

2015 Annual Report on Traffic Congestion in the Denver Region

October 2016



2015 Annual Report on Roadway Traffic Congestion in the Denver Region

1. Introduction

The Denver Regional Council of Governments has prepared annual reports on traffic congestion since 2006. When comparing 2015 to 2006, four themes emerge:

- Traffic congestion is slightly worse overall for the region, due primarily to population growth.
- More transit options are available to help people avoid driving in severe congestion.
- Interest in and opportunities for walking or bicycling to destinations are growing.
- There is greater access to real-time information on traffic conditions, major incidents and travel options to avoid driving alone.

2. How much do we travel on a typical day? (Trends in Vehicle Miles of Travel)

DRCOG staff routinely estimates the annual change in the total vehicle miles traveled (VMT) per day on roadways in the Denver region. Staff consolidates data from several sources to produce the annual estimate. The sources include: Federal Highway Administration annual reports; Colorado Department of Transportation automated traffic recorder “continuous counter” monitors; other traffic counts at locations with results for both the current and past analysis years; and other sources such as toll highway transactions.

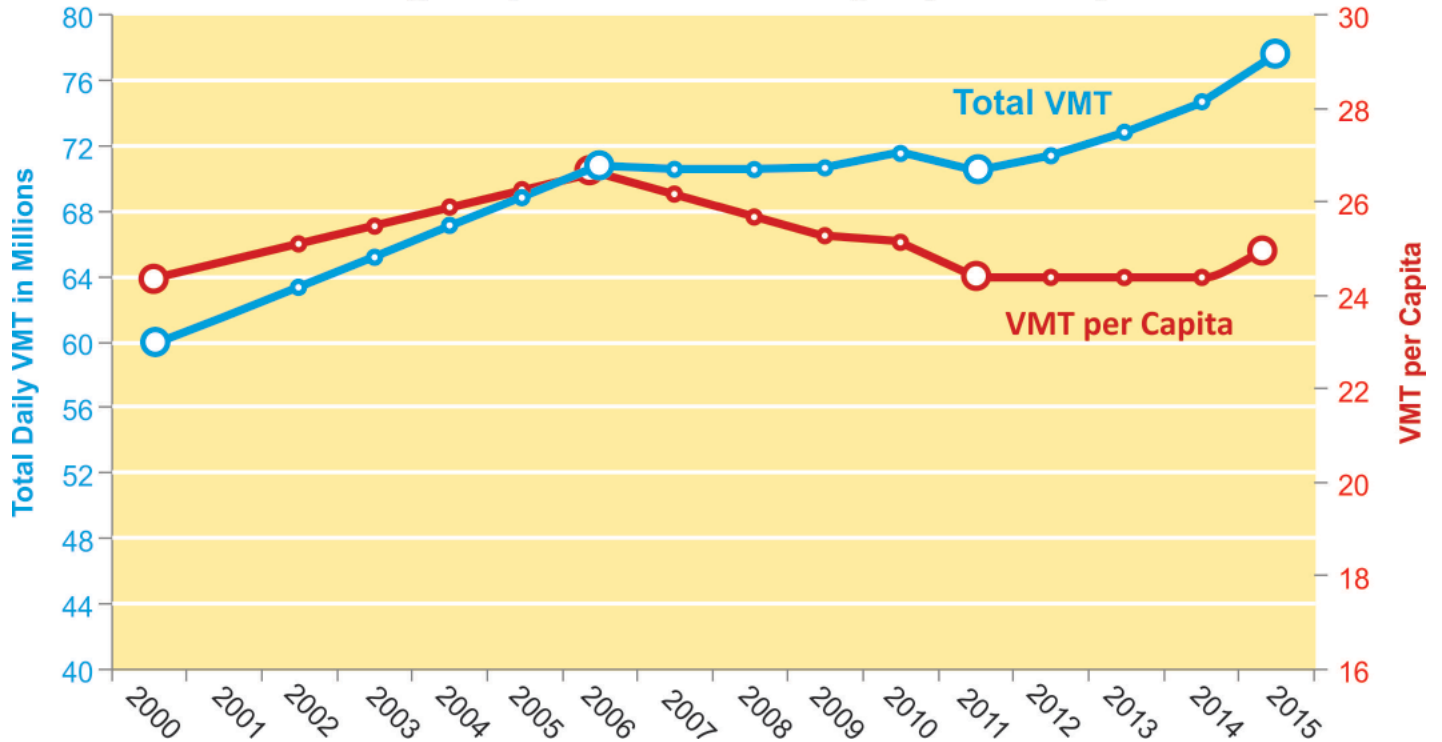
Figure 1 depicts average weekday VMT by all types of motor vehicles for the Denver region during the past 15 years. The solid blue line shows that total daily VMT rose steadily through 2006, flattened out through 2011, but has increased during the past four years.

In 2015, the Denver region’s VMT increased by 4 percent, the highest annual percentage growth since the late 1990s. It also appears the region experienced the largest raw value growth in daily VMT ever (an increase of 3.0 million/day). In comparison, total VMT growth during the eight years from 2006 through 2014 was about 3.8 million.



Figure 1

Average Daily VMT in the Denver Region (2000 - 2015)



Compared to the 4 percent growth in VMT, the total population in the region increased by 2 percent in 2015. This resulted in the first distinguishable increase in VMT per capita since 2006 (dashed red line). While VMT per capita did increase, the region is still below its peak in 2006.

Many factors caused the increase in VMT during the past couple years, including:

- Booming economy throughout the region,
- Increase in the number of personal trips to jobs, entertainment, shopping,
- Increase in commercial vehicle and service trips,
- Decrease in the price of fuel starting in late 2014 and remaining low through 2015 (see Figure 2).

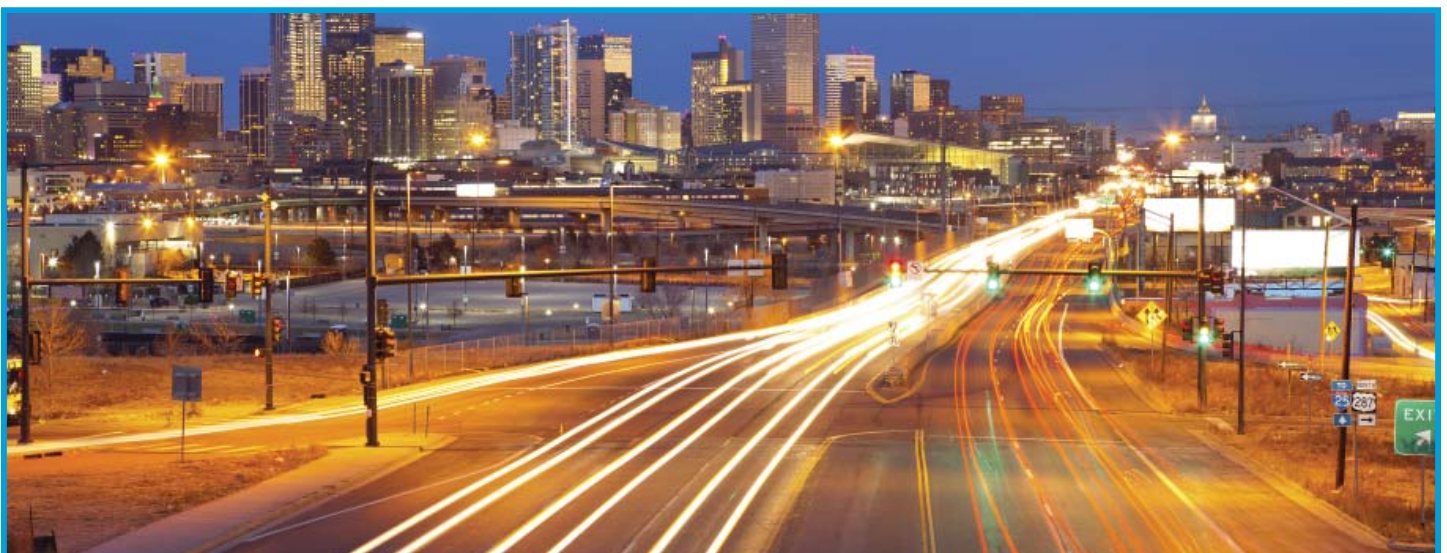
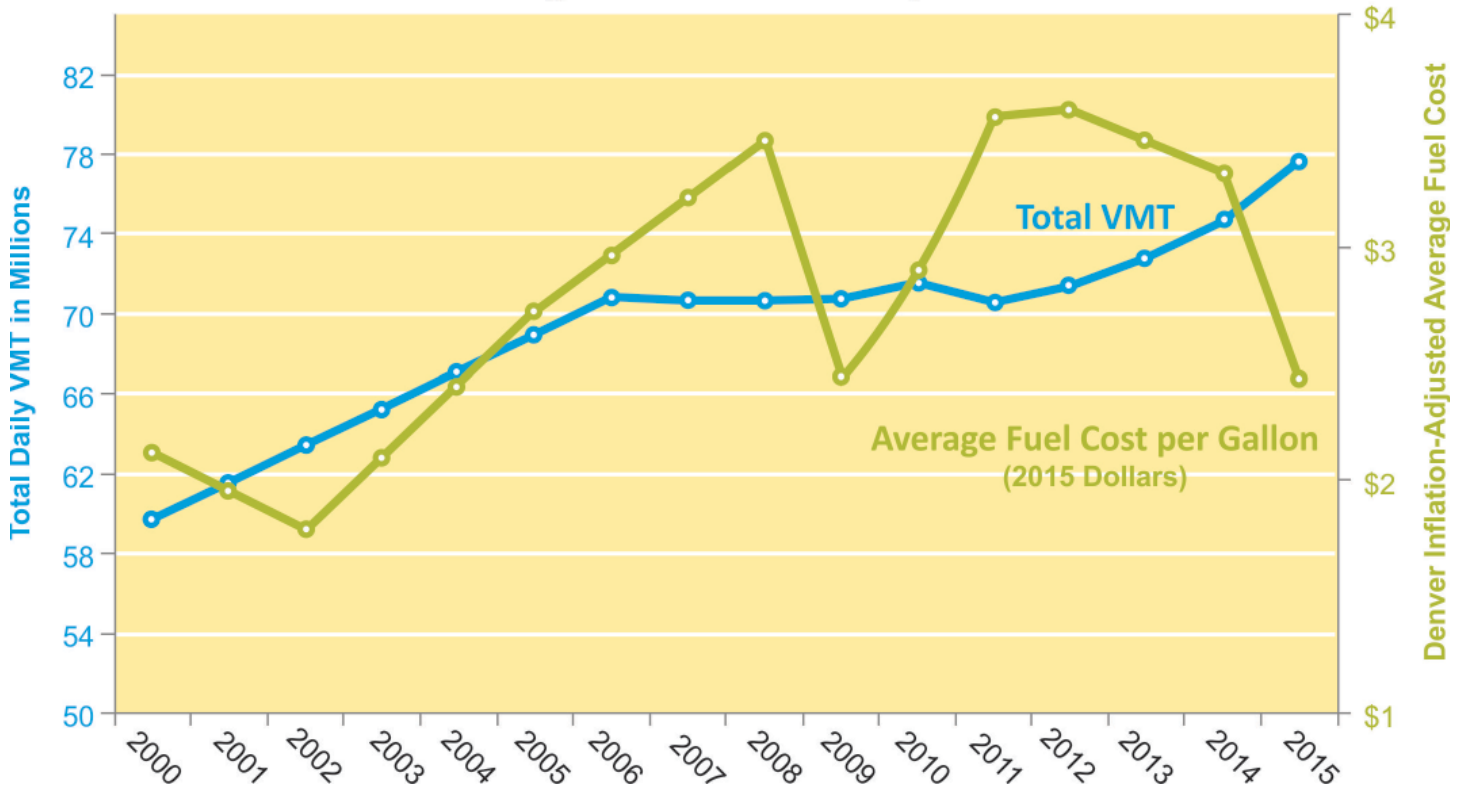


Figure 2

Denver Region VMT and Fuel Cost per Gallon



The relationship between regional VMT, the economy, fuel costs, transportation options and land use is extremely complicated, involving numerous economic considerations and personal decisions. However, it appears the combination of low fuel costs, a thriving economy, increased population have contributed to the increase VMT in the Denver region. Even though people are walking, bicycling, and sharing rides more frequently, as well as shopping more via the internet, delivery and shared-ride vehicles must still travel on the region's roadways.



Though future VMT change is difficult to predict, certain factors and responses must remain in the forefront in our region's effort to lower VMT per capita:

- VMT is a key element related to the region's goals and federal mandates to reduce harmful pollutant emissions and greenhouse gases,
- VMT is a direct contributor to increased traffic congestion,
- To slow the growth of VMT, DRCOG and its partners must continue to support the interrelated elements of traffic congestion mitigation by helping people avoid and adapt to congestion by:
 - ◆ Providing and encouraging viable mobility choices (transit, walk, bicycle)
 - ◆ Creating opportunities for shorter trips (for example, via mixed-use land-use patterns)
 - ◆ Facilitating carpool and vanpool options (pre-organized and real-time)
 - ◆ Encouraging teleworking and flexible work hours
 - ◆ Supporting and use travel demand management services of DRCOG (waytogo.org) and its partner
 - ◆ transportation management organizations
 - ◆ Improving real-time traveler information regarding major incidents on roadways or rail transit, and
 - ◆ up-to-the-moment optional travel modes.

3. New Methodologies for Measuring Traffic Congestion

DRCOG and other agencies have traditionally calculated traffic congestion measures based on models of an average day that incorporate traffic volumes, roadway capacity characteristics, vehicle occupancy, transit ridership and other factors. The measures (as reported later in this document) reflect the three dimensions of congestion: width of roadways (bottlenecks), distance of traffic queuing back-ups and length of time (hours per day) congestion occurs. Congestion is not an event that affects a single location or point in time.

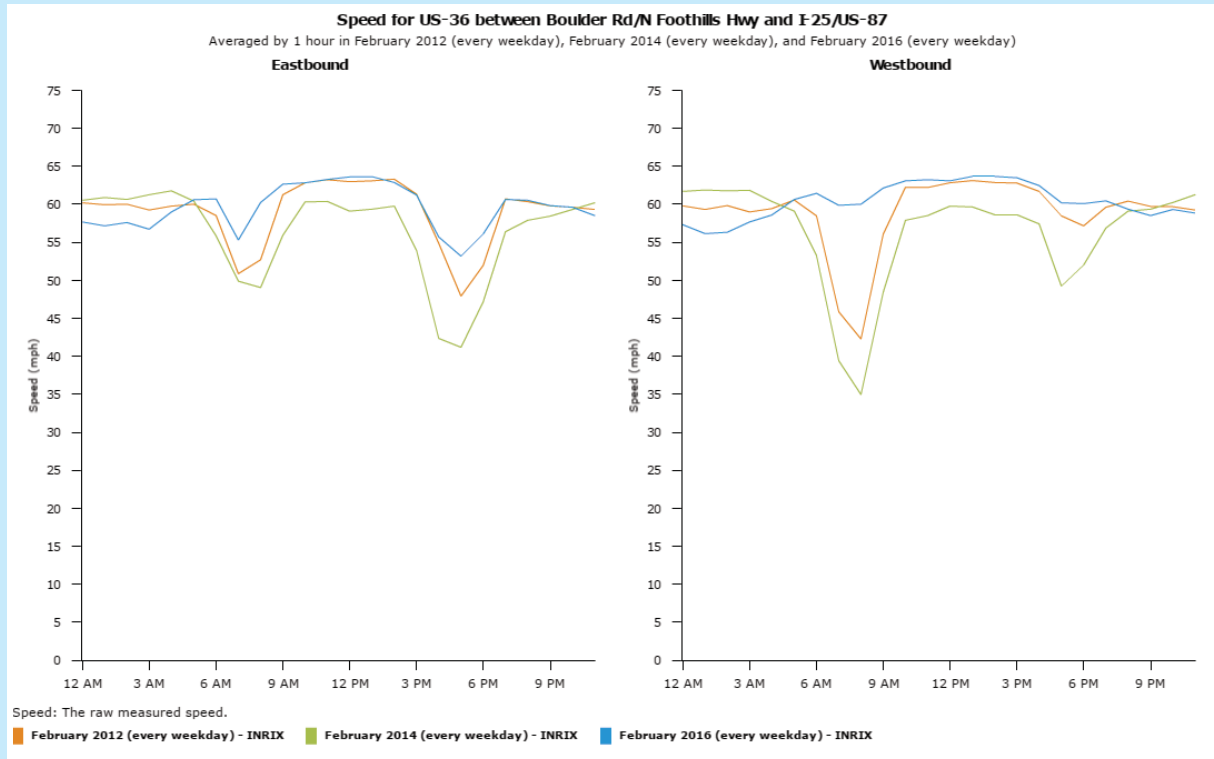
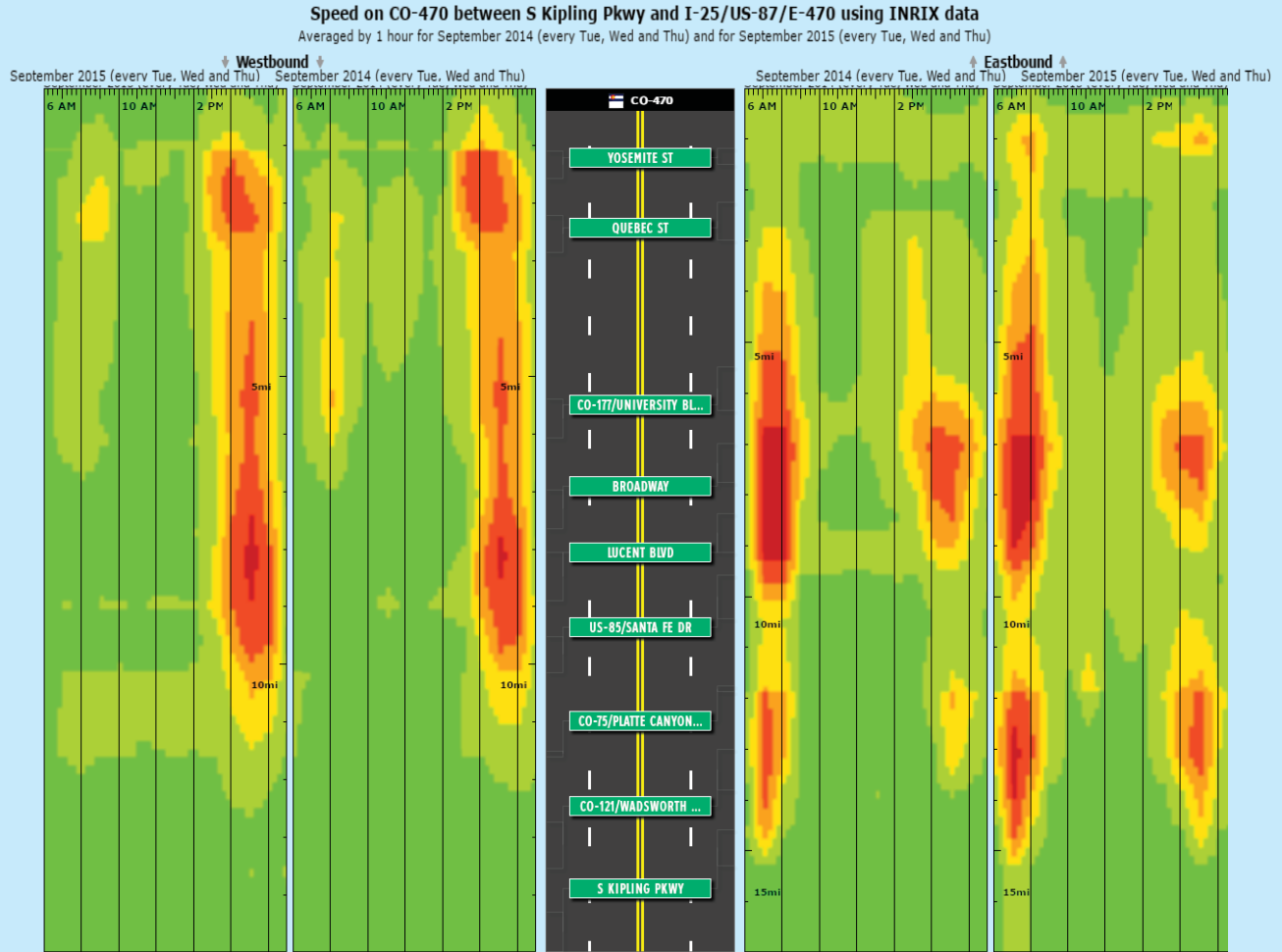
In recent years however, valuable new congestion information has become available based on new technologies and big data:

- Do you have a GPS navigation device in your car?
- Do you have packages delivered to you?
- Do you travel with your smartphone while walking, bicycling, driving, or any mode of travel?

If you answered "yes" to any of these questions, you are a source of big data on traffic movements (speed, back-ups, origins, destinations) compiled by private companies such as INRIX and HERE. These companies, as well as other third party firms, use GPS vehicle probe data to summarize traffic conditions in large metropolitan areas and on major highways throughout the world. Billions of pieces of information (data points) are obtained and converted into measurements and graphical depictions of congestion. The Colorado Department of Transportation has purchased data from INRIX, which it made available to DRCOG. The results are very accurate for freeways, rural highways and roads without a lot of traffic signals or roadside activity. The results reflect traffic conditions every hour throughout the year, and thus reflect congestion due to all causes, including incidents such as crashes, construction, weather events or breakdowns.

Examples of data visualizations are shown on the following page. DRCOG will incorporate some of the results into its congestion management process and future reports. Congestion effects of crash reduction associated with advanced vehicle and roadway technology efforts will also be incorporated. In addition, federal legislation requires that several measures produced from big data vehicle probe sources be reported to the Federal Highway Administration.

Example of Graphic Visualizations from INRIX



4. CMP Transportation Projects Recently Completed or Underway

Several notable congestion relief projects have been completed by local governments, the Colorado Department of Transportation, and RTD in the past year or are underway, as shown in **Table 1**. Transit and bicycle and pedestrian projects provide travel options enabling many people to avoid congestion.

Table 1
Example Transportation Projects Addressing Congestion and Mobility

Interchange/Roadway Projects:	Status
Central Park Boulevard: Extension from 47th Avenue to 56th Avenue	Completed
I-70 eastbound Clear Creek County: Peak period managed lane	Completed
U.S. 36 from Boulder to I-25: Add managed lanes/Bus Rapid Transit	Completed
U.S. 6 Freeway from Federal Boulevard to I-25: Reconfigure interchange	Completed
I-25 from U.S. 36 to 120th Avenue: Add managed lanes	Completed
I-25 from RidgeGate Parkway to C-470/County Line Road: Widening	Completed
Arapahoe Road at I-25: Interchange reconfiguration	Underway
E-470 from Parker Road to Quincy Avenue: Widening	Underway
C-470 from Kipling Parkway to I-25: Add managed lanes	Underway
Rapid Transit Projects:	Status
A Line East Rail Line (Denver Union Station to Denver International Airport) commuter rail	Completed
B Line Northwest Corridor (Westminster station to Denver Union Station) commuter rail	Completed
R Line I-225 Corridor: (Nine Mile to Peoria/Smith stations) light rail	open 2016
G Line Gold Line (Ward Road station to Denver Union Station) commuter rail	open 2016
North Metro Rail Line (Denver Union Station to 124th/Eastlake station) commuter rail	Underway
Southeast Rail (Lincoln to RidgeGate stations) light rail	Underway
Bicycle/Pedestrian Projects:	Status
U.S. 36 Bikeway	Completed
Kipling Avenue multi-use Path: 32nd Avenue to 44th Avenue	Completed
Pearl Parkway multi-use Path: 30th Street to Foothills Parkway	Completed
38th/Blake Street Station area pedestrian access improvements	Completed
Colorado Center Pedestrian/Bicycle bridge over I-25	Completed
Superior Trail: McCaslin Bus Rapid Transit Station to Davidson Mesa (U.S. 36 Bikeway)	Underway
U.S. 6 multi-use path: Colfax Avenue to Johnson Road	Underway



Colorado Center I-25 Crossing



U.S. 36 Bus Rapid Transit

5. Annual Congestion Performance Measures

DRCOG maintains a database to monitor traffic congestion and performance measures for the 2,400-mile Regional Roadway System (Figure 3). The congestion database identifies key attributes associated with roadway capacity and traffic volume for each segment of the system.

Table 2 displays several measures for the Regional Roadway System. The 2040 estimates are based on forecasts from the DRCOG regional travel demand model. A key assumption is that more than 1.2 million additional people will be living in the Denver region by 2040, a 39 percent increase. There will be significant growth in transit, bicycle, and walking trips; outpacing the population increase. These travel options encourage people to avoid or adapt to traffic congestion. However, the increase in travel by modes other than driving alone will not likely be enough to offset the growth in motor vehicle travel and associated traffic congestion.

The **Regional Roadway System** represents the DRCOG-designated freeways, tollways, major regional arterials and principal arterials. These are the most heavily traveled and important connecting corridors of the region. This system handles almost 80 percent of the total traffic in the region.

Table 2
Current and Future Congestion Measures on Denver Regional Freeways and Arterials
 (does not include minor local streets)

Vehicle Measures:	2015		2040 (RTP)		Percent Change between 2015 and 2040
	Average Weekday	Annual Total Estimate (1)	Average Weekday	Annual Total Estimate (1)	
Vehicle Miles of Travel	59,973,000	20,270,768,000	72,740,000	24,585,996,000	21%
Vehicle Hours of Travel	1,388,000	469,053,000	1,918,000	648,251,000	38%
Average Travel Speed (mph)	43	n/a	38	n/a	0%
Vehicle Hours of Delay	240,000	81,259,000	533,000	180,063,000	122%
Travel Delay Per Driven Registered Vehicle (2)	8 min. 0 sec.	45 hours	12 min. 30 sec.	71 hours	57%
Travel Delay Per Household	11 min. 45 sec.	66 hours	18 min. 30 sec.	104 hours	56%
Person Measures:					
Person Miles of Travel	80,963,000	27,365,537,000	98,199,000	33,191,095,000	21%
Person Hours of Travel	1,873,000	633,222,000	2,589,000	875,139,000	38%
Person Hours of Delay	325,000	109,700,000	719,000	243,085,000	122%
Travel Delay Per Resident	6 min. 30 sec.	37 hours	10 min. 15 sec.	57 hours	55%
Other:					
Percent of Travel Time in Delayed Conditions	17%	n/a	28%	n/a	n/a
Travel Time Variation (peak vs. off peak)	1.24	n/a	1.36	n/a	10%
Lane Miles of Roads Congested for 3 Hours or Longer	1,702	n/a	2,363	n/a	39%
(Percent of Total Lane Miles)	24%	n/a	31%	n/a	n/a
Economic Costs:					
Commercial Vehicles (3)	\$1,300,000	\$455,300,000	\$4,200,000	\$1,405,300,000	209%
Passenger Vehicles (3)	\$2,600,000	\$882,700,000	\$5,600,000	\$1,902,000,000	115%
Total Cost of Delay	\$3,900,000	\$1,337,900,000	\$9,800,000	\$3,307,300,000	147%
Transit and Other Regionwide Measures:					
Total Regional Transportation District Transit Boardings	340,000	n/a	826,000	n/a	143%
Rail Transit Boardings	75,500	n/a	258,300	n/a	n/a
Regional Transportation District Park-n-Ride Parking Space Use (out of 32,011 spaces)	59%	n/a	n/a	n/a	n/a
Modeled Bicycle and Walking Trips	834,000	n/a	1,244,000	n/a	49%
Traffic Crashes (2013)	190	64,070	n/a	n/a	n/a

Sources: DRCOG Congestion Mitigation Program Database, Regional Transportation District Ridership Statistics, 2040 Regional Transportation Plan

Technical Notes:

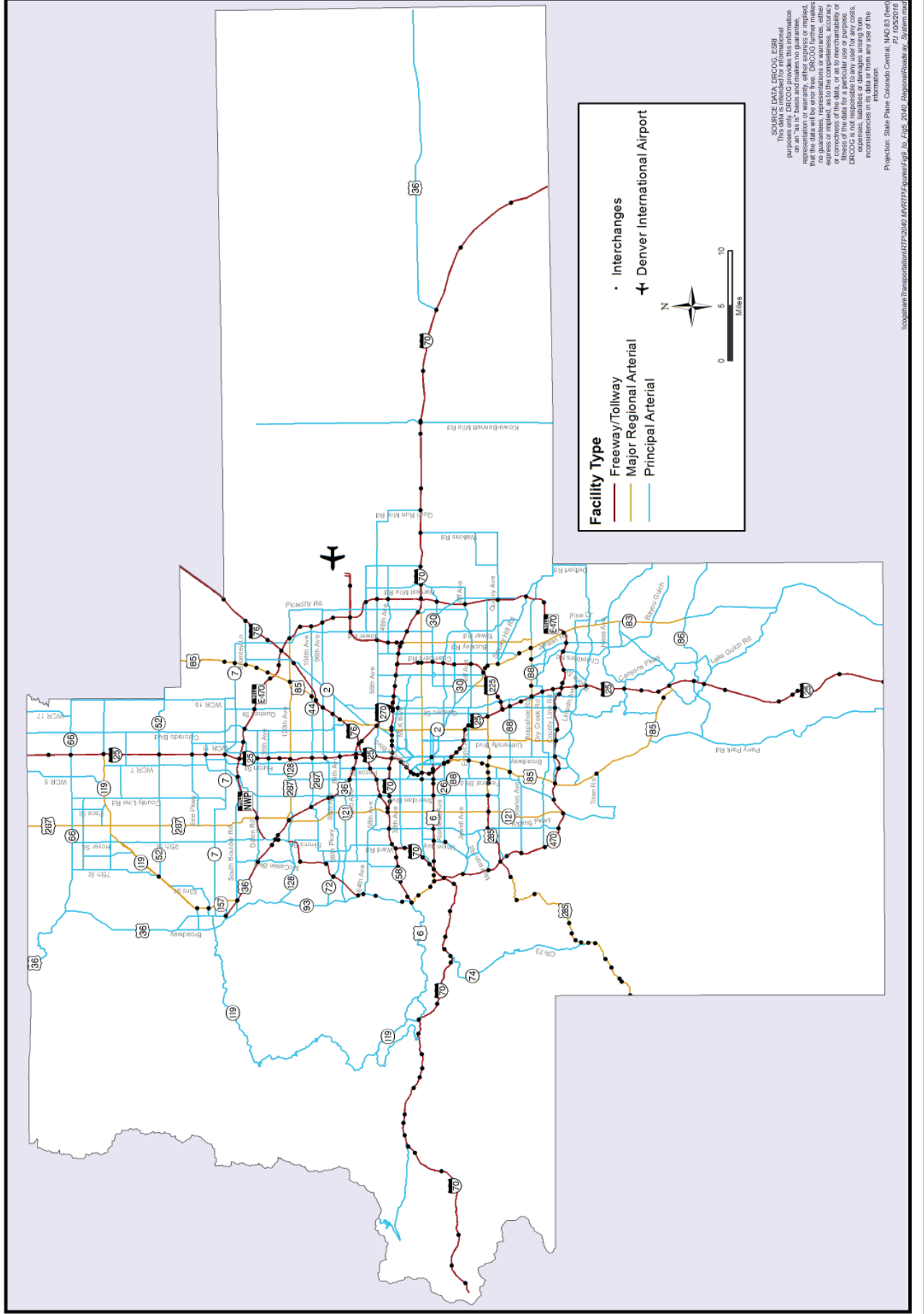
(1) Annual Total Estimate is Average Weekday total multiplied by 338

(2) Assumption of 1,798,912 registered vehicles driven per day in 2015 and 2,415,682 in 2040

(3) Cost calculations incorporate \$12 per hour per adult in car, \$48.30 per hour per light commercial vehicle operator, and \$71 per hour for heavy commercial truck.

Figure 3

DRCOG Regional Roadway System



For more information:

Colorado Department of Transportation
www.coloradodot.info

Regional Transportation District
www.rtd-denver.com

Traveler Information
www.cotrip.org

Traffic Congestion Videos

The Phantom Traffic Jam – an explanation
<https://www.youtube.com/watch?v=goVjVVaLe10>

Traffic Waves
<https://www.youtube.com/watch?v=19S3OdK6710>

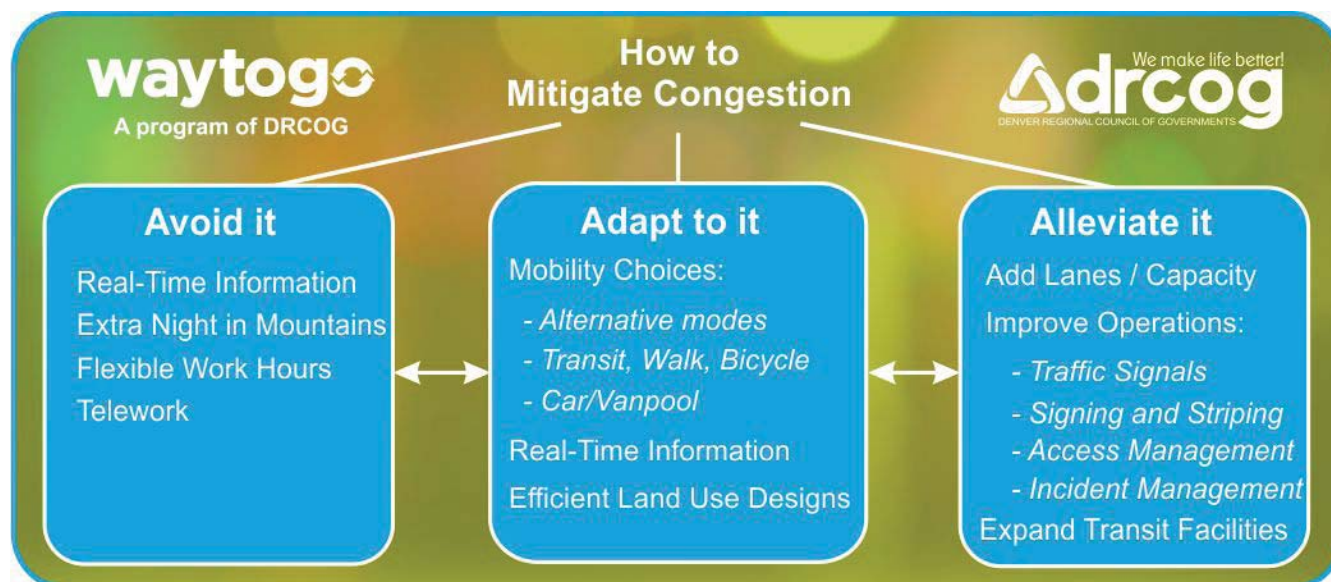
For ways to avoid or adapt to congestion via mobility options please visit:

Way to Go
<http://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 <http://drcog.org/node/178>.

Contact Senior Transportation/Air Quality Planner Robert Spotts, at rspotts@drcog.org for additional information regarding DRCOG's Congestion Mitigation Program.

The Three A's of Congestion Mitigation





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