North Front Range Metropolitan Planning Organization

Performance Report for the 2019 Congestion Management Process

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Performance Report for the 2019 CMP

Introduction

Reducing congestion is an objective of the North Front Range Metropolitan Planning Organization (NFRMPO) in support of the goal of moving people and goods safely, efficiently, and reliably. The NFRMPO uses a systematic and performance-based approach to address congestion, as documented in the 2019 Congestion Management Process (CMP). The 2019 CMP identifies strategies and performance measures to help inform transportation investment decisions.

This performance report supplements the 2019 CMP by monitoring the implemented congestion strategies in terms of the CMP's performance measures. The purpose of the performance report is to identify effective strategies for congestion management to enable the region to strategically improve system performance. This report fulfills the federal requirement for a periodic assessment of the effectiveness of implemented congestion strategies.

The performance analysis in this report shows the region is making progress on four of seven performance measures with available data. The report also identifies the implemented projects and programmed projects that contribute toward congestion management.

Performance Analysis

The 2019 CMP identifies four direct measures of congestion and four indirect measures of congestion, as listed in **Table 1** and **Table 2**, respectively.

Table 1. Direct Metrics for Evaluating Congestion

CMP Performance Measure	Description
Travel Time Index (TTI)	Ratio of average peak travel time to an off-peak (free-flow) standard. A value of 1.5 indicates that the average peak travel time is 50% longer than off-peak travel times.
Vehicle Miles Traveled (VMT) per Capita	Miles traveled by vehicles in a specified region over a specified time period. Calculated per person for all trips or for specific destinations including home, work, commercial, etc.
Travel Time Reliability (TTR)	Measures non-recurring delay for all vehicles by comparing the 80th percentile travel time to the average (50th percentile) travel time. A value of 1.5 or higher indicates the segment is not reliable. A corridor may be congested, but reliable if the congestion is consistent.
Truck Travel Time Reliability (TTTR)	Measures non-recurring delay for trucks by comparing the 95th percentile travel time to the average (50th percentile) travel time. A value of 1.5 or higher is considered unreliable.

Table 2. Indirect Metrics for Evaluating Congestion

CMP Performance Measure	Description
Number of Crashes	The number of collisions involving one or more vehicles.
Transit Ridership per Capita	The number of unlinked trips per resident within each provider's service area. Measuring per capita helps account for population growth.
Percent of Non-Single Occupant Vehicle (SOV) Commute Trips	Percent of all commute trips completed by any mode other than SOV, including by transit, bicycle, walking, or carpooling.
Percent NHS Miles Covered by Fiber	Percent of National Highway System (NHS) miles with fiber-optic cables installed and used for transportation management purposes.

Performance on these measures of congestion reflect a range of factors. In addition to effectiveness of deployed strategies, performance is also influenced by work zone impacts and changes in travel behavior due to factors such as the price of fuel and, notably in 2020 and 2021, public health emergencies. The performance measure analysis that follows uses various timeframes for analysis, with the latest year of data ranging from 2019 to 2021 based on data availability for each performance measure.

Overall, four of seven performance measures with available data are trending in the right direction, as shown in **Table 3**. The performance measure analysis indicates progress is being made in addressing congestion, but additional strategies are needed to meet the region's congestion reduction goals.

Table 3. Status of CMP Performance Measures

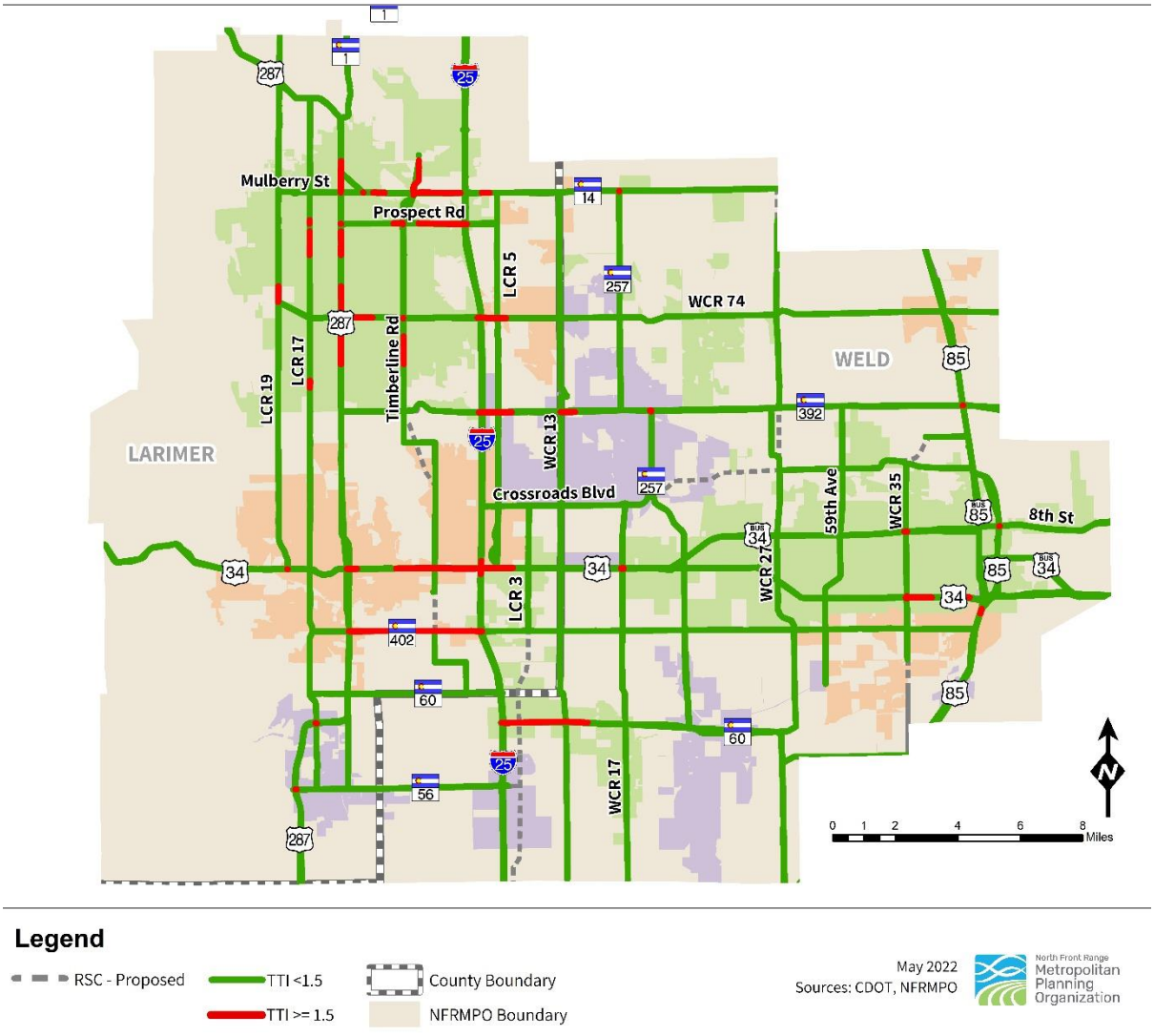
CMP Performance Measure	Baseline Value	Current Value	Status
Travel Time Index (TTI): Percent congested	5.9%	5.1%	Improving
Vehicle Miles Traveled (VMT) per Capita	22.9	19.7	Improving
Travel Time Reliability (TTR): Percent unreliable	2.8%	2.3%	Improving
Truck TTR (TTTR): Percent unreliable	35%	49%	Worsening
Number of Crashes	10,392	10,508	Worsening
Transit Ridership per Capita	15.4	6.3	Worsening
Percent of Non-Single Occupant Vehicle (SOV) Commute Trips	23.4%	25.0%	Improving
Percent NHS Miles Covered by Fiber	N/A	43%	N/A

Travel Time Index (TTI)

TTI measures recurring congestion and is defined as the ratio of the travel time during the peak period to the time required to make the same trip at free-flow speeds. For example, a value of 1.3 indicates a 20-minute free-flow trip requires 26 minutes during the peak period.[1] Typically, roadways with a TTI greater than or equal to 1.5 are considered congested.

Figure 1 highlights the regional TTI for 2021, which shows much of the network experienced free-flow or near free-flow conditions. TTI in 2021 was accessed from the INRIX dataset, the NFRMPO 2015 Regional Travel Demand Model (RTDM), and local travel time datasets such as BlueTOAD and Acyclica. Overall, 5.1 percent of the RSC network was congested in 2021, a decrease from 2018 when 5.9 percent of the network was considered congested.

Figure 1. Travel Time Index of 1.5 or Greater, 2021



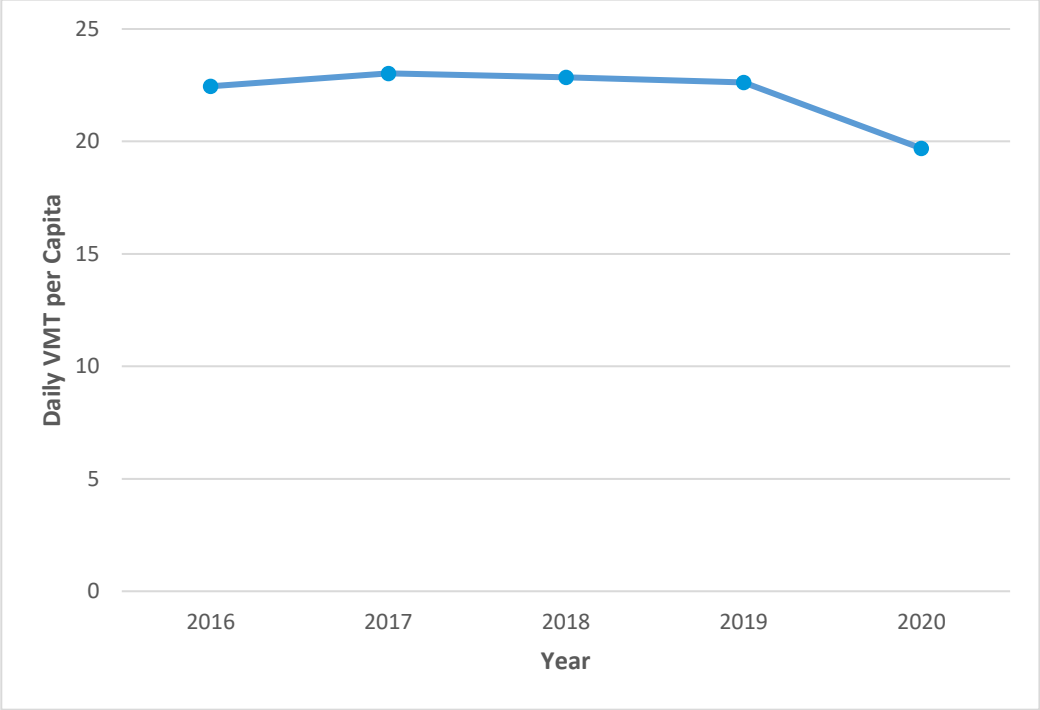
[1] Glossary of Mobility-Related Terms. Texas A&M Transportation Institute. Urban Mobility Information. https://mobility.tamu.edu/umr/media-information/glossary/. Accessed 5/3/22.

Vehicle Miles Traveled (VMT) per Capita

VMT is the number of miles traveled by vehicles within a specified region, during a specified time period. Modeling VMT requires estimates of trip origin and destination. A reduction in VMT provides environmental benefits through reductions in emissions, fuel usage, roadway wear, and vehicle wear. Land use planning principles, such as infill development or mixed-use development can be used to help reduce VMT per capita.

According to VMT estimates from the 2015 Regional Travel Demand Model (RTDM), annual VMT estimates on state highways produced by CDOT, and population estimates from the Colorado State Demography Office, daily VMT per capita within the North Front Range increased from 2016 to 2017 and decreased from 2017 through 2020 as shown in **Figure 5**. Specifically, VMT per capita rose from 22.5 miles per day in 2016 to 23.0 miles per day in 2017, and then dropped to 19.7 miles per day in 2020.

Figure 2. Daily VMT per Capita in the North Front Range, 2016-2020



Source: NFRMPO 2015 RTDM, CDOT, and the Colorado State Demography Office

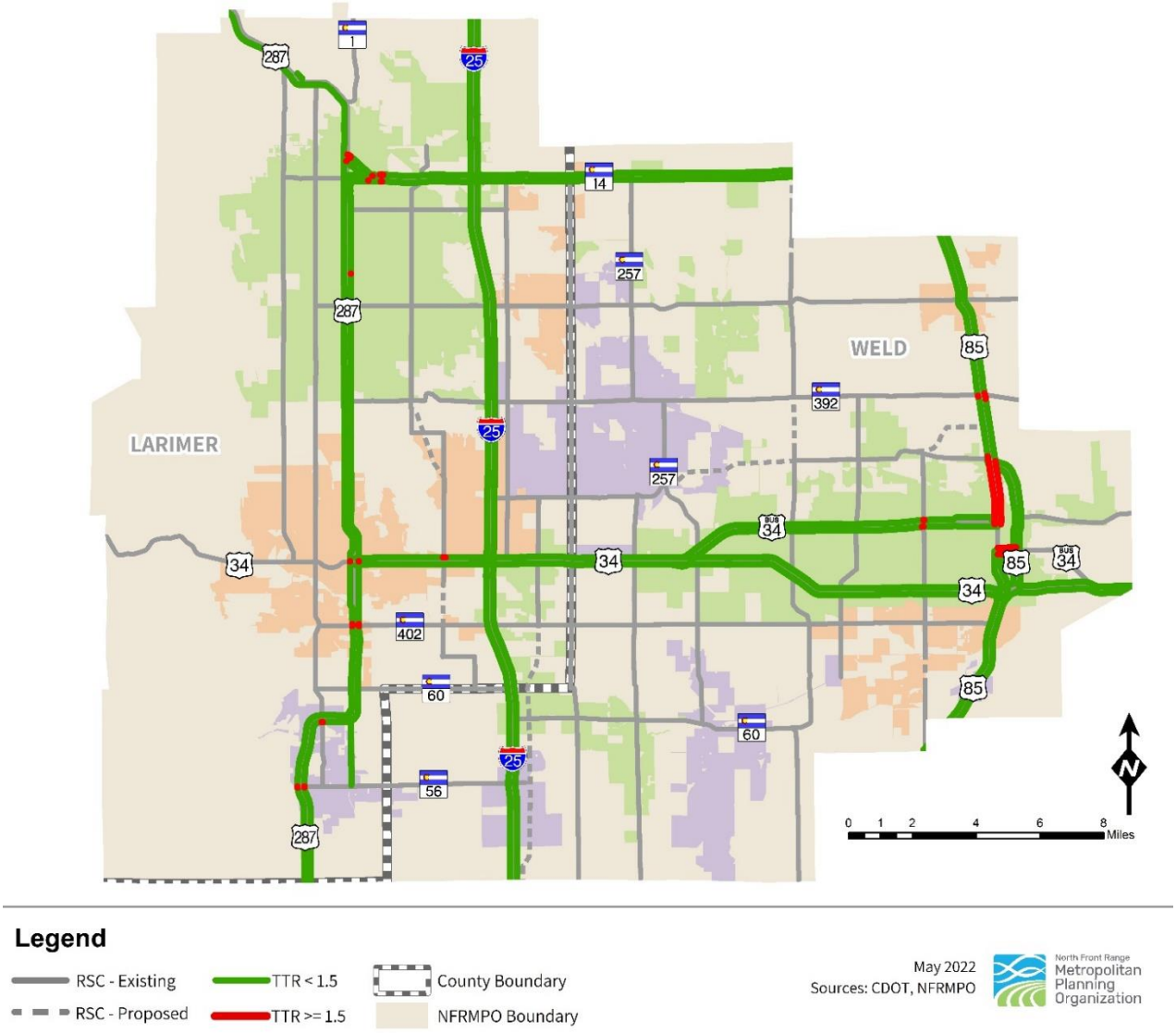
Travel Time Reliability (TTR) Index

Whereas TTI measures the average travel time during peak periods to assess average levels of congestion, TTR measures the variance in travel times to assess the consistency or dependability in travel times. Reliability is important for both personal and business travelers so they can plan their travel to arrive on time. TTR is measured as the 80th percentile travel time divided by the 50th percentile (median) travel time, with ratios of 1.5 or greater considered unreliable. A roadway that typically takes 20 minutes to travel during the evening peak period but sometimes takes over 30 minutes qualifies as

unreliable if the longer travel time occurs at least 20 percent of the time. Data for TTR is available from the National Performance Measure Research Data Set (NPMRDS) for the National Highway System (NHS). Roadway segments with a TTR of 1.5 or greater are shown in **Figure 3**.

In 2021, 2.3 percent of the NHS system in the region was unreliable according to the TTR index, a slight decrease from 2018 when 2.8 percent of the NHS system was unreliable. According to the TTR index, reliability is improving in the region.

Figure 3. TTR Index of 1.5 or Greater, 2021



Truck Travel Time Reliability (TTTR) Index

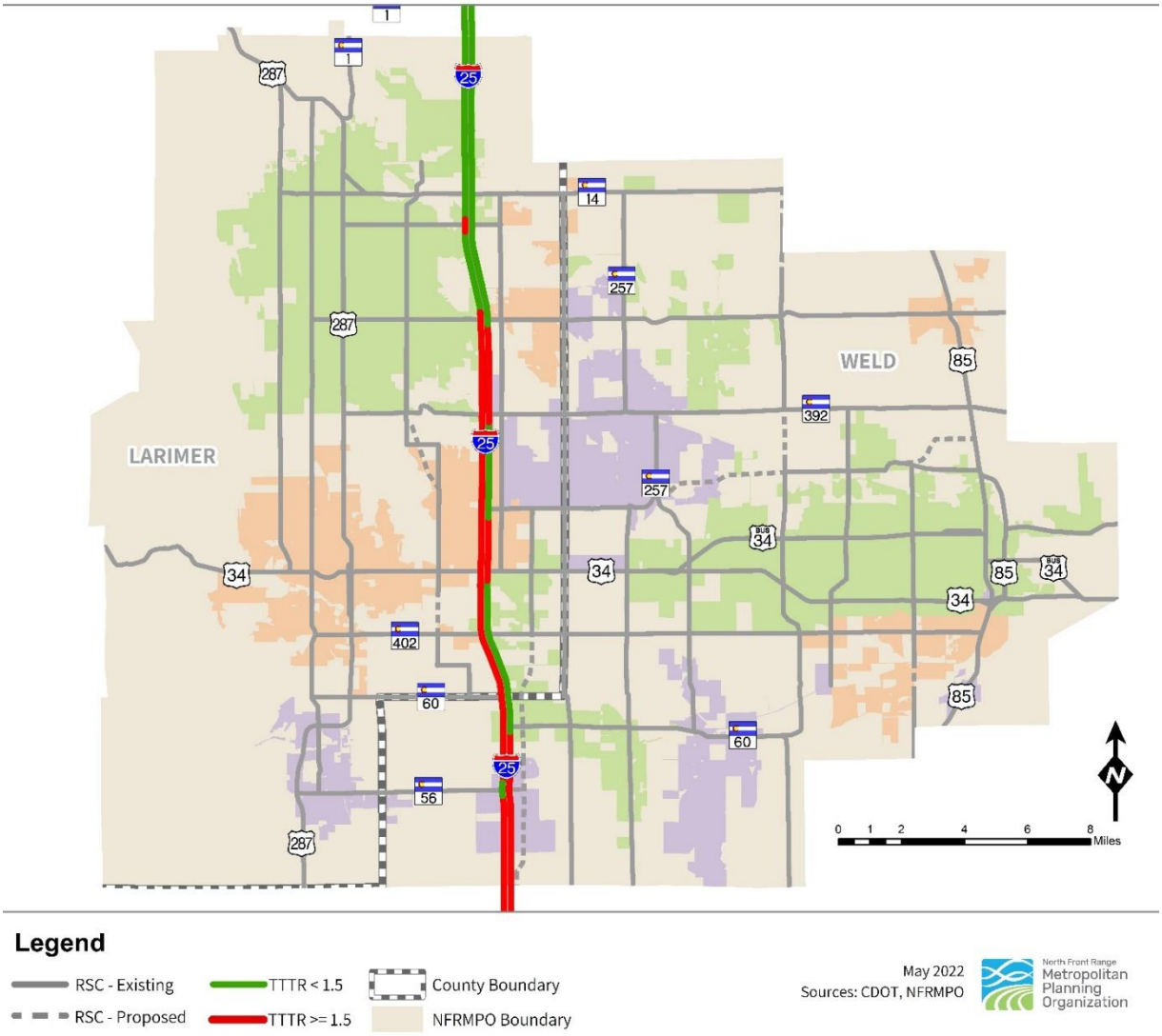
TTTR is a similar measure to TTR but is calculated using only commercial vehicles and uses a more stringent measure of success. TTTR measures the variance in truck travel times to assess consistency or

dependability. Specifically, TTR is measured as the 95th percentile travel time divided by the 50th percentile (median) travel time, with ratios larger of 1.5 or greater considered unreliable. A roadway that typically takes 20 minutes to travel during the evening peak period but sometimes takes over 30 minutes qualifies as unreliable if the longer travel time occurs at least 5 percent of the time. By examining the 95th percentile instead of the 80th percentile, TTTR is more stringent than the TTR measure because it requires more of the examined time periods to fall below the 1.5 ratio threshold. TTTR also uses slightly different reporting time periods than TTR, due to the importance of additional time periods for commercial vehicles.

Data for TTTR is available from the National Performance Measure Research Data Set (NPMRDS) for the Interstate portion of the National Highway System (NHS). Roadway segments on I-25 with a TTTR of 1.5 or greater are shown in **Figure 7**. The majority of the I-25 corridor is considered unreliable for truck traffic; however, the lack of reliability may be due to the work zone impacts of the North I-25 expansion project.

In 2021, 49 percent of I-25 within the NFRMPO region was unreliable for truck traffic, an increase from 2018 when 35 percent of I-25 was unreliable. According to the TTTR index, truck traffic reliability is worsening in the region.

Figure 4. TTTR Index of 1.5 or Greater, 2021

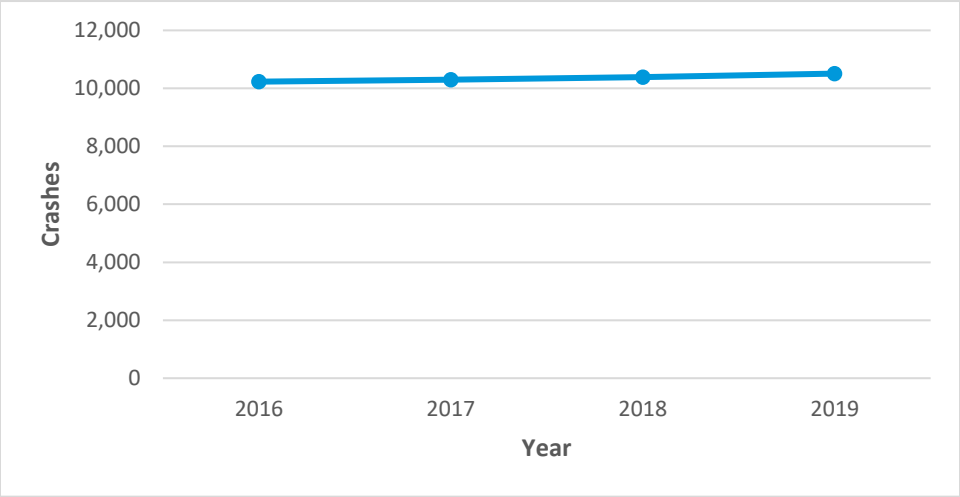


Number of Crashes

Crashes can cause non-recurring congestion; however, not all crashes result in congestion, such as crashes occurring at low-volume time periods and/or in low-volume locations. Crash data is available from CDOT and includes crashes on all public roads. Crashes on state facilities are geocoded by CDOT, while crashes on local and county facilities are geocoded by NFRMPO.

Crashes within the North Front Range region increased slightly from 2016 through 2019, as shown in **Figure 8**.

Figure 5. Number of Crashes in the North Front Range Region, 2016-2019



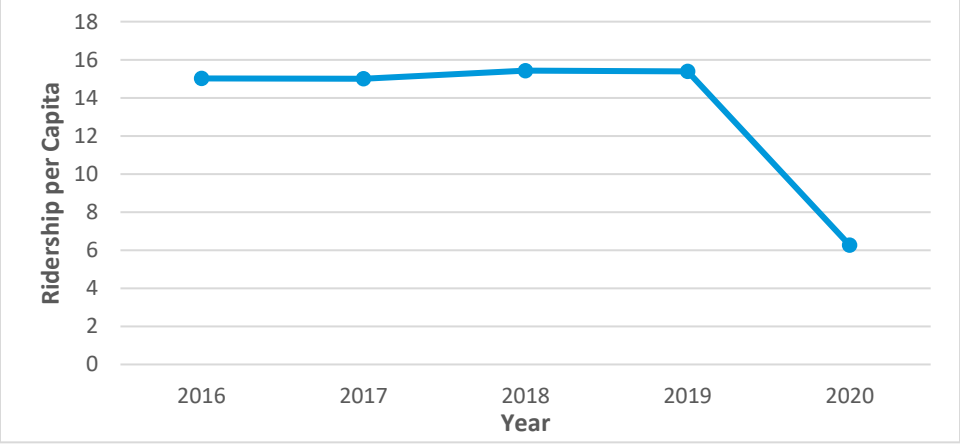
Source: CDOT and NFRMPO

Transit Ridership per Capita

Transit ridership indicates the use of the transit system relative to the population served by the transit system. Data is available from the National Transit Database (NTD) for three of the providers within the region – City of Loveland Transit (COLT), Greeley-Evans Transit (GET), and Transfort – and data for Bustang, the fixed-route transit service operated by CDOT is available from CDOT.

Transit ridership per capita hovered around 15 riders per capita from 2016 through 2019 and dropped by more than 50 percent to 6.3 riders per capita in 2020, as shown in **Figure 9**. The COVID-19 pandemic caused the decrease in transit ridership in 2020 and preliminary data for 2021, not presented, indicates transit ridership per capita increased from 2020 to 2021.

Figure 6. Fixed-Route Transit Ridership per Capita, 2016-2020



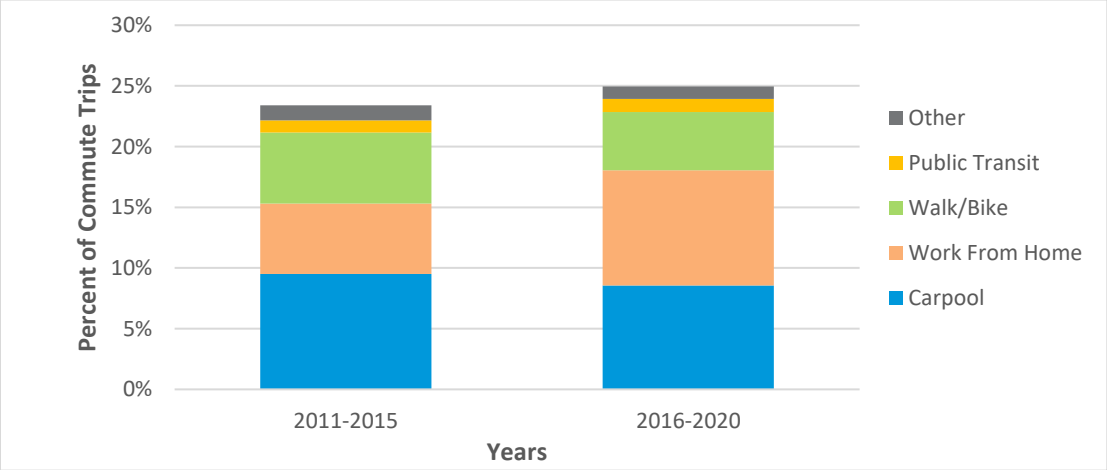
Source: NTD and CDOT

Percent of Non-Single Occupant Vehicle (SOV) Commute Trips

Travel to work often occurs during peak periods, and the majority of commute trips occur in SOVs, which consume more space on the transportation network than any other mode. This performance measure assesses the percent of commute trips occurring by non-SOV modes such as bicycling, walking, transit, carpooling, and working from home. Survey data on commute modes is available from the U.S. Census American Community Survey (ACS). Data is averaged over a five-year period and reflects the typical commute mode used by the respondent, which means modes used infrequently are likely underrepresented in the dataset.

Within the North Front Range, non-SOV commute trips increased from 23.4 percent for 2011-2015 to 25.0 percent for 2016-2020, reflecting the increase in work from home in 2020 due to the COVID-19 pandemic.

Figure 7. Non-SOV Commute Trips, 2011-2015 and 2016-2020



Source: American Community Survey, U.S. Census Bureau

Percent NHS miles Covered by Fiber

Fiber-optic networks are used to maximize operational efficiency and management of the existing roadway infrastructure through the use of Intelligent Transportation Systems (ITS) and devices. As of 2021, 43 percent of NHS miles within the North Front Range are covered by fiber. Data for earlier years is not available at this time, but this measure will be tracked going forward to allow for trends analysis in future CMP documents.

Implemented and Programmed Strategies

This performance report identifies the implemented and programmed projects funded through the NFRMPO that include one or more congestion management strategies in their project scope. Projects are included if they were completed between fiscal year (FY) 2016 and FY2022 or if they are programmed

for FY2023.[2] Many other projects occur within the North Front Range region to address congestion that are not funded through the NFRMPO and are therefore excluded from this report.

Congestion management strategies can be organized into four main categories, as identified in FHWA's "Congestion Management Process: A Guidebook."[3] Strategies associated with each category are provided in **Table 4**. The strategies do not constitute an exhaustive list of congestion management strategies. All reasonable strategies must be evaluated and deemed ineffective or infeasible prior to the consideration of additional system capacity.

[2] FY2016 was chosen as the earliest project completion year for this report because the most recent CMP Performance Report for the region was completed in 2016 and included projects completed as of the issuance of that report: https://nfrmpo.org/wp-content/uploads/2016-cmp-annual-report.pdf.

[3] Congestion Management Process: A Guidebook. U.S. Department of Transportation, Federal Highway Administration. April 2011. Accessed from https://www.fhwa.dot.gov/planning/congestion_management_process/cmp_guidebook/cmpguidebk.pdf.

Table 4. Congestion Management Strategies by Category

Category	Strategy
Transportation Demand Management	Congestion Pricing
	Parking Management and Parking Pricing
	Ridesharing
	Telework and Flexible Work Hours
	Pedestrian and Bicycle Improvements
Public Transportation Improvements	Operations Improvements
	Capacity Improvements
	Bicycle and Pedestrian Accessibility Improvements
Traffic Operational Improvements / Intelligent Transportation Systems (ITS)	Traffic Metering
	Access Management
	Converting HOV lanes to HOT lanes
	Bus-only shoulder lanes
	Traffic Signal Optimization
	Geometric Improvements
	Road Diets
	Traffic Incident Management
Additional System Capacity	New HOV or HOT lanes
	Removing bottlenecks
	Intersection Improvements
	Center turn lanes
	Overpasses or underpasses
	Closing gaps in the street network
	New travel lanes (including truck climbing lanes)

The implemented projects in **Table 5** and programmed projects in **Table 6** are sorted into one of the four categories identified above based on their primary congestion-related project scope: Transportation Demand Management (TDM), Public Transportation Improvements, Traffic Operational Improvements/ ITS, or Additional System Capacity. However, many projects include TDM components even though their primary congestion-related project scope falls into one of the other three categories. Accordingly, the tables below also identify if the project includes one or more TDM components.

Table 5. Implemented Projects with Congestion Management Strategies, FY16-FY22

Strategy Category	Project Name	Regionally Significant Corridor	Includes TDM Component(s)
Transportation Demand Management	Sheep Draw Trail Poudre Connection	None	X
	Milliken to Johnstown Trail Connection	SH60	X
	Great Western Trail	WCR 74	X
	Colorado Front Range Trail	LCR 17	X
	Little Thompson River Corridor Trail—Phase 1a	SH60	X
	7th Street Multimodal Study & Early Action	Multiple	X
	Berthoud Pkwy Trail Gap Elimination Project	LCR 17	X
	Greeley #3 Canal Trail, Phase 2 & 3	WCR 35 / 35th Avenue	X
	Laporte Avenue Improvements - Fishback to Sunset	None	X
	Poudre River Regional Trail Windsor to Timnath Connector	LCR 5	X
	SH 287 West Sidewalk Gap	US287	X
	Siphon Overpass -- UPRR Power Trail Grade Separated Crossing	LCR 7 / LCR 9 / Timberline Rd	X
Traffic Operational Improvements / ITS	Adaptive Signal US 85 Greeley	US85	--
	10th Street Access Control Implementation	US34 Business	--
	US 85 Access Control at 31st Street	US85	--
	Loveland Traffic Optimization	Multiple	--
	Greeley Signal Timing 2016	Multiple	--
	Adaptive Signals 34 and 85 Bypass	Multiple	--
	Central System and Controller Replacement	Multiple	--
Public Transportation Improvements	Secure Bicycle Parking (2 locations)	Multiple	X
Additional System Capacity	US 34 Business (10th St): 23rd to 35th	US 34 Business	X
	US 34 Widening: Denver to Boyd Lake	US 34	X
	I-25 Truck Climbing Lane	I-25	--
	LCR 17 Expansion, Berthoud	LCR 17	X
	65th Avenue Widening	65th Ave	X
	I-25/Crossroads Bridge	I-25	--
	Horsetooth and College Intersection Improvement	US 287	X
	65th Ave: US34 Bypass to 37th Ave	65th Ave	X
	North LCR 17 Expansion	LCR 17	X

Table 6. Programmed Projects with Congestion Management Strategies, FY23

Strategy Category	Project Name	Regionally Significant Corridor	Includes TDM Component(s)
Transportation Demand Management	South Boyd Lake Trail	US34	X
	WCR23/Great Western Trail Pedestrian Connection	WCR74	X
Traffic Operational Improvements / ITS	Traffic Signal Progression Improvements—US34	US34	--
	Greeley Citywide Signal Retiming	Multiple	--
	Greeley Phase 3 Fiber	Multiple	--
Additional System Capacity	Intersection Improvements at SH 257 & Eastman Park Drive	SH257	X
	Timberline Road Corridor Improvements	LCR 7 / LCR 9 / Timberline Rd	--
	59th Avenue and O Street Roundabout	O St	X
	US 34 (Eisenhower Boulevard) Widening—Boise Avenue to I-25	US34	X
	North Taft Ave & US34 Intersection Widening/Improvements	US34 & LCR17	X
	College and Trilby Road Intersection Improvements	US287	X
	CR19 (Taft Hill Rd) Improvements - Horsetooth Rd to Harmony Rd	LCR 19	X
	Roundabout at WCR 74 and WCR 33	WCR 74	X
	37th St Widening	SH402 / Freedom Pkwy	--
	US 34 Widening - Boise to Rocky Mountain Ave	US34	X
	83rd Ave Roadway Improvements	83rd Ave	X

Conclusion

As identified in the Implemented and Programmed Strategies section, a variety of strategies are being used to manage congestion within the NFRMPO region. The implemented strategies cover a wide range of corridors and are contributing to the management of congestion. Across the region, four of seven performance measures with available data are trending in the right direction. The performance measure analysis indicates progress is being made in addressing congestion, but additional strategies are needed to meet the region's congestion reduction goals.