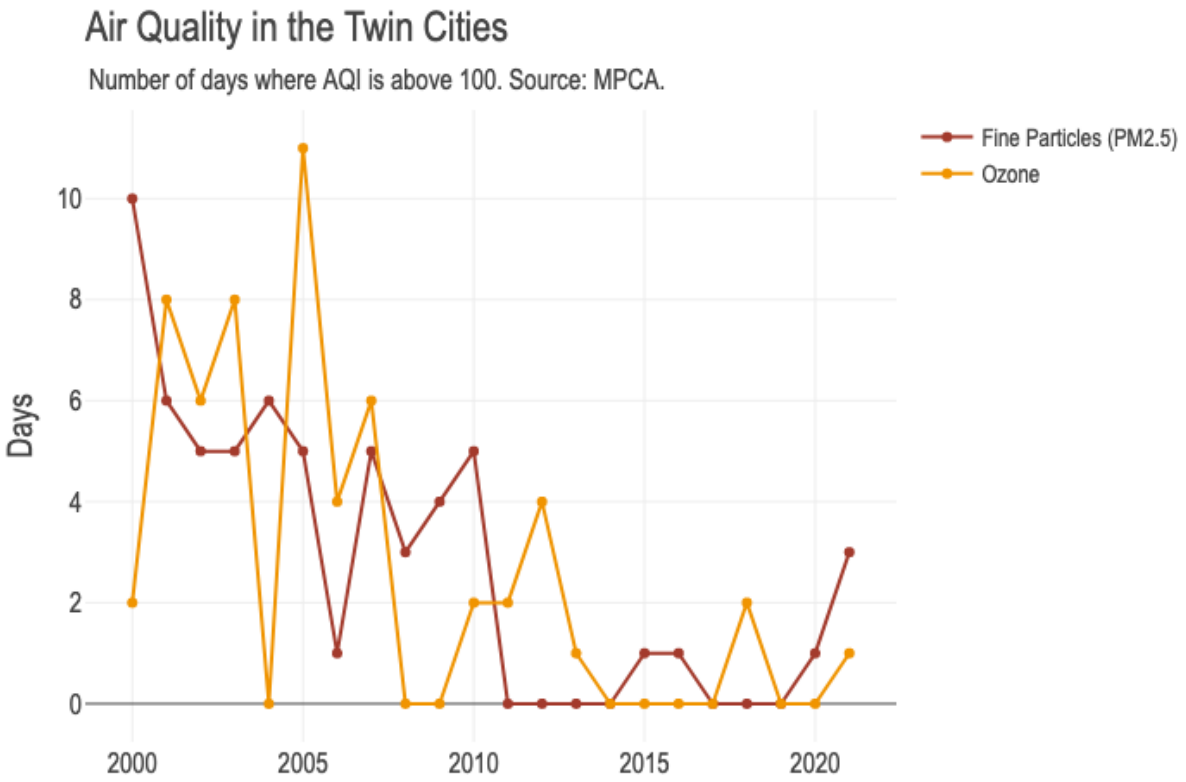


14.1.1 Air Quality Index (AQI)

The Air Quality Index (AQI) is an EPA measurement system that converts pollutant measurements into categories that describe their possible effects on human health. These categories span categories from good to unhealthy or very unhealthy. The MPCA uses daily forecasts of AQI for small particulate matter ($PM_{2.5}$) and ozone to inform residents about potential health risks from air quality conditions. The Minnesota Pollution Control Agency (MPCA) issues an air quality alert when the pollutant with the highest AQI approaches or exceeds 101.

Figure 14.2 shows the number of days in each year that ozone or $PM_{2.5}$ levels exceeded an AQI of 100. While the figure includes some fluctuation, the general trend shows a decrease in annual days with an AQI over 100 between 2000 and 2020. The MPCA does note that many changes in the AQI are not necessarily due to short-term changes in emissions from things such as transportation. Much of the fluctuations in AQI come from meteorological conditions such as temperatures, winds, precipitation, and air pressure.

Figure 14.2: Number of days exceeding air quality standards, by $PM_{2.5}$ and Ozone



14.2 Regional Vehicle Miles Traveled (VMT)

Vehicle miles traveled (VMT) per person remained stable at approximately 25.5 VMT per person per day from 2010 through 2019. In 2020 with the onset of the COVID-19 pandemic, this fell to approximately 20 VMT per person per day. However, in 2021 it was already beginning to rebound toward the previous long running rate. As population has increased in our region from 2010 through 2019, daily regional VMT has continued to increase from approximately 73 million in 2010 to 81 million in 2019. Like VMT per person per day, total regional VMT fell in 2020 and has partially rebounded in 2021.

Regional VMT is important to the transportation system as it is an indicator of transportation's contribution to greenhouse gas emissions and negative public health impacts from burning fossil fuels. As VMT increases, congestion becomes more prominent with its own direct impacts and those of the highway improvements that often result. It also indicates how well our transportation system provides options to driving alone that can reduce household transportation costs and improve public health and the climate. Options other than driving alone can be especially important to low-income populations and those who don't have access to a private vehicle.

The regional population[10] has steadily grown since 2010, from 2,938,394 to 3,292,036 in 2021 (a total increase of 12%).

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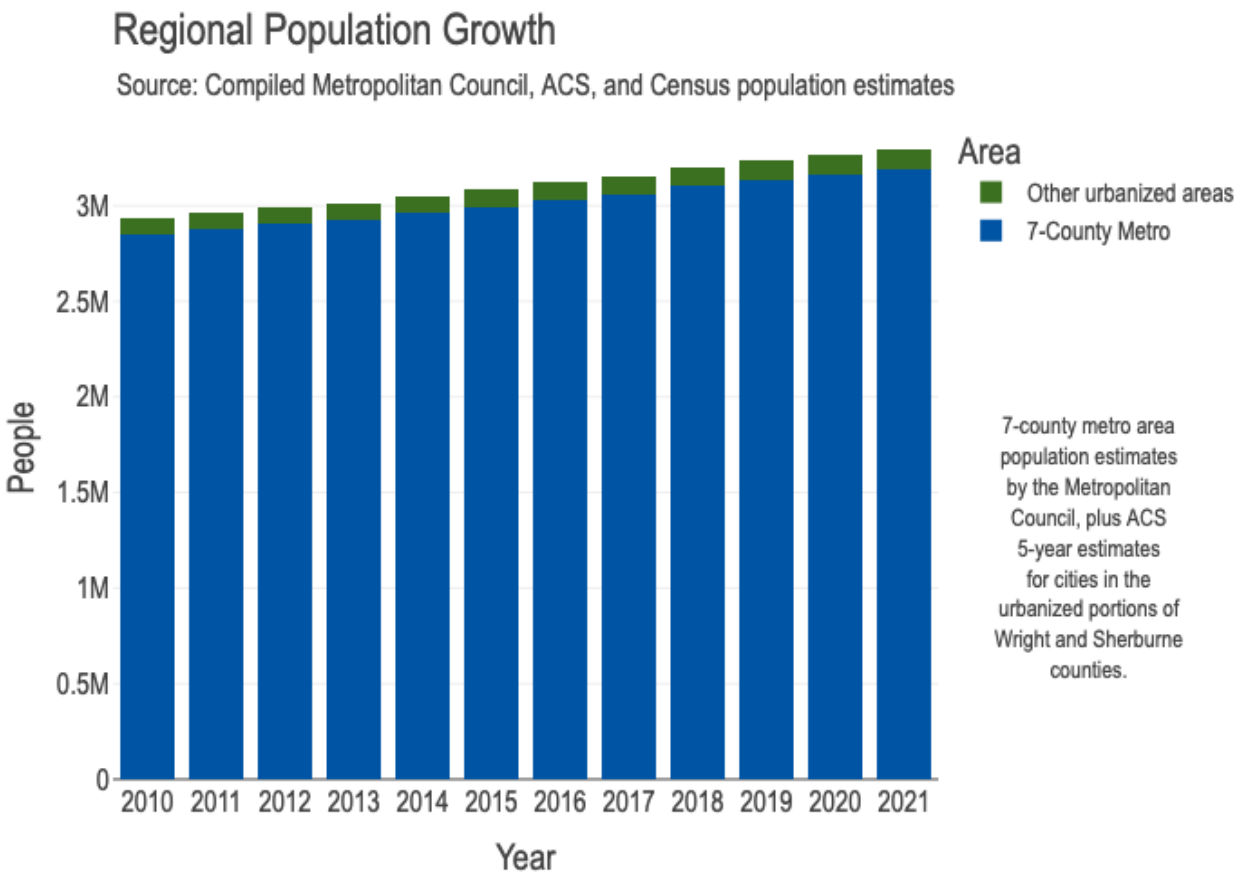
[10] The MPO area includes the 7-county core Twin Cities metro and the urbanized portions of Sherburne and Wright counties. Some cities have only a portion of the city area in the MPO boundary. Due to data availability, the entirety of each city is included in the estimate.The 7-county metro population is

Figure 14.3: Population growth of the metropolitan planning area from 2010 to 2021



From 2010 to 2019, VMT increased from 73.1 to 80.9 million miles per day. VMT fell in 2020, but rebounded somewhat in 2021.

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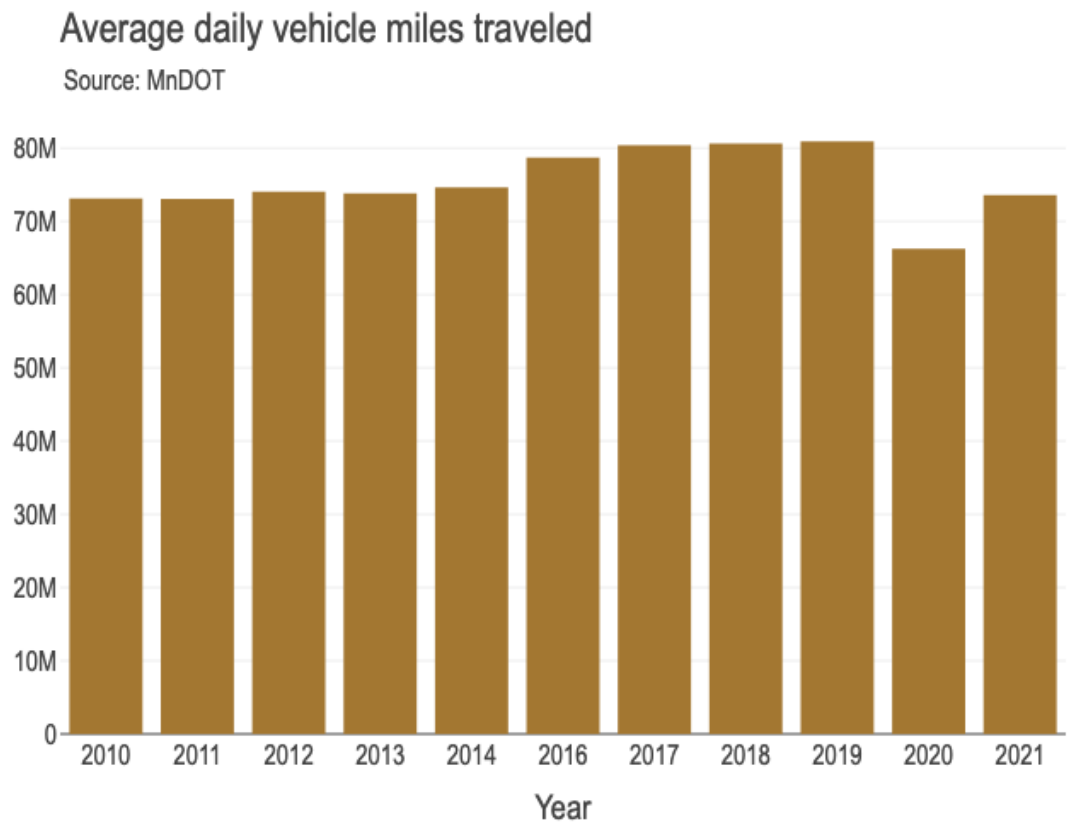
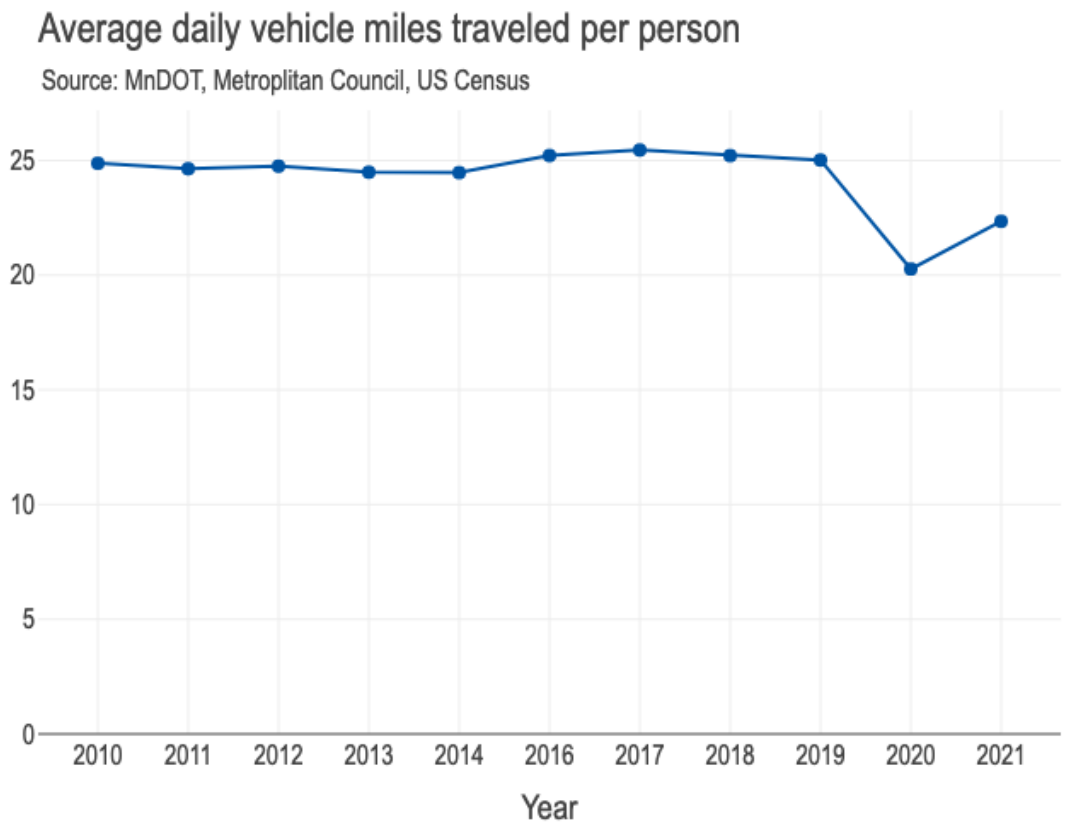
compiled from the 2010 and 2020 decennial census counts and Met Council intercensal population estimates for 2011-2019, calibrated to 2020 census counts, and Met Council 2021 population estimates.The urbanized areas of Sherburne and Wright counties are compiled from the 2010 and 2020 census counts and intermediary American Community Survey (ACS) 5-year estimates.

Figure 14.4: Average daily vehicle miles traveled in the metropolitan planning area from 2010 to 2021. 2010, 2011, and 2012 VMT data include only the 7-county metro.



From 2010-2019, per-capita VMT varied in a narrow range from 22.3 to 25.5 miles per person, per day. In 2020, per-capita VMT plunged to 20.3 miles per person per day, a 18.8% decrease. It rebounded in 2021 to 22.3 miles per day per person.

Figure 14.5: Average daily vehicle miles traveled per person in MPO area. 2010, 2011, and 2012 VMT data include only the 7-county metro.



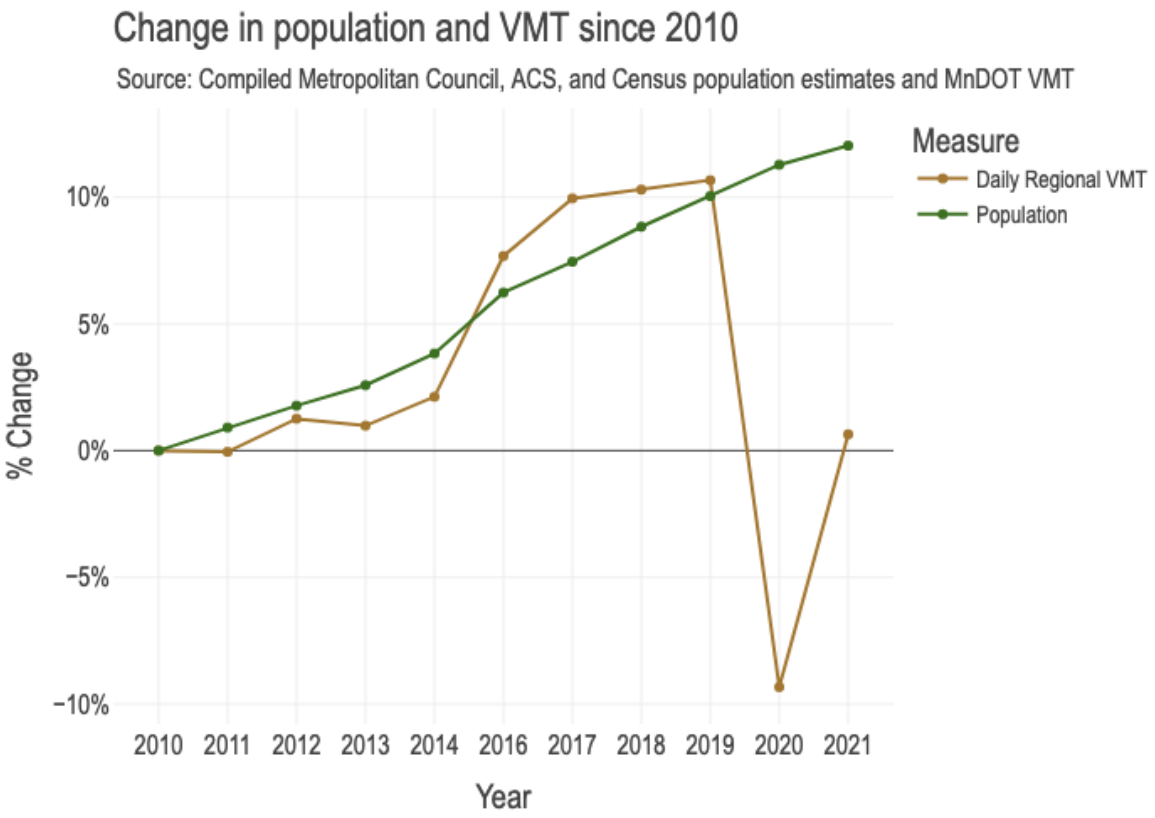
Increases in population and VMT kept pace with each other from 2010 to 2019, with total population growing by 10% from 2010-2019, and VMT growing by 8% [11].

These trends diverged in 2020, with a substantial decrease in VMT.

In 2021, VMT was just 1% lower than 2010 levels: the pandemic had essentially re-set VMT to 2010 levels. Future years of data will be needed to see if the reduction is permanent.

[11] VMT estimates for 2015 from MnDOT are unavailable.

Figure 14.6: Change in population and average daily vehicle miles traveled per person since 2010. 2010, 2011, and 2012 VMT data include only the 7-county metro.



In comparison,

Table 14.1: Freeway and arterial street vehicle miles traveled per person in peer regions, arranged by 10-year average

PEER REGION	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	10-YEAR AVERAGE
St. Louis	22.7	22.8	22.1	22.6	22.6	22.5	22.9	23.4	23.2	23.2	19.5	22.5
Dallas	20.3	20.3	20.2	19.8	20.3	20.9	21.5	21.2	20.8	20.7	17.7	20.3
Cincinnati	19.8	20.1	19.6	20.5	20.3	20.1	21.1	20.1	19.8	19.8	16.9	19.8
Minneapolis-St. Paul	19.7	19.7	18.9	19.7	19.9	19.8	20.3	20.7	20.6	20.5	16.3	19.6
Milwaukee	18.9	19.0	18.3	17.9	17.8	18.5	19.9	20.3	20.4	20.4	16.4	18.9
Baltimore	17.9	17.9	17.8	18.5	18.3	18.6	19.0	19.2	19.2	19.4	15.1	18.3
Denver	18.2	18.1	16.8	16.3	17.7	18.2	18.5	18.8	18.9	19.0	16.2	17.9
Cleveland	17.4	17.3	16.4	17.4	17.4	17.4	17.9	18.3	18.4	18.6	15.3	17.4
Seattle	18.6	19.0	17.9	17.1	16.7	17.0	17.2	17.1	17.1	16.8	13.1	17.1

Pittsburgh	15.7	15.6	13.8	13.5	14.0	14.7	14.9	14.8	15.8	16.4	13.2	14.8
Portland	15.1	15.1	14.1	13.8	14.2	14.4	14.4	14.4	14.5	14.6	11.7	14.2

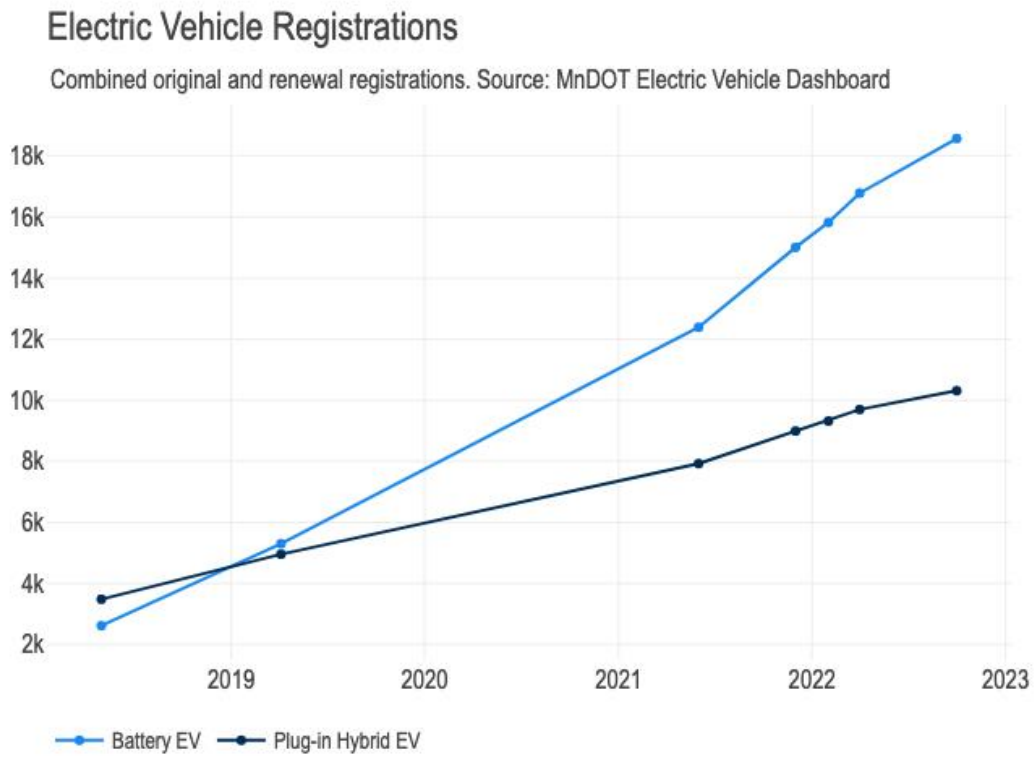
Source: TTI Urban Mobility Report 2021

14.3 Electric vehicle registrations

Plug-in Hybrid Electric Vehicle (PHEV) registrations have grown 48% from 2018 to 2022 while Battery Electric Vehicles (BEV) have grown 241% in the same timeframe from a similar starting point (MnDOT 2022b). PHEVs are those with a traditional internal combustion engine and fuel tank, and an electric motor and a small battery that can provide 30-50 miles of range. This allows the initial miles after being charged to use electricity while the internal combustion engine and fuel tank allow for greater range. BEVs have an electric motor and battery to provide all the vehicle's propulsion. As the available range on new BEVs continues to improve, they are rapidly becoming a more common choice in new vehicle purchases. In 2022, battery electric vehicles made up 5.8% of new car sales in the U.S. (Tucker 2023).

Both types of vehicles often result in more greenhouses when they are manufactured. However, due additional efficiency in their energy use and the common sources of that electricity, they result in fewer greenhouse gases and criteria pollutants over the life of their use. The benefits to climate change and public health of electric vehicles will only increase as our electricity generation continues to use fewer fossil fuels and more renewable sources.

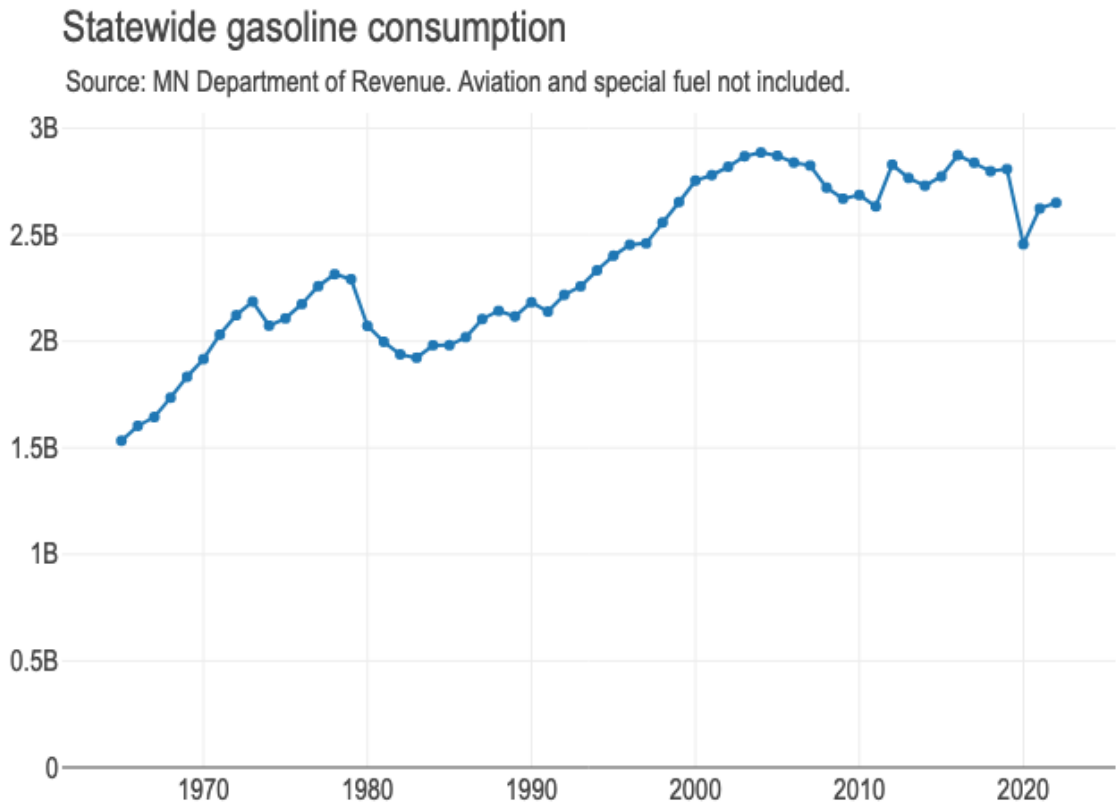
Figure 14.7: Number of EV registrations, separated by BEVs and PHEVs



14.4 Fuel consumption

Fuel consumption, as shown in data from the Minnesota Department of Revenue, was flat from 2018 to 2019 but fell in 2020 with the beginning of the COVID-19 pandemic and partially recovered in 2021. Fuel consumption follows the vehicle miles traveled pattern in the short term, but in the long term is reduced by improved fuel efficiency and the increasing rate of electric vehicle adoption. Like VMT, fuel consumption is an indicator of transportation's contribution to climate change and public health. It is also important for transportation finance as the gas tax is an important revenue source for state and local agencies to be able to maintain and improve the transportation system.

Figure 14.8: Gallons of gasoline consumed per year, not including aviation, from 1965 to 2022. Source: Minnesota Department of Revenue



14.5 Greenhouse Gas Emissions (GHG) analysis

According to the Met Council greenhouse gas inventory, the transportation sector is the regions's largest emitter of greenhouse gases (GHGs). Many residents in the metro region use some types of transportation that do not release GHGs, including walking and bicycling. However, other modes of transportation like cars, motorcycles, trains, buses, and airplanes do emit GHGs. The shipping industry also contributes to GHG emissions in the region as goods are transported within and pass through the metropolitan area on trains and trucks.

Figure 14.9: Regional greenhouse gas emissions by sector, 2018.

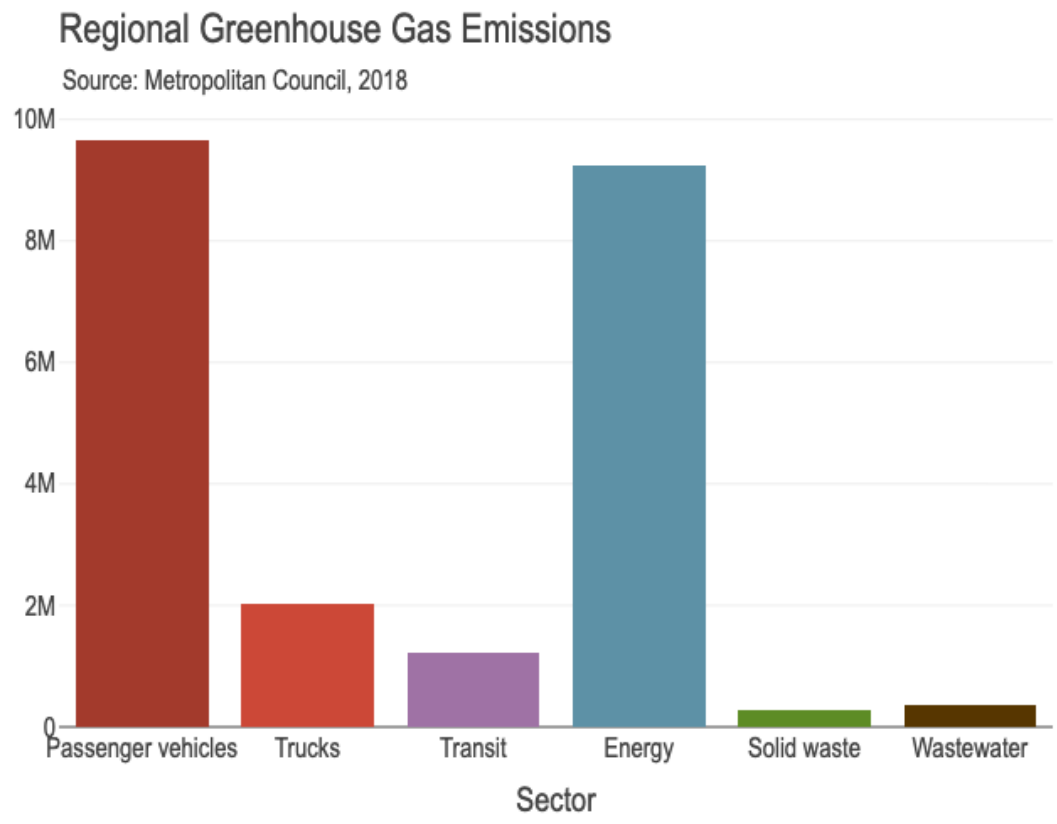
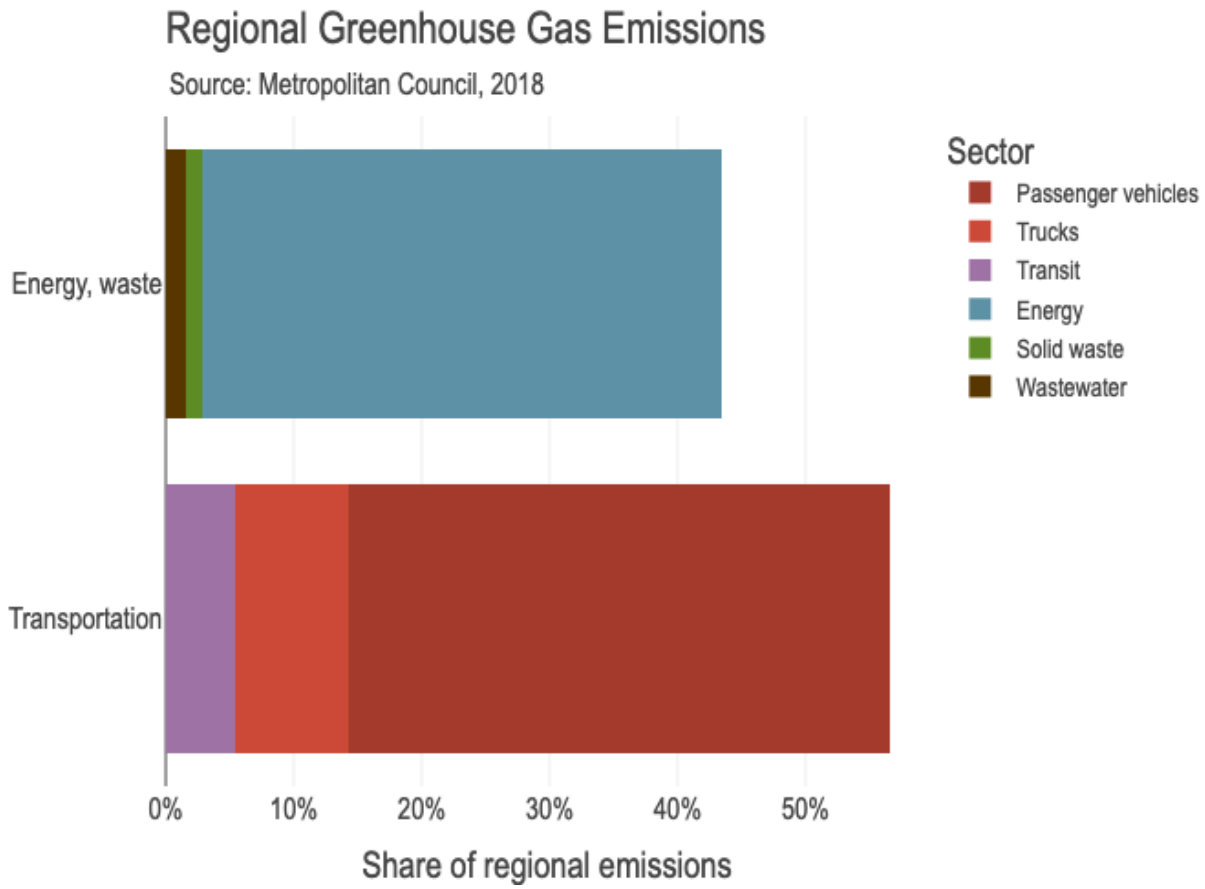


Figure 14.10: Regional transportation greenhouse gas emissions as a percentage all greenhouse gas emissions, 2018.



Learn more about how the transportation greenhouse gas inventory was calculated on the project methodology page.

15. Increase the availability and attractiveness of transit, bicycling, and walking

Increase the availability and attractiveness of transit, bicycling, and walking to encourage healthy communities through the use of active transportation options.

15.1 The Regional Bicycle Transportation Network (RBTN)

The Regional Bicycle Transportation Network (RBTN) is the official regional bikeway network that sets the region's priority vision for planning and investment. The network was established in 2014 based on a Regional Bicycle System Study analysis and prioritization of potential corridors. This analysis was based on factors like bicycle trip demand, network connectivity, social equity, population and employment density, and connections to transit.

15.1.1 RBTN Corridors and Alignments

The RBTN consists of a series of corridors and general alignments. The corridors are established where there is existing or potentially high bicycle trip demand between regional destinations and activity centers, and reflect where alignments have not yet been identified. Alignments are defined where there are existing or planned bikeways, or in the absence of these, a general consensus of which road or roadways would most efficiently meet the regional corridor's intent. Corridors and alignments are classified as Tier 1 or Tier 2 priorities, with Tier 1 representing the region's highest priorities for bikeway planning and investment. You can find an interactive map of the current RBTN corridors and alignments on the Council website

The RBTN has provided the backbone arterial network vision to accommodate daily bicycle trips since 2014 and the region continues to monitor progress on its implementation. Figure 15.2 shows the regional network's implementation status by existing and planned bikeway miles. Figure 15.3 displays the shares of total RBTN centerline miles for existing and planned bikeways.

Figure 15.2: RBTN centerline miles by bikeway planning status. Source: Metropolitan Council, 2020

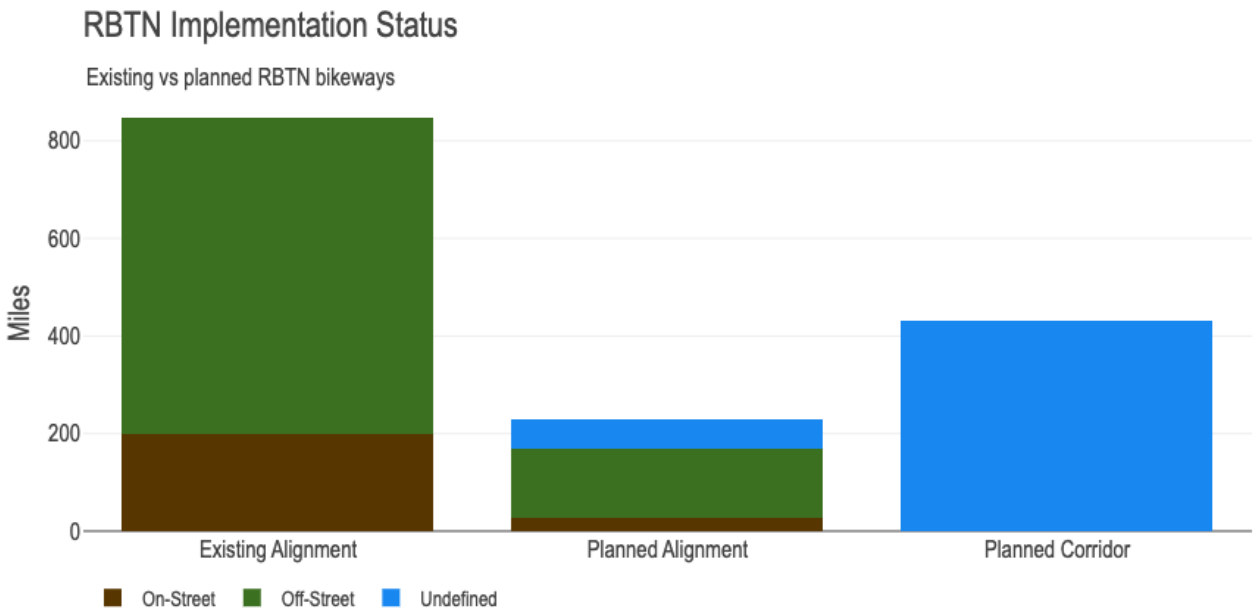
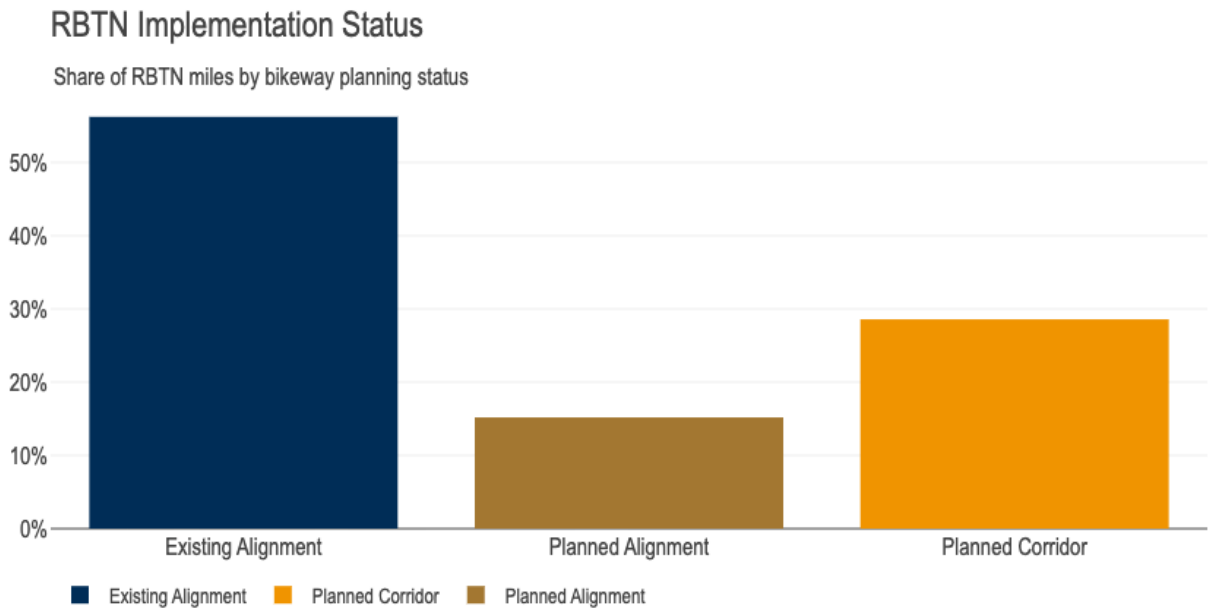


Figure 15.3: Share of total RBTN centerline miles by planning status. Source: Metropolitan Council, 2020



15.2 Bicycle and pedestrian miles traveled

This section shows how the total amount of bicycle and pedestrian travel has changed over time, using the Travel Behavior Inventory (TBI) household survey. An increase in the total distance and/or the total number of trips made by walking and biking is one indicator that the transportation system is working to support increased active travel in the region. Increased walking and biking can also reflect how the region is developing and where people are living, working, and recreating. Because of differing data collection methods over time, some increases in bicycle and pedestrian travel metrics is likely attributable to better data collection.

15.2.1 Results

Results from the TBI [12] suggest that total walk miles traveled has increased since 2010. Walk miles traveled in 2019 was 1.7 times greater than that of 2010; and grew again by 58% from 2019 and 2021. The black lines indicate the standard error.

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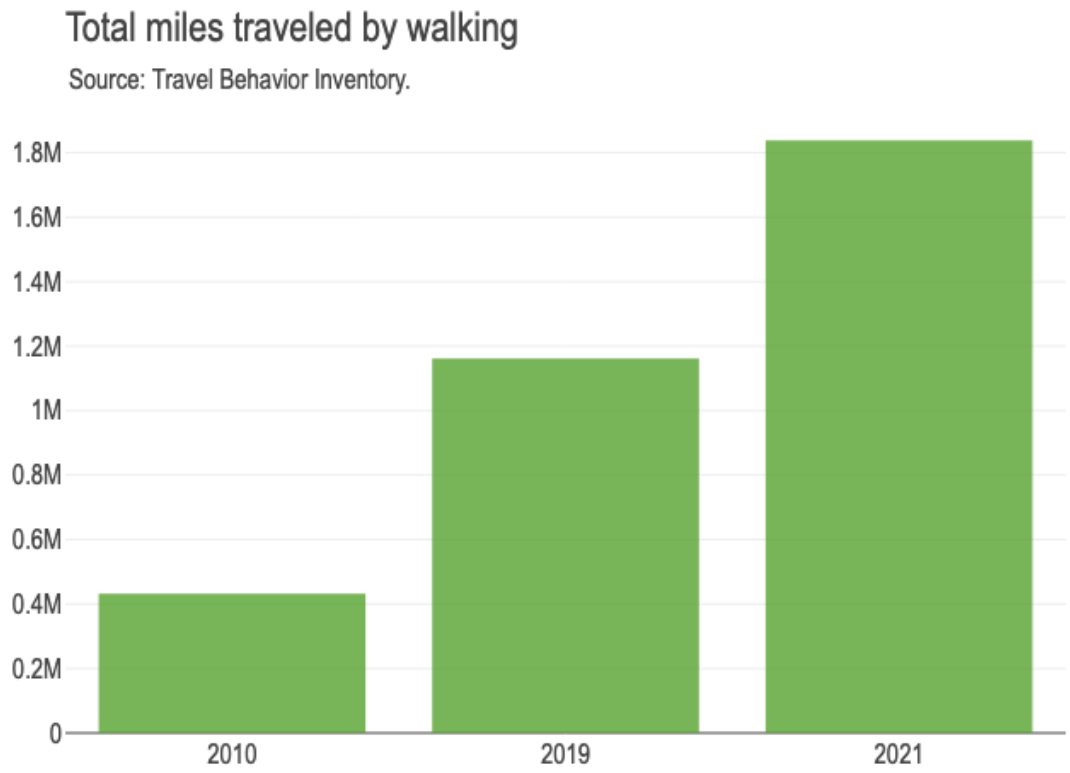
[12] Deriving a total miles traveled measure from the TBI requires some special considerations. While *smartphone*-based surveys collected in 2019 and 2021 collected observed trip distances along the actual path taken by the survey respondents, neither the 2010 TBI nor the phone- and web-based surveys from 2019 and 2021 TBI collected actual travel distances. To standardize across all years and survey types, travel distances for *all* trips were calculated using the Open Source Routing Machine (OSRM), a web-based routing engine. Trip origin and destination coordinates were fed to OSRM, which solved for the shortest-distance path by bike or foot. It is important to know that trip distances calculated in this manner are likely an under-estimated, for two reasons. First, using OSRM necessitates solving for the shortest-path distance, which is not always chosen by those on foot or bicycle owing to other considerations like safety, comfort and enjoyment. Second, survey respondents may not remember or report all of their trips. Walk trips in particular are more likely to be forgotten relative to trips made by driving, transit, and long-distance modes; and short trips like those made by

In contrast, bike miles traveled remained steady from 2010 to 2019, then decreased 17% from 2019 to 2021.

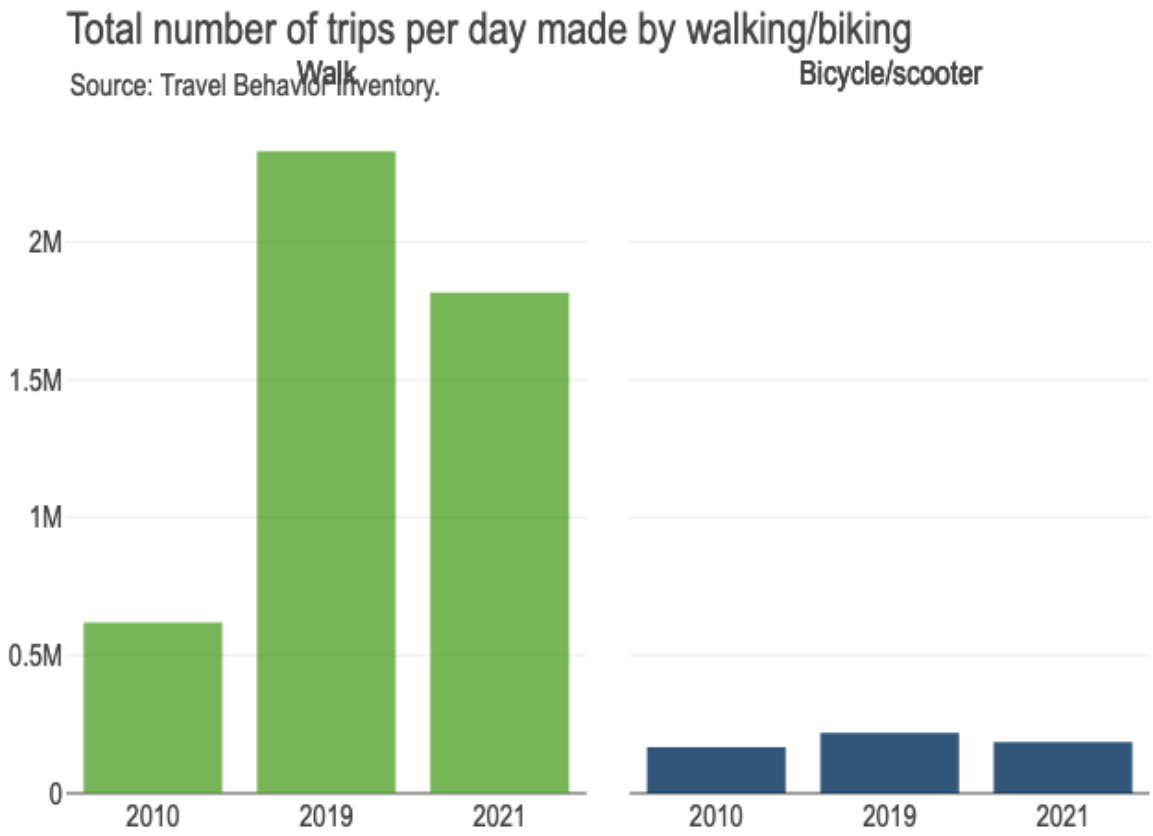
Figure 15.4: Total miles traveled by walking (2010, 2019 and 2021)



The increase in walk miles traveled from 2010 was primarily driven by an increase in the *number* of walk trips, which almost quadrupled from 2010 to 2019. This trend is explainable in part by the use of smartphone-based survey data collection in 2019, which likely improved reporting of short trips and walk trips. The black lines indicate the standard error.

walking are more likely to be forgotten than long trips. Smartphone-based data collection, used in 2019 and 2021, improved collection of walk trips, but no self-reported survey is perfect.

Figure 15.5: Total trips made by walking or biking, 2010, 2019 and 2021. Restricted to trips that start or end within the MPO. Data weighted at the trip level.



From 2019 to 2021, walk miles traveled grew by 58%, even while the total number of walk trips decreased. During this two-year interval, the increase in walk miles traveled was driven primarily by an increase in the typical length of walk trips. Median walk trip distance increased from 0.4 miles per trip in 2019 to 0.6 miles per trip in 2021. Walk trip distance increased the most for trips to school and work. Figure 15.6 shows the median walk trip distance over time. The black lines indicate the standard error.

Figure 15.6: Median walk trip distance by trip purpose type, 2010, 2019 and 2021. Restricted to trips that start or end within the MPO, with trips exceeding the 99th percentile of distance by mode excluded (14.4 miles by bike; 8.4 miles by foot). Data weighted at the trip level.

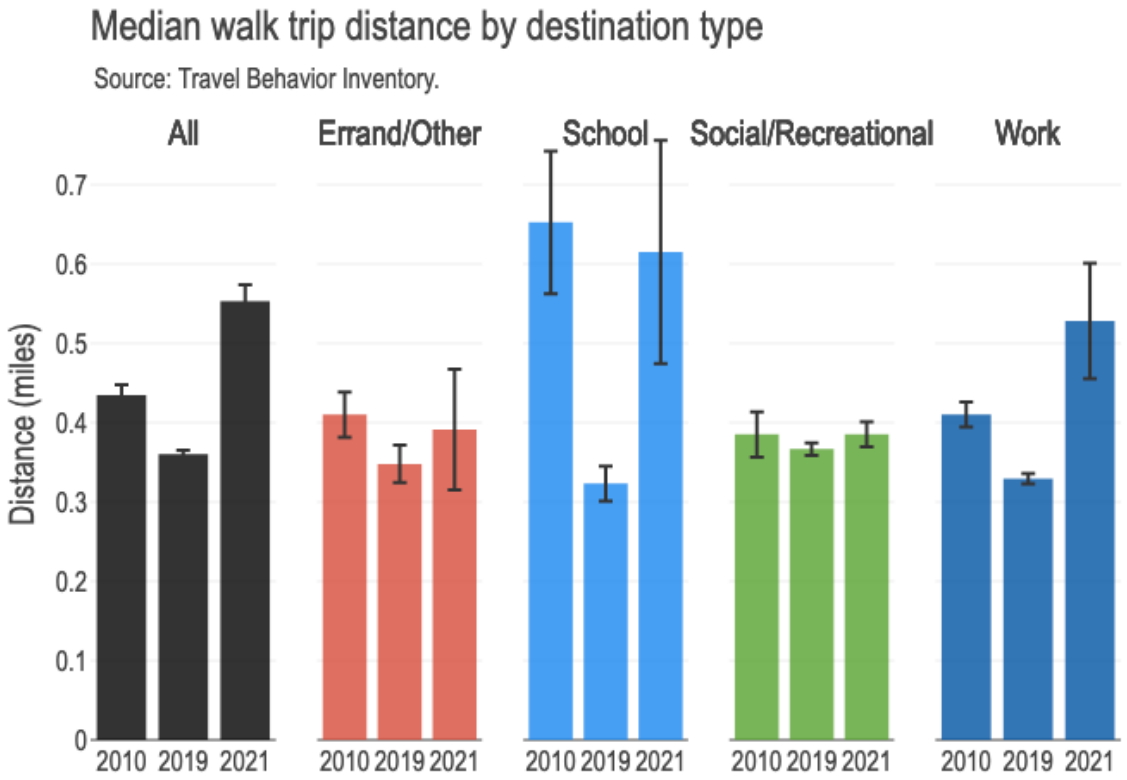
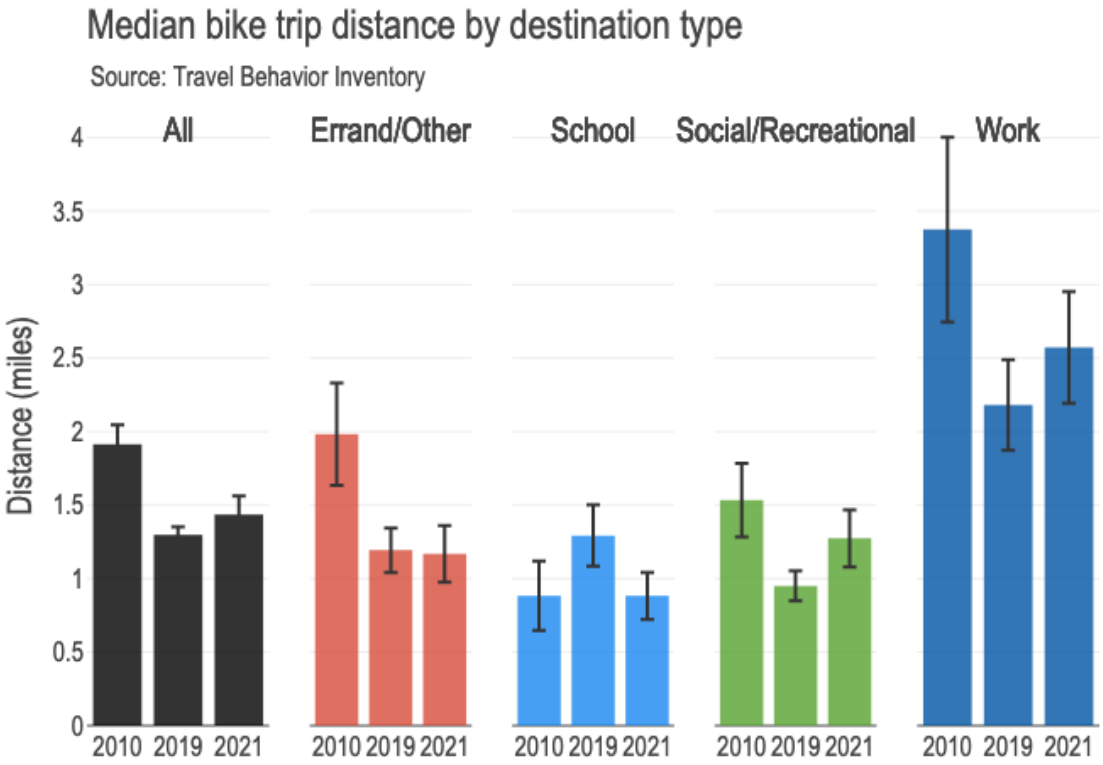

Median walk trip distance by destination type
Source: Travel Behavior Inventory.
All
Errand/Other
School
Social/Recreational
Work
Distance (miles)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
2010 2019 2021

Figure 15.7: Median bike distance by trip purpose type, 2010, 2019 and 2021. Restricted to trips that start or end within the MPO, with trips exceeding the 99th percentile of distance by mode excluded (14.4 miles by bike; 8.4 miles by foot). Data weighted at the trip level.



The reasons for an increase in walk trip length from 2019 to 2021 are unclear. One potential explanation is a reduction in transit service from 2019 to 2021, which could have shifted some walk-to-transit trips to walking alone. Improved capture of children's trips to school in the 2021 survey may also be a contributing factor. Future iterations of the TBI will reveal if this is a lasting trend.

The Travel Behavior Inventory survey suggests that residents are doing more walking, and slightly less bicycling in 2021 than in previous years (2010, 2019). Residents seem to be making slightly fewer, but longer, walk trips.

It is important to note that the uncertainties of survey data – especially for these modes where the sample size is significantly smaller than for dominant auto/driving modes – meaning that these findings should be taken not as a definitive answer, but rather one piece of evidence of increased active travel in the region. Additional years of survey data collection, as well as research by Met Council staff into alternative sources of information surrounding active travel, are crucial to determining whether these data points form a real trend.

15.3 High frequency transit accessibility

Increasing the availability of transit across the region - especially high-frequency transit - is one way to support active travel in the region. Here, we assess transit availability in the region as both the amount of geographic area within a ten-minute walk of transit, and as the population served by transit within a ten-minute walk of home.

We focus on high-frequency transit service, as defined by Metro Transit:

- stops served by routes that depart every 15 minutes or better,
- with at least three stops per hour,
- on weekdays from 6:00 a.m. to 7:00 p.m. and Saturdays from 9:00 a.m. to 6:00 p.m.

An index of the number of stops served by high-frequency routes and which routes are considered high-frequency can be found in Section C.4.

Our data comprise walkshed information from all regional transit agencies except Minnesota Valley Transit Authority (MVTA), which does not provide high-frequency transit.

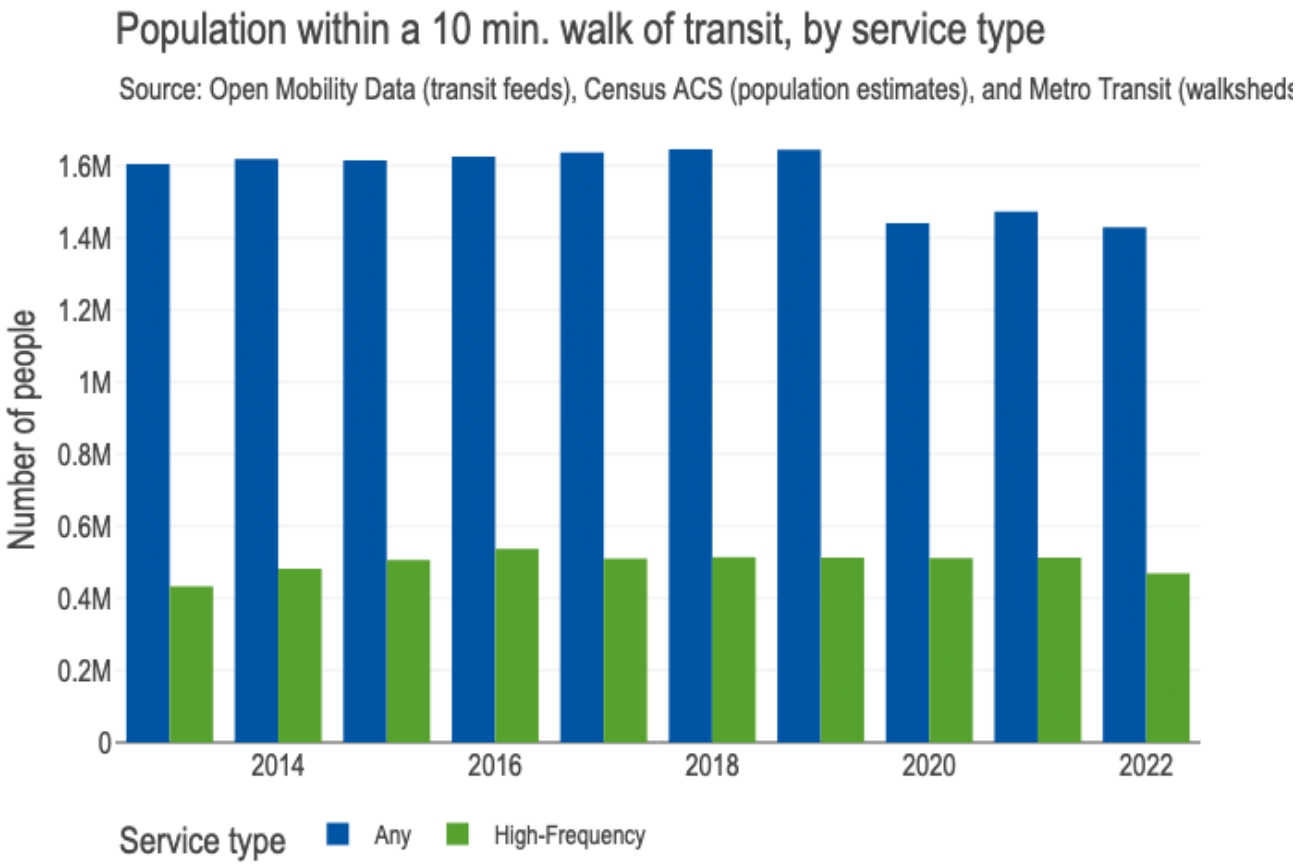
Figure 15.8 shows the areas served by high-frequency transit in 2016 (yellow) and 2022 (green). You can choose different years to view by clicking on the check boxes in the legend. High-frequency service is clustered in the downtown areas of Minneapolis and Saint Paul, as well as along the I-94 corridor between these two cities. A handful of areas in the north and south suburbs also appear, where transit service stations are located.

Figure 15.8: Map of high-frequency transit walksheds, by year (2013-2022)

The map reveals a few changes from 2016 to 2022, especially where some core local routes in Roseville and northern Saint Paul were reduced to less frequent service (the 62 and 65). These two routes in particular were supported with greater frequency in the years after the Green Line construction (2014-2016), with the hope that riders would use the lines to access the Green Line. Frequency was scaled back when ridership did not respond as hoped. Also apparent on the map are areas where express routes through Richfield and Edina were reduced or eliminated (the 515, 540, and 542) following driver shortages and ridership declines during COVID-19 pandemic.

Transit can operate most efficiently when it serves areas where people live, work and shop close to one another in dense communities. In our region, the percent of geographic area served by high-frequency transit has remained mostly flat since 2013, ranging between 2 and 2.5%. Meanwhile, the percent of area served by any transit at all has declined markedly in COVID-19, from 14% in 2019 to 11% in 2022. These diverging trends by service type speak to the need to continue supporting transit in their core market areas.

Figure 15.9: Share of geographic area of MPO within a ten-minute walk of transit, by service type, 2013-2022.

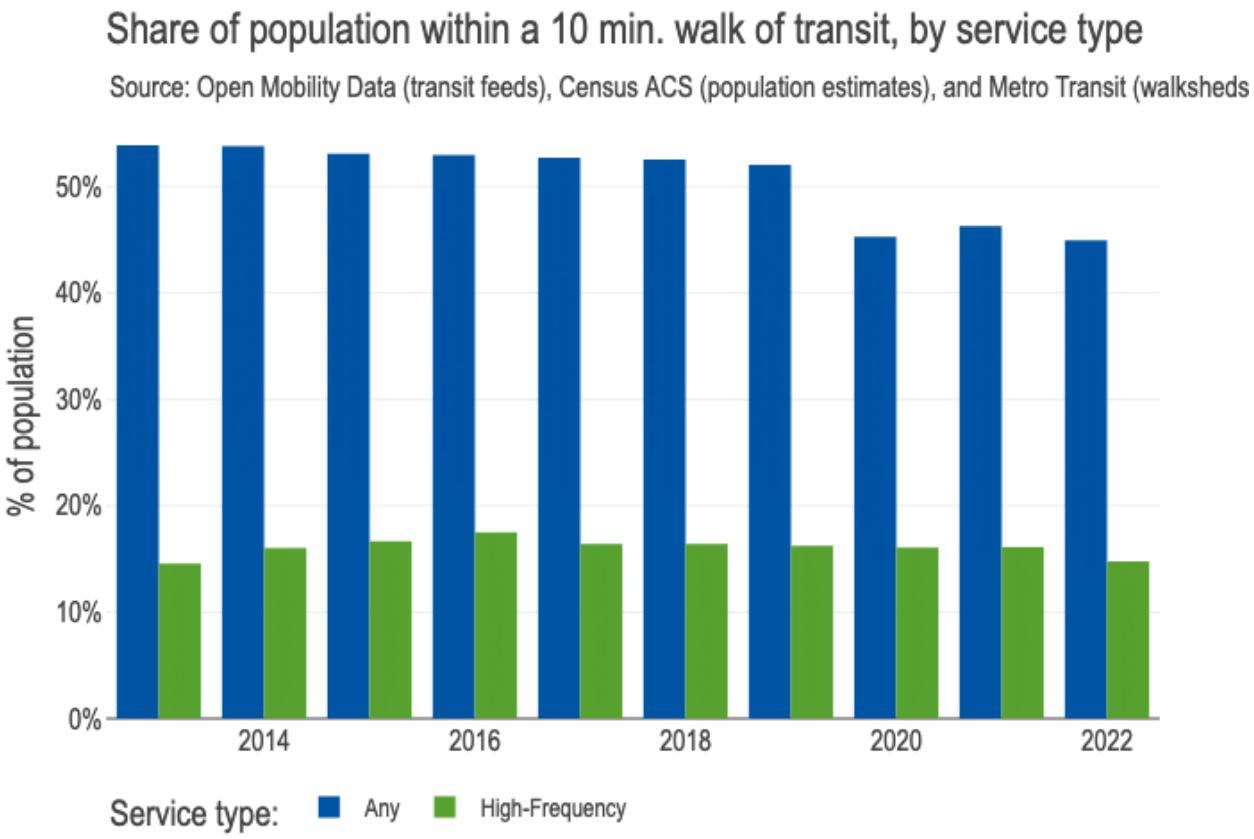


Transit availability can be improved in a few ways

1. Encouraging population growth within well-served areas (i.e., increasing the density of jobs and homes)
2. Expanding service into new areas
3. Improving frequency of existing transit routes.

As of 2022, roughly 15% of the region's population lived in that small slice of area (2% of the region's area) served by high frequency transit.

Figure 15.10: Share of population within a ten-minute walk of transit, by service type, 2013-2022.



The share of the regional population that can reach the high-frequency network within a ten-minute walk has been relatively flat since 2013, varying within a few percentage points (15%-18%). The peak of high-frequency transit availability by this measure occurred in 2016: 18% of residents in the region could reach high-frequency transit within a ten-minute walk.

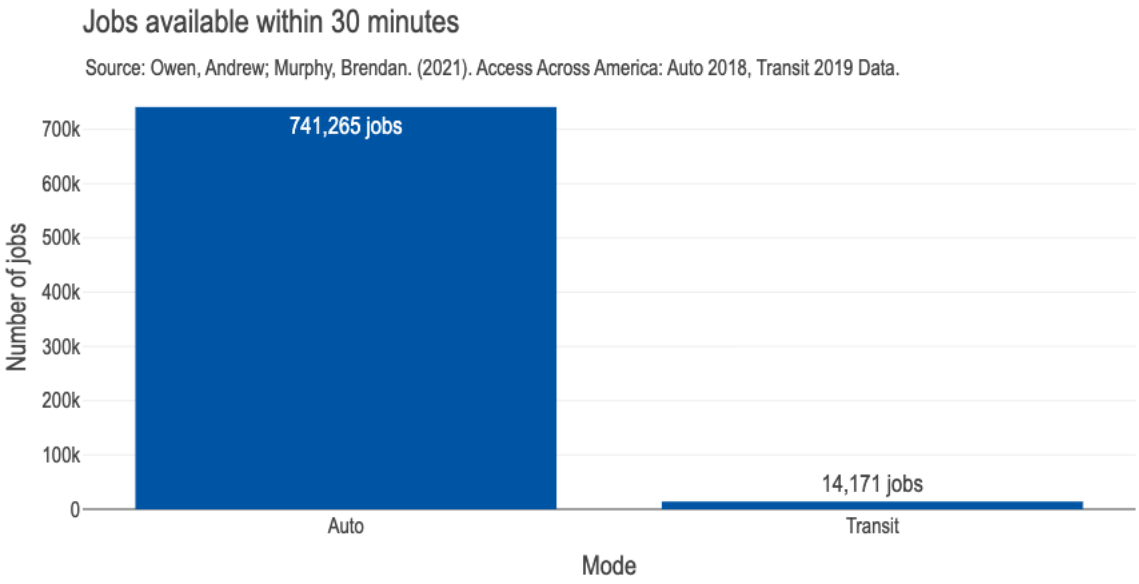
Today roughly one in seven residents have access to the kind of service that could allow a person to build a full life around public transit service. This number has been relatively flat for the last decade. This speaks to the regional prioritization of preserving core high-frequency service in the face of COVID-19 and driver shortages, while also suggesting that significant investment and changes to development strategies will be needed to increase transit availability in any meaningful way going forward.

15.4 Access to employment driving vs. transit

In the Twin Cities, the number of employment opportunities accessible by traveling in a private automobile is several magnitudes greater than the number of employment opportunities accessible traveling using public transportation; 741,265 jobs on average are accessible within 30 minutes to those traveling by private automobile in the Twin Cities (Murphy and Owen 2020), compared to only 14,171 jobs being accessible within 30 minutes by those traveling by public transportation (Murphy and Owen 2021).

The probability that a Twin Cities' residents' place of employment is within 30 minutes using automobile versus public transportation is evident when looking at the mode share of how people commute in the Twin Cities with 78% (+/- 1%) of work trips by automobile (Travel Behavior Inventory, 2021).

Figure 15.11: Number of jobs available by auto and by transit within 30 minutes. Departure time 8:00 a.m. for auto, average of 7:00 a.m. to 9:00 a.m. for transit.



Guiding 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

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

Strategies summarized

- The Met Council will partner with local governments responsible for planning and implementing the land use and local infrastructure needed to support Thrive MSP 2040. Local governments will prepare comprehensive plans that address the policies in Thrive MSP 2040 and system plans.
- The plan emphasizes the importance of job concentrations and nodes along transportation corridors and the need for local governments to plan for more dense development and diverse uses especially in these areas. The plan also emphasizes the importance of freight terminals and corridors, and their relationship to land use planning.
- The plan will ensure that local government land use policies allow for the creation of livable communities that support stewardship and sustainability of the transportation system, and the prosperity and livability of our region. This includes:
    - Planning and implementing an ample system of interconnected local highways and streets
    - Supporting higher expectations for land use around transit stations
    - Including bicycle and pedestrian elements, and supportive tools, in comprehensive plans
    - Planning for the long-term needs of freight modes such as trucks, barges, and railroads
    - Balancing the needs of the aviation system with local land use decisions

The intersection of land use, urban form, and the transportation system shapes the effectiveness of transportation investments. To guide our growth equitably, efficiently, and sustainably, the Met Council continues to collaborate with communities on local plans that support development and growth in ways that both meet community needs as well as the vision of Thrive MSP 2040.

Partnerships expand beyond local communities to MnDOT and other transportation partners. These relationships create sustainable stewardship of our natural, cultural, and fiscal resources.

16. Encourage land use design that integrates highways, streets, transit, walking, and bicycling.

Encourage local land use design that integrates highways, streets, transit, walking, and bicycling.

16.1 Livable Communities Act (LCA) funding

At the Met Council, there are several different grant programs within the Livable Communities Act (LCA). These programs are meant to create more housing choice, support living wage jobs, improve connectivity, and achieve more equitable development outcomes. Table 16.2 shows the scoring criteria that are related to transportation, access, or connectivity for the LCA development programs.

Table 16.1: Livable Communities Act (LCA) program summaries.

PROGRAM	PROGRAM DESCRIPTION	AVAILABLE FUNDING (2022)
Livable Communities Demonstration Account (LCDA)	Support development and redevelopment projects that link housing, jobs and services and use community and regional infrastructure efficiently	$9 million
Transit Oriented Development (TOD)	Grants focused on high density projects that contribute to a mix of uses in TOD-eligible areas. TOD-eligible areas can be along light rail, commuter rail, bus rapid transit, and high frequency bus corridors.	$5 million
Pre-development	Pre-development grants are for teams who are defining or redefining a project that will support Livable Communities and Thrive MSP 2040 goals.	$2 million (includes policy development)
Policy Development	Provides funding to participating cities to support locally adopted policies that influence physical development and further both LCA and Thrive MSP 2040 goals with an emphasis on equitable development	$50,000 max per city
Tax Base Revitalization Account - Clean-Up (TBRA-Clean-Up)	TBRA grants support redevelopment that eliminates or reduces the risk from contamination, increases the tax base, and creates or preserve jobs or affordable housing; clean up grants are intended for projects that have completed environmental site investigation or abatement assessment and seek public funding to assist with cost of implementing clean up or abatement plan	$2.375 million
Tax Base Revitalization Account - Site Investigation (TBRA Site)	Intended for redevelopment sites with suspected or perceived contamination and are seeking public funding to determine the scope and severity of the contamination and to develop a clean up plan for a specific project	$125,000
Tax Base Revitalization Account - Seeding	SEED grants are for sites within equitable development areas, that show potential for job	$500,000

Equitable Environmental Development (TBRA-SEED)	creation or housing development but do not have a specific redevelopment project in progress, and are seeking public funding for site investigation, partial cleanup, or both	
Local Housing Incentives Account (LHIA) - Affordable Housing	Helps expand and preserve lifecycle and affordable housing, both rented and owned	$3.5 million
Local Housing Incentives Account (LHIA) - Affordable Homeownership	Pilot provides grants to support affordable homeownership development, including acquistion and rehabilitation	TBD

Table 16.2: LCA programs, scoring criteria related to transportation, and percent of scoring related to transportation.

AREA	SCORING CRITERIA RELATED TO TRANSPORTATION	PERCENT OF OVERALL SCORING RELATED TO TRANSPORTATION
Livable Communities Demonstration Account (LCDA)		
Step 1	Increase density or intensity of land use on the site or in the project area if new construction OR preserve land use and density on the site or in the project area in a way that uses an existing building more efficiently	14%
-	Take advantage of available connection between housing, jobs, services and amenities across the region using existing and planned transit and transportation systems	-
Step 2	Provide design-led strategies that support or expand infrastructure for people to walk, bike, or use other kinds of transportation in or around the project site	17%
-	Catalyze or position the station area for additional transit-oriented development in a way that leverages public infrastructure	-
Transit Oriented Development (TOD)		

Step 1	Increase the level of station area activity through greater density or intensity of land use	26%
-	Increase the diversity of uses and activities and/or access to services and amenities in the transit corridor and station area	-
-	Take advantage of available connections between housing, jobs, services, resources and amenities across the region using existing and planned transit and/or transportation systems	-
-	Generate transit ridership, a higher diversity of trip purposes via transit, and reduce the need to use and own a personal vehicle	-
-	Further the transit-oriented nature of the station area as a node and/or district of TOD priority for projects that implement part of a broader adopted plan or vision for the transit station or corridor	-
Step 2	Provide design-led strategies that support or expand infrastructure for people to walk, bike, or use other kinds of transportation in or around the project site	22%
-	Catalyze or position the station area for additional transit-oriented development in a way that leverages public infrastructure	-
Pre-development		
-	Intensify land uses on the site and take advantage of connections between housing, jobs and services and amenities across the region and in the project area, including accessibility and universal design	31%
-	Minimize climate impact by reducing greenhouse gas emissions and conserving natural resources	-
Policy Development		
-	Intensify and increase density of land uses that better support multimodal transportation and connections between jobs, housing and amenities	50%

-	Minimize climate impact by reducing greenhouse gas emissions and conserving natural resources	-
Tax Base Revitalization Account - Clean-Up (TBRA-Clean-Up)		
-	Increase the use of transit and alternatives such as walking or biking	13%
Tax Base Revitalization Account - Site Investigation (TBRA Site)		
-	Increase the use of transit and alternatives such as walking or biking	21%
Tax Base Revitalization Account - Seeding Equitable Environmental Development (TBRA-SEED)		
-	Potential to increase the use of transit and alternatives such as walking or biking	29%
Local Housing Incentives Account (LHIA)		
Affordable Housing	No transportation related criteria	0%
Affordable Homeownership	No transportation related criteria	0%

These criteria indicate that transportation and connectivity are important considerations when awarding LCA funds. In 2021, the scoring criteria were expanded to become more flexible, meaning fewer measures that directly mention transportation. However, this broader scoring process allows for a wider diversity of applications and a greater focus on equity that is not necessarily represented in the table above.

17. Focus regional growth in areas that support multimodal travel

Focus regional growth in areas that support the full range of multimodal travel.

17.1 Community comprehensive plans with multimodal transportation

The Met Council is the regional planning agency charged with planning and coordinating the growth and development of the seven-county metropolitan area. While local governments focus on planning for their communities, the Met Council is responsible for regional services that communities need. The two coordinate their efforts by taking part in a process of plan-making, negotiations, and final review of the local plans by the Met Council.

State law (*Minnesota Statutes: Comprehensive Plans; Local Governmental Units* 2022) requires the Met Council to create regional plans and policies to guide growth and manage regional systems for transportation, aviation, water resources, and regional parks. The law also requires local governments to update their comprehensive plans.

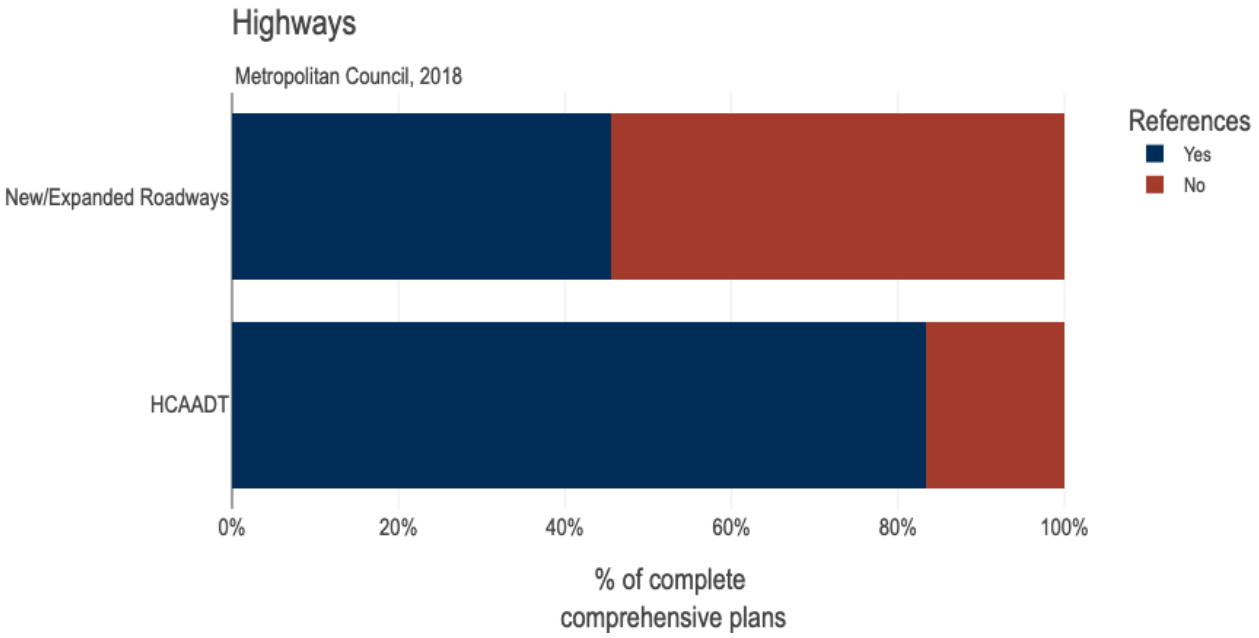
Under the law, the Met Council reviews local comprehensive plans to ensure they are in accord with the overall framework provided by the regional plans. The review helps determine how a community's planned actions relate to the interests of the whole region over the long term. It helps ensure that costly public infrastructure, like roads and sewers, are built in an economical and coordinated fashion, so that user fees and tax dollars are spent wisely.

Once the Met Council completes the review process for a comprehensive plan or amendment, the local government can implement it through zoning ordinances, capital budgets for public improvements, and other actions.

In April 2021, Met Council staff conducted an analysis of 66 completed comprehensive plans compiled the resulting transportation related policies, like those that include transit, bike, or pedestrian supportive policies or strategies.

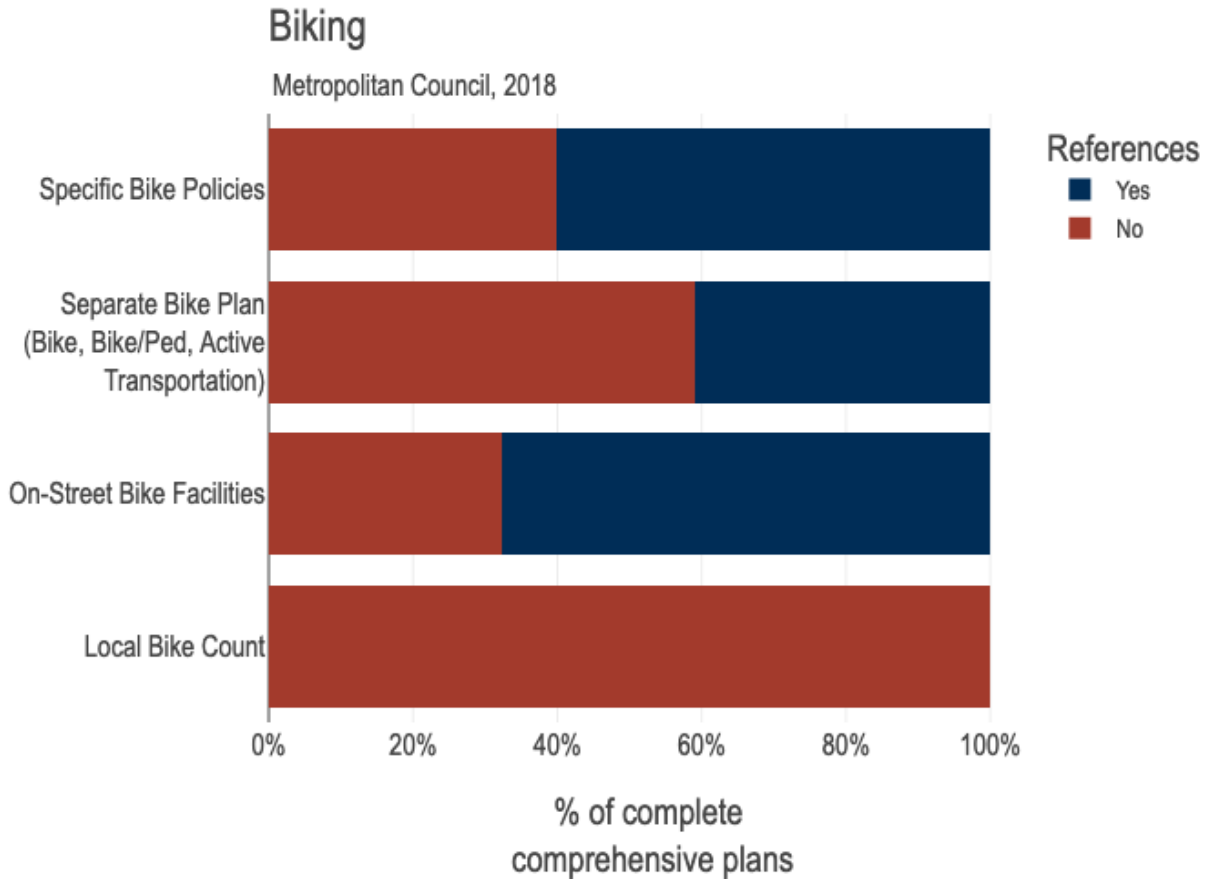
Around half of regional comprehensive plans mention new or expanded roadways. Most communities included counts of Heavy Commercial Annual Average Daily Traffic (HCAADT).

Figure 17.1: Percent of completed community comprehensive plans that include specific references to new or expanded roadways or heavy-commercial average annual daily traffic.



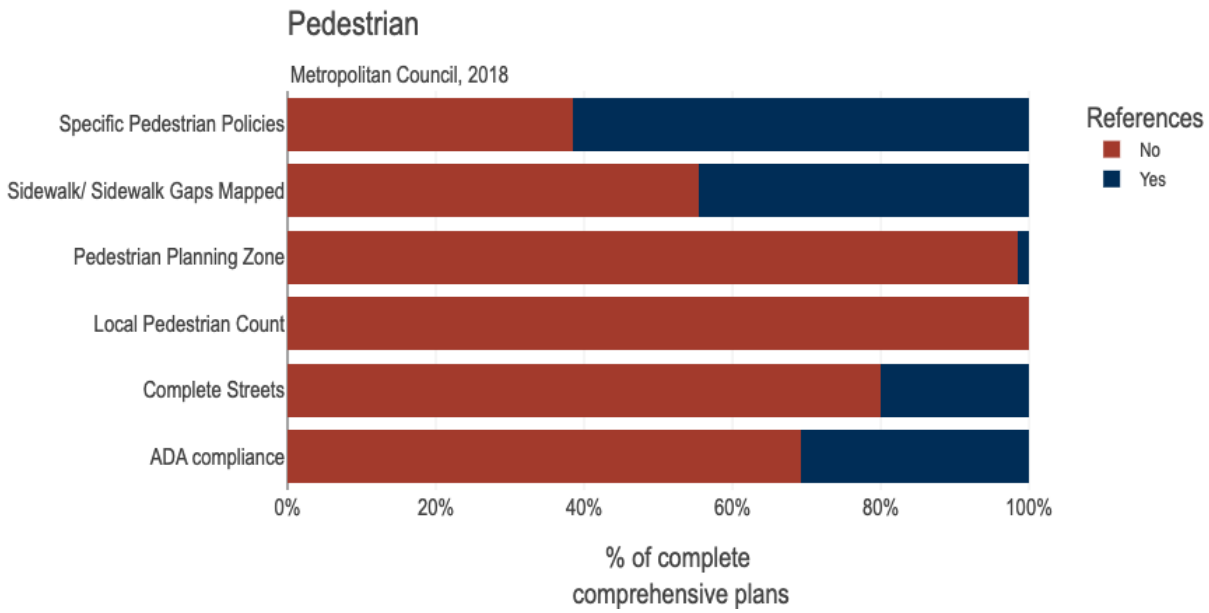
A majority of communities in the Twin Cities account for bicycle travel in one way or another in their comprehensive plans but there is little sense as to how residents are actually using bicycle facilities. Over half of plans have specific bicycle policies and an inventory of on-street bicycle facilities. Approximately one-third of communities have a separate bicycle plan. No communities' comprehensive plan included a count of bicycle traffic.

Figure 17.2: Percent of completed community comprehensive plans that include specific bike policies, separate plans for biking or active transportation, on street bike facilities, or local bike counts.



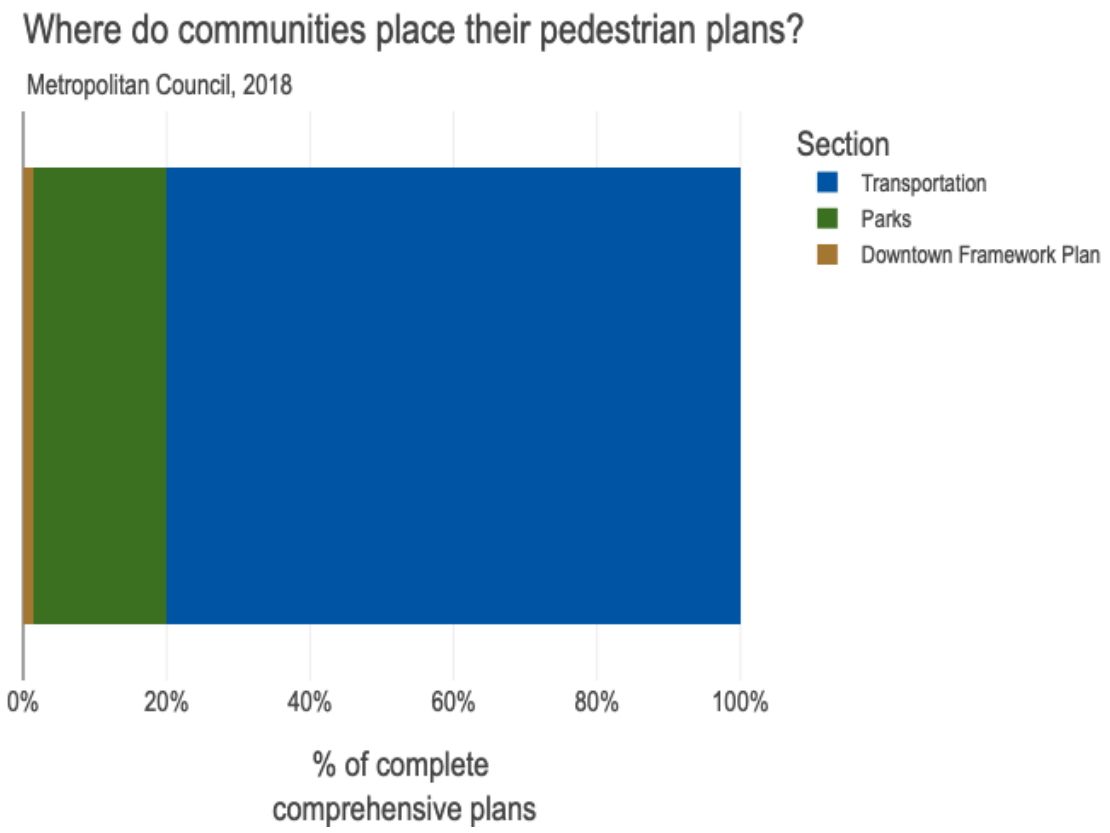
A similar pattern is found with pedestrian planning found in the region's comprehensive plans, with pedestrians being considered by over half of communities, but little knowledge of how residents are actually using pedestrian facilities. Over half of communities have specific pedestrian policies, slightly less than half include sidewalk and sidewalk gap mapping, very few have pedestrian planning zones, none have local pedestrian counts, and less than a quarter incorporate complete streets principles or address American Disability Act (ADA) compliance.

Figure 17.3: Percent of completed community comprehensive plans that include specific pedestrian policies, sidewalk and sidewalk gap mapping, pedestrian planning zones, local pedestrian counts, complete streets, or ADA compliance.



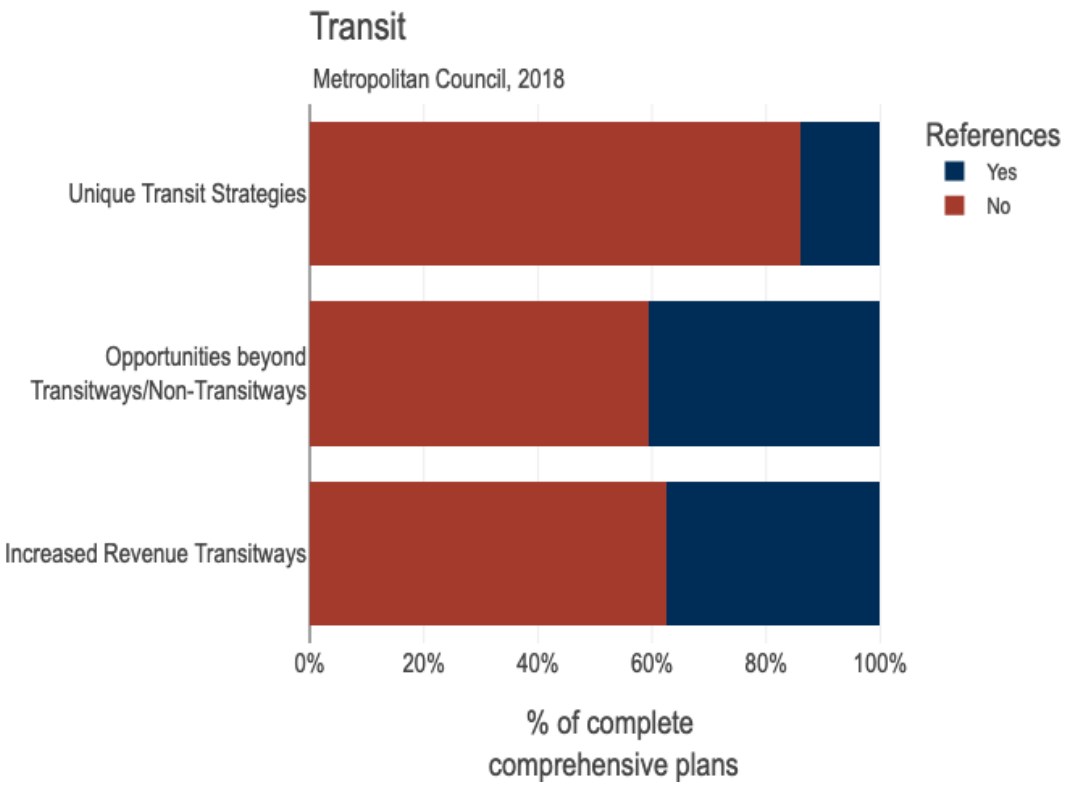
Planning for pedestrians typically occurs in a comprehensive plans' transportation chapter, less than a quarter of communities plan for pedestrians in the context of their park plans.

Figure 17.4: Percent of completed community comprehensive plans that include pedestrian planning in specific sections, like transportation, parks, or downtown framework plans.



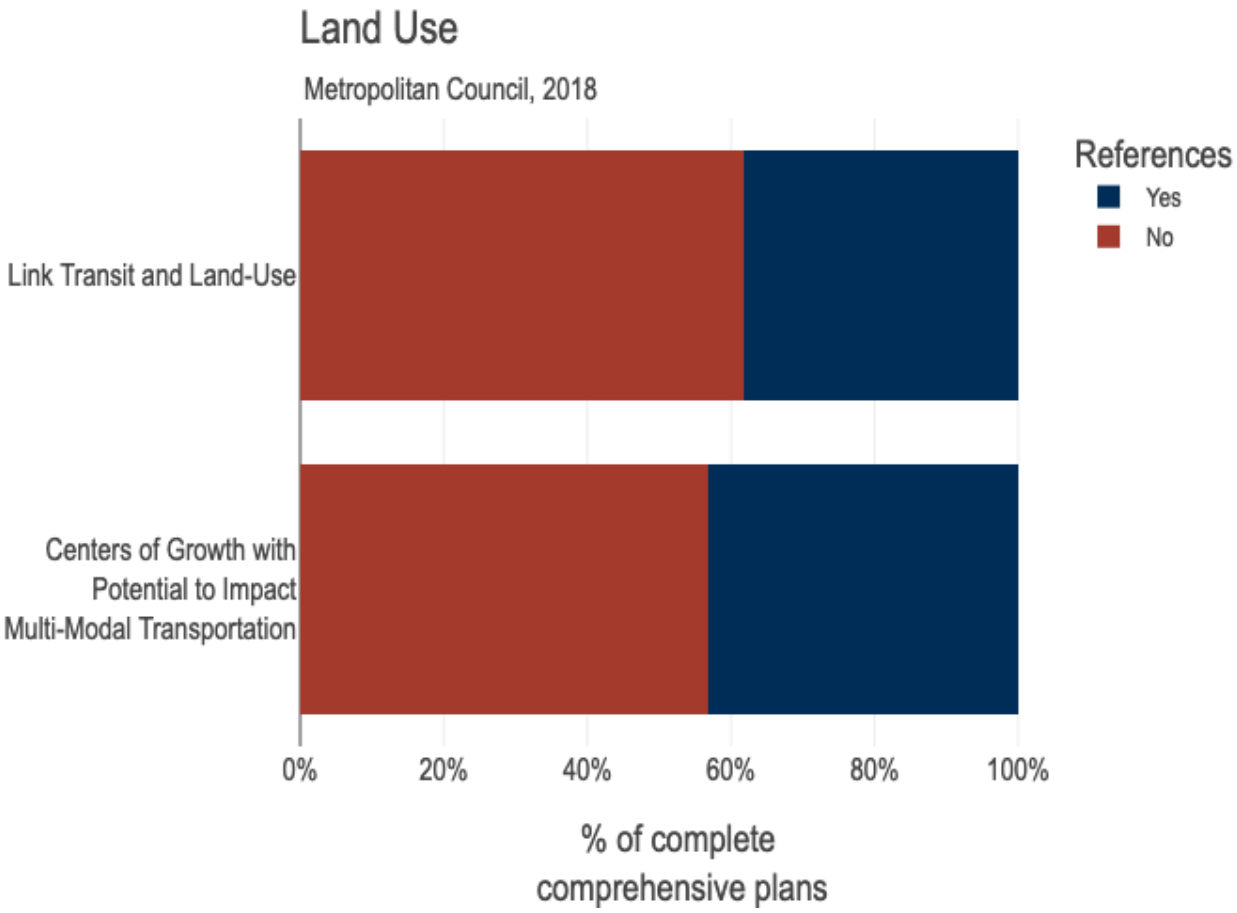
Communities vary in the degree to which they considered transit in their comprehensive plans. Slightly less than half of communities pursued opportunities beyond transitways and/or referenced transitways that were included in the increased revenue scenario.

Figure 17.5: Percent of completed community comprehensive plans that include unique transit strategies, opportunities beyond transitways or non-transitways, or increased revenue transitways.



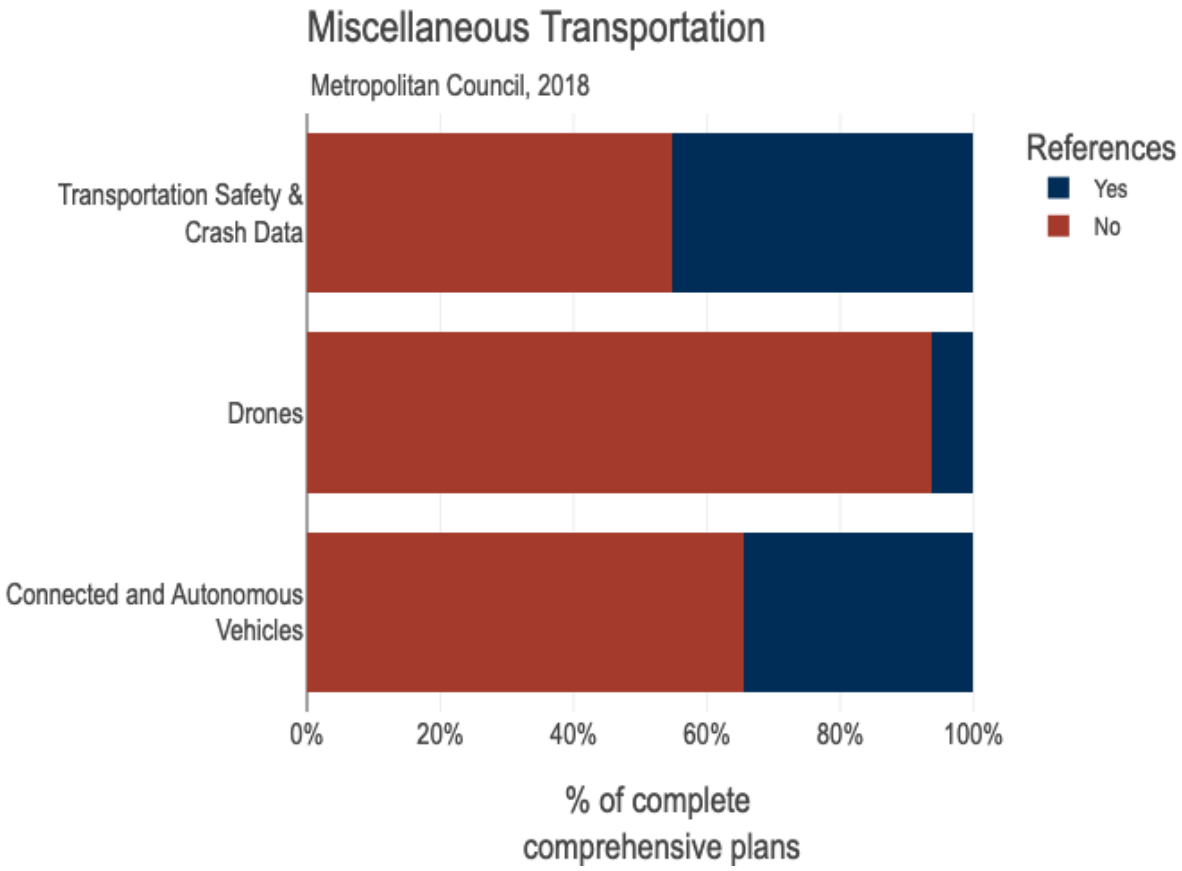
Slightly less than half of communities discuss linkage between transit service and land use within their plans and/or discuss the potential impact of centers of growth on multi-modal transportation.

Figure 17.6: Percent of completed community comprehensive plans that link transit and land use or plan for centers of growth with potential to impact multimodal transportation.



Roughly half of completed comprehensive plans discuss transportation safety and/or crash data. Connected and autonomous vehicles are an emerging theme, appearing in about one third of comprehensive plans. Drones are considered in few plans.

Figure 17.7: Percent of completed community comprehensive plans that include references to transportation safety and crash data, drones, or connected and autonomous vehicles.



18. Maintain adeqate highway, riverfront, and rail accessible land

Maintain adequate highway, riverfront, and rail - accessible land to meet existing and future demand for freight movement.

18.1 Industrial land near river and rail freight

The total acreage of land tax-classified or in use as industrial and near river or rail freight has increased consistently since 2005. Most of this growth is due to the changing tax-classification of land that is/was undeveloped or farmland or commercial land.

Figure 18.1: Acres of land tax-classified or in use as industrial within 1/4 mile of a river port facility, a DOT-listed dock, an intermodal rail facility, or anywhere along a class 2-3 rail line.

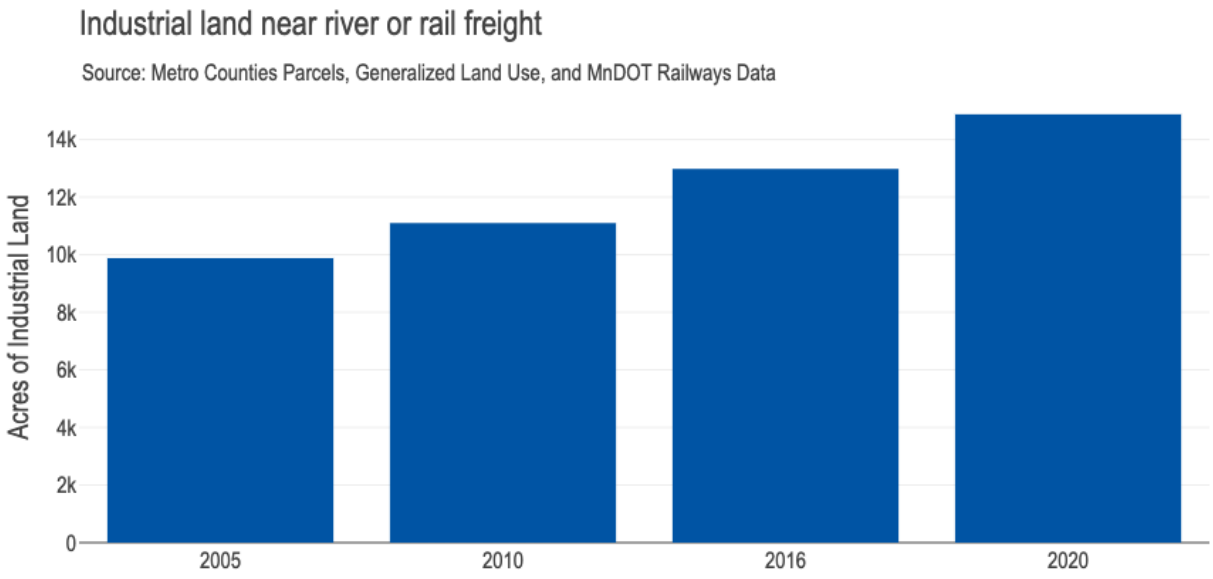


Table 18.1: Acres of land tax-classified or in use as industrial within 1/4 mile of a river port facility, a DOT-listed dock, an intermodal rail facility, or anywhere along a class 2-3 rail line.

YEAR	ACRES OF INDUSTRIAL LAND
2005	9,881
2010	11,098
2016	12,979
2020	14,874

Appendices

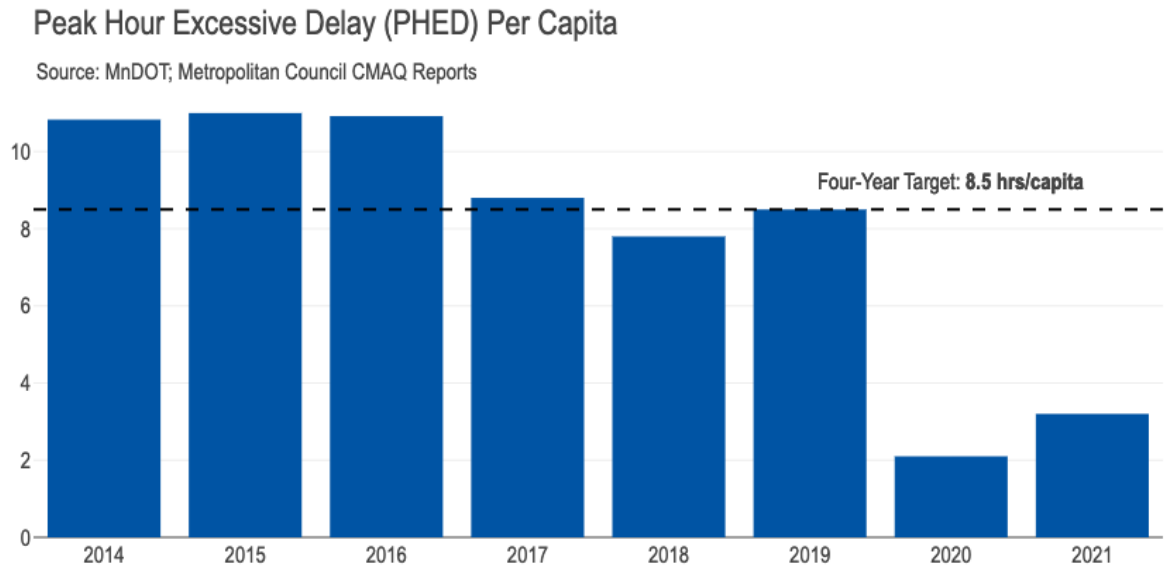
Appendix A — Peak Hour Excessive Delay

The Minnesota Department of Transportation tabulates Peak Hour Excessive Delay (PHED) measures for the region. These measures are reported in the Met Council's Congestion Mitigation and Air Quality (CMAQ) reports required by federal code 23 USC 149. This biennial report provides an assessment of the region's progress towards its 2- and 4-year targets established in the 2018 CMAQ Baseline Performance Report.

Data shown below are compiled from 2018, 2020, and 2022 CMAQ reports. Peak hour excessive delay per capita declined in the region from 2016 to 2017, and more precipitously from 2019 to 2020. In the most recent year of reporting (2021), PHED per capita was 3.2 hours per capita, well below the four-year target of 8.5 hours per capita established in the 2018 CMAQ baseline performance report.

To learn more about performance based planning measures, see Section C.3.

Figure A.1: Peak Hour Excessive Delay (PHED) Per Capita



Appendix B — Acronyms and Glossary

Table B.1: Commonly used acronyms

ACRONYM	DEFINITION
ADA	Americans with Disabilities Act
BEV	Battery Electric Vehicle
BRT	Bus Rapid Transit
CAV	Connected and Automated Vehicles
CMAQ	Congestion Mitigation and Air Quality
CSAH	County State Aid Highway
CTS	Center for Transportation Studies
EPA	Environmental Protection Agency
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FAST Act	Fixing America's Surface Transportation Act
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
GDP	Gross Domestic Product
HOV	High Occupancy Vehicle
HSIP	Highway Safety Improvement Program
LRT	Light Rail Transit
MAC	Metropolitan Airports Commission
MPCA	Minnesota Pollution Control Agency
MPO	Metropolitan Planning Organization
MTS	Metropolitan Transportation Services
MnDOT	Minnesota Department of Transportation
NAICS	North American Industry Classification System
NHS	National Highway System

NTD	National Transit Database
PCI	Pavement Condition Index
PHED	Peak Hour Excessive Delay
PHEV	Plug-in Hybrid Electric Vehicle
RBTN	Regional Bicycle Transportation Network
TAB	Transportation Advisory Board
TAC	Technical Advisory Committee to the TAB
TBI	Travel Behavior Inventory
TOD	Transit Oriented Development
TTI	Texas Transportation Institute
VRM	Vehicle Revenue Miles

Table B.2: Glossary

TERM	DEFINITION
Annual Average Daily Traffic (AADT)	The roadway estimates of total vehicles on a road segment on any given day of the year (all directions of travel). This represents the total number of vehicles per year divided by 365 and is developed using factors to adjust for season, day of the week, and vehicle type.
Bicycle Level of Traffic Stress	Developed by the University of Minnesota Accessibility Observatory, the Bicycle Level of Traffic Stress (LTS) evaluation is a method for classifying street segments' suitability for bicycling based on the physical characteristics of the roadway, such as speed limits, lane configurations, and the types of bicycle facilities present, if any. A value of 1 (lowest stress) to 4 (highest stress) is assigned to each street segment based on these characteristics. In this study, roadway characteristics are determined by street segment tag data in the OpenStreetMap network data used for routing computations. We define the LTS 1 network as 'lowest-stress', LTS 2 network as 'low-stress', the LTS 3 network as 'medium-stress', and the LTS 4 network as the 'open streets' network — i.e. if a person feels comfortable riding a bicycle on all streets (except limited-access highways, such as interstates and freeways), including arterials, they would experience 'open streets' access.
Heavy Commercial Annual Average Daily Traffic (HCAADT)	The roadway estimates of heavy commercial vehicles along a specific segment of roadway (all directions of travel) on any day of the year. This estimate represents the total number of heavy commercial vehicles per year, divided by 365, and includes factors adjusting for seasons.
High Frequency Transit Network	Stops served by routes that depart every 15 minutes or better, with at least three stops per hour, on weekdays from 6:00 AM to 7:00 PM and Saturdays from 9:00 AM to 6:00 PM within the Twin Cities Metropolitan area
Real GDP	Real gross domestic product is an inflation-adjusted measure of each area's gross product that is based on national prices for the goods and services produced within the area.
Travel Time Index	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 (6 to 10 a.m. and 3 to 7 p.m.) than in off-peak conditions, when the motorist could travel at free-flow speeds.

B.1 Additional resources

B.1.1 MnDOT Transportation Data and Analysis (TDA) Glossary

MnDOT maintains a glossary of transportation terms. The glossary can be found on the MnDOT website.

B.1.2 Transit

The Federal Transit Administration (FTA) National Transit Database (NTD) maintains a comprehensive glossary of transit terms and measures. The glossary can be found on the NTD website.

B.1.3 Safety

The National Highway Transit Safety Administration (NHTSA) operates the Fatality Analysis Reporting System (FARS), a nationwide census providing NHTSA, Congress and the American public yearly data regarding fatal injuries suffered in motor vehicle traffic crashes. Data in this report was downloaded directly from the FTP site. Learn more on the NHTSA website.

B.1.4 Environment and Climate

Environmental Protection Agency (EPA) National Ambient Air Quality Standards (NAAQS) are kept up to date on the EPA website.

The Minnesota Pollution Control Agency (MPCA) produces an annual report, “The air we breathe: The state of Minnesota’s air quality”. The report is available on the MPCA website.

Appendix C — Supplementary Tables

C.1 Cost of traffic injuries and fatalities

Cost of traffic serious injuries and fatalities come from a MnDOT analysis of comprehensive crash costs (Office of Transportation System Management 2022), as part of the state's Benefit-Cost Analysis for Transportation Projects. The most likely values reflect Minnesota's recent (three-year) crash history and procedures contained in Federal Highway Administration's Crash Costs for Highway Safety Analysis (Harmon, Bahar, and Gross 2018) published January 2018, with comprehensive crash cost valuation consisting of both economic/monetary impacts (e.g. medical services, insurance claims processing, legal fees) and estimates of the intangible effects from diminished quality of life following injury crashes. Low/high crash cost dispersion is taken from the range of uncertainty for the value of a statistical life found in U.S. Department of Transportation's "Departmental Guidance: Treatment of the Value of Preventing Fatalities and Injuries in Preparing Economic Analyses" (USDOT 2021) published March 2021.

Table C.1: Per-crash comprehensive costs.

SEVERITY	COST PER CRASH
Deaths	$13,600,000
Serious Injuries	$750,000
Minor Injuries	$230,000
Possible Injuries	$120,000
No Injury (Property Damage Only)	$13,000

Source: MnDOT Office of Transportation System Management.

C.2 National Ambient Air Quality Standards (NAAQS)

The Clean Air Act, which was last amended in 1990, requires EPA to set National Ambient Air Quality Standards (40 CFR part 50) for six principal pollutants ("criteria" air pollutants) which can be harmful to public health and the environment. The Clean Air Act identifies two types of national ambient air quality standards. **Primary standards** provide public health protection, including protecting the health of sensitive populations such as people who have asthma, children, and the elderly. **Secondary standards** provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

Periodically, the standards are reviewed and sometimes may be revised, establishing new standards. The most recently established standards are listed below. In some areas of the U.S., certain regulatory requirements may also remain for implementation of previously established standards.

Units of measure for the standards are parts per million (ppm) by volume, parts per billion (ppb) by volume, and micrograms per cubic meter of air ($\mu g/m^3$).

The NAAQS table in Table C.2 are used for Figure 14.1.

Table C.2.1: National Ambient Air Quality Standards

POLLUTANT	PRIMARY/SECONDARY	AVERAGING TIME	LEVEL	FORM
CARBON MONOXIDE (CO)	primary	8 hours	9 ppm	Not to be exceeded more than once per year
CARBON MONOXIDE (CO)	primary	1 hour	35 ppm	Not to be exceeded more than once per year
LEAD (PB)	primary and secondary	Rolling 3 month average	0.15 µg/m³[13]	Not to be exceeded
NITROGEN DIOXIDE (NO_2)	primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
NITROGEN DIOXIDE (NO_2)	primary and secondary	1 year	53 ppb[14]	Annual Mean
OZONE (O_3)	primary and secondary	8 hours	0.070 ppm [15]	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
$PM_{2.5}$	primary	1 year	12.0 µg/m³	annual mean, averaged over 3 years
$PM_{2.5}$	secondary	1 year	15.0 µg/m³	annual mean, averaged over 3 years
$PM_{2.5}$	primary and secondary	24 hours	35 µg/m³	98th percentile, averaged over 3 years
PM_{10}	primary and secondary	24 hours	150 µg/m³	Not to be exceeded more than once per year on average over 3 years
SULFUR DIOXIDE (SO_2)	primary	1 hour	75 ppb *16*	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years

[13] In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m³ as a calendar quarter average) also remain in effect.
[14] The level of the annual NO_2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.
[15] Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O_3 standards are not revoked and remain in effect for designated areas. Additionally, some areas may have certain continuing implementation obligations under the prior revoked 1-hour (1979) and 8-hour (1997) O_3 standards.
[16] The previous SO_2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2) any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO_2 standards or is not meeting the requirements of a SIP call under the previous SO_2 standards (40 CFR 50.4(3)). A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.

SULFUR DIOXIDE (SO_2)	secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

Source: EPA, 2023-05-30

C.3 Performance Based Planning Targets

Federally required performance measures are tracked and must be reported upon on a regular basis. The Met Council is required to set short-term performance targets for these measures. The results of these measures are primarily concerned with the overall trend and whether this trend is meeting the desired expectations. If a measure is not trending toward achieving the target, federal funds may need to be re-directed to address the problem.

C.3.1 Safety Performance (PM1)

All state departments of transportation and metropolitan planning organizations must adopt a program to measure system performance and set performance targets to monitor progress. Targets for the safety performance measures are required annually. Safety is one of five categories for federally required performance measures. The safety targets serve a dual purpose:

- Inform planning and programming to reduce fatal and serious injuries
- Track performance of the Highway Safety Improvement Program (HSIP)

Federal requirements specify five safety performance measures for both state DOTs and MPOs that must have annual targets for each measure listed in Table C.2.

The Met Council's targets are informed by statewide goals set forth in the 2020-2024 Minnesota Strategic Highway Safety Plan. The target setting method reduces targets annually to match the region's share the state goal for safety performance in 2025. The Met Council annually adopts targets, last updated in March 2023.

Table C.2: Safety Performance Targets, 2023

TARGET	TARGET VALUE	FIGURE
Total Traffic Fatalities	90 deaths	Figure 4.4
Fatality Rate (per 100 million vehicle miles travelled)	0.33	Figure 4.8
Serious injuries	600 injuries	Figure 4.5
Serious Crash Rate (per 100 million vehicle miles travelled)	2.18	Figure 4.7
Non-Motorized Fatalities/Serious Injuries	147 deaths or injuries	Figure 4.9

C.3.2 Pavement/Bridge Performance (PM2)

Table C.3: Pavement and bridge condition standards.

TARGET	TARGET VALUE	FIGURE
Interstate Pavement in Good Condition	70%	Figure 1.8
Interstate Pavement in Poor Condition	2%	Figure 1.6
Non-Interstate Pavement in Good Condition	55%	Figure 1.9
Non-Interstate Pavement in Poor Condition	2%	Figure 1.7
NHS Bridges in Good Condition	30%	Figure 1.1
NHS Bridges in Poor Condition	5%	Figure 1.2

C.3.3 System Performance and Congestion Mitigation and Air Quality (PM3)

Table C.4: System reliability standards.

TARGET	TARGET VALUE	FIGURE
Reliable person-miles travelled on interstate	82%	
Reliable person-miles travelled on non-interstate NHS	90%	
Truck travel time reliability index	< 1.4	

C.3.3.1 Congestion Mitigation and Air Quality (CMAQ)

Table C.5: Congestion mitigation and air quality (CMAQ) standards

TARGET	TARGET VALUE	FIGURE
Peak-hour excessive delay per capita	8.5 hours	Figure A.1
Travel by non-single occupancy vehicle	28%	Figure 6.2
On-road mobile source emissions	0.0 kg/day	

C.4 High-frequency transit stops and routes

As used in Section 15.3.

For each year, we sampled a comparable date from TransitFeeds.com and identified stops served by high-frequency routes, as defined by Metro Transit.

- stops served by routes that depart every 15 minutes or better,
- with at least three stops per hour,
- on weekdays from 6:00 a.m. to 7:00 p.m. and Saturdays from 9:00 a.m. to 6:00 p.m.

Once stops were identified, we joined each stop with its 10-minute walkshed. We estimated population by using American Community Survey (ACS) block groups, intersected with the Metropolitan Planning Organization (MPO) area and walksheds.

Table C.6: High-frequency routes, stops served by those routes by year and sample date.

YEAR	DATE SAMPLED	NUMBER OF STOPS SERVED BY HIGH-FREQUENCY ROUTES	NUMBER OF UNIQUE HIGH-FREQUENCY ROUTES	HIGH-FREQUENCY ROUTES
2013	2013-10-31	1,295	18	Blue Line, 84, 74, 64, 6, 54, 515, 5, 4, 3, 21, 2, 19, 18, 17, 16, 14, 10
2014	2014-10-06	1,392	21	Green Line, Blue Line, 84, 74, 65, 64, 63, 6, 54, 515, 5, 4, 3, 21, 2, 19, 18, 17, 16, 14, 10
2015	2015-10-02	1,451	21	Green Line, Blue Line, 84, 74, 65, 64, 63, 6, 54, 515, 5, 4, 3, 22, 21, 2, 19, 18, 17, 14, 10
2016	2016-09-29	1,594	24	Green Line, Blue Line, A Line, 83, 74, 65, 64, 63, 62, 6, 54, 515, 5, 4, 3, 22, 21, 2, 19, 18, 17, 14, 11, 10
2017	2017-09-29	1,476	21	Green Line, Blue Line, A Line, 74, 64, 63, 62, 6, 54, 515, 5, 4, 3, 22, 21, 2, 19, 18, 14, 11, 10
2018	2018-09-27	1,441	21	Green Line, Blue Line, A Line, 74, 64, 63, 62, 6, 54, 515, 5, 4, 3, 22, 21, 2, 19, 18, 14, 11, 10
2019	2019-09-28	1,334	22	Green Line, C Line, Blue Line, A Line, 74, 64, 63, 62, 6, 54, 515, 5, 4, 3, 22, 21, 2, 18, 14, 121, 11, 10
2020	2020-10-28	1,296	22	Green Line, C Line, Blue Line, A Line, 74, 64, 63, 6, 54, 515, 5, 4, 3, 22, 21, 2, 18, 14, 122, 121, 11, 10
2021	2021-10-02	1,361	21	Green Line, C Line, Blue Line, A Line, 74, 64, 63, 6, 54, 515, 5, 4, 3, 22, 21, 2, 18, 14, 121, 11, 10
2022	2022-10-01	1,101	17	Green Line, C Line, Blue Line, A Line, 64, 63, 6, 54, 5, 4, 3, 21, 2, 18, 121, 11, 10

Appendix D — Supplementary Maps

D.1 Transit Market Areas

Transit Market Areas are a tool used to guide transit planning decisions. They help ensure that the types and levels of transit service provided, in particular fixed-route bus service, match the expected demand in a given area

At the regional level, transit market areas approximate the level of transit service an area can support. The concept was initially developed in 1996 transit redesign to provide general guidelines on the mix of transit services that may be appropriate for a given area. This guidance is provided for broad regional context; appropriate transit services are defined through professional transit service planning processes.

The current Transit Market Areas, developed for the 2040 TPP update, are based on an index of population density, employment density, automobile availability (total automobiles available minus population over 16 years old), and intersection density (an indicator of urban form measured as a weighted count of intersections by block group).

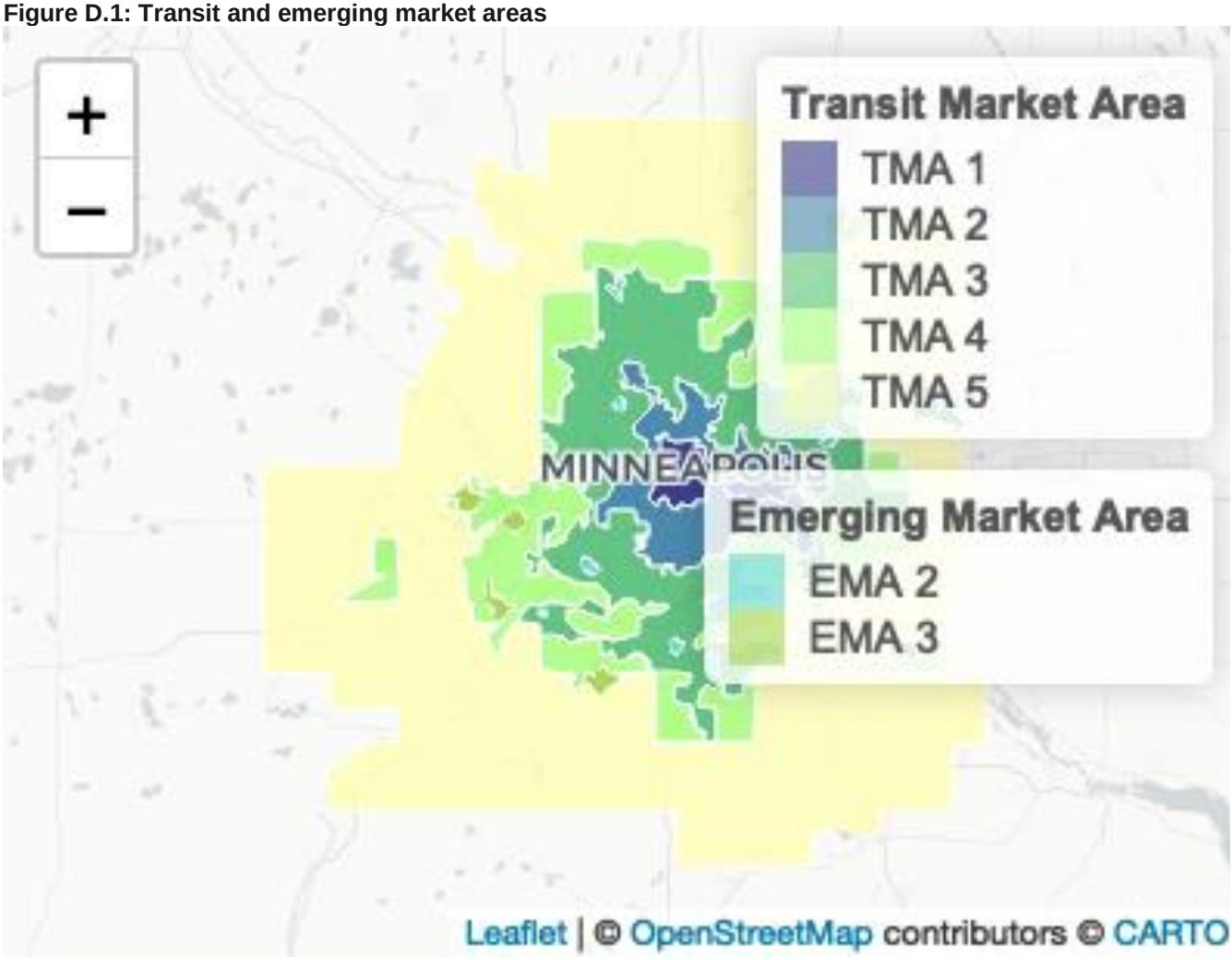
Table D.1: Transit market area descriptions

AREA	DESCRIPTION
Transit Market Area 1	**TMA 1** has the highest density of population, employment, and lowest automobile availability.
Transit Market Area 2	**TMA 2** has high to moderately high population and employment densities.
Transit Market Area 3	**TMA 3** has moderate density and is typically Urban with large portions of Suburban and Suburban Edge communities.
Transit Market Area 4	**TMA 4** has lower concentrations of population and employment and a higher rate of auto ownership. It is primarily composed of Suburban Edge and Emerging Suburban Edge communities.
Transit Market Area 5	**TMA 5** has very low population and employment densities and tends to be primarily Rural communities and Agricultural uses.
Emerging Market Area 2	**EMA 2** is a non-contiguous area within TMA 3 that has higher potential for transit service than TMA 3. These areas are typically freestanding town centers.
Emerging Market Area 3	**EMA 3** is a non-contiguous area within TMA 4 that has higher potential for transit service than TMA 4. These areas are typically freestanding town centers.

Parts of Stillwater, Hastings, Waconia, and Forest Lake are considered freestanding town centers. Freestanding town centers are areas that historically grew independently of Minneapolis and St. Paul and are still separated from the urban and suburban areas of the metro by rural land. Because of their concentrated downtowns laid out in a traditional urban form, these areas have a transit market index value that would indicate market area III or higher. However, their relatively small population and land area, as well as their distance from other transit-supportive land uses, limits the potential for local fixed-route transit.

Learn more about Transit Market Areas in Appendix G of the TPP

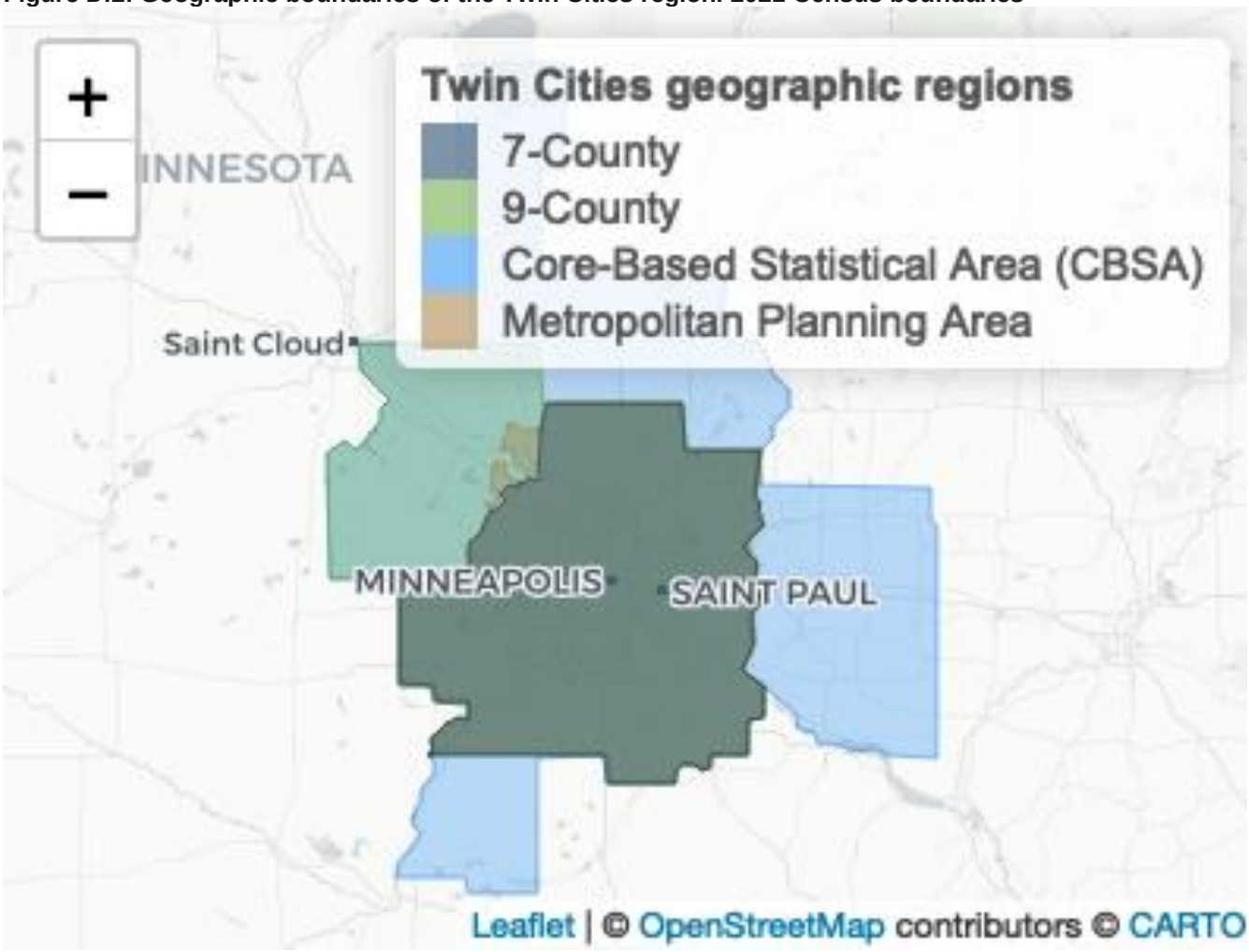
Figure D.1: Transit and emerging market areas



D.2 Regional geographic boundaries

- **Planning or Metropolitan Planning Organization (MPO) area** Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington Counties, the urban portions of Wright and Sherburne counties, and Houlton, Wisconsin.
- **7-County Metro** Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington Counties only.
- **Core-Based Statistical Area (CBSA)** a broader area defined by the United States Census that includes the 7 County Metro Area and the addition of Chisago, Isanti, Sherburne, and Wright counties in Minnesota and St. Croix and Pierce counties in Wisconsin. The Twin Cities CBSA is also the metropolitan statistical area (MSA) for the region.

Figure D.2: Geographic boundaries of the Twin Cities region. 2021 Census boundaries



Appendix E — List of Figures

High-resolution PDFs are available to download online.

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Appendix F — List of Tables

Appendix G — References

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