



Denver Regional Council of Governments



2011 Annual Report on Traffic Congestion in the Denver Region

July 30, 2012

This annual report and other documents are available at the DRCOG website www.drcog.org

Visit our partner agency websites for more information:

Colorado Department of Transportation: www.coloradodot.info

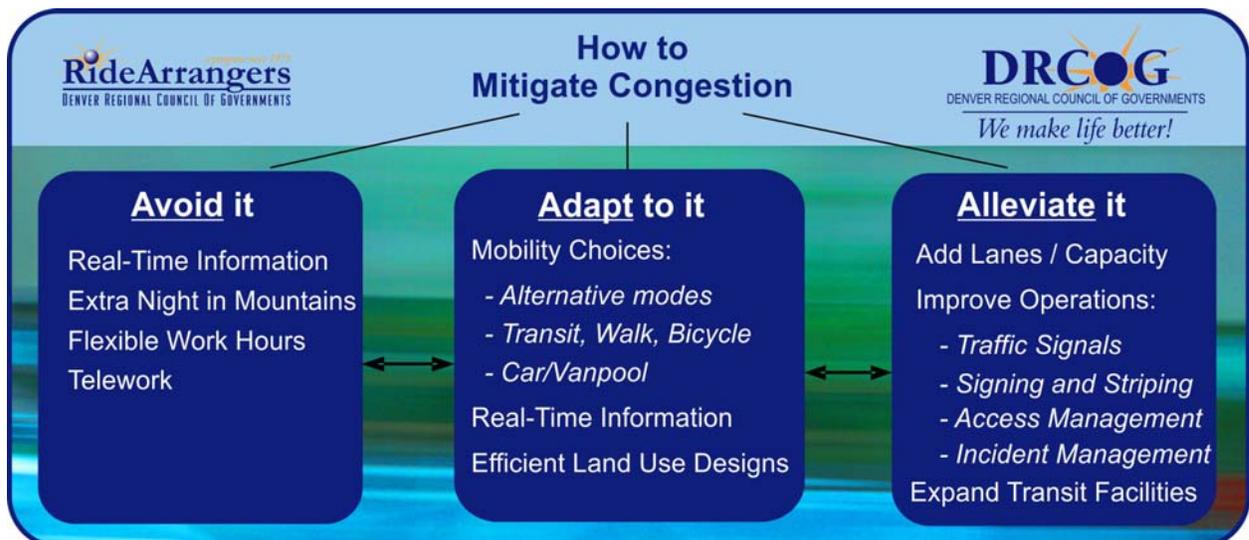
Regional Transportation District: www.rtd-denver.com

Traveler Information: www.cotrip.org

For ways to avoid or adapt to congestion via mobility options, please visit RideArrangers:
www.drcog.org/index.cfm?page=RideArrangers

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Contact Rush Wickes at rwickes@drcog.org for additional information regarding DRCOG's Congestion Mitigation Program



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DRCOG Congestion Mitigation Program

Introduction

The Denver Regional Council of Governments (DRCOG) reports annually on congestion-related issues in the region. The annual report highlights trends in motor vehicle travel, reports on existing congestion-related delay, forecasts 2035 congestion, and identifies key congested locations. This year's report also highlights completed congestion projects in the Denver region.

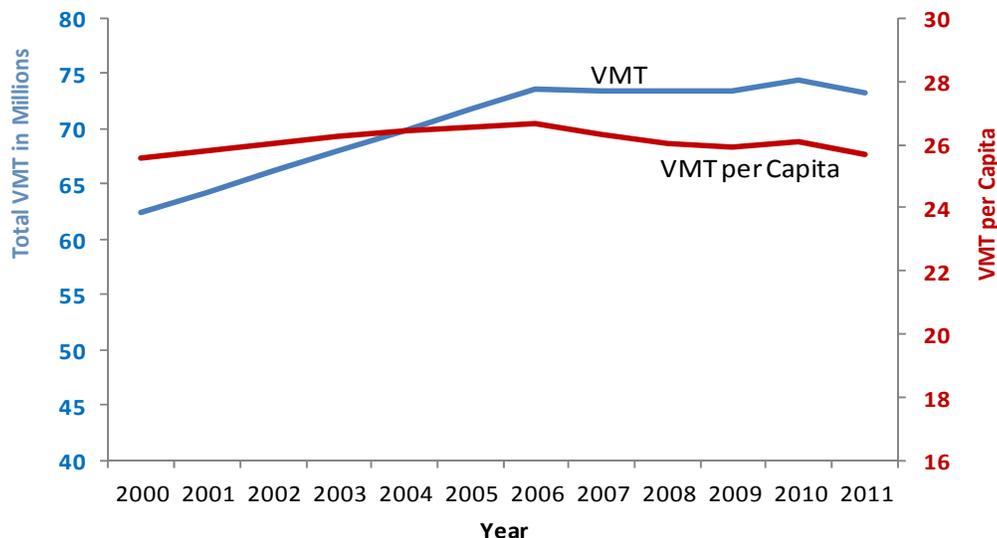
Traffic congestion will never be eliminated entirely; however, efforts can be made to reduce its severity. DRCOG coordinates a three-pronged approach of strategies with partner agencies to address congestion, as outlined on the inside cover diagram:

- Help people avoid congestion through real-time information, so they can adjust their travel schedules or routes.
- Provide travel mode options and residential land use choices so people can adapt to congestion.
- Alleviate congestion by increasing the carrying capacity of the roadway.

Trends in Vehicle Miles of Travel

The chart below shows trends in vehicle miles of travel (VMT – the total amount of miles traveled by all cars, motorcycles, and trucks within the Denver region). Average weekday VMT increased substantially between 2001 and 2006, but has leveled off due to both a change in driving habits and the recent economic recession. DRCOG's goal in the Metro Vision 2035 Plan is to reduce VMT per capita by 10 percent between 2005 and 2035 (i.e., reduce VMT to 23.7 miles per day per person). VMT per capita has decreased, but substantial changes in travel behavior will be needed to meet the long-term goal.

Denver Region Weekday VMT (2001-2011)



Existing and Future Measures of Congestion

The table on the following page shows current and future estimated measures of traffic congestion on regional freeways, expressways, and principal arterials (designated as the regional roadway system, depicted in Figure 1). The data in the table does not include delay on minor arterials, collectors, and local neighborhood streets.

Congestion measures were calculated based on average daily traffic volumes and the hourly vehicle carrying capacity of each freeway and arterial roadway segment. Capacity was determined by the roadway segment's physical attributes, such as number of lanes, number of traffic signals and driveways, steepness of grade, and amount of heavy vehicle traffic. For example, a typical suburban freeway can be expected to efficiently carry about 1,700 vehicles per lane per hour before intermittent slow-downs occur. As traffic volumes exceed that level, more delays, reduced speeds, and stop-and-go situations occur. Arterial roadways generally have a capacity half that of freeways, due primarily to traffic signals and vehicles turning to/from driveways and parking lots. Crashes and other incidents reduce the capacity further.

Some key findings for the regional roadway system reported in the table include:

- Weekday VMT is expected to increase by more than 60 percent by 2035, while vehicle hours of delay is expected to triple.
- The average driver experienced 38 hours of extra travel time in 2010 due to congestion related delay. By 2035, this will increase to 90 extra hours of travel time per year.
- In 2035, half of all lane miles of freeways and major roads will be congested for more than three hours per day.
- A 70 percent increase in bicycling and walking trips is expected between 2010 and 2035. Transit ridership is predicted to more than double.



**Figure 1
Key Congested Locations in
2010 and 2035**

Congested Corridors - Mobility Grade
Grade of "A" through "F" was assigned based on a combination of scores for the following measures:

- Duration** - How long does the congestion last? (number of hours per day congested)
- Severity** - How much of driving time is in delayed conditions? (percent of travel time in delay in peak hour)
- Magnitude** - What is the total amount of delay for all travelers at that location? (total daily delay time per mile)
- Variation** - What is the variation in travel time between off-peak and rush hour?
- Reliability** - How often do crashes or incidents occur? (crashes per mile per year)

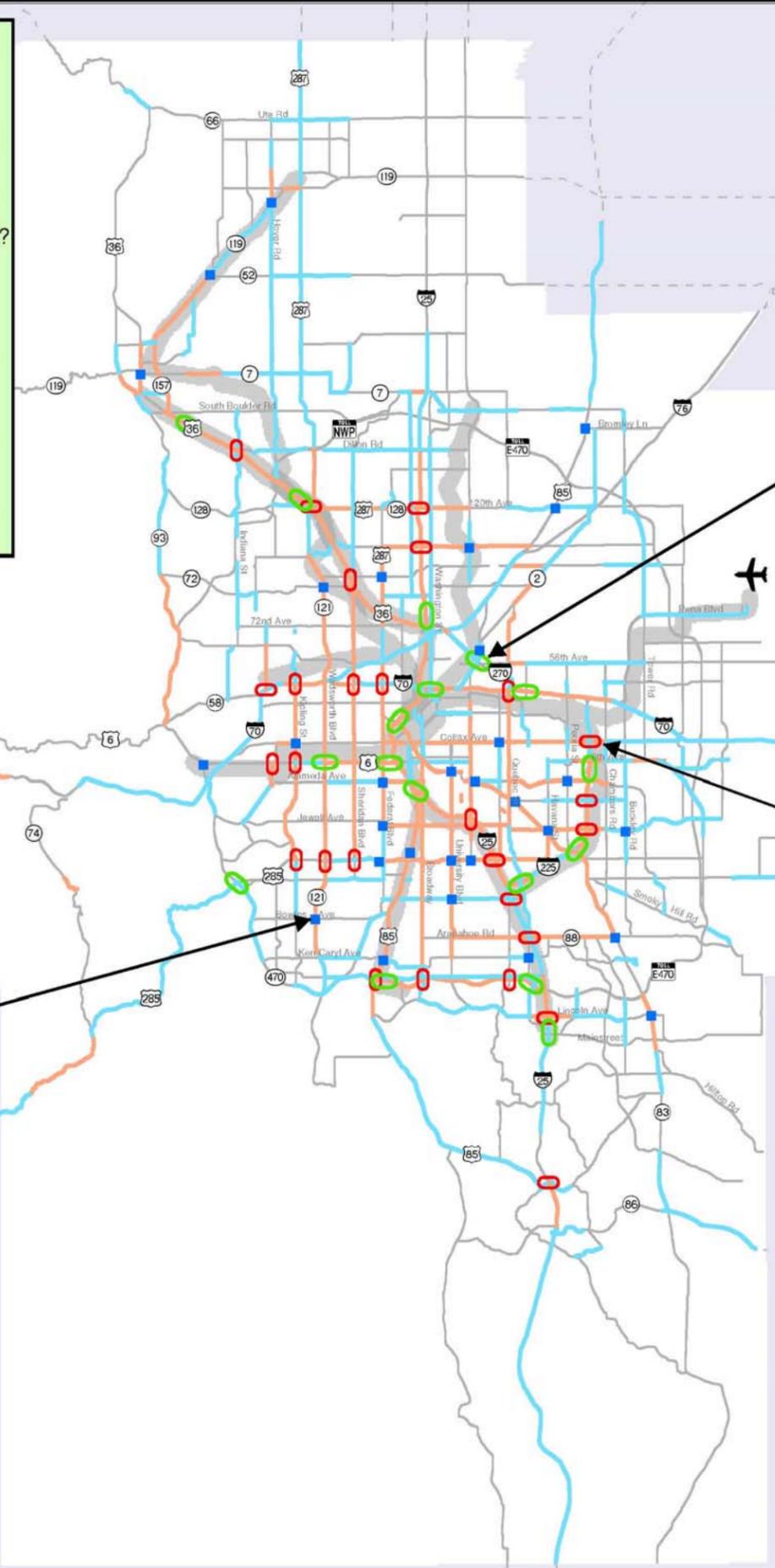
Freeway Bottleneck Points
Free-flow locations where traffic often slows down or backs up because of on-ramps, hills, trucks, or sharp curves.



Arterial-Freeway Ramp Intersections
Extensive congestion occurs where arterial streets intersect with freeway ramps in a series of signalized intersections.



Arterial-Arterial Intersections
There are 3,500 signalized intersections in the region. This map shows the locations with the worst delays.



Congested Corridors in 2010 and 2035
(Congestion Mobility Grade of D or F)

- Corridor Congested in 2010
- Corridor Congested by 2035
- FasTracks Rapid Transit System

Congested Points In 2010

- Arterial / Arterial Intersections
- Arterial / Freeway Ramp Intersections
- Freeway Bottleneck Points

0 10 20
Miles

This map and the data it depicts are intended for informational purposes only. DRCOG provides this information on an "as is" basis and makes no representation or warranty that the data will be error free. DRCOG is not responsible to any user for any costs or damages arising from inconsistencies in its data.
Source: DRCOG
Projection: Colorado State Plane, NAD 83
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Existing and Future Congestion Measures on Denver Freeways and Major Roads (Regional Roadway System)*

	2010		2035		% Change Between 2010 and 2035
	"Average" Weekday	Annual Total Estimate ¹	"Average" Weekday	Annual Total Estimate ¹	
Vehicle Measures:					
Vehicle Miles of Travel	55,758,000	18,846,204,000	90,432,488	30,566,180,944	62%
Vehicle Hours of Travel	1,171,000	395,798,000	2,230,000	753,740,000	90%
Average Travel Speed (mph)	48		41		
Vehicle Hours of Delay	177,000	59,826,000	635,000	214,630,000	259%
Travel Delay per Driven Registered Motor Vehicle ² (minutes)	6.9	2,300 (38 hours)	16.0	5,400 (90 hours)	133%
Travel Delay per Household (minutes)	9.3	3,100 (52 hours)	21.7	7,300 (122 hours)	134%
Person Measures:					
Person Miles of Travel	75,273,000	25,442,274,000	122,084,000	41,264,392,000	62%
Person Hours of Travel	1,581,000	534,378,000	3,011,000	1,017,718,000	90%
Person Hours of Delay	239,000	80,782,000	857,000	289,666,000	259%
Travel Delay per Resident (minutes)	5.0	1,700 (28 hours)	11.8	4,000 (67 hours)	138%
Other:					
Percent of Travel Time in Delayed Conditions	15%	n.a.	28%	n.a.	
Travel Time Variation (peak vs. off-peak)	1.20	n.a.	1.46	n.a.	
Lane Miles of Roads Congested for 3+ hours (percent of total lane miles)	1,217 18%	n.a.	3,508 45%	n.a.	188%
Traffic Crashes on Regional Roadways (2005)	133	45,000	n.a.	n.a.	
Economic Costs:					
Total Cost of Delay (\$27.50 per vehicle hour) ³	\$4,960,000	\$1,676,480,000	\$17,800,000	\$6,016,400,000	259%
Transit & Non-Motorized Measures:					
Total RTD Transit Boardings	322,100	97,180,000	791,200	238,711,000	146%
Rail Transit Boardings	63,300	19,098,000	332,900	100,438,000	426%
RTD Park-n-Ride Parking Space Utilization (out of 26,653 spaces)	64% (17,180)	n.a.	n.a.	n.a.	n.a.
Modeled Bicycle and Walking Trips	918,000	n.a.	1,560,600	n.a.	70%

Sources: DRCOG CMP Database, RTD January 2010 Facts & Figures, RTD Ridership Statistics Archive, 2035 MVRTP.

* The designated Regional Roadway System is depicted in Figure 1.

Technical Notes: 1 Annual Total Estimate is "Average Weekday" total * 338. 2 Assumed 1,546,000 driven registered vehicles in 2010 and 2,383,000 in 2035. 3 Cost incorporates \$24/hour per adult in car and \$71/hour per commercial vehicle, in current dollars.

Key Congested Locations

Figure 1 shows key congested locations in the Denver region, and highlights congested corridors in 2010 and anticipated in 2035. The congested corridors were identified based on the mobility grade for each segment. The mobility grade factors in variables such as duration and extent of congestion, as well as crash frequency, which affects travel time reliability.

Recent Congestion Relief Projects - Results

As the region’s population continues to grow, traffic congestion will likely increase, as shown in the earlier table. However, budget constraints and other factors will prevent the region from simply building its way out of congestion. The region must invest its funds wisely in projects at key bottleneck locations, such as those highlighted in Figure 1. Several smaller scale projects have been completed recently or are underway on freeways and arterials across the region. Three recently completed projects and associated benefits are highlighted below.

University Avenue and Arapahoe Road Intersection Improvement (Completed 2008)

Major capacity improvements were made at the University Avenue and Arapahoe Road intersection in Centennial in 2008. An additional left-turn lane was added to the northbound and southbound approaches and an additional through lane was added to each approach. These improvements resulted in the existing (“after”) configuration, which consists of three through lanes, dual left-turn lanes, and an exclusive right-turn lane on each approach.

The intersection was removed from the Key Congested Locations map (depicted in Figure 1), to reflect the improved operations. The table below shows the average peak hour intersection delay per vehicle before the project and after the intersection improvements in 2010. On average, each vehicle saves 30 seconds of travel time. If a driver traveled through the intersection five days a week for 50 weeks, it would equate to driving two hours less per year.



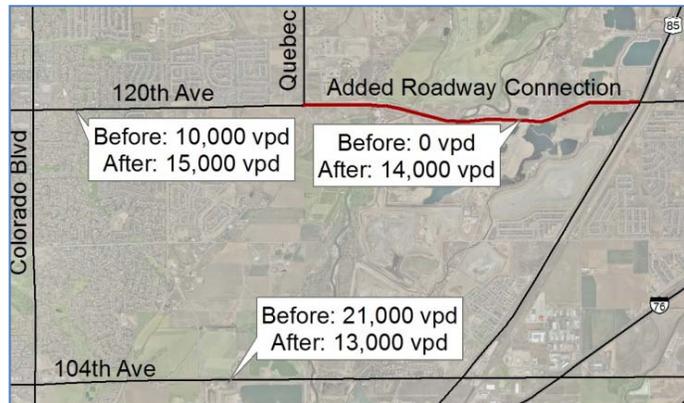
Project Impact on Delay – Afternoon Rush Hour

Vehicles Entering Intersection	~ 5,500 veh.
LOS and Avg. Delay – Before Project	E (70 sec/veh.)
LOS and Avg. Delay - After Project	D (40 sec/veh.)

(LOS – Level of Service “grade”)

120th Avenue Extension to US-85 (Completed 2006)

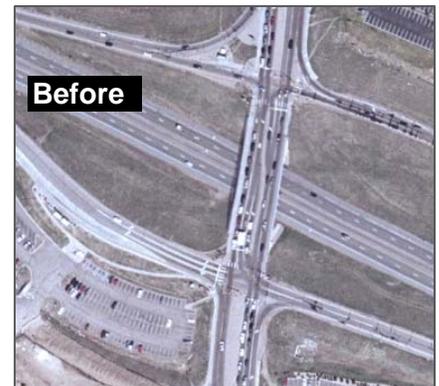
The 120th Avenue extension, completed in 2006, connects 120th Avenue from Quebec Street to US-85 in Adams County. The extension is a 2.8 mile new four-lane divided arterial, which crosses the South Platte River. The project relieved east-west congestion in the fast growing northeast metro area, diverting traffic from parallel narrower roadways. The figure below shows the changes in average daily traffic volume (vehicles per day) on 120th Avenue and 104th Avenue before and after the road construction.



McCaslin Boulevard and US-36 Interchange Loop Ramp (Completed 2006)

In 2006 a loop ramp was added to the US-36 and McCaslin Boulevard interchange. The loop ramp improved operations at the south-ramp intersection by removing the southbound left-turning movement from McCaslin Boulevard onto US-36 eastbound.

The table below shows the project's impact on delay at the south ramp intersection. However, improvements were not made at the north intersection, so the overall interchange area remains heavily congested.



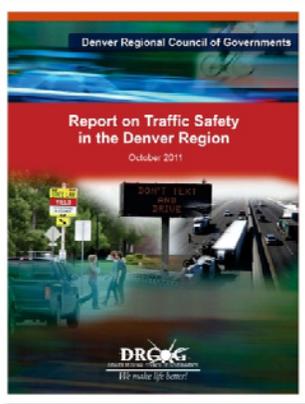
Project Impact on Delay – Afternoon Rush Hour

Vehicles Entering South-ramp Intersection	4,000 before 3,450 after
LOS (Avg. Delay) – Before Project	E (70 sec/veh)
LOS (Avg. Delay) – After Project	C (31 sec/veh)

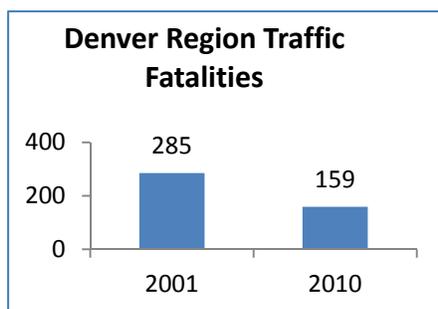
(LOS – Level of Service “grade”)

Traffic Safety News

Traffic crashes and incidents are closely related to congestion. Although injuries and fatalities are by far the most serious consequence of crashes, the ensuing traffic back-ups (and often secondary crashes) cause a significant amount of the region's congestion. DRCOG completed a regional traffic safety report in 2011. The report can be accessed on the Traffic Safety page of the DRCOG website (www.drcog.org/TrafficSafety).



The report highlights traffic crash trends in the Denver region, identifies high-crash locations, and discusses types of mitigation strategies to reduce the number of crashes. The report shows the number of annual traffic fatalities has decreased significantly over the last decade, as depicted in the chart below. The total number of crashes (reported) has gone down slightly to about 70,000 per year.



While traffic fatalities have been trending downward, further improvements can be made to reduce the total number of crashes and reduce the level of injury severity in crashes. According to CDOT, about 85 percent of all crashes occur due to improper driver behavior. Motorists and non-motorists must be alert at all times when on the road. To aid in reducing the traffic congestion impacts after crashes, two key sets of strategies must be utilized and enhanced:

- Incident management – e.g. coordinated response, detours, clearing of crash scene.
- Traveler information systems – e.g. websites, message signs, mobile device alerts.

See the DRCOG Congestion website for more information and resources:

www.drcog.org/index.cfm?page=CongestionMitigationProgram-CMP

Congestion Management Activities in 2011/2012

Several major congestion-relieving projects are underway or due to break ground in 2012; these projects are listed in the table below. Roadway and interchange projects can relieve some congestion, while FasTracks projects allow many commuters to avoid traffic congestion.

In addition to those listed below, several bicycle and pedestrian, travel demand management, intelligent transportation systems, and traffic signal program projects are implemented annually.



C-470/Santa Fe Interchange (source: AASHTO)

Major Roadway/Interchange Projects	Status	Estimated Completion
New interchange at Parker Rd. and Arapahoe Rd.	Completed	2011
Widening of I-225 from Mississippi Ave. to 2 nd Ave. and restriping of I-225 from 2 nd Ave. to Colfax Ave.	Completed	2011
New interchange at I-70 and Central Park Blvd.	Completed	2011
Pecos St. Grade Separation at Union Pacific Railroad	Completed	2011
C-470/Santa Fe Dr. southbound to eastbound flyover ramp	Completed	2012
Interchange reconstruction at I-25 and Alameda Ave.	Underway	2012
Interchange reconstruction at I-225 and Colfax Ave. / 17 th Pl. (Phases 3 and 4)	Underway	2013
Widening of Federal Blvd. from Alameda Ave. to 6 th Ave.	Underway	2013
Interchange Improvements at I-25 and Santa Fe Dr.	Underway	2014
Widening of I-225 from Mississippi Ave. to Parker Rd.	Underway	2014
Widening of US-36 from Federal Blvd. to w/of Interlocken Loop	Underway	2015

FasTracks Projects	Status	Estimated Completion
Denver Union Station intermodal renovations	Underway	2013
West Corridor light rail	Underway	2013
I-225 Corridor (Parker to Peoria/Smith) light rail	Underway	2015
East Corridor (to DIA) commuter rail	Underway	2016
Gold Line Corridor commuter rail	Underway	2016
Northwest Corridor Phase 1 (to Westminster station) commuter rail	Underway	2016



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