



System performance report

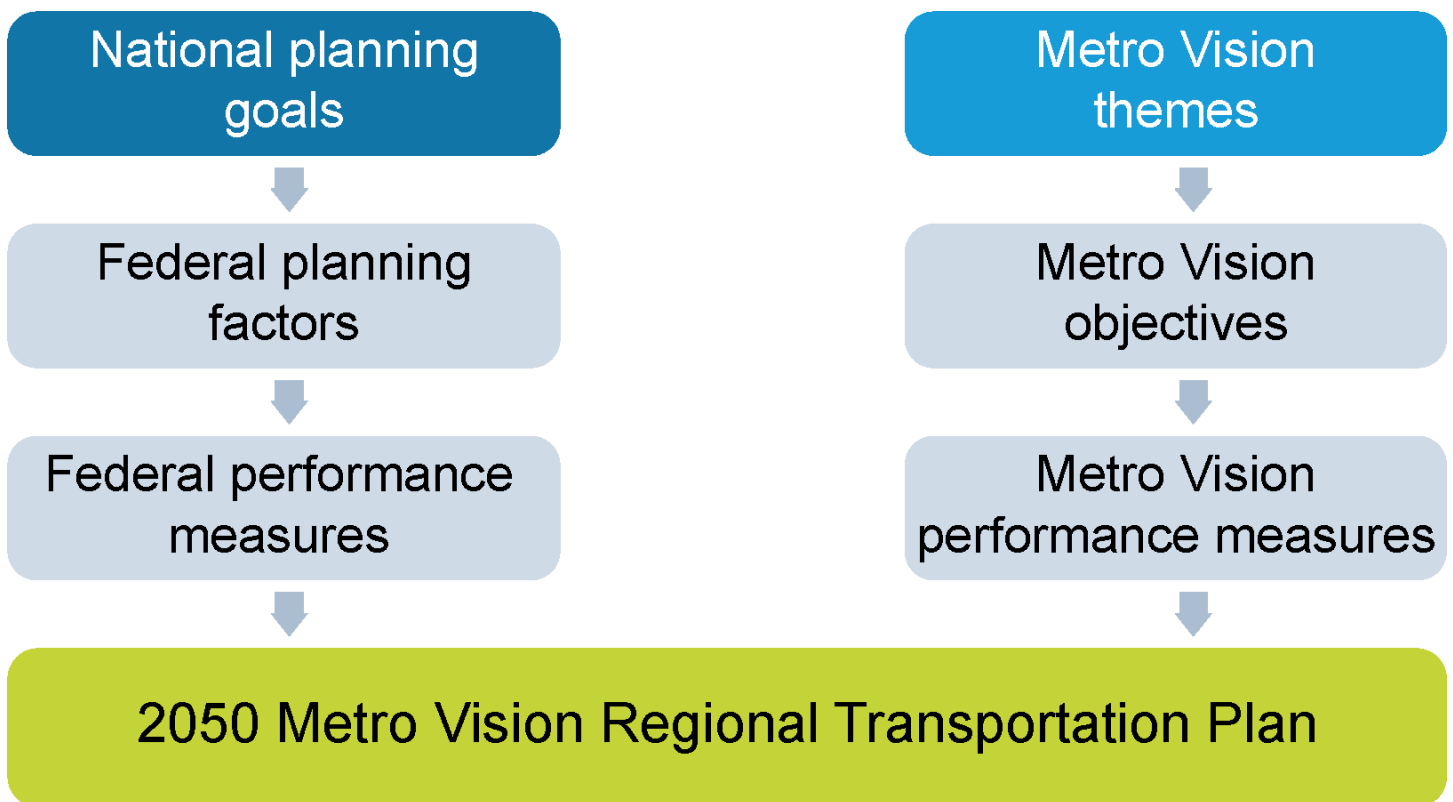
System performance report

This appendix serves as the System Performance Report for the 2050 Metro Vision Regional Transportation Plan. The report includes an evaluation of system performance with respect to the performance targets. The progress descriptions include the performance data and associated performance target information that is available at the time of plan adoption.

Federal and regional framework

The Denver Regional Council of Governments uses a performance-based planning and programming framework that incorporates federal and regional priorities and objectives. DRCOG staff incorporated the seven national planning goals and 10 federal planning factors with the adopted Metro Vision themes and objectives in the development of the 2050 RTP. The federal and regional performance measures were used in the evaluation of candidate projects.

Figure 1: Integration of federal and regional performance based planning and programming into the 2050 RTP



National planning goals

As a result of Moving Ahead for Progress in 21st Century Act, seven national goals were established:

- **Safety:** To achieve a significant reduction in traffic fatalities and serious injuries on all public roads.
- **Infrastructure condition:** To maintain the highway infrastructure asset system in a state of good repair.
- **Congestion reduction:** To achieve a significant reduction in congestion on the National Highway System.
- **System reliability:** To improve the efficiency of the surface transportation system.
- **Freight movement and economic vitality:** To improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development.
- **Environmental sustainability:** To enhance the performance of the transportation system while protecting and enhancing the natural environment.
- **Reduced project delivery delays:** To reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project development and delivery process, including reducing regulatory burdens and improving agencies' work practices.

The seven national goals outlined here were carried forward into the subsequent surface transportation legislation, the Fixing America's Surface Transportation Act. The FAST Act continues MAP-21's overall performance approach and ensures investment in projects that collectively make progress toward the national goals.

Federal planning factors

The 2050 RTP addresses the 10 planning factors outlined in federal transportation funding legislation as follows:

Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency.

- The plan discusses the importance of and connections to the region's passenger and general aviation airports (Chapter 2).
- The plan specifically includes the DRCOG Multimodal Freight Plan (Appendix M) as well as specific freight projects and a freight program in the fiscally constrained project and program investment strategies (Chapter 3).
- The 2050 RTP provides projects, programs, and services to link employment centers with major multimodal facilities and intermodal freight terminals (Chapter 3).
- Finally, Chapter 4 and the 2050 RTP System Performance Report discusses freight-related performance-based planning and outcomes.

Increase the safety of the transportation system for motorized and nonmotorized users.

- Safety is a foundational priority of the 2050 RTP; Chapter 1 emphasizes the importance of safety in the 2050 planning process.
- Chapter 2 includes data and trends related to safety.
- Chapter 3 includes specific safety projects and a safety program in the fiscally constrained project and program investment priorities.
- Chapter 4 and the 2050 RTP System Performance Report discusses safety-related performance-based planning and outcomes, including proposed measure and target revisions to DRCOG's Metro Vision Plan.
- Finally, DRCOG's innovative Taking Action on Regional Vision Zero is incorporated into the 2050 RTP (Appendix K).

Increase the security of the transportation system for motorized and nonmotorized users.

- Safety and security are closely linked in the 2050 RTP. In addition, Chapter 2 discusses DRCOG's role in regional transportation security activities.

Increase the accessibility and mobility of people and for freight.

- Accessibility is discussed throughout the 2050 RTP, especially in the context of transit and environmental justice (Chapter 4 and Appendix D).
- The 2050 RTP is thematically structured around the concept of multimodal mobility to provide a range of travel options to improve accessibility for people and freight.
- The DRCOG Multimodal Freight Plan (Appendix M) specifically discusses mobility and accessibility for freight and goods movement.

Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements, and state and local planned growth and economic development patterns.

- Protecting and enhancing the environment is a key focus of the 2050 RTP (Chapter 4 and Appendix O). The 2050 planning process facilitated the active involvement of the air quality regulatory agencies and residents interested in air quality. The 2050 RTP is in conformance with the State Implementation Plan for air quality. Projects identified for inclusion in the transit and highway networks are considered with respect to environmental impact at the system level. Chapters 3 and 4 also discuss Colorado's Greenhouse Gas Pollution Reduction Roadmap (HB19-1261).
- Chapter 4 discusses the relationship between the 2050 RTP and the project development process. Specifically, before individual major projects go through final design engineering and construction, federal requirements specify they must go through appropriate National Environmental Policy Act reviews and studies to ensure project alignments, designs and mitigation measures result in environmentally sensitive projects. Chapter 4 also discusses other environmental issues, data and considerations at the long-range planning level.
- Energy conservation is promoted by attempting to minimize travel delays and provide extensive transit services and other travel options through the 2050 RTP. The scenario planning analysis results (Chapter 3 and Appendix F) emphasized the importance of efficient land use patterns and travel options to decrease vehicle miles traveled and encourage more pedestrian- and transit friendly development. In the 2050 RTP, promoting and facilitating travel options are acknowledged through the travel demand management programs funded through the plan, as well as the fiscally constrained project and program investment strategies (Chapter 3) and the Coordinated Transit Plan (Appendix J) and Active Transportation Plan (Appendix L).
- Quality of life is also addressed throughout the 2050 RTP, from the multimodal fiscally constrained project and program investment strategies (Chapter 3), to the plans focus on equity and environmental justice (Chapter 4) and specific modal plans in the appendices J-N addressing safety, activity transportation, transit, freight, and mobility and technology. Additionally, the plan's scenario analysis process focused on the relationships between land use, multimodal transportation investments, and mobility outcomes to improve the region's quality of life.
- The 2050 RTP explicitly considered state and local planned growth and economic development patterns through extensive outreach to local governments and economic development organizations to produce the small area forecasts (Appendix F), the official land use, growth and socioeconomic inputs used to create the 2050 RTP.

Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight.

- The 2050 RTP specifically address the integration of transportation system elements. The plan discusses multimodal connections throughout the document and its fiscally constrained project and program investment strategies (Chapter 3).
- In addition to examples discussed for other FAST Act Planning Factors above, the plan includes an expansive fiscally constrained and envisioned transit system to connect the region (Chapter 3). This includes a regional bus rapid transit network and mobility hubs to connect travel modes to an envisioned intercity rail system.
- Chapter 2 also discusses transit-to-aviation connections.
- Finally, the DRCOG Multimodal Freight Plan, Mobility Choice Blueprint and the other modal plans (Appendices J-N) emphasize integration and connectivity across and between travel modes.

Promote efficient system management and operation.

- The 2050 RTP specifically discusses system management and operational activities (Chapters 2 and 3).
- The plan identifies and funds operational improvements, facility management, traveler and transit information systems, and travel demand modification efforts to ensure that the regional transportation system will work as efficiently as possible. Intelligent transportation system efforts will provide transportation efficiency benefits, as well as safety and security enhancements (Chapter 3).
- The Mobility Choice Blueprint (Appendix N) also addresses the role evolving technology could play in system management and operations.
- A key outcome (with associated objectives and strategic initiatives) of Metro Vision's transportation theme is that "the regional transportation system is well-connected and serves all modes of travel" which the 2050 RTP implements (Chapters 1 and 4).
- From a Transportation Performance Management perspective, the 2050 RTP System Performance Report (Appendix G) addresses efficient system management and operation.

Emphasize the preservation of the existing transportation system.

- Preservation of the existing transportation system is a key focus of the 2050 RTP. Chapters 2 and 3 emphasize the allocation of more than half of available revenues toward system preservation, operation and maintenance. Preservation is applied to all types of travel mode facilities on the system, from roadways to transit stations to sidewalks.
- The 2050 RTP System Performance Report also discusses DRCOG, Colorado Department of Transportation and Regional Transportation District activities related to system preservation and state of good repair.

Improve the resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts of surface transportation.



- Transportation system resiliency is specifically addressed in Chapter 2 of the 2050 RTP and is addressed more broadly throughout the plan, such as safety, security and operations (Chapter 2), as well as environmental mitigation (Chapter 4) and related materials in the appendices.
- While stormwater reduction and mitigation is addressed during the project development and implementation process, Chapter 4 discusses the importance of stormwater and related environmental issues at the regional level. DRCOG monitors National Environmental Policy Act and Planning and Environment Linkage studies to ensure stormwater (among many other issues) is addressed during corridor and project studies.

Enhance travel and tourism.

- The 2050 RTP funds a connected network of multimodal projects, programs and services to increase travel mobility for all users (Chapter 3).
- The issues of travel, mobility and accessibility are discussed throughout the plan, as is the issue of balancing increased mobility for individual users while desiring to reduce or limit increases in vehicle miles traveled, greenhouse gas emissions and single-occupant vehicle mode share to work at the regional level.
- The 2050 RTP's investments in key transportation facilities and services also facilitate tourism, such as via interstate highways, Denver International Airport and Denver Union Station. For example, RTD's FasTracks system includes connections to Denver International Airport (University of Colorado A Line), major regional tourist attractions (Coors Field, Empower Field at Mile High and Ball Arena), and other activity centers that significantly facilitate tourism and general travel.

Federal performance measures

Table 1: Federal performance areas and measures

 <p>Safety performance</p>	Individual targets for all public roads, developed and adopted annually (covers the DRCOG metropolitan planning organization region only).	
	Safety	Number of fatalities.
		Rate of fatalities per 100 million vehicle miles traveled.
		Number of serious injuries.
		Rate of serious injuries per 100 million vehicle miles traveled.
		Number of nonmotorized fatalities and serious injuries.
 <p>Infrastructure condition</p>	Individual four-year targets for the non-Interstate National Highway System and the Interstate System.	
	Pavement condition	Percent of pavement on the interstate system in good condition.
		Percent of pavement on the interstate system in poor condition.
		Percent of pavement on the non-interstate national highway system in good condition.
		Percent of pavement on the non-interstate national highway system in poor condition.
	Individual four-year targets for all bridges carrying the National Highway System, including on- and off- ramps.	
	Bridge condition	Percent of bridges in good condition.
		Percent of bridges in poor condition.



System performance, freight, and congestion mitigation and air quality

Single, unified two- and four-year targets for the Denver-Aurora, Colorado, urbanized area.

Traffic congestion

Annual hours of peak-hour excessive delay per capita.

Percent of non-single-occupant vehicle travel.

Individual four-year targets for the interstate system and non-interstate national highway system.

Travel time Reliability

Percent of the person miles traveled on the Interstate that are reliable.

Percent of the person miles traveled on the non-Interstate National Highway System that are reliable.

Individual four-year targets for the interstate system.

Freight reliability

Truck travel time reliability index.



Transit asset management

Individual targets for all public roads, developed and adopted annually (covers the DRCOG metropolitan planning organization region only).

Rolling stock	Percent of revenue vehicles by type exceeding the useful life benchmark.
Equipment	Percent of non-revenue vehicles by type exceeding the useful life benchmark.
Facilities	Percent of facilities by group rated under 3.0 on the Transit Economic Requirements Model scale.
Infrastructure	Percent of track segments by mode under performance restrictions.

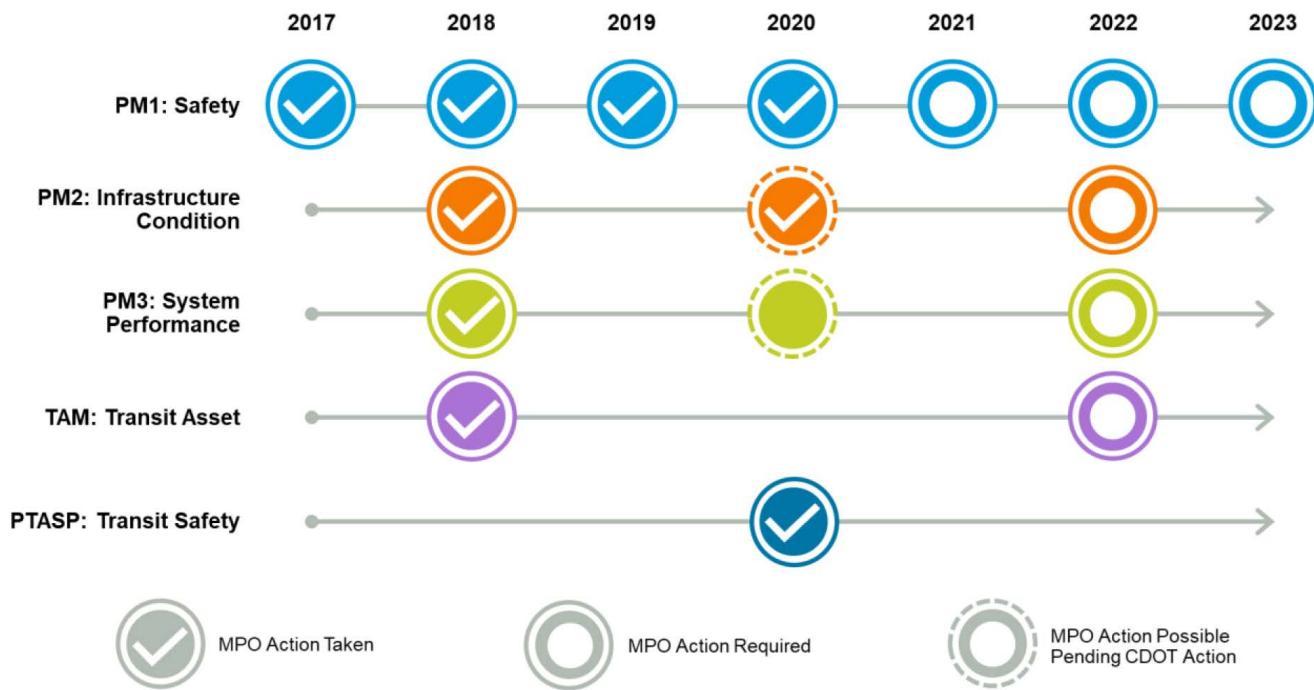


Public transportation agency safety plan

All operators of public transportation systems that are recipients and sub-recipients of Federal Transit Administration grant funds.

Fatalities	Total number of reportable fatalities and rate per vehicle revenue miles by mode.
Injuries	Total number of reportable injuries and rate per vehicle revenue miles by mode.
Events	Total number of reportable events and rate per vehicle revenue miles by mode.
Reliability	Mean distance between major mechanical failures by mode.

Figure 2: DRCOG target-setting timeline



The Federal Highway Administration and the Federal Transit Administration established a set of rulemakings for the implementation of federal performance-based planning and programming requirements. Each rulemaking pertains to a particular area of transportation, and lays out the goals, measures and data to be used in setting targets. CDOT, RTD and DRCOG must link investment priorities to the achievement of performance targets.

The integration of performance management is an evolving effort, as various state, regional and local transportation agencies set and evaluate targets. DRCOG has been coordinating with RTD, CDOT and the Federal Highway Administration and Federal Transit Administration to set targets for the performance measures.

With the exception of the traffic congestion reduction performance measures, DRCOG has 180 days to set targets after CDOT and RTD set targets. DRCOG has the option of supporting CDOT's or RTD's targets respectively or setting targets specific to the Denver region. For the traffic congestion reduction measures, CDOT and DRCOG are required to set single, unified targets for the urban area.

Figure 3: DRCOG target achievement status



Indicates the target has been achieved based on comparison to the baseline or actual values.



Indicates insufficient or incomplete data to determine whether the target has been achieved based on comparison to the baseline or actual values.



Indicates that the target has not been achieved based on comparison to the baseline or actual values.

DRCOG staff document achievement of performance targets in the System Performance Report numerically and graphically. When data is available, the actual values are shown in connection with one of three icons.



Performance Measure Rule 1: Safety performance targets

The safety performance targets support the Highway Safety Improvement Program to achieve a significant reduction in traffic fatalities and serious injuries on all public roads, including non-state-owned public roads and roads on tribal lands.

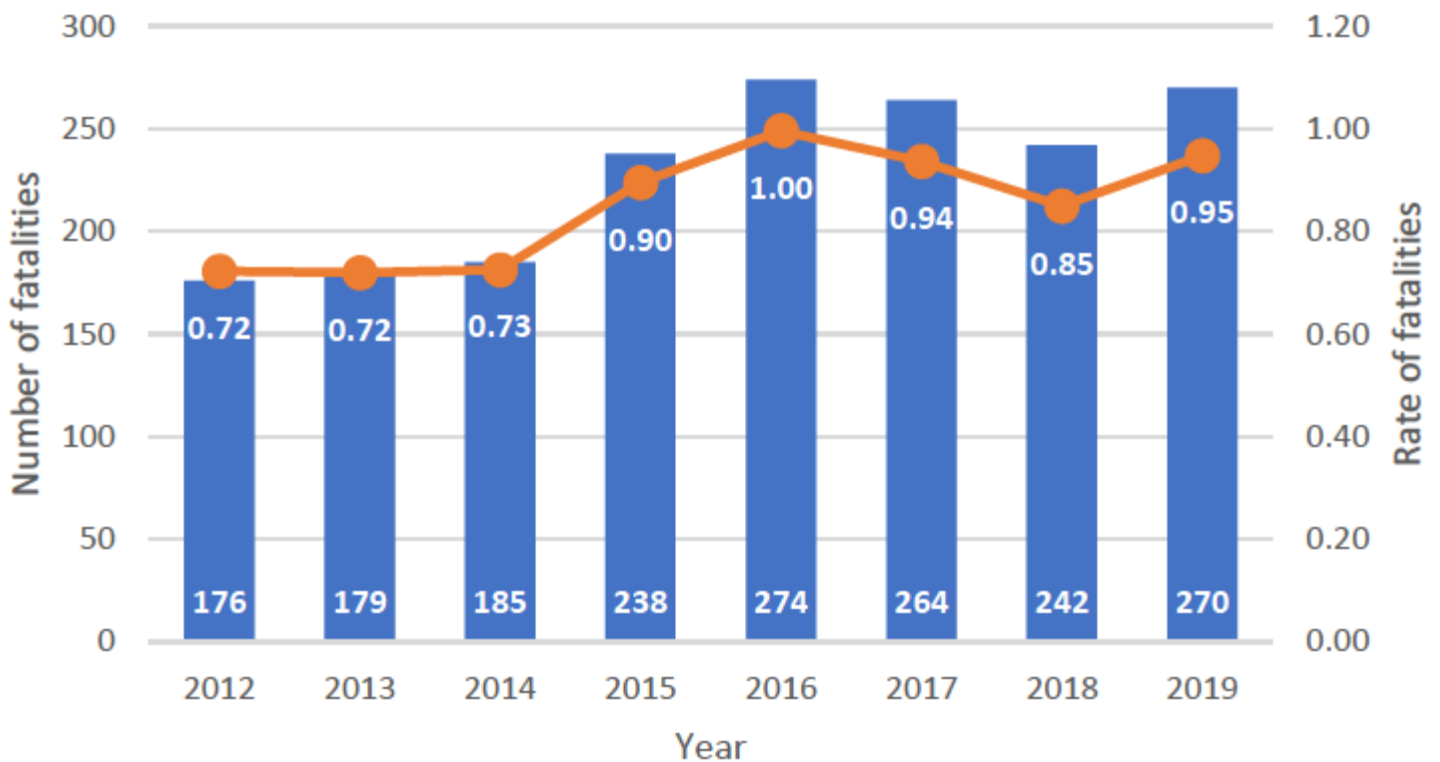
Current conditions

DRCOG staff receives safety data for the Denver region annually from CDOT and calculates crashes within the metropolitan planning organization area.

Since 2012, fatalities have increased as population, employment and vehicle miles traveled have increased. The rate of fatalities per 100 million vehicle miles traveled has also increased from 2012, however, the rate has remained stable since 2016. There were 270 fatalities on public roads within the DRCOG metropolitan planning organization area, the second-highest number of fatalities since 2012.

While the trend is increasing, DRCOG staff have realigned the federal fatality targets to reflect the region's adoption of Taking Action on Regional Vision Zero and to achieve zero fatalities by 2040.

Figure 4: Fatalities in the DRCOG Metropolitan Planning Organization region (2012-2019)



Despite an increase in population, employment and vehicle miles traveled, the number of serious injuries has remained stable since 2012. 1,764 serious injuries occurred on roads in the DRCOG metropolitan planning organization area in 2019. While the number of serious injuries has remained stable, the rate per 100 million vehicle miles traveled has steadily decreased. Except for a spike in 2018, the rate indicates serious injuries have not worsened despite increases in population, employment and vehicle miles traveled.

Across the nation, nonmotorized fatalities and serious injuries continue to increase and prove a challenge to local governments and transportation providers to reduce. This trend is also visible in the Denver region, with 302 nonmotorized serious injuries and 69 nonmotorized fatalities in 2019. DRCOG staff have incorporated the same methodology as for fatalities and serious injuries in setting the nonmotorized targets.

DRCOG staff have also incorporated Regional Vision Zero in setting serious injury targets. The methodology now calculates a goal of zero serious injuries by 2045

Figure 5: Serious injuries in the DRCOG Metropolitan Planning Organization region (2012-2019)

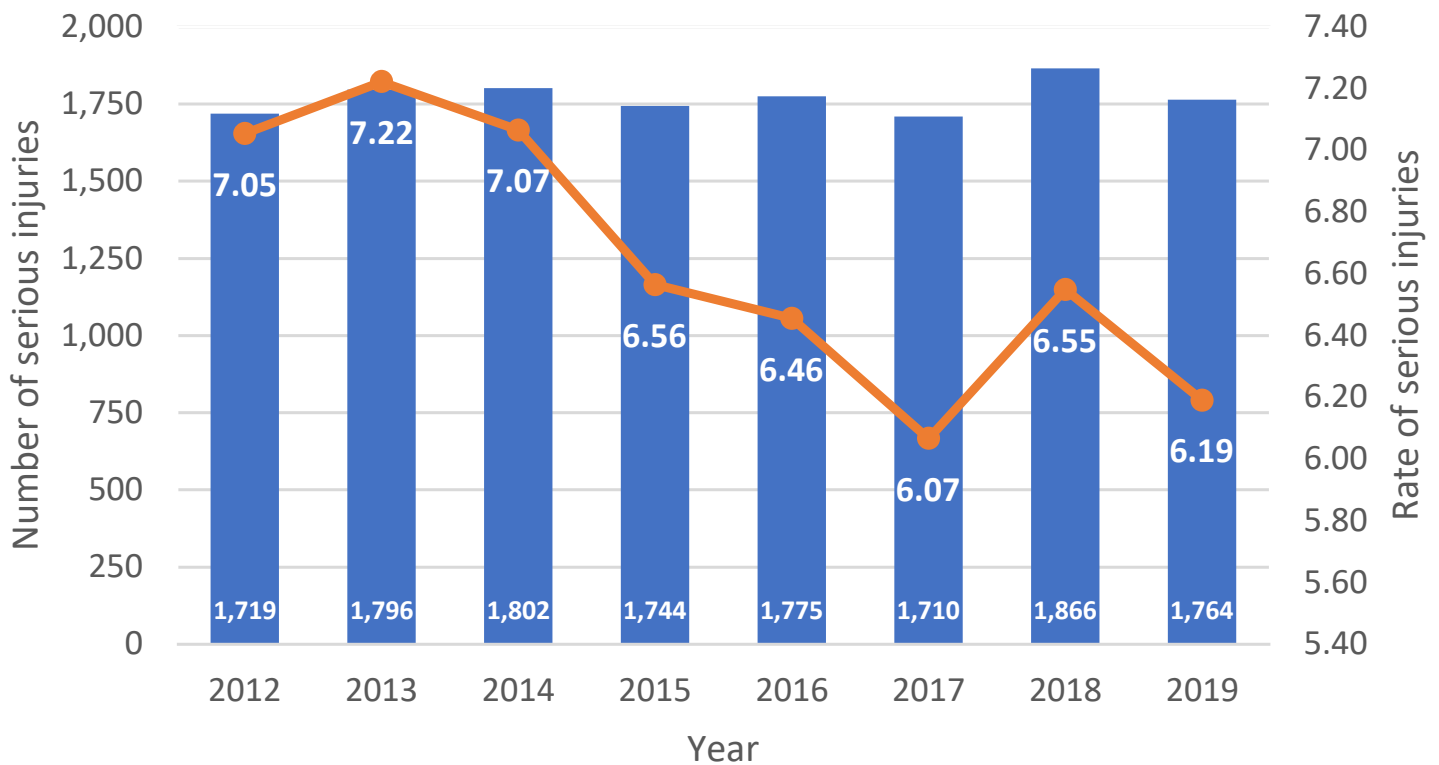
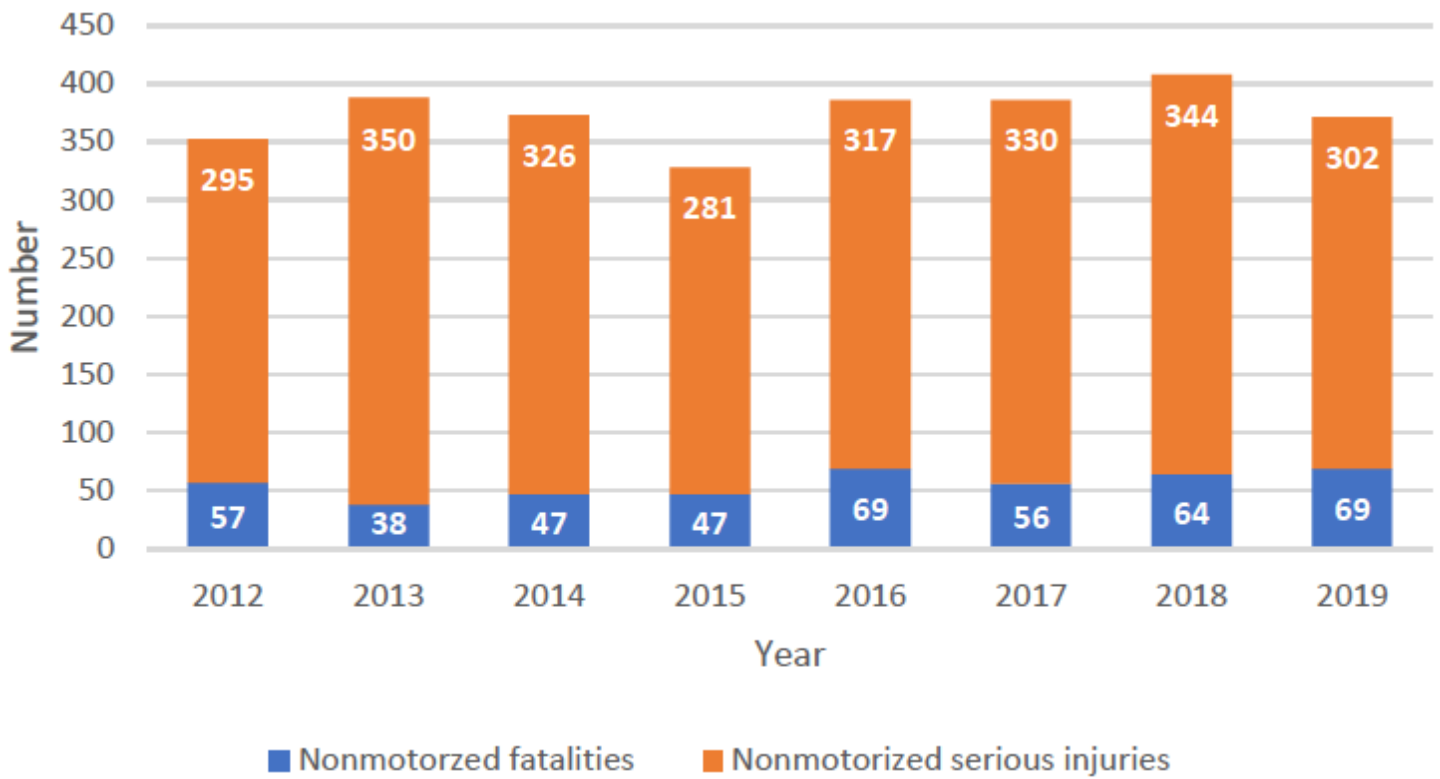


Figure 6: Nonmotorized fatalities and serious injuries in the DRCOG Metropolitan Planning Organization region (2012-2019)



Progress in achieving targets

With safety performance measures being an annual target and one of DRCOG's top priorities, DRCOG and members governments have taken steps to achieve the safety targets. In the 2022-2025 TIP, 118 projects totaling \$898 million are identified to help achieve the safety targets.

CDOT and DRCOG also developed the Safer Main Streets initiative in 2020. Safer Main Streets program was developed to support infrastructure projects that improve safety and accessibility along urban arterials especially for vulnerable users who depend on a reliable urban street network, such as pedestrians, bikers, motorcyclists, transit users, the elderly and people with disabilities. In the Denver and Boulder areas, 30 transportation projects worth \$58.9 million were selected.

DRCOG adopted Taking Action on Regional Vision Zero in June 2020. Taking Action on Regional Vision Zero is a safety action plan that includes a toolkit for local governments within the Denver region to prioritize safety. It also defines 25 action initiatives with an implementation timeline and additional safety measures to support FAST Act performance measures and additional tracking on regional progress toward safety improvements.

DRCOG staff are working with stakeholders to adopt a regional Complete Streets Toolkit to provide further guidance for local governments to plan, design and implement Complete Streets. Included in the regional Complete Streets Toolkit are street typologies, which highlight opportunities for regional connections for nonvehicular modes. The street typologies recommendations have also been incorporated in the 2050 Metro Vision Regional Transportation Plan.

In developing the 2050 RTP, DRCOG staff solicited, evaluated and included a diverse set of projects, including the establishment of an arterial safety and Regional Vision Zero program that includes projects and set-asides. Over \$465 million is programmed toward projects in the 2050 RTP that explicitly improve arterial safety and Regional Vision Zero.

The DRCOG Board has established safety targets specific to the DRCOG metropolitan planning organization area each year since the federal measures became effective. The Board's decision to establish safety targets reflects the importance of safety and supports efforts to reduce fatalities and serious injuries. The progress in achieving the safety targets is shown in table 2, see Figure 3 for more information on symbology.

Table 2: 2018 safety performance targets

2018 performance measures	Five-year rolling average			Acheived
	Baseline (2012-2016)	Targets (2014-2018)	Actuals (2014-2018)	
Number of fatalities	210	246	241	
Rate of fatalities per 100 million vehicle miles traveled	0.81	0.90	0.88	
Number of serious injuries	1,767	1,948	1,769	
Rate of serious injuries per 100 million vehicle miles traveled	6.87	7.20	6.50	
Number of nonmotorized fatalities and serious injuries	365	346	366	

Table 3: 2019 safety performance targets

2019 performance measures	Five-year rolling average			Acheived
	Baseline (2013-2017)	Targets (2015-2019)	Actuals (2015-2019)	
Number of fatalities	228	256	258	
Rate of fatalities per 100 million vehicle miles traveled	0.85	0.93	0.93	
Number of serious injuries	1,765	1,953	1,772	
Rate of serious injuries per 100 million vehicle miles traveled	6.68	6.97	6.37	
Number of nonmotorized fatalities and serious injuries	372	344	376	

Table 4: 2020 safety performance targets

2020 performance measures	Five-year rolling average			Acheived
	Baseline (2014-2018)	Targets (2016-2020)	Actuals (2016-2020)	
Number of fatalities	241	259	TBD	—
Rate of fatalities per 100 million vehicle miles traveled	0.88	0.90	TBD	—
Number of serious injuries	1,769	1,814	TBD	—
Rate of serious injuries per 100 million vehicle miles traveled	6.50	6.36	TBD	—
Number of nonmotorized fatalities and serious injuries	370	366	TBD	—

Table 5: 2021 safety performance targets

2021 performance measures	Five-year rolling average			Acheived
	Baseline (2015-2019)	Targets (2017-2021)	Actuals (2017-2021)	
Number of fatalities	258	255	TBD	—
Rate of fatalities per 100 million vehicle miles traveled	0.93	0.89	TBD	—
Number of serious injuries	1,772	1,733	TBD	—
Rate of serious injuries per 100 million vehicle miles traveled	6.37	6.02	TBD	—
Number of nonmotorized fatalities and serious injuries	376	372	TBD	—



Performance Measure Rule 2: Infrastructure condition targets

The National Highway Performance Program provides support for the condition and performance of the National Highway System, for construction of new facilities and to ensure that investments of federal-aid funds are directed to support progress toward achieving performance targets established in a state's asset management plan.

CDOT has provided DRCOG staff with the latest information on pavements and bridges on the National Highway System in the Denver region. While data is collected for good, fair and poor conditions, targets are only required for good and poor condition. While DRCOG has elected to support CDOT's pavement and bridge condition targets, the following charts illustrate

the performance of pavement and bridge in the Denver region in comparison with CDOT's four-year targets.

Current conditions

Using the federal methodology, data on pavement condition only goes back to 2017. As of 2019, 99% of interstate pavement in the Denver region is in good or fair condition and less than 1% is in poor condition.

Pavement condition on the noninterstate National Highway System is in similarly reasonable condition with 95% of pavement is in good or fair condition

The latest data for bridge condition in the Denver region show most bridges — 93% — are considered to be in good or fair condition. Until 2019 the percentage of bridges in poor condition remained stable, while those in good condition steadily declined.

Figure 7: Interstate pavement condition in the Denver region (2017-2019)

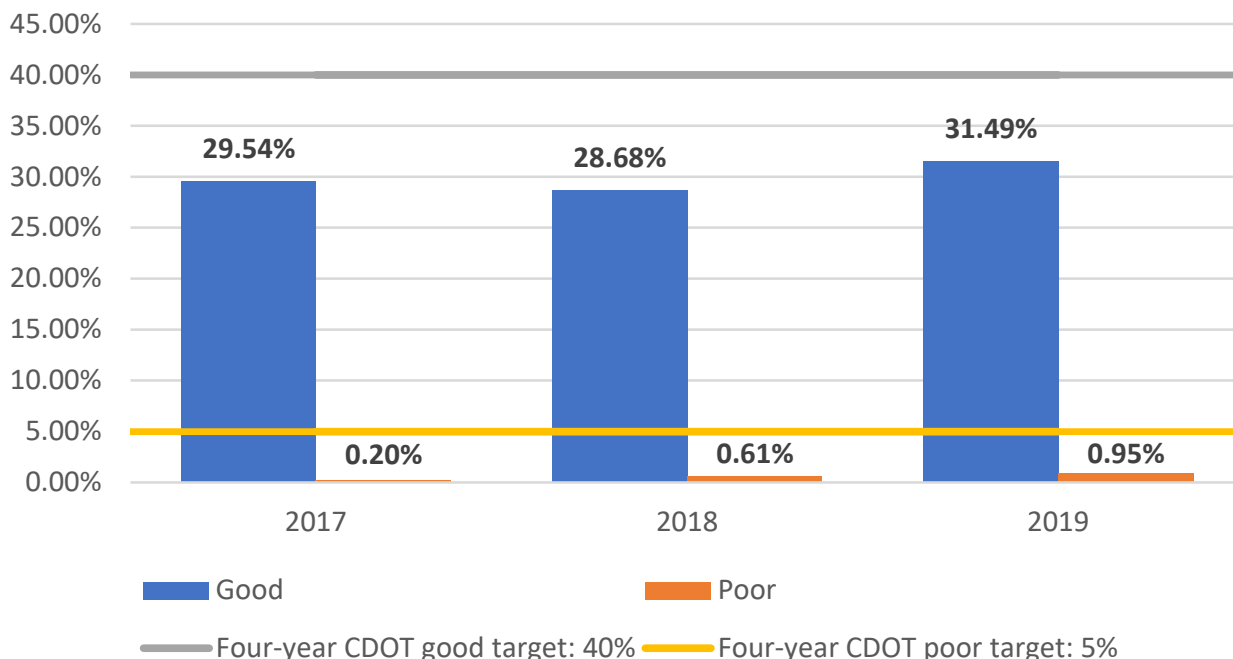


Figure 8: Noninterstate national highway system pavement condition in the Denver region (2017-2019)

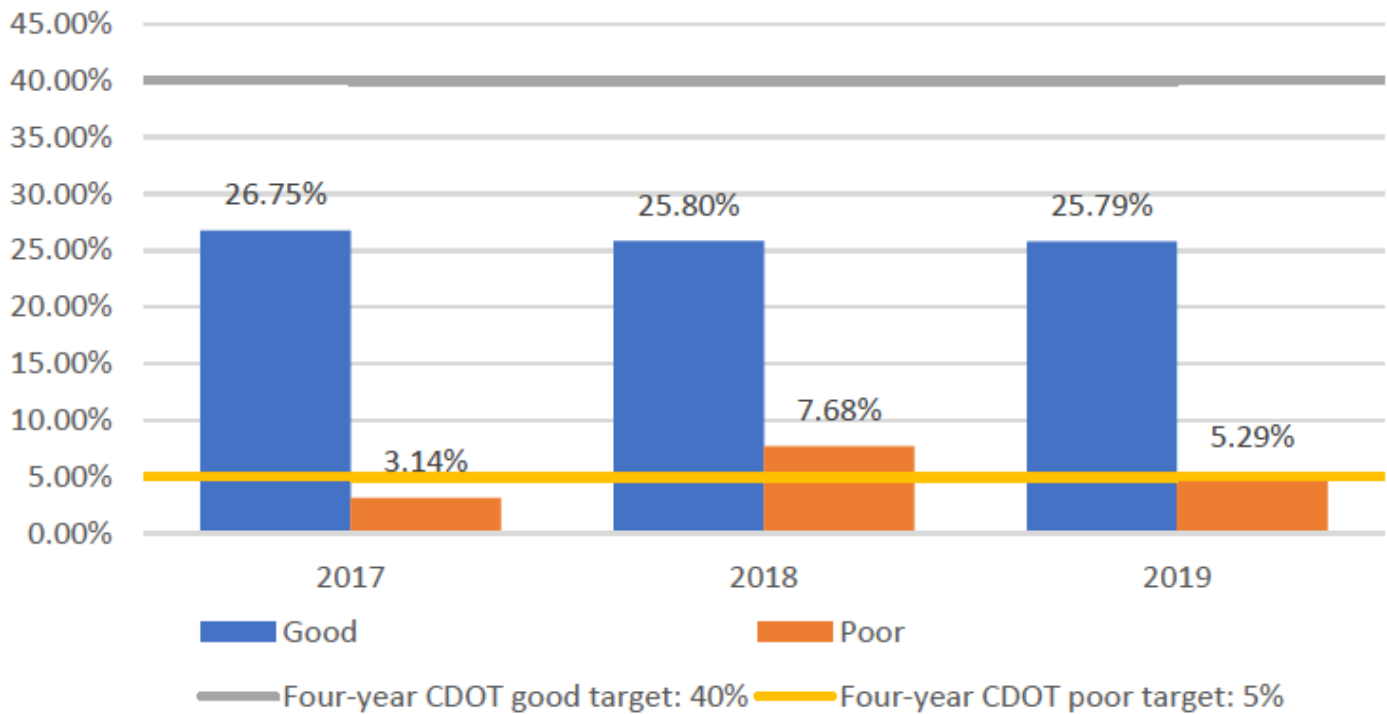
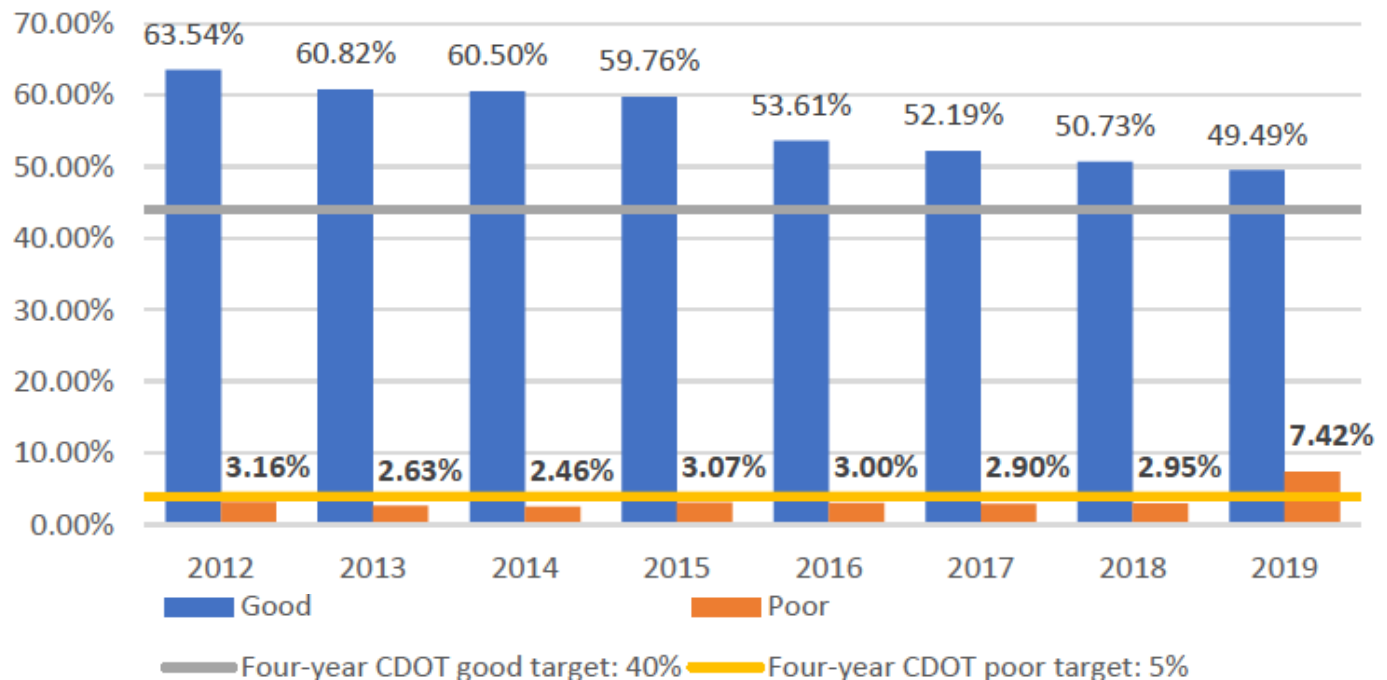


Figure 9: National highway system bridge condition in the Denver region (2012-2019)



Progress toward achieving targets

Each of CDOT's programs fall into one of seven major investment categories. One category is a Maintenance and Operations category, from which CDOT's program of projects is developed. The program of projects is developed in consultation with the department's local partners, the public and through the development of CDOT's 10-year strategic pipeline of projects. The investments contribute toward achievement of objectives for asset management, translating into improving performance for pavement and bridge objectives within the FAST Act.

In DRCOG's 2022-2025 Transportation Improvement Program, 51 projects totaling \$865 million have been identified to achieve the state's pavement condition targets and 30 projects totaling \$628 million have been identified to achieve the state's bridge condition targets.

As a result of a combination of factors, including the role CDOT plays in the management, construction and maintenance of state highways, the DRCOG Board elected to support CDOT's original and revised pavement and bridge condition targets instead of setting targets specific to the region. DRCOG evaluates the performance of the region against the state to determine whether separate regional targets are preferred. Because there was limited available data at the time of target-setting, DRCOG staff recommended taking a conservative approach and the Board elected to support the state's targets for the first performance period. Progress in achieving the four-year infrastructure condition targets is shown in tables 6-7, see Figure 3 for more information on symbology.

Table 6: Pavement condition targets







Pavement condition performance measures	Baseline (2017)	Four-year targets (2021)	Four-year actuals (2021)	Full period performance progress
Percent of pavement in good condition (Interstate)	44.88%	40%	TBD	
Percent of pavement in poor condition (Interstate)	0.25%	5%	TBD	
Percent of pavement in good condition (noninterstate National Highway System)	49.34%	40%	TBD	
Percent of pavement in poor condition (noninterstate National Highway System)	0.96%	5%	TBD	

Table 7: Bridge condition targets

Bridge condition performance measures	Baseline (2017)	Four-year targets (2021)	Four-year actuals (2021)	Full period performance progress
Percent of bridges in good condition	48.8%	44%	TBD	
Percent of bridges in poor condition	4.19%	4%	TBD	



Performance Measure Rule 3: System performance targets

The system performance targets assess:

- Performance of the Interstate and noninterstate National Highway System for the purpose of carrying out the National Highway Performance Program,;
- Freight movement on the Interstate System.
- Traffic congestion and on-road mobile source emissions for the purpose of carrying out the Congestion Mitigation and Air Quality Improvement Program.

CDOT has provided DRCOG staff with the latest information on travel time reliability, freight reliability, traffic congestion and on-road mobile source emissions in the Denver region.

Travel time reliability

Travel time reliability measures are the percent of person-miles traveled on the National Highway System that are reliable, expressed as the level of travel time reliability. Person-miles take into account the users of the National Highway System. Data include bus, auto and truck occupant levels to reflect the various users of the National Highway System.

Level of travel time reliability is defined as the ratio of the longer travel times (80th percentile) to a “normal” travel time (50th percentile), using data from the National Performance Management Research Data Set. Data are collected in 15-minute segments between 6 a.m. and 8 p.m. local time.

While DRCOG has elected to support CDOT’s travel time reliability targets, the following charts illustrate the system’s performance in the Denver region in comparison to CDOT’s four-year targets.

Within the Denver region, interstate travel time reliability has hovered between 60% and 70% since 2012. As of 2019, the majority of interstate segments in the Denver region were considered reliable by the federal measurement.

Since 2017, the reliability on the noninterstate National Highway System has remained above 80%, with slight increases each year. On the noninterstate National Highway System, 83% of segments are considered reliable as of 2019.

Figure 10: Interstate level of travel time reliability in the Denver region (2012-2019)

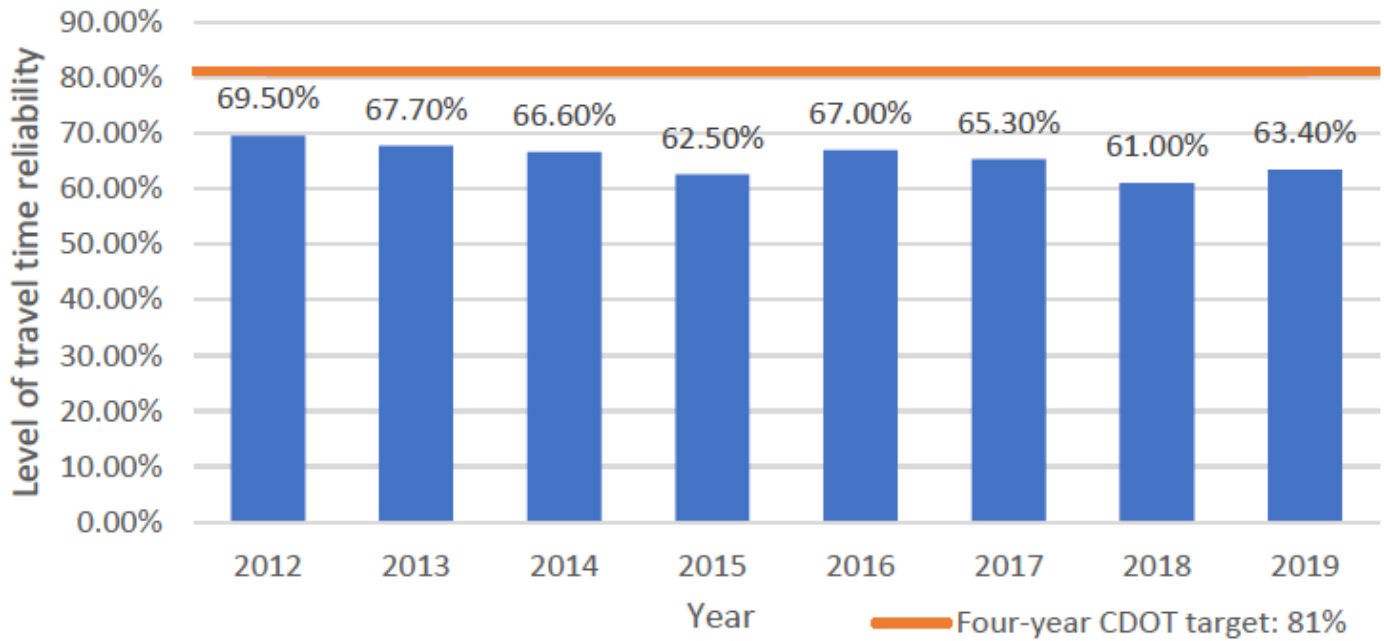


Figure 11: Non-interstate national highway system level of travel time reliability in the Denver region (2012-2019)

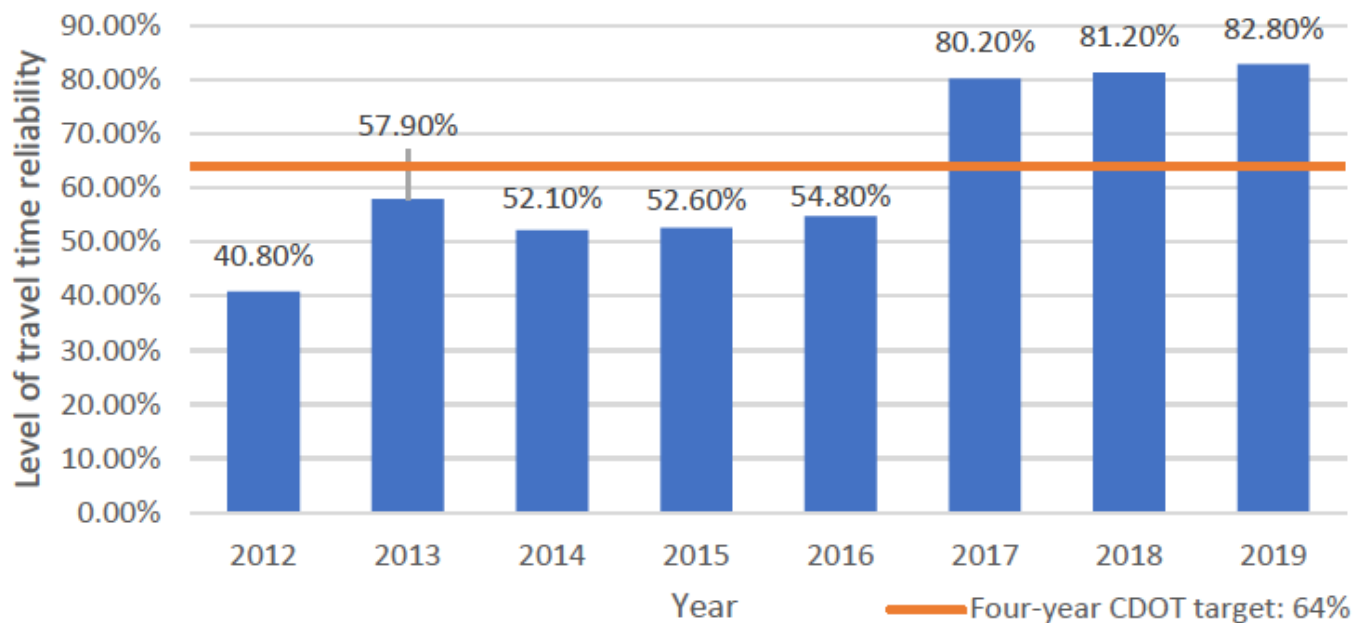




Table 8: Travel time reliability targets

Performance measures	Baseline (2017)	Four-year targets (2021)	Four-year actuals (2021)	Full period performance progress
Percent of the person-miles traveled on the interstate system that are reliable	81.7%	81%	TBD	
Percent of the person-miles traveled on the noninterstate national highway system that are reliable	63.5%	64%	TBD	

Each of CDOT’s programs fall into one of seven major investment categories from which the program of projects is developed, in consultation with CDOT’s local partners, the public and through the development of CDOT’s 10-year strategic pipeline of projects. The investments contribute toward achievement of objectives for safety, asset management and mobility goal areas, with mobility goal objectives translating into improving performance for travel time reliability within the FAST Act. Additionally, in DRCOG’s 2022-2025 Transportation Improvement Program, 58 TIP projects totaling \$702 million were identified to contribute to achievement of the travel time reliability targets.

Following a DRCOG staff evaluation of the performance of the region against the state to determine whether separate regional targets would be preferred, the DRCOG Board elected to support CDOT’s performance targets related to travel time reliability. During its evaluation, DRCOG staff took a conservative approach and recommended the Board support the state’s targets for the first performance period. Progress toward achieving the four-year travel time reliability targets is shown in Table 8, see Figure 3 for more information on symbology.

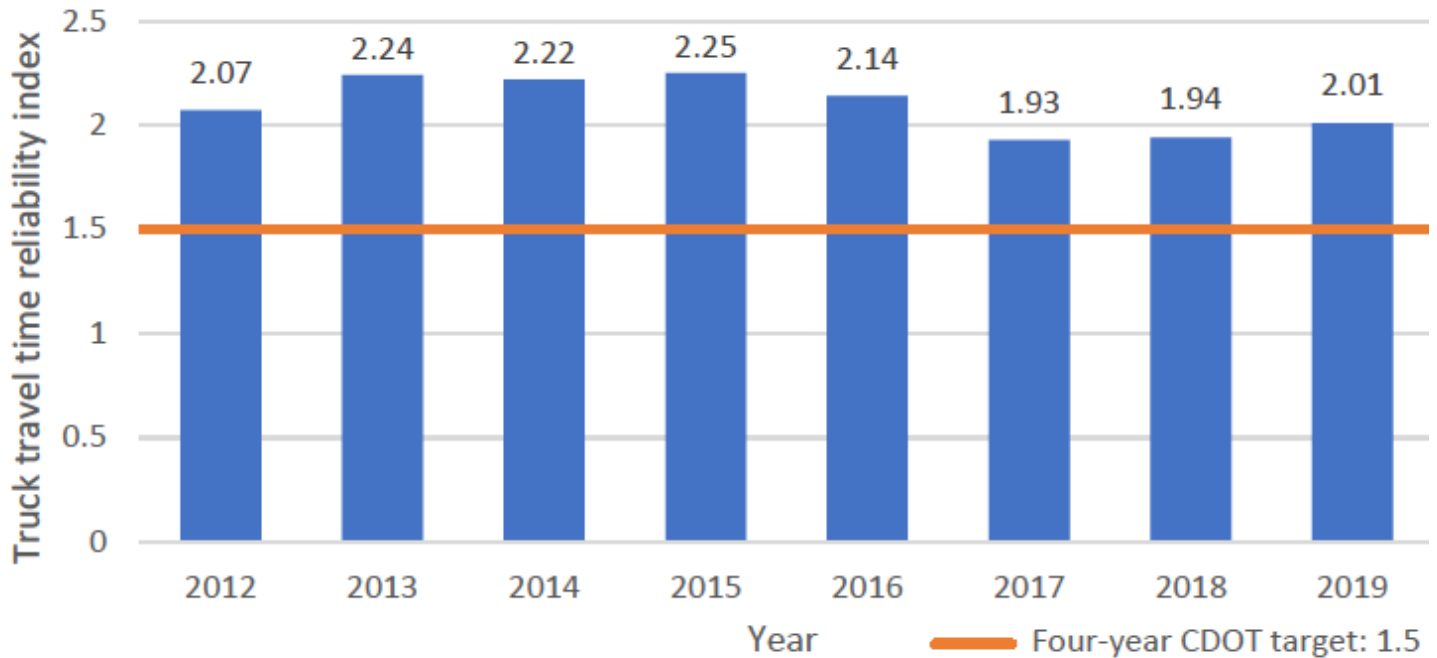
Freight reliability

There is a separate measure for travel time reliability for freight on the Interstate System, the Truck Travel Time Reliability Index. It is broken down into five periods: morning peak, midday and afternoon peak Monday through Friday; weekends and overnight daily. The Truck Travel Time Reliability Index ratio is generated by dividing the 95th percentile time by the “normal” time (50th percentile) for each segment. The Truck Travel Time Reliability Index is generated by multiplying each segment’s largest ratio of the five periods by its length, then dividing the sum of all length-weighted segments by the total length of interstate. Lower values for the Truck Travel Time Reliability Index indicate greater freight reliability.

While DRCOG has elected to support CDOT’s freight reliability targets, the following charts illustrate the system’s performance in the Denver region in comparison with CDOT’s four-year targets.

The Truck Travel Time Reliability Index in the Denver region has oscillated between 1.93 and 2.25 since 2012. The latest performance in 2019 shows a TTTR Index of 2.01.

Figure 12: Truck travel time reliability index in the Denver region (2012-2019)



In the 2022-2025 Transportation Improvement Program, 27 TIP projects totaling \$628 million were identified to help achieve the freight reliability targets. DRCOG adopted the Multimodal Regional Freight Plan in June 2020. A key aspect of the freight plan is identification of regional projects to position the Denver region for federal and state investment in freight infrastructure and maintain efficient freight mobility in the region.

In developing the 2050 RTP, DRCOG staff solicited, evaluated and included a diverse set of projects, including the establishment of a freight program that includes projects and set-asides. In the 2050 RTP, over \$220 million is programmed toward projects that explicitly improve freight and goods movement.

Following a DRCOG staff evaluation of the region's performance against the state's to determine whether separate regional targets would be preferred, the DRCOG Board elected to support CDOT's performance targets related to freight reliability. In conducting their evaluation, DRCOG staff took a conservative approach and recommended the Board support the state's targets for the first performance period. Progress in achieving the four-year freight reliability targets shown on the following pages, see Figure 3 for more information on symbology.

Table 9: Freight reliability targets

Performance measures	Baseline (2017)	Four-year targets (2021)	Four-year actuals (2021)	Full period performance progress
Truck Travel Time Reliability Index	1.45	1.5	TBD	

Traffic congestion reduction

The traffic congestion performance measures are applicable to all urbanized areas that include National Highway System mileage; have a population over 1 million; and are designated as nonattainment or maintenance areas per National Ambient Air Quality Standards. The Denver-Aurora, Colorado, Urbanized Area, including the planning area of the Denver Regional Council of Governments, meets the threshold. The following charts illustrate the system’s performance in the Denver region in comparison with the joint DRCOG and CDOT targets.

The Peak Hour Excessive Delay measurement uses travel times of all traffic during each 15-minute interval for all applicable reporting segments in the travel time dataset occurring for peak periods from Jan. 1 through Dec. 31 of the same year, for the Denver-Aurora, Colorado, Urbanized Area, as reported by the National Performance Management Research Data Set. Since 2012, travelers in the Denver region have experienced increased excessive delay during peak hours. However, the latest available data in 2019 shows a decrease in delay from a high of 19.4 hours.

Non-single-occupant vehicle travel includes any travel mode other than driving alone in a motorized vehicle, including travel via carpool, van, public transportation, commuter rail, walking, bicycling or telecommuting. Since 2015, travelers in the region have increased their share of non-single occupant vehicle travel. The highest recorded percentage of non-single occupant vehicle travel occurred in 2019.

Figure 13: Annual hours of peak hour excessive delay in the Denver-Aurora, Colorado urbanized area (2012-2019)

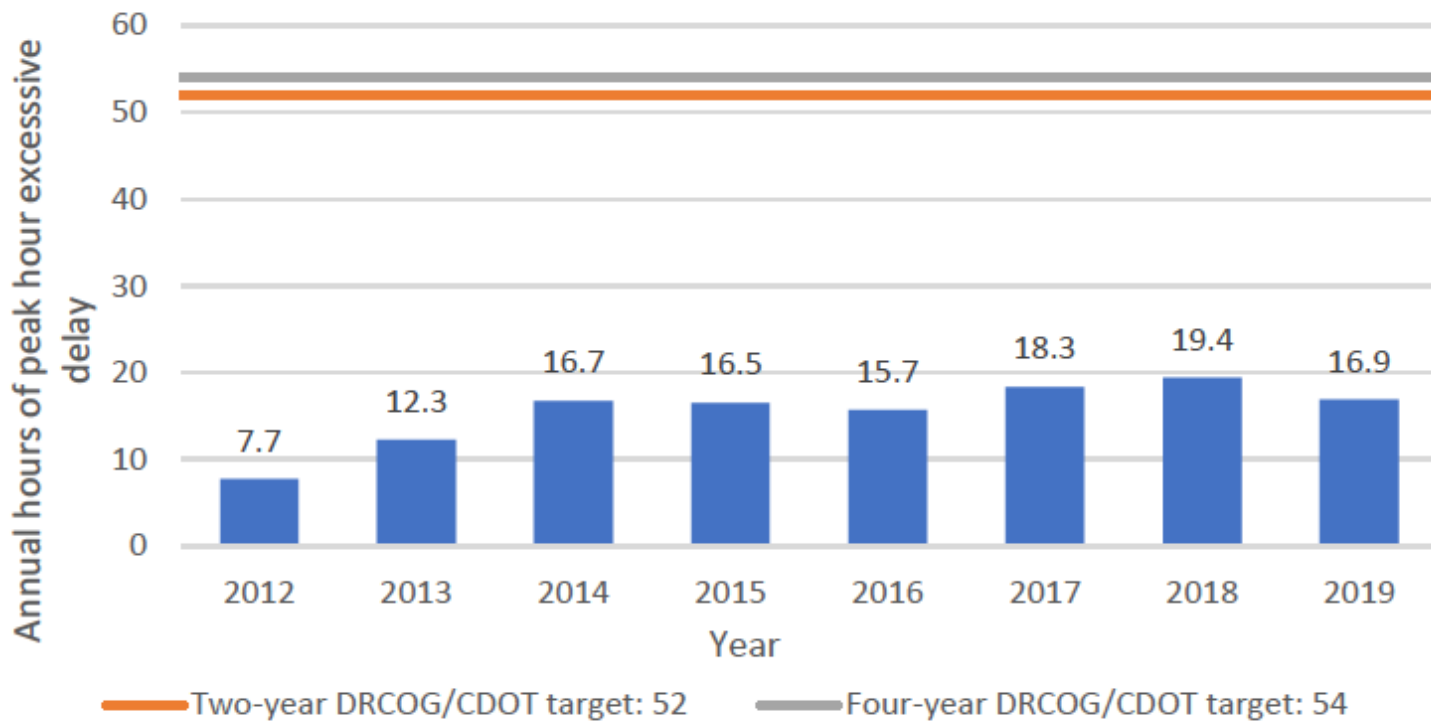
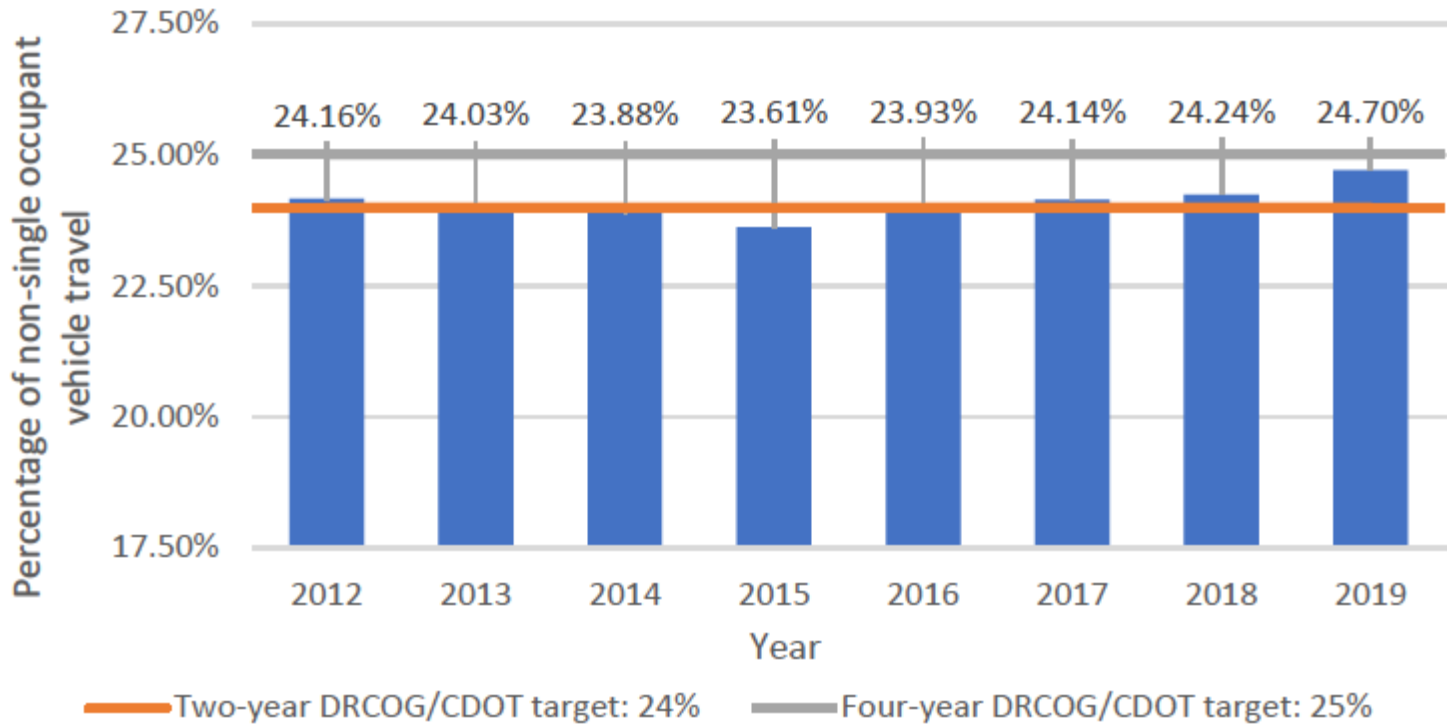


Figure 14: Percentage of non-single-occupant vehicle travel in the Denver-Aurora, Colorado, urbanized area (2012-2019)



In the 2022-2025 Transportation Improvement Program, 133 TIP projects totaling \$916 million were identified to help achieve the traffic congestion targets. Additionally, within the 2020-23 TIP, a Transportation Demand Management Services Set-Aside supports marketing, outreach and research projects that reduce single-occupant vehicle travel and ultimately reduce traffic congestion and improve regional air quality. The 2020-2023 TIP Policy established \$1.8 million in federal funds for non-infrastructure transportation demand management projects over the four-year period.

In addition to the investments through the TIP, DRCOG has adopted or developed multiple multimodal plans to promote non-single-occupant vehicle travel in the region including the Active Transportation Plan in January 2019 and the Mobility Choice Blueprint in February 2019 to guide future investment and outline the region's needs and vision.

In the 2050 RTP, DRCOG staff solicited, evaluated and included a diverse set of projects, including the establishment of an active transportation program that includes projects and set-asides. Over \$179 million is programmed toward projects in the 2050 RTP that explicitly improve regional shared-use paths and encourage more bicycling and walking the region. Additionally, \$725 million is included for transit corridor planning projects and programs that can increase travel options in the region.

Completed jointly with CDOT, the DRCOG Board and CDOT Transportation Commission established performance targets related to traffic congestion. For Peak Hour Excessive Delay, DRCOG has easily achieved the two-year target of 52, recording an actual value of 16.9. DRCOG and CDOT elected not to revise the four-year PHED target for the first performance period, and instead evaluate targets for the second performance period when consistent data can be used to extrapolate trends over time. Having achieved the two-year non-single-occupant vehicle target and being on track to meet its four-year equivalent, DRCOG and CDOT elected not to revise the four-year non-single-occupant vehicle target for the first performance period. Progress in achieving the traffic congestion targets is shown in tables 10 and 11, see Figure 3 for more information on symbology.

Table 10: Traffic congestion two-year targets





Performance measures	Baseline (2017)	Two-year targets (2019)	Two-year actuals (2019)	Mid period performance progress
Percentage of non-single-occupant vehicle travel	23.8%	24%	24.7%	
Annual hours of peak hour excessive delay per capita	47.65	52	16.9	

Table 11: Traffic congestion four-year targets

Performance measures	Baseline (2017)	Four-year targets (2021)	Four-year actuals (2021)	Full period performance progress
Percentage of non-single-occupant vehicle travel	23.8%	25%	TBD	
Annual hours of peak-hour excessive delay per capita	47.65	54	TBD	

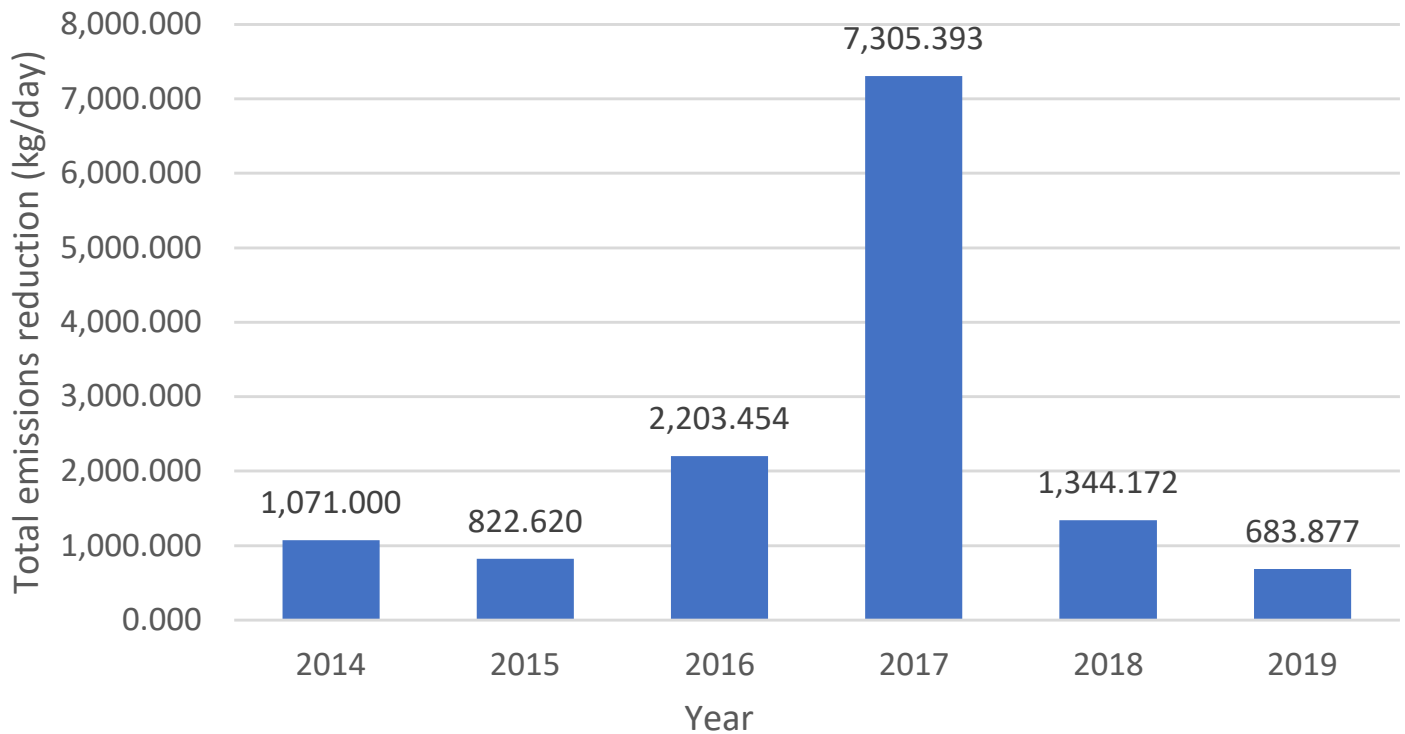
Total emissions reduction

This measure is limited to areas in nonattainment and maintenance to further the Congestion Mitigation and Air Quality program’s purpose of funding programs and projects intended to satisfy the national ambient air quality standards. DRCOG was required to establish two- and four-year performance targets for each criteria pollutant.

CDOT has provided the latest data on emissions reduction benefits based on project obligation in the Denver region since 2014. Tables 12 and 13 illustrate the system’s performance in the Denver region in comparison to DRCOG’s targets.

In the 2022-2025 Transportation Improvement Program, 30 TIP projects totaling \$96 million were identified as helping to achieve the on-road mobile source emissions targets. The suite of projects includes two set-asides within the TIP, an Air Quality Improvements Set-Aside and Regional Transportation Operations and Technology Set-Aside that dedicates funds to improving air quality.

Figure 15: Total emissions reductions in the Denver region (2014-2019)



The Air Quality Improvements Set-Aside dedicates funds exclusively for the Regional Air Quality Council in programs such as vehicle fleet technology, ozone outreach and education, and ozone State Implementation Plan modeling. The Regional Transportation Operations and Technology Set-Aside funds transportation technology and systems improvements that improve performance and reliability, safety and security, bicycle and pedestrian accessibility, and improve interconnections within and beyond the region for people and freight.

The DRCOG Board elected to develop on-road mobile source emissions targets based on Congestion Mitigation and Air Quality obligations in the Denver region. DRCOG has met the two-year targets through the obligation of 53 projects identified from the U.S. Department of Transportation User Profile and Access Control System that received obligation in fiscal years 2018 and 2019. DRCOG is also on track to meet the four-year targets for on-road mobile source emissions. DRCOG staff expects 25 projects to be obligated in fiscal year 2020 and fiscal year 2021 that will contribute to achieving the four-year performance targets. Progress in achieving the on-road mobile source emissions targets is shown on the following pages, see Figure 3 for more information on symbology.

Table 12: Total emissions reductions two-year targets









On-road mobile source emissions performance measures	Baseline (fiscal year 2016)	Two-year target (fiscal years 2018-2019)	Two-year actuals (fiscal years 2018-2019)	Mid-period performance progress
Volatile organic compounds (kilograms/day)	88.616	86	131.414	
Particulate matter 10 (kilograms/day)	40.714	31	39.7433	
Carbon monoxide (kilograms/day)	1,682.796	1,152	1,497.037	
Nitrogen oxides (kilograms/day)	391.338	86	359.855	

Table 13: Total emissions reductions four-year targets

Performance measures	Baseline (fiscal year 2016)	Four-year targets (fiscal years 2018-2021)	Four-year actuals (fiscal years 2018-2021)	Full period performance progress
Volatile organic compounds (kilograms/day)	88.616	105	TBD	
Particulate matter 10 (kilograms/day)	40.714	152	TBD	
Carbon monoxide (kilograms/day)	1,682.796	1,426	TBD	
Nitrogen oxides (kilograms/day)	391.338	105	TBD	



Transit asset management

Transit asset management develops a framework for transit agencies to monitor and manage public transportation assets, improve safety, increase reliability and performance to keep their systems operating smoothly and efficiently.

Current conditions

As a relatively young agency and prior to COVID-19, RTD had not experienced the decaying infrastructure or immediate funding shortages that many older and larger transit systems have. RTD's asset management maturity improvement initiative is not driven by a growing set of decaying assets, but by the expansion of the asset base in recent years.

The funding for the most recent expansion projects did not make provision for the long-term maintenance and capital renewal of the new assets. Without a solid, long-term renewal plan in place including funding earmarked, RTD risks a growing backlog of renewal projects without adequate funding. A growing backlog increases risk to safety, service and future sustainability.

Progress in achieving targets

RTD aims to comply fully with MAP-21 and FAST Act requirements for transit asset management and beyond. It has developed an overall Strategic Asset Management Plan to summarize its strategy to improve asset management

In support of RTD's transit asset management targets, DRCOG's 2022-2025 Transportation Improvement Program includes 30 projects totaling \$632 million that have been identified as helping to achieve the targets.

Additionally, in developing the 2050 RTP, DRCOG staff solicited, evaluated and included a diverse set of projects, including the establishment of a regional bus rapid transit program that includes projects and set-asides. Over \$1.2 billion is programmed toward projects in the 2050 RTP that start implementing the findings from RTD's Regional Bus Rapid Transit Feasibility Study.

RTD is the major public transportation provider in the DRCOG metropolitan planning organization region, has fixed-route rail guideways and is a Tier I agency that has developed a Transit Asset Management Plan. As such, RTD has developed information and targets for the required state of good repair measures. The Tier II agencies in the DRCOG metropolitan planning organization region participated in the CDOT-sponsored Statewide Group Transit Asset Management Plan.

In consultation with the Federal Transit Administration and CDOT, the DRCOG Board elected to support RTD's transit asset management performance targets. RTD provides annual updates on the performance of its system to DRCOG staff. Progress in achieving the transit asset management targets is shown on the following pages, see Figure 3 for more information on symbology.

Table 14: 2021 rolling stock targets

Rolling stock (revenue vehicles by type)	Baseline number	Baseline percent	Target number	Target percent	Achieved
Articulated bus	116	0.0%	116	0.0%	—
Over-the-road bus	174	0.0%	174	0.0%	—
Bus	771	24.0%	768	25.1%	—
Cutaway	372	0.0%	410	0.0%	—
Light rail vehicle	201	0.0%	201	0.0%	—

Table 15: 2021 equipment targets

Equipment (nonrevenue vehicles by type)	Baseline number	Baseline percent	Target number	Target percent	Achieved
Automobile	48	43.8%	48	79.2%	—
Truck and other rubber tire	387	13.2%	387	18.1%	—
Steel wheel vehicles	4	0.0%	4	0.0%	—

Table 16: 2021 infrastructure targets

Equipment (nonrevenue vehicles by type)	Baseline number	Baseline percent	Target number	Target percent	Achieved
Light rail	119.5	2.0%	119.5	2.0%	—
Commuter rail: N Line	13.2	0.0%	13.2	2.0%	—

Table 17: 2021 facilities targets

Facilities (by group)	Baseline number	Baseline percent	Target number	Target percent	Achieved
Stations and parking	110	10.9%	106	11.3%	—
Maintenance and administration	13	0.0%	13	0.0%	—















Public Transportation Agency Safety Plan

The latest federal performance measures are targets for transit safety. Certain operators of public transportation systems that receive federal Section 5307 funds under the Federal Transit Administration's Urbanized Area Formula Grants are required to develop safety plans. It brings management and labor together to better control risk, detect and correct safety problems earlier, share and analyze safety data more effectively and measure safety performance more precisely.

In support of RTD's Public Transportation Agency Safety Plan targets, DRCOG's 2022-2025 Transportation Improvement Program includes 30 projects totaling \$677 million identified to help achieve the targets.

RTD has developed, adopted and certified a Public Transportation Agency Safety Plan and developed targets for the required measures. Following consultation with the Federal Highway Administration and the Federal Transit Administration, the DRCOG Board elected to support RTD's 2021 Public Transportation Agency Safety Plan targets in December 2020. Progress toward achieving transit safety targets is shown on the following pages, see Figure 3 for more information on symbology.

Table 18: 2021 transit safety targets

Public transportation agency safety plan targets		Achieved
Zero fatalities in RTD operating systems; bus, light rail and commuter rail		
Preventable accident rate per 100,000 miles:		
	Bus less than 1.0	
	Light rail less than 1.0	
10% reduction in light rail preventable accidents		
10% reduction in bus preventable accidents		
10% reduction in commuter rail accidents		
25% reduction of lost-time employee injuries		
15% reduction of on-the-job injuries		
	25% reduction of slip-and-fall injuries	
	25% reduction of injuries from strains	
Measure and hold to current levels of performance for system reliability without decline in reliability or increases in costs as described in the current Transit Asset Management Plan.		

Conclusion

DRCOG will continue to coordinate with CDOT, RTD and other relevant stakeholders to integrate their performance measure goals, objectives and plans into its planning process by linking investment priorities to the applicable performance measure targets to the maximum extent practicable. Furthermore, DRCOG will continue to direct investments in future versions of the RTP and TIP toward projects that have the potential to support the targets and measures shown.