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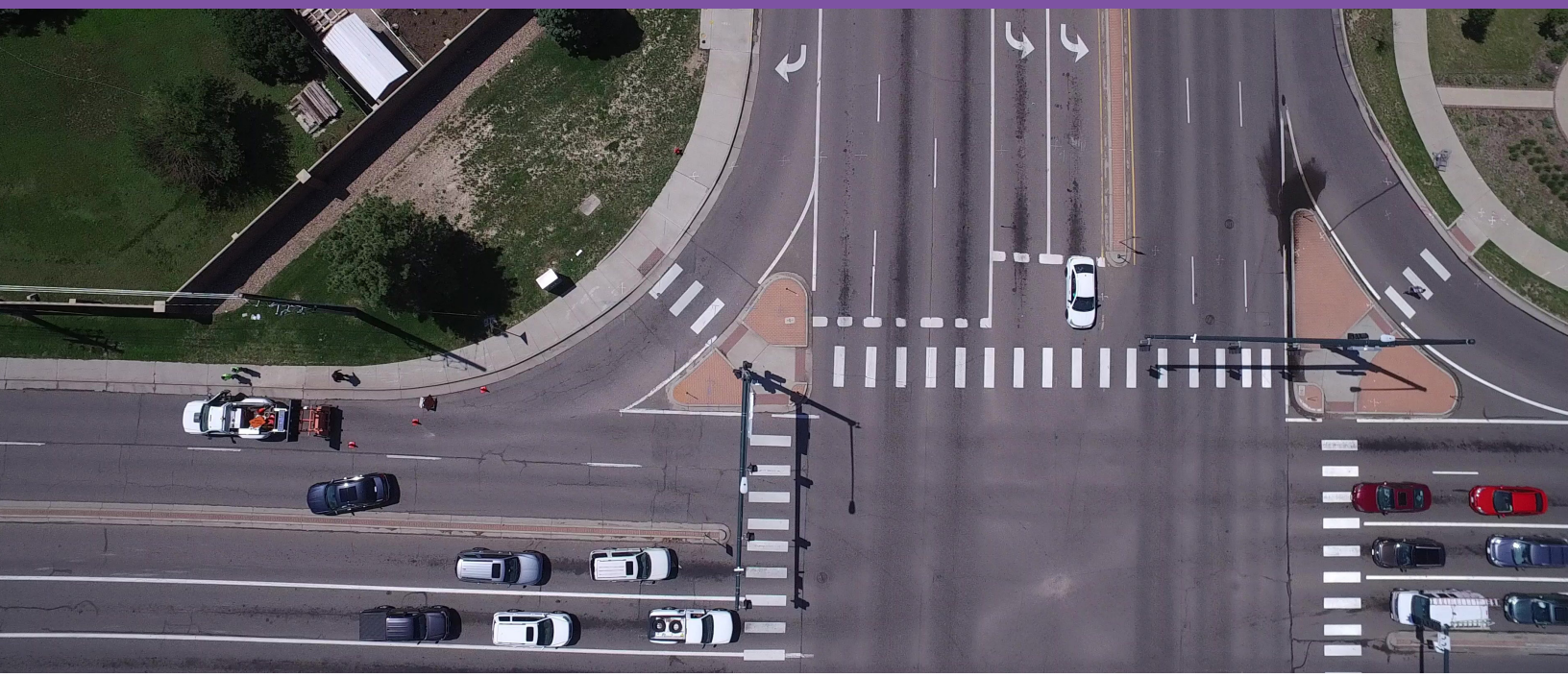
DENVER REGIONAL COUNCIL OF GOVERNMENTS

2022 Annual Report on Roadway Traffic Congestion in the Denver Region

November 2023



Introduction

The Denver area is a vibrant and growing region, experiencing a continued influx of residents, visitors, and economic activity. On average, people in vehicles make about 13 million trips per day in the region, accounting for more than 83 million miles traveled on the region's street and highway system. Traffic congestion is prevalent in the region and delays will never completely disappear.

The Denver Regional Council of Governments Annual Report on Roadway Traffic Congestion in the Denver Region has provided consistent analysis and monitoring of the performance of the region's roadways since 2006. The 2022 report provides a snapshot of regional travel in 2022 and evaluates the potential long-term travel behavior changes caused by the COVID-19 pandemic.

The report concludes with regional travel projections for 2050 associated with the 2050 Metro Vision Regional Transportation Plan as adopted in October 2022. The plan and extensive local, regional and state planning efforts, including the statewide greenhouse gas rulemaking from Senate Bill 21-260, will continue to shape how the council's staff measure and monitor traffic congestion into the future.

Congestion management process

The congestion management process is essential to the council's overall multimodal transportation planning process. The federally required process must be conducted by all large metropolitan planning organizations. Separate from this effort, the U.S. Department of Transportation requires the council to address several planning factors through its transportation planning responsibilities, including "improving the resiliency and reliability of the transportation system," which is closely tied to the congestion management process. The council's Annual Report on Roadway Traffic Congestion in the Denver Region is just one component of its congestion management process. The process also includes an extensive database of roadway attributes, traffic counts, vehicle crash incidents, other multimodal data metrics and performance measures. The effort also identifies major traffic bottleneck locations and severely congested segments on the designated regional roadway system, as well as resources which council and member government staff use to monitor the implementation and benefits of council-funded congestion reduction and mobility choice projects.

The council's 2050 Metro Vision Regional Transportation Plan identifies overarching desired outcomes and specific initiatives related to the congestion management process:

- 2050 Metro Vision Regional Transportation Plan outcomes: "The regional transportation system is well-connected and serves all travel modes; The transportation system is safe, reliable and well maintained."
- 2050 Metro Vision Regional Transportation Plan initiative: Implement "New technology and other operational investments to improve reliability and mitigate increasing congestion and delays."

The congestion management process addresses specific objectives to help reach the outcomes identified in the regional transportation plan. The following objectives are applicable to all travel modes, as well as the movement of goods and freight:

1. Improve the multimodal reliability of the Regional Roadway System – *so people and businesses experience less unexpected delay.*
2. Reduce the number and duration of crash events – *so the transportation system operates more safely, first responders work in a safer environment, and extensive travel delays and dangerous back-ups are reduced.*
3. Reduce excessive travel delays faced by occupants of all types of motor vehicles – *so that people and businesses experience lower costs associated with severe traffic congestion.*
4. Increase and improve active transportation modes (such as walking and biking) and transit service – *so people can avoid driving or adapt to traffic congestion.*
5. Improve traveler information and alert systems – *so people and businesses can make informed decisions about travel modes and routes to destinations and drivers are alerted to critical incidents ahead of them.*
6. Improve day-to-day and major maintenance efforts – *so the safety and reliability of the entire multimodal transportation system is enhanced.*
7. Expand the toolkit of congestion reduction strategies – *so the council's member governments and partner agencies have a full suite of project types to consider, fund and implement.*
8. Ensure that congestion management process projects and actions are implemented in an equitable manner across the region – *so that low-income and disadvantaged communities reap significant benefits and are not burdened by negative impacts.*

The congestion management process is also closely aligned with other key council planning efforts:

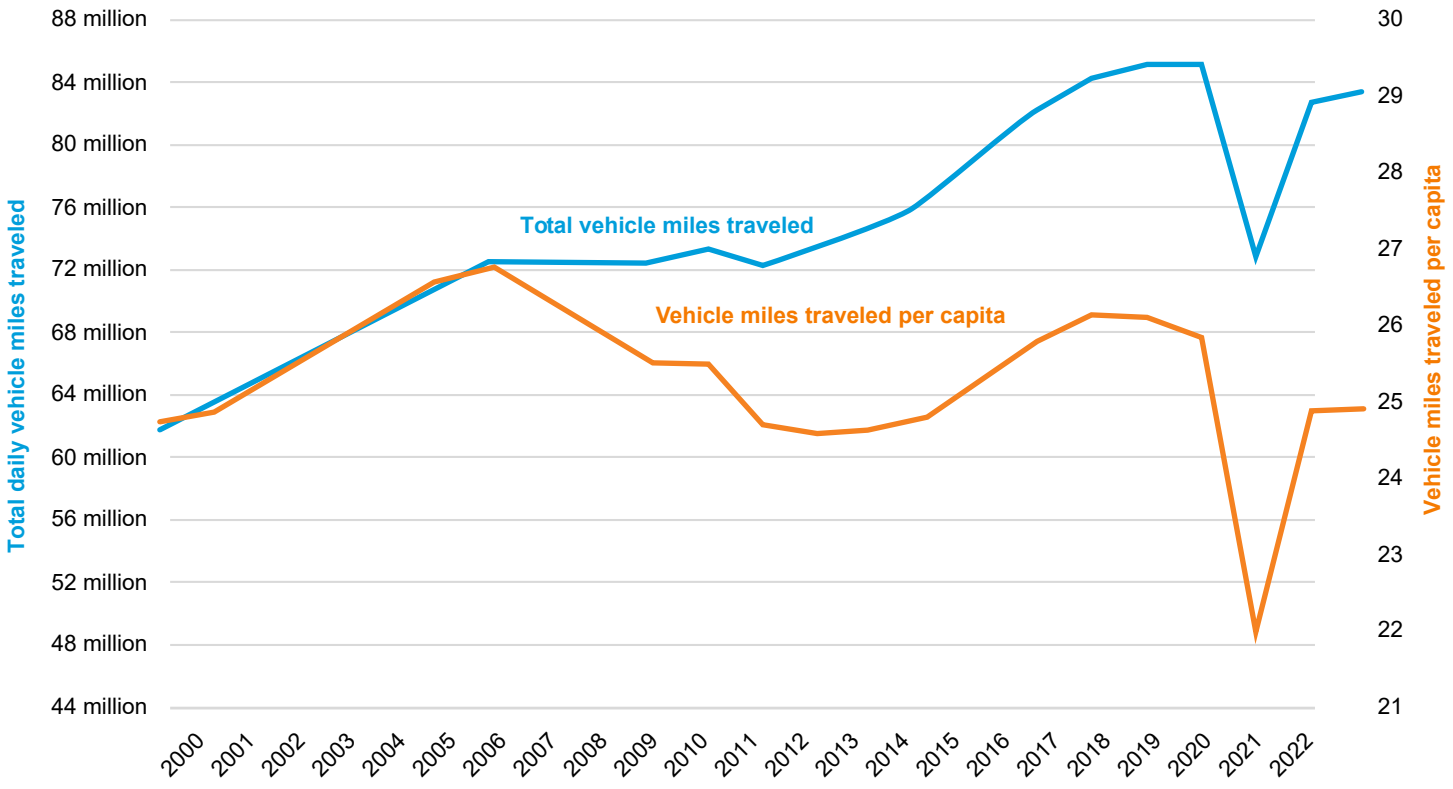
- Regional Transportation Operations and Technology Strategic Plan
- Active Transportation Plan
- Coordinated Transit Plan
- Taking Action on Regional Vision Zero
- Transportation Demand Management Strategic Plan

Vehicle miles traveled in 2022

Each year, council staff estimate the vehicle miles traveled on the region's roadways during an average weekday. Seasonal variations and other disruptions commonly affect average daily vehicle miles traveled throughout the year. Staff estimate that in 2022, vehicle miles traveled increased by 1% compared to 2021. However, the **average daily vehicle miles traveled was still approximately 2% lower than in 2019, before the COVID-19 pandemic**. The average vehicle miles traveled per capita was 24.7 miles on an average day, still significantly less than 2019 levels as population continued to grow in the region despite lower total vehicle miles traveled.

Figure 1 illustrates that from 2000 to 2018 vehicle miles traveled in the region increased approximately 40%. In 2018 and 2019, there was very little total growth in vehicle miles traveled during the period before the pandemic affected the entire country. During 2020, the average daily vehicle miles traveled declined by about 15% to levels comparable to 2005 and 2011. In 2022, total vehicle miles traveled grew at approximately the same rate as the population, meaning that both total vehicle miles traveled and vehicle miles traveled per capita remained significantly lower than 2019 levels.

Figure 1. Average daily vehicle miles traveled in the Denver region (2000-2022)

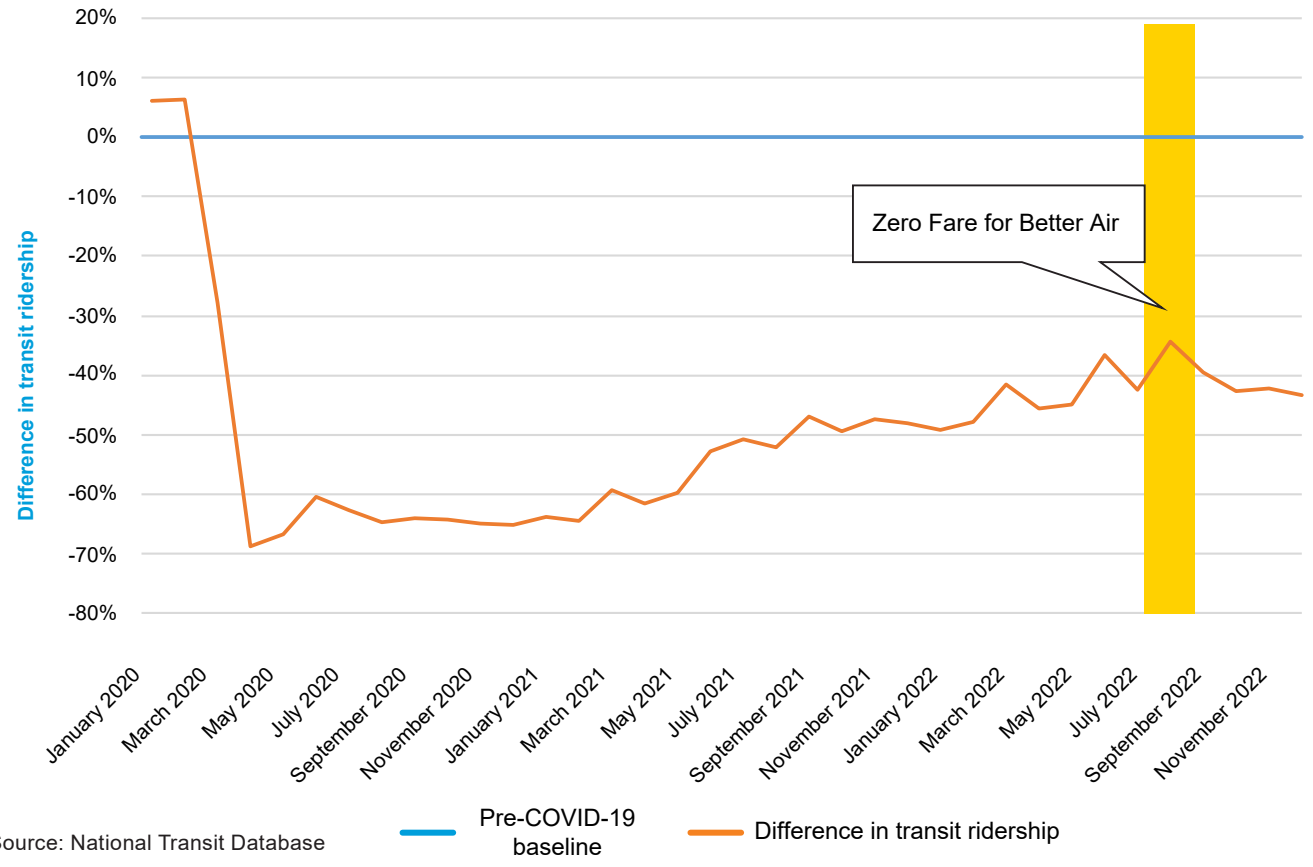


2022 regional transit

While traffic volumes rebounded across the region, transit ridership has yet to return to pre-pandemic levels. Figure 2 illustrates the slow climb of transit ridership from the onset of the pandemic to the end of 2022. Fewer workers in office buildings, increased telework, reduced transit service levels and ongoing health and safety concerns have all contributed to the sustained reduction in transit ridership. However, ridership reached its highest post-pandemic point in August 2022 with the pilot of the Zero Fare for Better Air program. Zero Fare for Better Air was a statewide initiative to provide optional funding to local and metropolitan transit agencies across the state to reduce or operate without collecting fares during the highest ozone month of August. This initiative was renewed for July and August 2023 and will continue to affect transit and ridership.

Through the Re-Imagine RTD program, Regional Transportation District staff are working to identify comprehensive strategies to better connect people to the places they want and need to go. The district's work, along with its partners throughout the region, will continue to affect ridership in the future as the region moves beyond the COVID-19 crisis.

Figure 2: Regional Transportation District ridership comparison



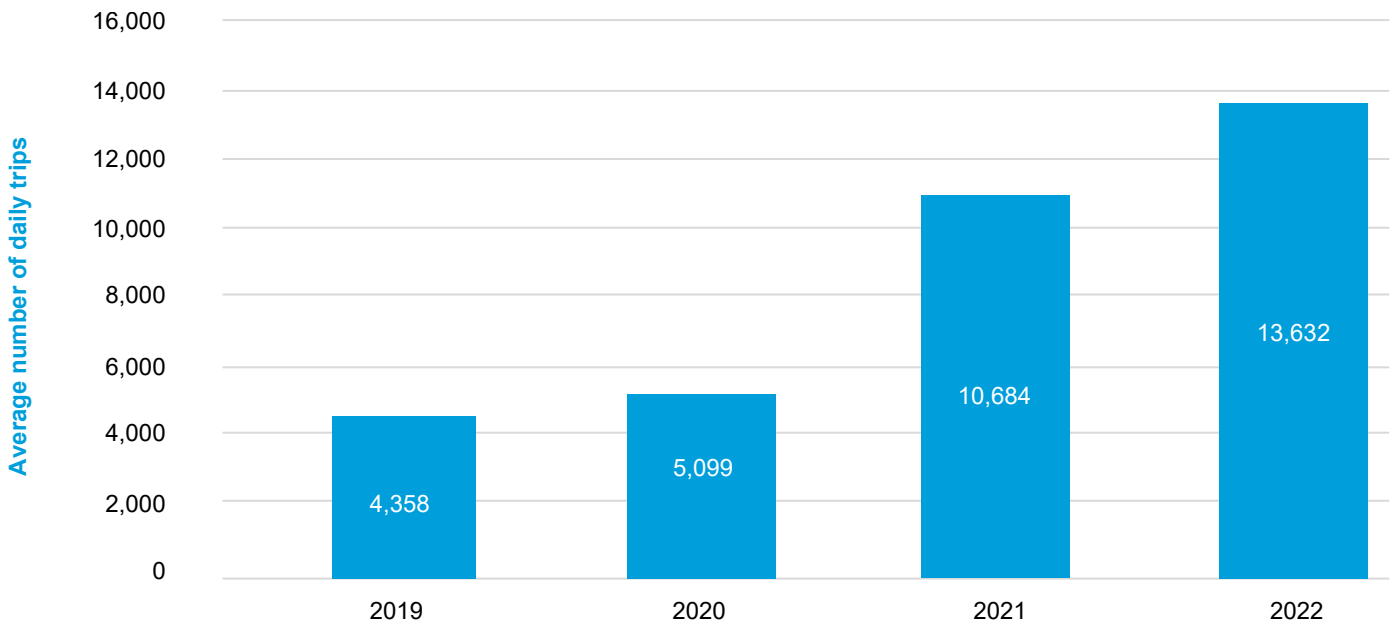
Source: National Transit Database

2022 shared micromobility

While transit has yet to return to pre-pandemic levels, **shared micromobility usage tripled since 2019**. Shared micromobility refers to shared, small, human- and electric-powered transportation solutions including station-based bikeshare, dockless bikes and e-bikes, and e-scooters. Such devices are typically available for short-term rentals and can be used in designated service areas.

Figure 3 illustrates the annual average number of shared micromobility trips per day in the Denver region in 2019 through 2022. The number of trips on any given day varies greatly depending on multiple factors including seasonality, weather and if school is in session. The total number of vehicles available and expanded areas of usage have contributed to the increased growth in usage. In the Denver region, users of shared micromobility vehicles traveled nearly 6 million miles in 2022.

Figure 3: Average number of micromobility trips per day



Source: Ride Report

Projected congestion in 2050

The Denver region will continue to grow and change over the next 30 years, as will travel patterns and congestion. Using forecasts from the State Demography Office within the Colorado Department of Local Affairs, Denver Regional Council of Government staff anticipate the region will grow by more than 1 million people and add 600,000 new jobs by 2050. The transportation system will change, with new facilities added across modes, and transit service will continue to evolve. Technological advancement will result in additional travel modes, mobility services and safety systems, changing how people get around and when they choose to travel.

Per federal legislation, the U.S. Department of Transportation established goals to reduce congestion, improve system reliability, and improve freight and goods movement. To track the region's progress at addressing congestion, the council's System Performance Report (Appendix G of the Regional Transportation Plan) highlights the federally established goals and progress toward performance measures such as travel time reliability and annual hours of peak-hour excessive delay per capita.

As for future progress as the region's population grows, the 2050 Metro Vision Regional Transportation Plan outlines how the region will continue to meet federal performance targets and improve transportation infrastructure and services. Between now and 2050, the council's travel model forecasts a 42% increase in vehicle miles traveled in the region. With limited intervention, such a significant increase would result in a near tripling of vehicle hours of delay and a near doubling in lane miles congested for longer than three hours a day. **In the projected scenario, congestion at 2 p.m. in 2050 is worse than it is at 5 p.m. in 2022.** Tables 1, 2 and 3 include a summary of congestion measures between 2022 and 2050.

Map 1 (on page 12) compares the most congested segments from 2022 with 2050 and reflects additional roads that will experience high levels of congestion in the future based on four key metrics:

- Severity: How bad is roadway congestion during rush hour?
- Duration: How many hours per day is the roadway congested?
- Magnitude: How many people (traffic volume) are affected by roadway congestion?
- Reliability: How often do crashes or incidents affect the roadway?

Table 1: Current and future congestion measures on Denver freeways and major roads (vehicle measures)

Note: The measures in this table only relate to the designated Regional Roadway System.

	2022 average weekday	2022 annual total estimate	2050 average weekday	2050 annual total estimate	Change between 2022 and 2050
Vehicle miles traveled	64,366,000	21,755,685,000	91,261,000	30,846,225,000	42%
Vehicle hours traveled	1,371,000	463,381,000	2,173,000	734,522,000	58%
Vehicle hours of delay	179,000	60,356,000	481,000	162,420,000	169%

Table 2: Current and future congestion measures on Denver freeways and major roads (person measures)

Note: The measures in this table only relate to the designated Regional Roadway System.

	2022 average weekday	2022 annual total estimate	2050 average weekday	2050 annual total estimate	Change between 2022 and 2050
Person miles traveled	88,039,000	29,757,321,000	126,691,000	42,821,499,000	44%
Person hours traveled	1,874,000	633,444,000	3,008,000	1,016,616,000	61%
Person hours of delay	246,000	82,989,000	662,000	223,616,000	169%
Travel delay per household (minutes/day)	11 minutes	3,773 hours	23 minutes	7,621 hours	109%
Travel delay per resident (minutes/day)	4 minutes	1,477 hours	9 minutes	3,186 hours	125%

Table 3: Current and future congestion measures on Denver freeways and major roads (other congestion measures)

Note: The measures in this table only relate to the designated Regional Roadway System.

	2022 average weekday	2022 annual total estimate	2050 average weekday	2050 annual total estimate	Change between 2022 and 2050
Percent of travel time in Delayed Conditions	13%	N/A	22%	N/A	N/A
Extra travel time (5 p.m. peak versus free flow)	18%	N/A	31%	N/A	N/A
Extra travel time (2 p.m. peak versus free flow)	13%	N/A	23%	N/A	N/A
Lane miles of roads congested for three or more hours	1,328	N/A	2,821	N/A	112%
Percent of total lane miles congested for three or more hours	18%	N/A	34%	N/A	89%

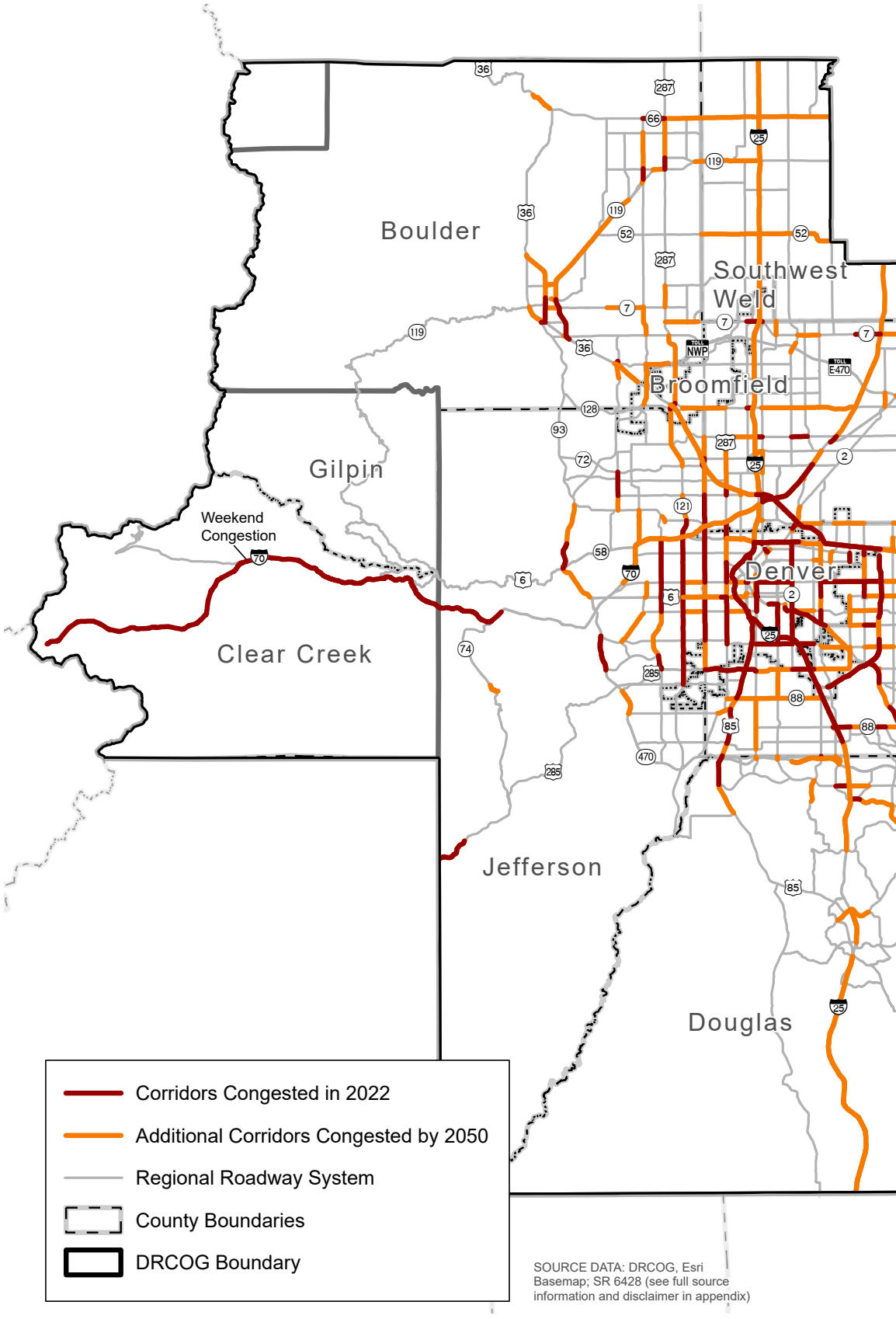
Other congestion measures (continued)

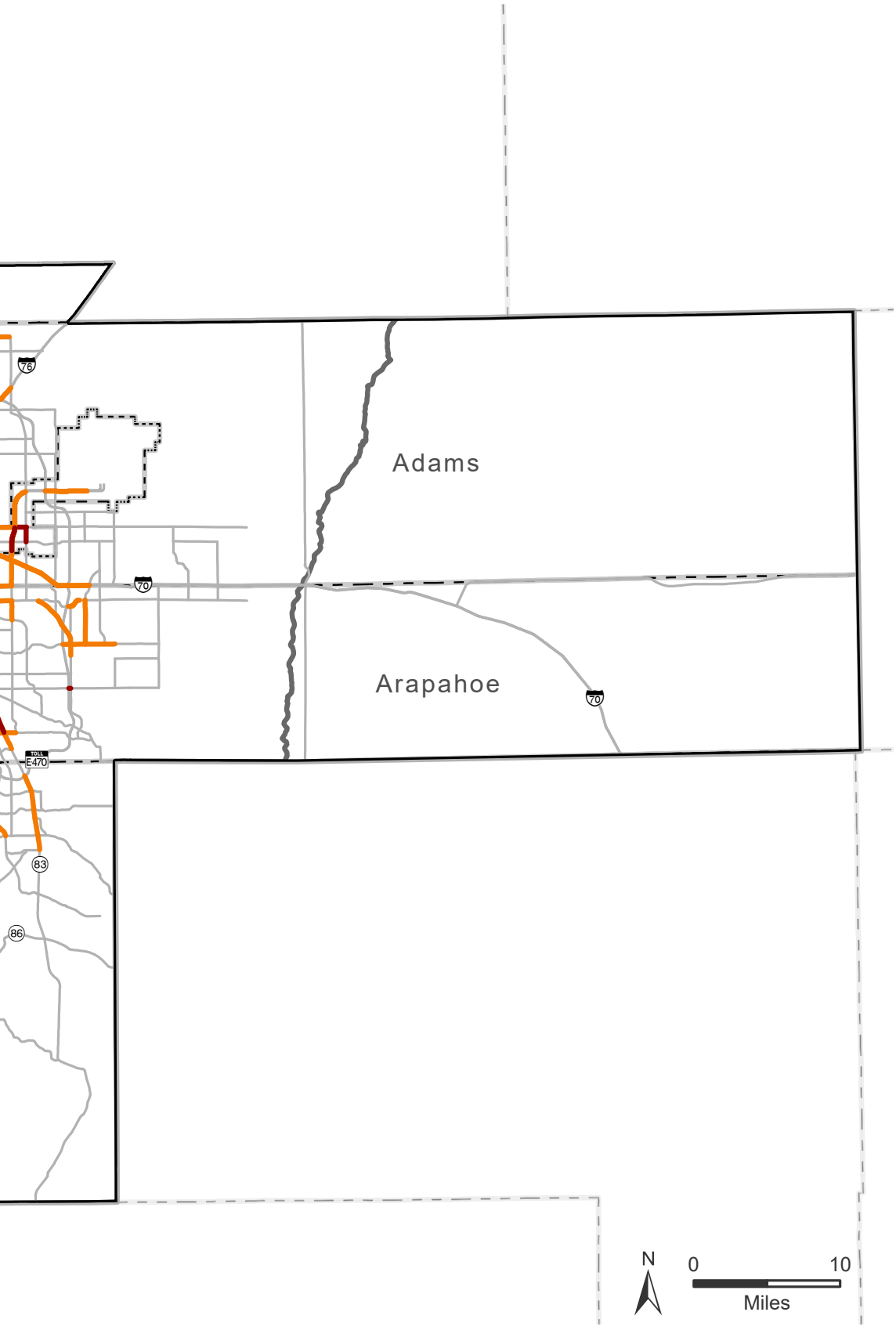
Note: The measures in this table only relate to the designated Regional Roadway System.

	2022 average weekday	2022 annual total estimate	2050 average weekday	2050 annual total estimate	Change between 2022 and 2050
Commercial vehicles Cost calculations incorporate $12.00 per hour per adult in car, $48.30 per hour per light commercial vehicle operator and $71 per hour for heavy commercial.	$1,211,000	$409,263,000	$2,885,000	$975,023,000	138%
Passenger vehicle occupants Cost calculations incorporate $12.00 per hour per adult in car, $48.30 per hour per light commercial vehicle operator and $71 per hour for heavy commercial.	$2,670,000	$902,344,000	$5,187,000	$1,753,096,000	94%
Total cost of delay	$3,880,000	$1,311,607,000	$8,071,000	$2,728,119,000	108%

Along many of the region's interstates and major corridors, such as Interstate 25 (pictured here in Denver), traffic congestion has not returned to pre-pandemic levels even during rush hour.
Photo by RaskyBH/Shutterstock.com

Map 1: Key congested locations in 2022 and 2050




Adams
Arapahoe
76
70
70
E470
83
86
N
0
10
Miles

Where congestion is most severe

In 2022, approximately 22% of the region's freeway congestion delays were on two segments which account for just 3% of the length of the freeway network.

Many travelers throughout the region experience significant delays and unreliable travel times related to traffic incidents along I-25 and I-270. Colorado Department of Transportation staff are currently examining both segments for potential operational and safety improvements. Projections for levels of congestion in 2050 suggest that it's imperative for the region's transportation planners to find solutions to avoid and adapt to congestion, especially for travelers on such corridors.

Interstate 25 Central:
Interstate 70 to University Boulevard

2% of regional freeway length

17% of regional freeway delay

Interstate 270:
Interstate 70 to Interstate 25

1% of regional freeway length

5% of regional freeway delay

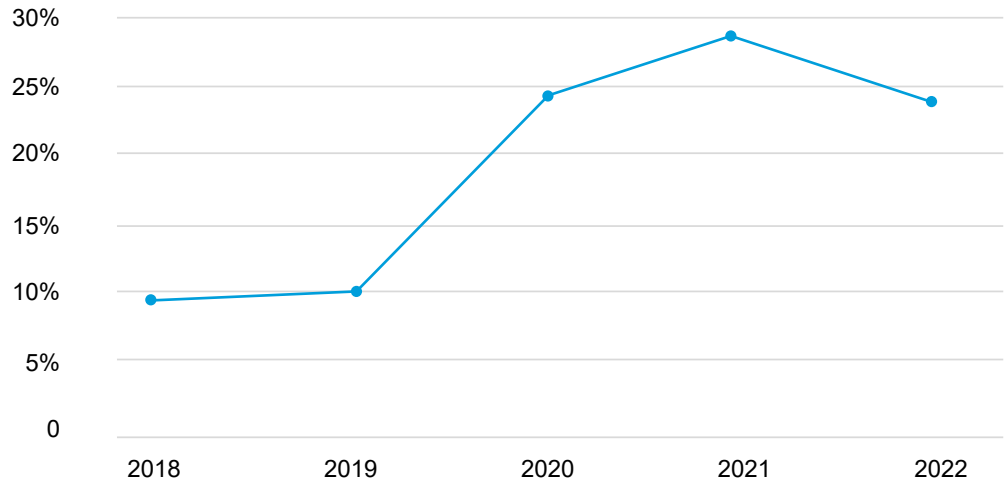
Regional shifts in travel behavior

As telework became a public health necessity during the COVID-19 pandemic, it rapidly changed the patterns and frequency with which people move throughout the region, especially those who previously commuted to an office job. As local agencies lifted restrictions and concerns about health risks waned through 2021 and 2022, traffic congestion returned nationwide, including in the Denver region. However, the times of day and severity of congestion may have changed throughout the region due to widespread shifts in how people work and acquire goods and services.

Denver Regional Council of Governments staff examined three major freeway corridors in the region, using travel time data obtained from INRIX traffic vehicle probe-based data, to compare how congestion has shifted between 2019, prior to the pandemic, and 2022.

Each corridor is unique and does not reflect regionwide dynamics. This said, while pre-pandemic levels of traffic congestion haven't fully returned to the Denver region, observed trends suggest it could soon. Figure 4 represents the percentage of people working from home in the Denver region from 2018 to 2022.

Figure 4: Percentage of people who typically work from home in the Denver region from 2018 to 2022



Source: U.S. Census Bureau, American Community Survey 2022 one-year data

U.S. Route 6 is a frequently congested corridor between Golden and Denver.

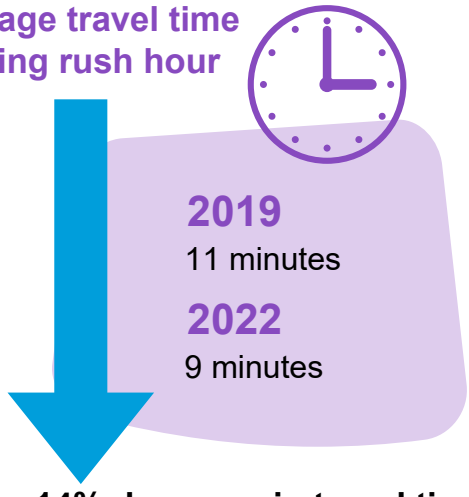
Lakewood to Denver morning commute

The U.S. Route 6 eastbound corridor from Union Boulevard to Knox Street is a 5-mile stretch of freeway that brings people and goods from Interstate 70 and the Lakewood area into and through central Denver. In 2022, about 146,000 vehicles moved through U.S. Route 6 at Federal Boulevard on an average day, only 2% less than 2019 before the pandemic. However, the time of day this travel occurred shifted dramatically in 2022. During the morning commute, significantly fewer vehicles moved through the corridor, especially in the earliest parts of rush hours, resulting in faster travel times. The most pronounced difference is in the earliest part of the morning rush hour, where 17% less vehicles were counted from 6-7 a.m.

This change in the morning rush hour is almost certainly caused by the large increase in work from home rates (refer to Figure 4 on page 15). Many of the jobs in central Denver are office jobs conducive to telework options. Further, even commuters who did travel into the downtown area may have more flexibility in their work hours or no longer feel the need to leave as early as 6 a.m. to beat traffic, as travel times in the later parts of the morning peak decreased significantly as well. With less traffic, the Denver region may be experiencing a reduction in "peak spreading."

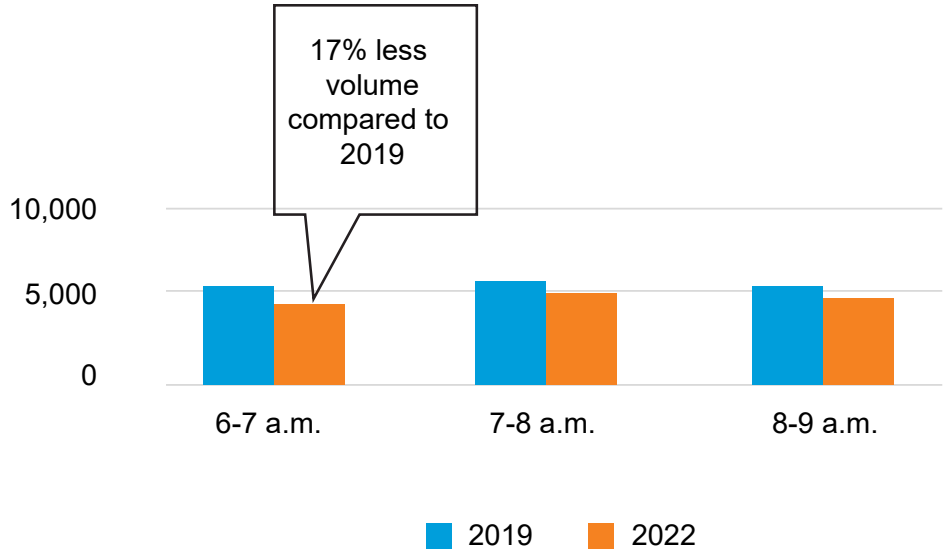
Map 2: Lakewood to Denver morning commute

Average travel time during rush hour



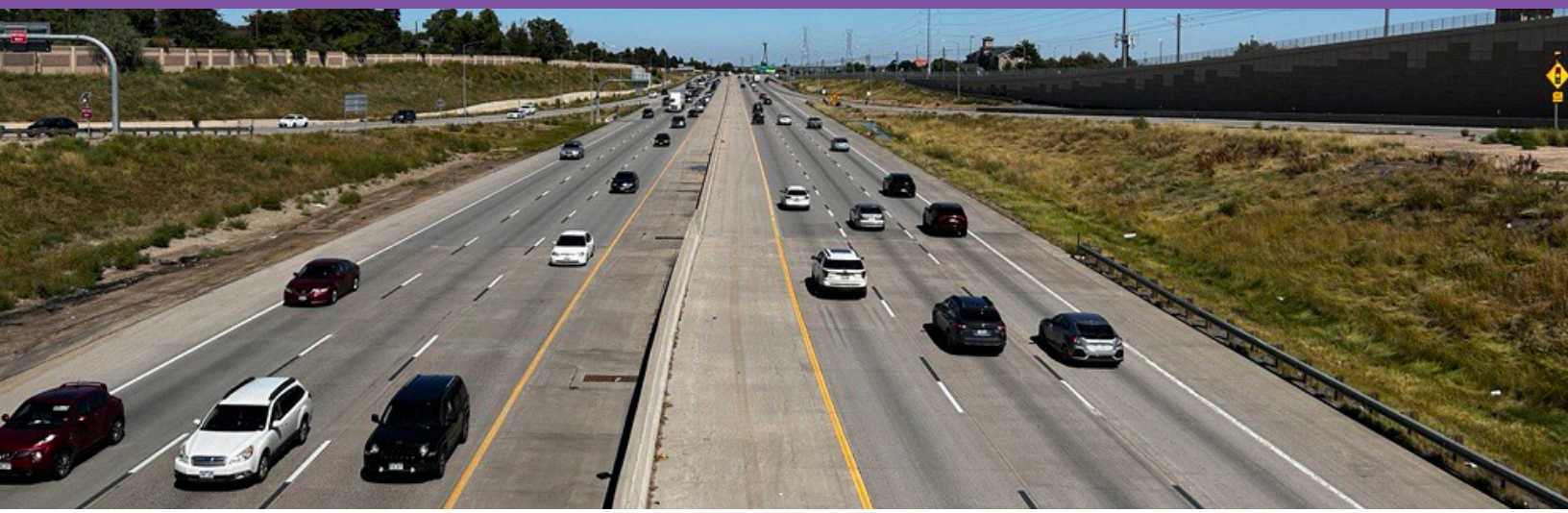
14% decrease in travel time

Figure 5: U.S. Route 6 and Federal Boulevard eastbound morning peak traffic volumes



Source: Colorado Department of Transportation, Automatic Traffic Recorders

The Lakewood Gulch Trail runs parallel to U.S. Route 6 connecting Lakewood to Denver by bike.
Photo by Colorado Department of Transportation



Mississippi Avenue overlooking Interstate 225 toward the north. Photo by Max Monk/Denver Regional Council of Governments.

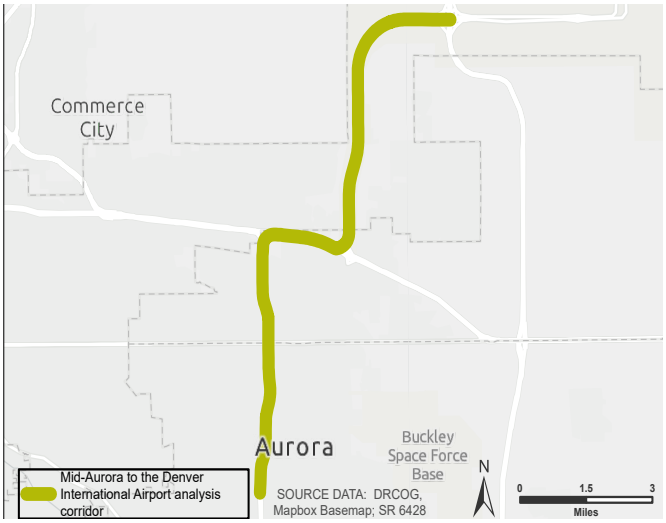
Traveling from mid-Aurora to Denver International Airport

Going from the Aurora area to Denver International Airport via Interstate 225 and Peña Boulevard returned to pre-pandemic traffic conditions early in 2022. During busy holiday travel times, traffic volumes surpassed even 2019 levels by roughly 17% in December 2022. Traffic on Peña Boulevard is unique because the corridor does not have peak rush hours. Given that a large percentage of the travel along Peña Boulevard is associated with the Denver International Airport, it becomes congested even at off-peak times.

A 2022 return to pre-pandemic levels of traffic and congestion on the corridor is caused by record-high levels of passengers at Denver International Airport, significant population and housing growth in the area between Peña Boulevard and E-470, and the completion of the Peña Boulevard/Tower Road interchange. Denver Regional Council of Government staff estimate that between 2019 and 2022, the area experienced a 20% increase in jobs (4,750 new jobs) and a 6% increase in housing units (1,050 new housing units), funneling additional traffic into bottleneck points through the corridor.

Figure 6 highlights average travel times across multiple months for the I-225 to Denver International Airport corridor.

Map 3: Traveling from mid-Aurora to Denver International Airport

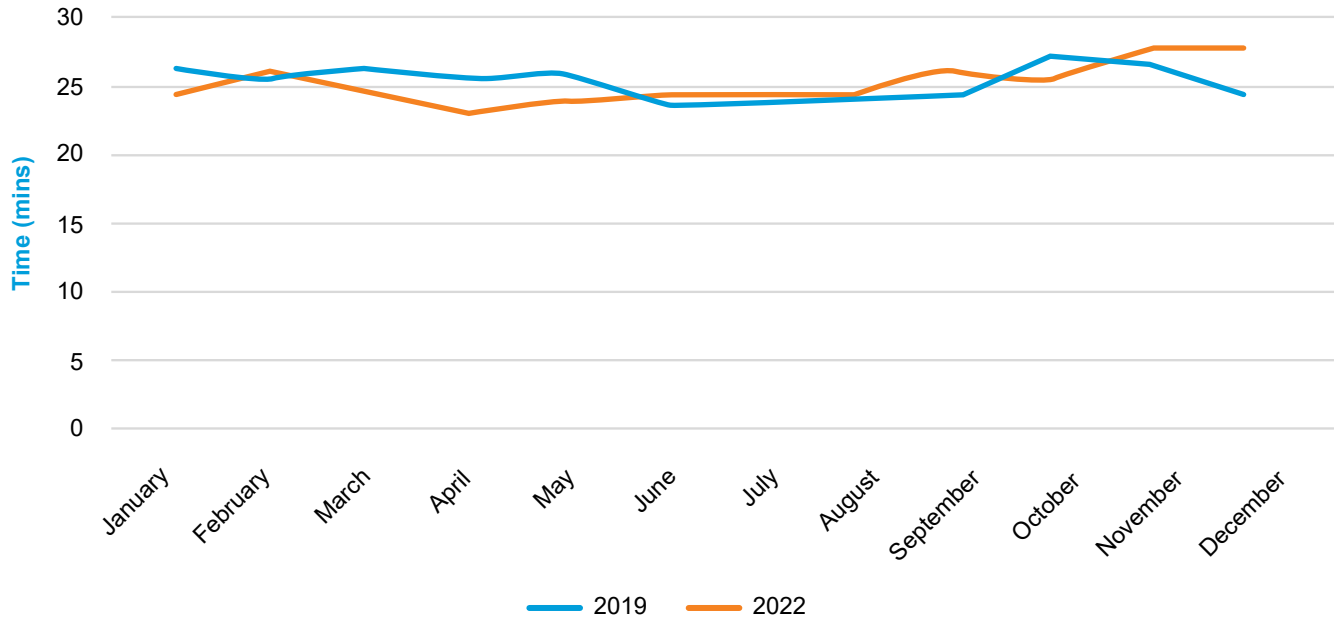


Average travel time during rush hour

2019
25 minutes

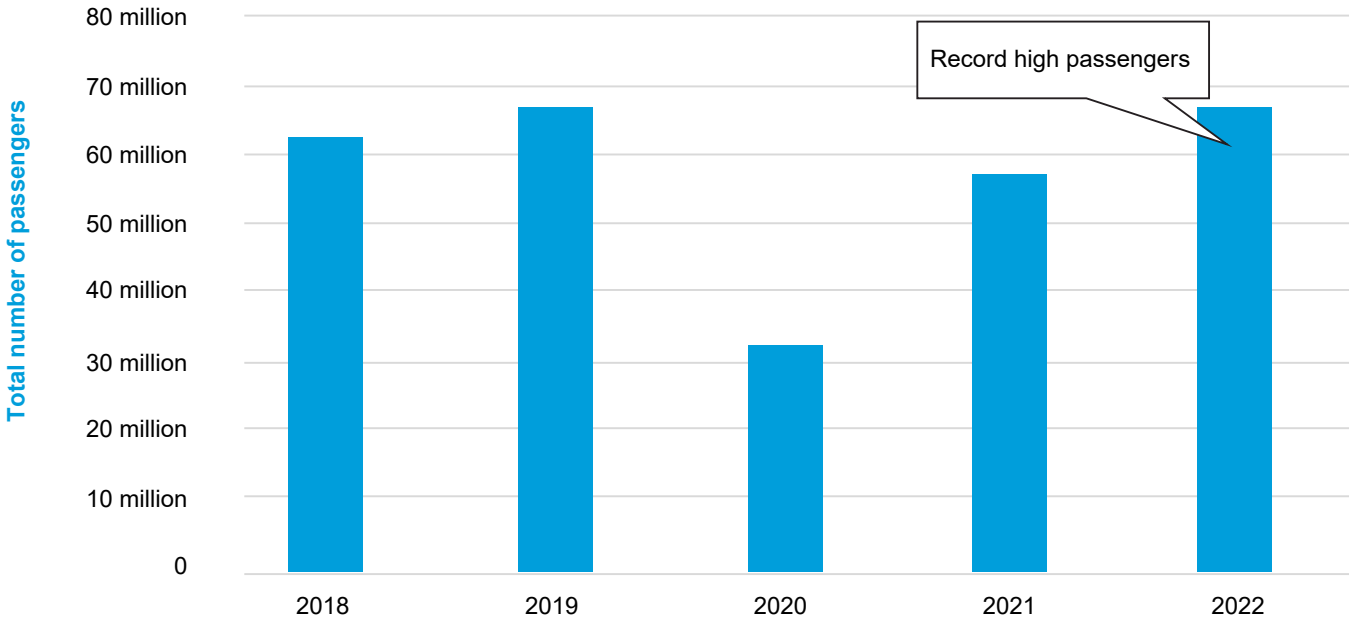
2022
25 minutes

Figure 6: Average rush hour travel time for mid-Aurora to Denver International Airport by month

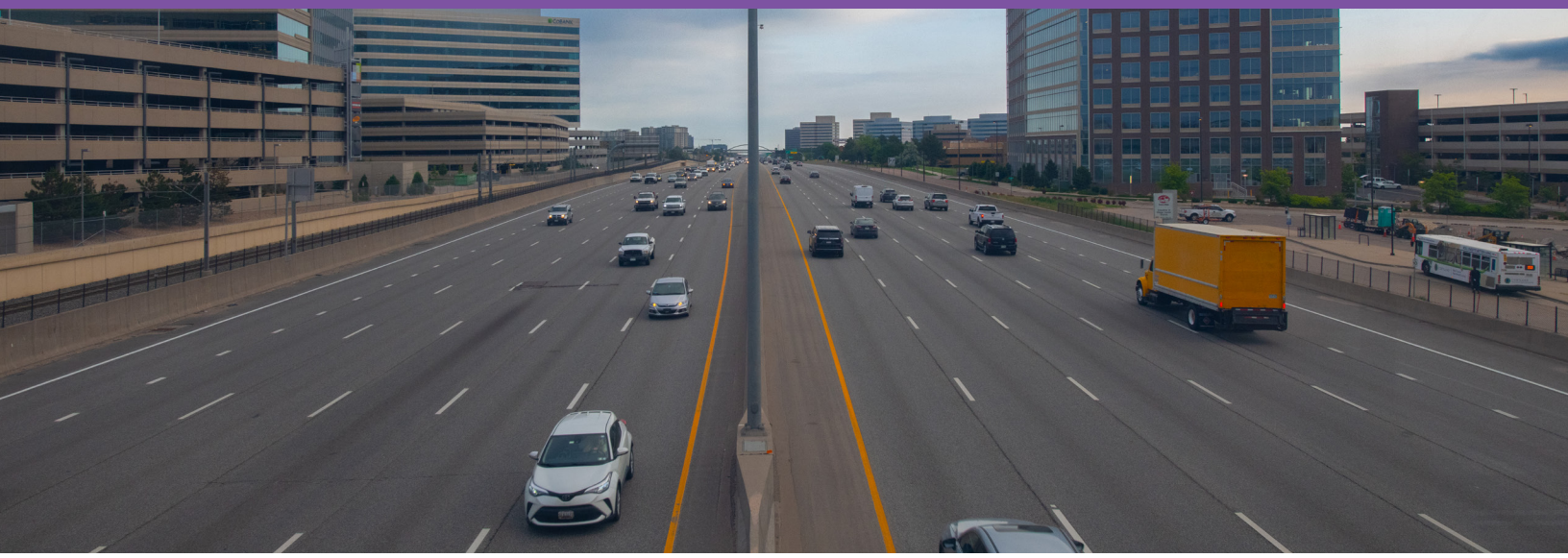


Source: INRIX

Figure 7: Average number of passengers at Denver International Airport



Source: Denver International Airport



From an overpass on I-25, looking northward in the Denver Tech Center. Photo by JR Goodwin/Denver Regional Council of Governments.

Commuting from Highlands Ranch to the Denver Tech Center

Commuting from Highlands Ranch to the Denver Tech Center takes travelers 13% less time in 2022 than 2019. Similar to the U.S. Route 6 corridor, there are still less trips coming into Tech Center offices following the onset of the pandemic. In addition, the completion of the C-470 managed lane project, which opened in 2020, facilitated smoother, more reliable travel conditions than prior to the pandemic for most of its length.

Figure 8 illustrates how travel times in 2022 were lower than 2019 in every month of the year for commutes from Highlands Ranch to Denver Tech Center Corridor.

Map 4: Commuting from Highlands Ranch to the Denver Tech Center

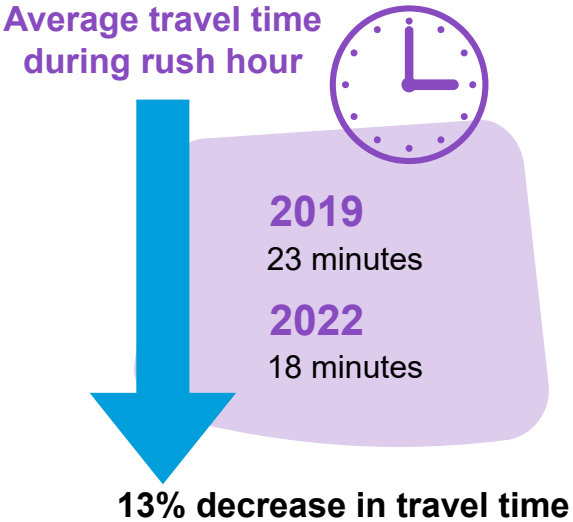
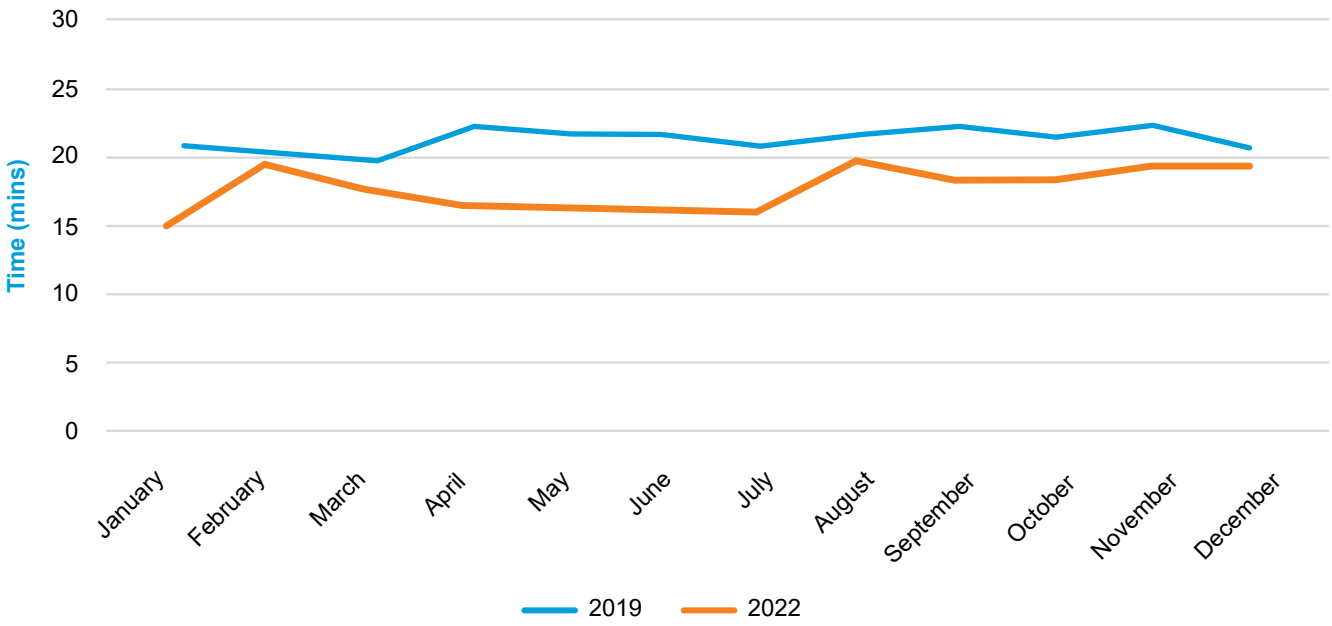


Figure 8: Average rush hour travel time from Highlands Ranch to the Denver Tech Center by month



Source:INRIX

C-470 at University Boulevard in Highlands Ranch.
Photo by Stephen Martinez/Colorado Department of Transportation

Travel behavior conclusion

There's no question the pandemic greatly affected how people and goods move throughout the region. It wholly changed travel behavior in many sectors, resulting in fewer people commuting on a given day; stymied recreational activity in urban spaces; and modified patterns of commercial vehicle deliveries and movements. However, many travel corridors have returned to near-2019 levels for travel time and average speed. Coupled with population growth, it's reasonable to suggest that regional congestion may surpass pre-pandemic conditions in the coming years.

At the end of 2022 pandemic-related behaviors continued to shift, with more people working hybrid schedules and feeling more comfortable traveling. Council staff will continue to analyze behavior change (related to the COVID-19 pandemic and beyond) related to how the region's "normal" changes over time.

Current projects to address congestion

The Denver Regional Council of Governments supports local governments, the Colorado Department of Transportation, and the Regional Transportation District to complete projects to mitigate the effects of congestion. Table 4 lists example transportation projects addressing congestion and mobility completed or underway in 2021 and 2022. The list is not comprehensive, rather, it illustrates several categories of relevant projects. Interchange and roadway projects address key bottlenecks in the region. Transit, bicycle and pedestrian projects expand and enhance non-roadway facilities to provide additional travel options, enabling people to better avoid congestion.

In addition to location-specific projects, there are also programmatic investments throughout the region to reduce congestion or help people avoid or adapt to congestion. Eight transportation management associations throughout the Denver region provide community-specific solutions and the Denver Regional Council of Governments addresses congestion through the Way to Go program, a no-cost solution to the region's commuting challenges

Conclusion

Traffic patterns and roadway congestion are evolving following the effects of COVID-19. The growth in population and jobs in the Denver region requires thoughtful management of transportation system resources. New technologies and the effects of the pandemic will continue to influence travel behaviors. As demand for the transportation system's limited resources becomes more competitive, transportation demand management partners, transit agencies and new mobility technology innovations will be essential to mitigating congestion and its negative effects on air quality, the economy and residents' quality of life. Denver Regional Council of Governments staff take seriously the responsibility of creating partnerships to mitigate severe effects of congestion and implement multimodal facilities for people to have options alternative to driving.

Traffic congestion in the region is expected to worsen. In a growing region, an increase in congestion is to be expected – however, to mitigate major increases in congestion (while simultaneously supporting economic growth and the reduction of greenhouse gas emissions), effective planning, partnerships and innovation are paramount. Council staff are committed to partnering with state, regional and local agencies to keep people, goods and services moving efficiently across all travel modes now and into the future.

Table 4: Example transportation projects addressing congestion and mobility competed or underway in 2021 and 2022

Interchange and roadway projects:	Status
Vasquez Boulevard Operational Improvements: 52nd to 64th	Underway
Sheridan Boulevard/U.S. Route 36 Multimodal Improvements	Complete
I-70/State Highway 79 Roadway Operational Improvements	Underway
120th Avenue Operational Improvements	Underway
I-25/Dry Creek Road Operational Improvements	Underway
Transit Projects	**Status**
Havana Street Transit Improvements: Montview to Dartmouth	Underway
Bicycle/pedestrian projects:	**Status**
25th Avenue Pedestrian Improvements	Underway
High Line Canal Trail: East Colfax Avenue to I-70	Complete
C-470 Multi-Use Trail, Grade-Separated Crossing at Yosemite Street	Complete
C-470 Multi-Use Trail, Grade-Separated Crossing at Acres Green Drive	Underway
Rock Creek and Coal Creek Trail Connection	Complete
U.S. 36 Bikeway Extension: Superior to Broomfield	Complete
100th Avenue Multimodal Improvements	Underway
Sheridan Boulevard Multimodal Improvements	Complete

Visit DRCOG's partner agency websites for more information:

Colorado Department of Transportation | *codot.gov*
Regional Transportation District | rtd-denver.com
Colorado Department of Transportation Traveler Information | *cotrip.org*
For ways to avoid or adapt to congestion, visit Way to Go | *waytogo.org*

Preparation of this report has been financed in part through grants from the U.S. Department of Transportation, Federal Highway Administration and Federal Transit Administration. This report and others are available at DRCOG's congestion mitigation webpage (*drcog.org/congestion*).

Contact Robert Spotts, program manager, at *rspotts@drcog.org* for additional information regarding DRCOG's congestion mitigation program.

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